

From the Department of Clinical Science and Education,  
Södersjukhuset, Karolinska Institutet, Stockholm, Sweden

# The Use of a Prehospital Decision System in the Emergency Medical Service –

**The acute emergency chain for geriatric patients**

Veronica Vicente



**Karolinska  
Institutet**

Stockholm 2013

All previously published studies were reproduced with permission from the publisher.  
Published by Karolinska Institutet. Printed by [name of printer]

© Veroncia Vicente, 2013  
ISBN 978-91-7549-021-2

*“Without the body there is no life”*

## ABSTRACT

**Background:** The objective of this organisational study was to create and evaluate, for use by the prehospital emergency nurse (PEN), a Prehospital Decision System (PDS) and a decision support tool (DST), to safely steer geriatric patients to optimal healthcare in Stockholm, Sweden.

**Aim:** The overall aim was to optimise the acute emergency chain to ensure that elderly persons ended up at the optimal healthcare based on their medical needs.

**Methods:** Study *I* was built on mixt methods approach with descriptive analysis (step one-three) and an interim analyse of a clinical trial (step four) to create a PDS and DST. In study *II* qualitative content analysis with the perspective of caring science were used on data from the emergency medical services' (EMS) medical records to identify and illuminate the assessment category "general affected health condition". In study *III*, a randomised control trial was used to evaluate the safety and feasibility of transport the geriatric patients to an optimal healthcare. Study *IV*, was a qualitative interview study with elderly patients. The study was carried with the perspective of caring science and a phenomenological approach was applied to describe patients' lived experiences of participating in the choice of healthcare when being offered an alternative care pathway by the EMS.

**Findings:** In study *I*, a PDS and DST were created. The developing process identified organisational and logistical factors that were prerequisites to safely steering elderly patients directly from their homes to an optimal healthcare. The most important factors that were found were the receiving units' capacity, personnel competence, organisational resource ability, and the patient categories (medical conditions) of which eleven conditions were identified. In study *II*, a total of 1006 EMS medical records were analysed and after exclusion there remained 88 records. The findings showed that "general affected health condition" in elderly people in the EMS setting could be understood as referring to a patient with frailty. These patients had a growing weakness that had become unmanaged and prevented them having a controlled and functioning life, which forced them to seek help. In study *III*, of a total of 806 randomised geriatric patients, 666 remained after exclusion, 449 (67.4%) were assigned to the intervention group and 217 (32.6%) to the control group. The primary outcome result showed that 20% (CI. 95%, 16.6-24.0) of the intervention group could be steered to a geriatric ward (GW) or to a community acute centre (CCAC) at a community based-hospital (CH). The secondary outcome showed that 6.7% (CI. 95%, 3.1-13.8) of the intervention group required a secondary transport within 24 hours from the CH to the tertiary hospital ED. The evaluation of the PDS and DST showed that the Swedish PEN had good compliance with the system. Study *IV* show that, elderly patients choose a healthcare alternative involving a caring encounter in which they are treated like unique human beings. Five meaning constituents emerged in the descriptions: endurable waiting, speedy transference, a concerned encounter, trust in competence and choice based on suffering from care.

**Conclusion:** The findings from the four studies demonstrate that with the help of the created PDS and DST – developed for eleven medical conditions – the Swedish PEN could safely decide upon which optimal healthcare elderly patient should be steered and treated at. The PDS offer a reduced risk for being exposed for suffering from care for elderly patients.

**Keyword;** Emergency medical service, Ambulance, Prehospital emergency nurse, Triage, Healthcare, Geriatric patients, Decision support system

## LIST OF PUBLICATION

The thesis is based on the following four studies, which will be referred to by their Roman numerals (I-IV).

- I. **Vicente V**, Sjöstrand F, Wireklint Sundström B, Svensson L, Castrén M. 2012. Developing a decision support system for geriatric patients in prehospital care. *European Journal of Emergency Medicine*. July. In press.
- II. **Vicente V**, Ekebergh M, Castrén M, Sjöstrand F, Svensson L, Wireklint Sundström B. 2012. Differentiating frailty in older people using the Swedish ambulance service: A retrospective audit. *International Emergency Nursing*, 20, 228-235.
- III. **Vicente V**, Svensson L, Wireklint Sundström B, Sjöstrand F, Castrén M. The Use of a Prehospital Decision System in the Emergency Medical Services – Randomised controlled trial of geriatric patients in Sweden. *Journal of the American Geriatrics Society*. 28 September 2012. Submitted.
- IV. **Vicente V**, Castrén M, Sjöstrand F, Wireklint Sundström B. Elderly Patients' Participation in Emergency Medical Services When Offered an Alternative Care Pathway. *International Journal of Qualitative Studies on Health and Well-being*. 1 November 2012. Submitted.

# CONTENTS

1	Introduction.....	7
2	Background.....	8
2.1	Emergency medical services .....	8
2.2	Older person needing care .....	13
2.3	Patient triage and prioritising for treatment .....	16
2.4	Problem area .....	20
2.5	Conceptual framework .....	20
3	Aim of the study .....	22
3.1	Overview of the studies .....	22
4	Material and Methods.....	24
4.1	Setting and data collection.....	24
4.2	Ethical considerations .....	35
5	Main Findings.....	36
5.1	Findings of creating a PDS with a DST .....	36
5.2	The findings of evaluating the PDS and DST.....	39
6	Discussion.....	45
6.1	Findings.....	45
6.2	Methodological considerations and limitations .....	56
6.3	Further reseach.....	59
7	Conclusions.....	60
8	Svensk sammanfattning (Summery in Swedish).....	61
9	Acknowledgements .....	65
10	References.....	67
11	Appendix.....	75
11.1	Eleven Prehospital Decision Support Tools.....	75

# LIST OF BOXES, FIGURES AND TABLES

## BOX

Box 1: Emergency Medical Service personnel education .....	9
Box 2: Advance notice to the Emergency Department .....	12
Box 3: Differences in age terms.....	13
Box 4: Definition of triage .....	16
Box 5: Healthcare providers .....	17

## FIGURE

Figure 1: Patients way in the acute emergency chain .....	10
Figure 2: Focus and attributes in the research process .....	21
Figure 3: Overview of the overall research framework.....	23
Figure 4: Focus and attributes in study I .....	25
Figure 5: The four consecutive steps in developing process I .....	26
Figure 6: Focus and attributes in study II .....	29
Figure 7: Focus and attributes in study III .....	31
Figure 8: Focus and attributes in study IV .....	32
Figure 9: Flowchart of Randomised Control Trial n=806 .....	40
Figure 10: Compliance with the decisions support system .....	43
Figure 11: DST- Urinary disorder with/without catheter .....	75
Figure 12: DST- Fever .....	75
Figure 13: DST- Diabetes .....	76
Figure 14: DST- Dizziness .....	76
Figure 15: DST- Pneumonia .....	77
Figure 16: DST- Chronic Obstructive Pulmonary Disease .....	77
Figure 17: DST- Frailty .....	78
Figure 18: DST- Population criteria: Frailty.....	78
Figure 19: DST- Back pain/Contusion .....	79
Figure 20: DST- Falls on the same level (low-energy trauma) And Hip trauma (without suspicion of femur fracture) .....	79
Figure 21: DST- Hypotension .....	80

## TABLE

Table 1: Socio-demographic and patient characteristics of the participants (n=11) .....	33
Table 2: Primary outcomes, patients steered to the Geriatric clinic or the Community Acute Care Centre by the Prehospital nurse .....	40
Table 3: Secondary outcomes, patient's secondary transport to the Emergency Department from the Geriatric clinic or the Community Acute Care Centre .....	41
Table 4: Patient required a secondary transport within 24 hours from the Community-based Hospital to the Emergency Department at the tertiary hospital n = 6 .....	42
Table 5: Time outcomes - Ambulance assignments time and Patient Length of Stay in Emergency Department .....	44

## LIST OF ABBREVIATIONS AND GLOSSARY TERMS

BScN	Bachelor of Science in nursing
CCAC	Community Acute Care Centre
CC	County Council
CH	Community-based Hospital
CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Disease
DST	Decision Support Tool
ED	Emergency Department
EMCC	Emergency Medical Communication Centre
EMD	Emergency Medical Dispatchers
EMS	Emergency Medical Services
ePCR	electronic Patient Care Record
GCS	Glasgow Coma Scale
GW	Geriatric Ward
HCS	Home Care Service
ICD	International Classification of Disease
ICD-10	International Classification of Disease, 10th Revision
LoS	Length of Stay
LSf	Landstings Styrelsens förvaltning (County Council)
NBHW	The National Board of Health and Welfare (Socialstyrelsen)
NACA	National Advisory Committee for Aeronautics - seriousness degree
PDS	Prehospital Decision System
PEN	Prehospital Emergency Nurse
RCT	Randomised Control Trial
RLR	Reflective lifeworld research
SCC	Stockholm County Council
SLSO	Stockholm county health organisation (part of the SCC)



# 1 INTRODUCTION

The Emergency Medical Services (EMS) in Stockholm have about 165 000 annual assignments and approximately 52% of the patients are 65 years or older (AISAB, 2009).

The EMS receives the assignments from the Emergency Medical Dispatchers (EMD) at the Emergency Medical Communication Centre (EMCC). The acuteness of the patient's condition depends on the complaint that is the main symptoms the patient is suffering from. The EMS assignment can be from the highest priority level (blue lights and siren) to transportation. Nearly all EMS patients are transported to an acute hospital Emergency Department (ED) and this is regardless of the patient's medical condition or degree of severity of their condition (SOSFS, 2009:10). The prehospital emergency care and treatment begins where the patient is found, for example at the scene of an accident or at the home. The prehospital emergency nurse (PEN) is specialist educated ambulance nurse and has a broad base of knowledge and skills to integrate a caring science approach with the medical knowledge needed in practice (Elmqvist et al., 2008, Suserud, 2005, Wireklint Sundström and Dahlberg, 2011, Wireklint Sundström and Dahlberg, 2012).

Older persons are more frequently treated and transported by the EMS compared to younger. Approximately 20% of all ED visitors are elderly. These patients tend to have longer ED stays than the younger patients (Samaras et al., 2010). Studies show that this is an especially vulnerable group of patients, not just because they more frequently suffer from multiple illnesses with atypical signs and symptoms, but also because they often do not receive the appropriate treatment they need. ED is not always the optimal place for these patients. The ED personnel, such as emergency physicians and nurses, are not specifically trained in geriatric approaches (Ellis et al., 2011, Salvi et al., 2007).

The care of the elderly patients needs to be improved. Not just by increasing the knowledge concerning geriatric care in the EDs, but also by finding new organisational system that will make it possible to provide the best care for these older patients throughout the entire acute emergency chain. This is not unproblematic because of during the last decade, the healthcare system is becoming more and more complex. Healthcare providers receive and treat patients according to their political mandate. Some hospitals have a specific mandate such as trauma hospitals (Robertson-Steel, 2006). However, nearly all EMS transports ends unselected at the nearest ED.

The EMS needs to become an essential part of the acute emergency chain of care for older patients. To improve healthcare management, one step is to triage and steer patients directly from their homes to specialist healthcare, even if it means by-passing the ED. Rapid access to healthcare offering high specific knowledge about geriatric patients' medical conditions, needs and treatment strategies is required. This can be done with the help of the EMS and Swedish PEN.

## **2 BACKGROUND**

### **2.1 EMERGENCY MEDICAL SERVICES**

#### **2.1.1 Definitions and concept**

The EMS are defined as “*Healthcare provided by healthcare professionals within or adjacent to the ambulance*” (SOSFS, 2009:10) by The National Board of Health and Welfare (NBHW). Henceforth in this thesis the acronym EMS will refer to the ambulance service.

Prehospital emergency care is related to procedures administered or care provided prior to a patient’s arrival at a hospital (Encyclopedia, 2012). The EMS is the extended arm of acute emergency care and is therefore part of the total healthcare system.

Prehospital emergency care in Sweden has been given greater integration, both functionally and organisationally, as a part of the acute emergency care chain. Both medical and caring assessment and treatment methods have been introduced in the EMS. Swedish prehospital emergency care is undergoing a process of rapid development in all aspects. The level of competence of EMS personnel has increased and this has created the possibility that even at the scene quickly provide care in emergency situations (SOSFS, 2009:10). Especially focus is on early assessments and support patients to right healthcare (Swedish ambulance nurse association, 2012).

#### **2.1.2 EMS organisation**

##### **2.1.2.1 History**

In Stockholm at the end of the 18<sup>th</sup> century, a couple of horse-drawn ambulances were reserved for patients with highly contagious and deadly diseases. The first automobile ambulance was purchased in 1910. The early ambulances had warning signals from the beginning. First, it was bells, later sirens, and a blue light was not introduced until the 1960s. Anyone with a license to transfer passengers could purchase an ambulance and offer their services with no medical training. The ambulances were considered clean transportation resources (Suserud, 1998).

Since the 1960s much has happened. The following events describe some significant changes that have had major impacts on the development of prehospital emergency care:

- 1970 – Some county councils (CC) began to take over the EMS in their own regime.
- 1980 – A new position (type of employment) was established in the counties, medical director. This position entailed supervision of the medical equipment in the EMS, but not of the emergency/medical care of the patients. Later the same year the NBHW required that all EMS personnel must have a minimum competence level equivalent to an assistant nurse.
- 1987 – Semi-automated defibrillators were introduced/launched in Swedish ambulances.

- 1990 – The CCs decided that the EMS could be subject to purchase, that private companies got the opportunity to perform EMS.
- 2005 – The NBHW stated that only registered nurses were allowed to administer medication. In practice this meant that at least one registered nurse had to be on board on every ambulance to make medical advanced care possible.
- 2008 – The Stockholm County Council (SCC) decided that each ambulance in Stockholm must have a specialist educated nurse on board (Gårdelöf, 2011, Suserud, 2001, Suserud, 2005).

Swedish prehospital emergency care is closely associated with the development of EMS. The characteristics of current EMS organisation are that the assignments have changed, both in terms of increased competence requirements and more advanced technical equipments. From earlier being associated with a transport assignment to today requiring that EMS personnel independently provide prehospital emergency care for quality improvement in praxis (Suserud, 2005).

There are three personnel categories in the EMS in Sweden; Emergency Medical Technicians (EMT), Registered Nurses (RN) and Prehospital Emergency Nurses (PEN) (*Box 1*). Responsible for the medical management is hold of physicians often an anesthesiologist (Suserud, 1998, Wireklint Sundström and Ekebergh, 2012).

#### **EMS personnel**

**The EMT** has 40 weeks at high school of supplementary education in prehospital emergency care and has to be profession as an Assistant Nurse (Bremer et al., 2012, Suserud, 1998).

**The RN** has a Bachelor of Science in Nursing which requirements courses of 180 credits including at least 90 credits in-depth studies in the field of Caring Science. A degree project in Caring Science with focus on Nursing worth at least 15 credits is obligatory (Karolinska Institutet, 2012).

**The PEN** has a specialist ambulance nurse education requirements course of 60 credits including at least 30 credits with in-depth studies in Caring Science. The criterion for entering this programme is a Bachelor of Science in Caring Science/Nursing. Since 2007, courses have been available to acquire deeper knowledge in Prehospital Emergency Care, leading to a one-year Master's Degree and a postgraduate Diploma in Specialist Nursing, Prehospital Emergency Care Programme (Wireklint Sundström and Ekebergh, 2012).

**Box 1: Emergency Medical Service personnel education**

#### **2.1.2.2 The EMS organisation today**

In Sweden with 9 million inhabitants (Central Bureau of Statistics, 2012) there are approximately 700 operating ambulances (Lindström, 2012). In the SCC there are 2 million inhabitants and 61 ambulances. Two of these are emergency support ambulances, 59 can carry and transport patients during daytime, 39 during weekday nights and 42 weekend nights. These 61 ambulances are operated by three companies,

two private and one owned by the SCC (Procurement of EMS in Stockholm, 2011). In 2011, the EMS in SCC made 165 047 assignments and 52% of the patients were 65 years or older.

### 2.1.3 Patient way through the acute emergency care chain

No EMS assignment is the same, and every patient is unique. Common for all assignments is that they precede of that a person experience symptom of illness or that an incident occurs (Elmqvist et al., 2008). The following section gives an example of how an assignment can begin (*Figure 1*).

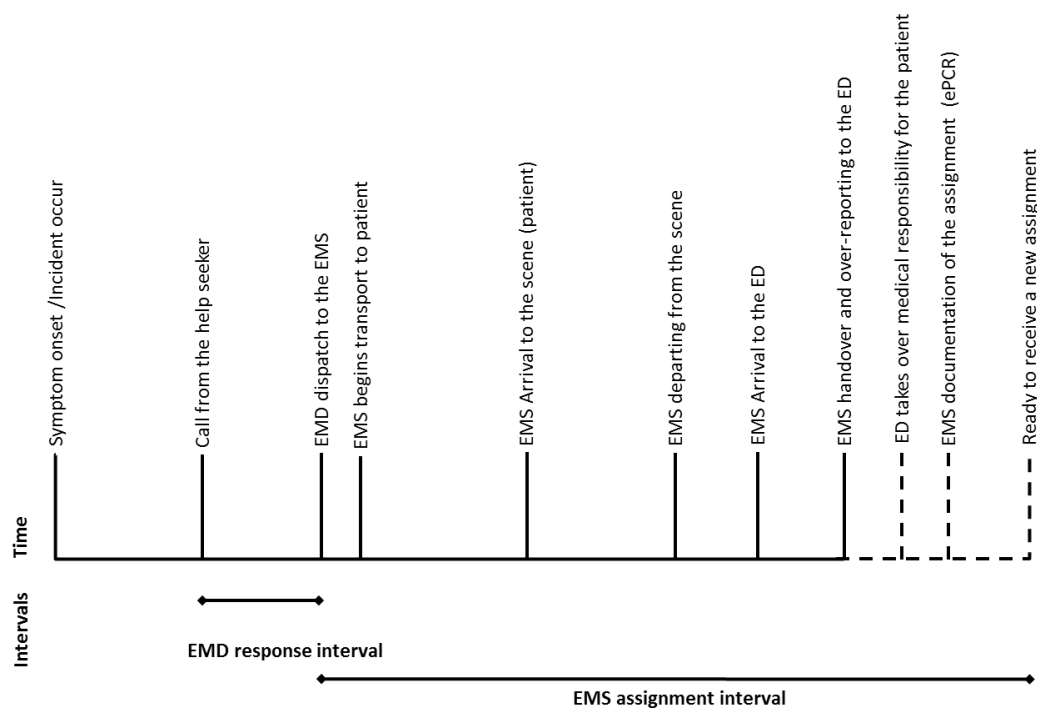


Figure 1: Patients way in the acute emergency chain

When the emergency medical dispatchers (EMD) at the emergency medical communication centre (EMCC) answer the call from the help seeker they make the first assessment of the care needs. If there is a need for an ambulance the EMD dispatches the EMS through an operative communication system. Through this system the EMS personnel receive the assignment number, date, time, and patient's address, brief information on the patient's state of health (EMD assessment) and priority level of the assignment (Lindström, 2012). The scene might be the patient's home but may also be a public place such as a public square, the subway or a traffic situation (Wireklint Sundström, 2005). The EMS immediately acknowledges the assignment and start the assessment by reflecting on the EMD's information. The pre-information given from an EMD provides the EMS personnel with basic expectations to what they will have to take care of. Holmberg and Fagerberg (2010) state that the first information is general and focused on how to reach the patient. Wireklint Sundström and Dahlberg (2012) have shown that the EMS personnel maintain certainty and control, and at the same time require to be prepared for an open encounter with the waiting patient. This approach of openness is of specially importance to avoid being governed by

predetermined statements. The information provided by the EMD might differ from the real situation. Therefore it is the patient who provides reliable information about her/his situation.

The primary starting-point in the encounter with the patient is to have a medical focus (Holmberg and Fagerberg, 2010). The EMS personnel initially make a medical assessment to clarify the patient's needs. Two main assessments strategies are carried out on arrival (Wireklint Sundström and Dahlberg, 2011). First an analytical decision-making process, diagnostic reasoning, second an interpretation of the patient's needs based on her/his health condition. This means that the EMS personnel have a care assessment approach open to the whole situation including patient's total lifeworld.

All EMS personnel follow national medical guidelines (EMS medical guidelines, 2012) that contain protocols for procedures, and treatments for specific symptoms and groups of diagnoses. The symptoms and diagnoses are categorized into a specific list of predetermined conditions. This list of conditions (that can be selected in the EMS electronic Patient Care Record (ePCR) system) does not follow the ICD-10 code system. The use of the protocols and list of predetermined conditions by the EMS personnel is mandatory.

Depending on the patient's medical condition the EMS personnel start the treatment. They can conduct the assessment and give treatment both on the scene and in the ambulance, depending on the acuteness of the patient's condition. The care can include different kinds of measures such as holding the hand, giving drugs, bandaging wounds, or advanced life support (Elmqvist et al., 2008). The EMS personnel inform the patient to prepare for the next step (Holmberg and Fagerberg, 2010). It could be to encourage a conscious patient by informing about what is happening throughout the whole caring process. This gives the patient awareness of what has happened and also makes it possible for him/her to express all sensations and feelings and give the patient more control of the situation.

During the EMS transport to the care facility the EMS personnel continue to make assessments of the patient and also, if required, give medical treatment. The transport time to the care facility varies depending on the assignment's acuteness and priority level. If the patient is in an acute life-threatening condition the assignment will be given the highest priority (Prio 1), and the patient will be quickly transported with blue lights and sirens (*described on page 18*). At this priority level the EMS personnel will give an advance notice (*Box 2*) to the ED (EMS medical guidelines, 2012). The majority of acute ambulance transports goes to tertiary care ED, even those who are not in need of emergency room facilities (Altmayer et al., 2005).

**Advance notice to the ED**

An advance notice regarding a critically ill/injured patient is given to the receiving hospital through the EMCC. The warning has to be given five minutes before arrival at the ED.

The report must contain information on;

1. Age, sex/event/injury mechanism
2. Symptoms/injuries
3. Vital signs
4. Estimated time of arrival

**Box 2: Advance notice to the Emergency Department**

On arrival at the ED the patient is unloaded from the ambulance and placed on a stretcher in the emergency room or in any other room, even in the waiting room. The ED nurses take over the medical and care responsibility after report from the EMS personnel. The handover is described as brief, lasting some minutes, but enables the ED nurse to form an impression of the patient's care needs (Suserud, 2005). After the handover process the EMS personnel make an electronic Patient Care Record (ePCR) of the whole assignment. Finally, and after interior cleaning and disinfecting the ambulance vehicle the personnel inform the EMCC by the operative communication system that they are ready to receive a new assignment.

## 2.2 OLDER PERSON NEEDING CARE

### 2.2.1 Definition of older person

The World Health Organisation (WHO) defines an older person as someone over the chronological age of 65 years. However, there is no global consensus on the concept “older” person; the United Nations (UN) does not define a chronological age but has agreed upon an age of  $\geq 60$  years. Age classification varies between countries and over time. In many instances it reflects the social class differences or functional ability related to the population workforce. It often also reflects current political and economic standards (WHO, 2012).

In Sweden, the chronological age of 65 is the retirement age, so this is when an individual is considered an older person (National guidelines for cardiac care NBHW, 2008b). There is an on-going discussion that it should be the biological age that decides when a person is classified as elderly rather than the person’s chronological age. The discussion is still on-going. The concept of aging can be described from four different perspectives: chronological, biological, psychological and social age (*Box 3*).

#### Differences in age concepts

A person’s **chronological age** is the time that has elapsed since the person was born, for example 65 years of age. The **biological age** is a person's biological status at a certain age, the biological age is influenced by individual performance and functional capacity. The **psychological age** is a person's capacity to adapt to the daily life demands, their learning ability and memory capacity, and the **social age** is determined by how well a person functions in work and with family and in other social roles (Dehlin and Rundgren, 2007).

**Box 3: Differences in age terms**

### 2.2.2 Definition of geriatric patient

A commonly used definition of a geriatric patient;

*"An elderly patient with organ failure from two or more systems simultaneously, and where there is a need for a broad multi-dimensional approach to best diagnose and treat the patient" (Dehlin and Rundgren, 2007, p. 55).*

The typical geriatric patient may have one or more underlying chronic diseases in the anamneses simultaneously with an acute disease. Untreated diseases can quickly lead to symptoms such as confusion, anorexia, weight loss, dehydration, fainting, immobilization, pain, incontinence, sleep disturbances and frailty. To identify the underlying diseases requires a careful and comprehensive evaluation of problem-oriented approach with both functional and clinical assessments (Dehlin and Rundgren, 2007).

### **2.2.3 The elderly as care consumers**

The elderly population is increasing in Sweden. Over the past 50 years the number of people aged 65 or older has more than doubled, from 700,000 to nearly 1.7 million. Life expectancy has increased since year 1984: 79.9<sup>♀</sup>/73<sup>♂</sup> to 2010: 83.3<sup>♀</sup>/79.4<sup>♂</sup>, for women by 3.4 years and for men by 5.6 years. Men have a greater increase in average life expectancy than women, though women will live longer than men (Status report; Health and social care for older people, NBHW, 2008a). The increase is mainly due to the fact that mortality has declined for all ages, particularly the mortality from cardiovascular diseases. In Stockholm, of a total two million inhabitants approximately 300,000 are older persons. By the year 2060, the number of persons above the age of 65 will have increased to 56% of the total population (Central Bureau of Statistics, 2012).

A large proportion of hospital care consists of the care of older persons, since, as mentioned earlier, health problems increase with age (Aminzadeh and Dalziel, 2002). In 2006, 70% of the elderly population had been treated at least on one occasion in in-patient care. With increased age and life expectancy and older patients we will have an increased need for healthcare resources in the future. This will put a great demand on healthcare professionals both in-hospital and prehospital. The challenges are to satisfy the patients' need for safety and to provide the best possible care (Samaras et al., 2010).

### **2.2.4 Reasons why the elderly seek care**

Most of the older population are relatively healthy, and have a good ability to function even in old age. The line between normal aging and having a disease is not clear and it can be difficult to distinguish between "normal" aging, which affects the ability to move, the sight and the hearing, and more pathological conditions (Dehlin and Rundgren, 2007).

The most common health problems in older people are of a medical nature, as opposed to surgical and psychiatric conditions. Among elderly patients visiting the ED the most common injuries and illnesses are associated with falls, osteoarthritis and cardiovascular diseases such as dysrhythmias, congestive heart failure, syncope, pneumonia, chronic obstructive pulmonary disease, dehydration, urinary infections, abdominal disorders and frailty (Aminzadeh and Dalziel, 2002, Public Health Report NBHW, 2005).

#### ***2.2.4.1 From a patient perspective***

One of the main reasons elderly persons call EMCC "112" is a sensation that something is wrong with their body, the body does not function normally. The disease itself creates an experience of limited life. This can induce and increase existential thoughts, such as that the death is coming closer. These thoughts and the disease, will force the person to seek help, leading to dependence on healthcare. In their request for freedom, autonomy and independence, it can be difficult for them to affirm their need for help from others (Strandberg et al., 2002). Being dependent of others restricts freedom and creates vulnerability. Calling the EMS and acknowledging one's own need to receive help, will occur when a person no longer has control over her/his own situation (Ahl and Nyström, 2012).



Older people who experience an adversely affected health condition often find that they cannot manage their daily living activities. For the older person, this can result in reduced body strength, reduced intake of water and food, weight loss, falls, confusion, problems taking care of their own hygiene, infections and so on. Reasons for reduced daily activity are often associated with lost strength, illness or are age-related (Public Health Report NBHW, 2005 and Status report; Health and social care for older people, NBHW, 2008a). The consequences of the failure in carrying out daily activities, regardless of the reasons, can be devastating for the elderly. Depending on the older patient's previous experiences and knowledge, the expectations and fears of current healthcare differ for each individual. The common picture they all have when they seek healthcare is that they are going to receive help.

## 2.3 PATIENT TRIAGE AND PRIORITISING FOR TREATMENT

### 2.3.1 Patient triage in ED

Patient triage in EDs (*Box 4*) is to determine the time and sequence in which the patient should be seen (Göransson et al., 2005, Olofsson et al., 2009, Farrohknia et al., 2011).

#### **Definition of triage**

The term “*triage*” is devised from the French verb “*trier*” (to sort). In the context of healthcare practice triage means; The evaluation and classification of casualties for purposes of treatment and evacuation. It consists of the immediate sorting of patients according to type and seriousness of injury and likelihood of survival, and the establishment of priority for treatment and evacuation to assure medical care of the greatest benefit to the largest number (Oxford reference, 2012).

#### **Box 4: Definition of triage**

To triage is to gather information on the patient’s current medical condition and what is causing it. Tasks that are performed during the triage assessment include physical assessment and recording vital signs. Thereafter, based on the findings, the patient is assigned an acuity rating which indicates the length of time she/he can wait before being seen by a physician (Göransson et al., 2005). Various triage scales have been developed and are used in the ED, such as the Canadian Triage and Acuity Scale (CTAS), the Manchester Triage Scale (MTS), Adaptive process (ADAPT) and Rapid Emergency Triage and Treatment System (RETTs) (Farrohknia et al., 2011, Göransson et al., 2005, Olofsson et al., 2009, Robertson-Steel, 2006). These triage scales include to quickly identify the patients urgency of medical care and to optimise the waiting time in the ED. Triage scales improve the performance of the healthcare providers, through decreasing time to definitive care. These scales are modified and developed to suit the ED organisation and are not developed to be used, in their present form, in the EMS setting.

### 2.3.2 Triage and prioritising of elderly

#### **2.3.2.1 Elderly’s encounter with healthcare**

Elderly patients receive different healthcare, depending on their needs. The responsibility for the older persons’ healthcare is shared between the communities and CC. From the community they can receive care, living in sheltered housing or in their own homes, by the Home Care Service (HCS). From the CC they can receive different levels of healthcare such as primary care, secondary care or tertiary care. The definitions of the different healthcare providers are explained in *box 5* (Status report; Health and social care for older people, NBHW, 2008a).

**Healthcare providers**

**Primary care:** District healthcare centre with facilities such as a laboratory, radiology department and medical staff. This level includes community healthcare, health centres, rehabilitating.

**Secondary care:** Local hospital with facilities such as a laboratory, radiology department and medical staff. This level includes specialist medical care as a geriatric clinic.

**Tertiary care:** University hospital and acute care hospitals. This level also includes the ED.

**Box 5: Healthcare providers****2.3.2.2 Elderly encounter with the ED**

The ED is a key access point to the healthcare system (Altmayer et al., 2005) because it provides care to all in need, especially those who are often unable to gain access to basic healthcare services elsewhere (Byszewski et al., 2007). ED visits increase significantly every year. In Sweden the visits at the ED increased between 2004 and 2006 by 106 000, from 1.71 million to 1.82 million (6.2%) (Säfwenbergh, 2008). Elderly patients represent an increasing group of ED patients (Salvi et al., 2007). International studies (George et al., 2006, Rutschmann et al., 2005, Schumacher, 2005) show that approximately 20% of ED patients are aged 65 years or older.

Studies have shown that the elderly patient group does not always receive the most appropriate treatment based on their needs in the ED (National operations supervision on elderly care at the ED NBHW, 2006). This could be based on the fact that the ED personnel, such as emergency physicians and nurses, have not been specifically trained in geriatric problem-oriented approaches with both functional and clinical assessments (Ellis et al., 2011, Salvi et al., 2007).

Under the NBHW supervision an evaluation (2006) was carried out to find out how elderly patients are taken care of in the ED. The report identified that high age itself is a specific risk factor from a patient safety perspective, regardless of diagnosis, and that the knowledge of management and ED personnel of this reality was flawed and there was little interest in improving it. The report concluded that the regular systematic monitoring of prioritisation and waiting times for elderly patients at EDs in the country was lacking. There is a need to clarify which department is responsible for the patient during transport and the waiting time for an X-ray or between clinics. The patient's current prescribed medications and those given in the emergency room were poorly documented. Documentation about the patient's illness, care and treatment was lacking in many medical records. And, finally, many patients could not be monitored adequately without intruding on their confidentiality and privacy (National operations supervision on elderly care at the ED NBHW, 2006).

A Cochrane publication by Ellis et al. (2011) showed that older patients benefit from having a Comprehensive Geriatric Assessment (CGA) at the acute hospital (Ellis et al., 2011). Once this is done it may generate a 25% increased chance of survival and to live at home after 6 months. Furthermore, CGA gives a 24% decreased risk of death or having a greater care need, 12 months after the registered visit to the acute hospital and after having been evaluated according to CGA standards. CGA is a diagnostic and care planning process that determines the medical, psychological and functional capabilities

of an older person. It requires a multi-disciplinary team staffed with at least a geriatrician, geriatric nurse and a physiotherapist but quite often occupational therapists, dieticians and pharmacologists are also included to really get a multidimensional view on the patient's different challenges. It is not only the acute problem that is being discussed; an important task is also to develop a co-ordinated and integrated plan for future treatment and long-term follow up. Ideally, the CGA team should work systematically and in a standardized way to not miss any vital areas and to ascertain the important results from such assessments. One method to use is the Acute Care instrument created by interRAI (Jonsson et al., 2006, Noro et al., 2011). For the ED staff, it is however important to not spend extra resources on CGA to patients not in need of a CGA. Hence, it would be of high value if a screener exist which may detect those frail elderly that benefit from a CGA from those who can do perfectly without these extra resources. Examples of such "geriatric triage instrument" that has been scientifically tested and based on clinical data is Triage Risk Screening Tool (TRST) (Meldon et al., 2003), Identification of Seniors at Risk (ISAR) (McCusker et al., 1999, McCusker et al., 2000) and Runciman and Rowland tests (Rowland et al., 1990, Runciman et al., 1996). Further, an instrument based on almost only on administrative data is for example Silver code (Di Bari et al., 2010). To reduce suffering and optimize resources, it is of great value to use these above screening methods to detect which patients are most likely to return to the ED shortly.

### 2.3.3 EMS triage and prioritising

Regarding EMS treatment guidelines in Stockholm (EMS medical guidelines, 2012), the EMS triage models include scoring the patients using the National Advisory Committee for Aeronautics (NACA) score (*see below*) and a priority level (*see below*) (SOSFS, 2009:10). The guidelines also have a triage model for trauma patient and the steering process for these patients (EMS medical guidelines, 2012).

The EMS personnel use the NACA score to grade the severity of the medical condition of the patient that is regarding the severity of the patient's illness and injury (Baker et al., 1974, Aminzadeh et al., 2004, Lockett et al., 2002, EMS medical guidelines, 2012).

The scoring is as follows;

- Score 0- No injury or disease
- Score 1- Mild injury or illness not requiring medical treatment
- Score 2- Minor injury or illness requiring medical treatment but no need for hospitalisation
- Score 3- Injury or illness that requires hospitalisation, but not life-threatening
- Score 4- Injury or illness that is potentially fatal
- Score 5- Life-threatening injury or illness where immediate treatment is needed
- Score 6- Serious injury or illness manifesting failure of vital functions
- Score 7- Died at the scene

The EMS personnel are also required to grade the level of priority for each patient according to the score of priority. The priority level decides how fast the EMS drives to the care facility as following (SOSFS, 2009:10);

- Prio 1- Acute life-threatening symptoms or severe accident. Assignment with the highest priority, blue lights and sirens.

- Prio 2- Acute but not life-threatening symptoms. Assignment of high priority, blue lights and sirens if needed.
- Prio 3- Other ambulance assignment. Tasks where supervision and care may be needed by medically trained personnel and where a reasonable waiting period is not deemed likely to affect the patient's condition.
- Prio 4- Clean transportation resource. Tasks not requiring supervision or care by trained medical personnel during transport (SOSFS, 2009:10).

To triage and steer patient to optimal healthcare demands inter alia protocols that aims to increase the safety and precision that the right patient ends up in the right destination. To triage trauma patients in CC the EMS personnel follow a flowchart protocol, which covers vital signs and extent of body damage (EMS medical guidelines, 2012).

Unfortunately there is little research regarding triage scales developed for the EMS organisation. It has mostly been devoted to major disaster situations where the number of injured exceeds the available resources in terms of equipment and skilled professionals (Baker, 2007, Bostick et al., 2008). However, the reality of the situation in everyday EMS work is not like that; on the contrary, usually the EMS assignment is one patient case at a time.

Triage scales in the EMS setting make it possible to directly triage and steer patients to optimal healthcare. Research interest has started to increase, especially regarding stroke and cardiac infarct patients (Herlitz et al., 2010). Similarly interest is also focused on patients with suspected hip fracture. Larsson and Holgers (2011) examine whether instituting prehospital, preoperative treatment for patients with suspected hip fracture could lead to reduced waiting times, less postoperative pain, fewer complications and shorter length of care. They found out that a potential improvement in care for elderly patients over 65 years of age by beginning treatment on scene by the EMS. They saw shorter waiting times in ED, fewer complications, and shorter length of care. By letting the EMS steer patients, even if it means by-passing ED first, directly from their homes to specialist care can not only decrease treatments delays but also decrease mortality (Berglin Blohm et al., 1998). Steering processes allows patients to immediately receive optimal healthcare based on their medical needs and to improve the quality of care.

## 2.4 PROBLEM AREA

There have been few examples of how to best steer the geriatric patients by the EMS. There is also little guidance on processes to effectively treat these patients in practice. The present standard treatment is that the EMS takes all geriatric patients to the acute care ED, without taking into consideration the geriatric patients' special needs. It is problematical that geriatric patients are not always taken care of optimally at the ED. To optimise patient flow through the acute emergency chain of healthcare and also to better take advantage of the medical and caring competence in the EMS a new approach to steer older patients is needed.

## 2.5 CONCEPTUAL FRAMEWORK

The objective of this organisation study was to create and evaluate – for use by the PEN – a PDS and a DST, to safely steer geriatric patients to optimal healthcare in Stockholm, Sweden.

The challenge of this organisational study is to create possibilities for PEN to safely steer geriatric patients to the optimal healthcare. Within this framework, the different studies have been conducted in different phases that are preparatory phase, *pre-event*, which has been the PDS and DST creation phase. The implementation phase, *event*, steered the geriatric patients by the EMS. Finally, *post-event*, an analysis of geriatric patients experiences of being steered to an alternative healthcare provider (*Figure 2*). Focus and attributes of interests in the research process resulted in changes in the different organisational structures and their functions, interactions between different healthcare provider, identifying the patient categories, creation of DST and compliance with the PDS (*I, II*). Furthermore, it has been of great importance to test (*III*) the system to guarantee that Swedish PEN with the help of a PDS can safely triage and steer geriatric patients to optimal healthcare. When implementing major organisational changes, designed to improve and enhance the quality of healthcare for individual patients, it is of great importance that the patients' experiences are evaluated (*IV*).

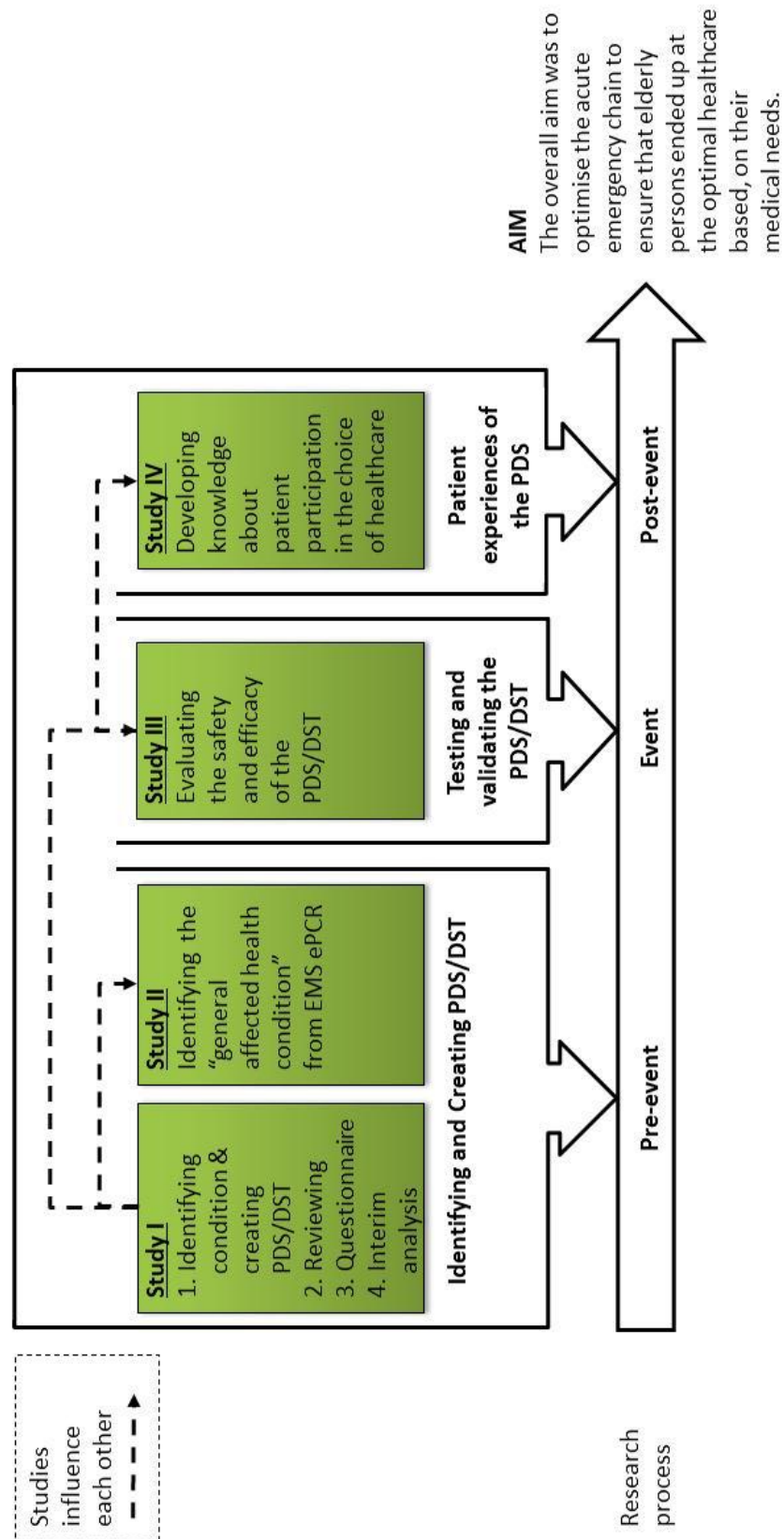


Figure 2: Focus and attributes in the research process

### 3 AIM OF THE STUDY

The overall aim was to optimise the acute emergency chain to ensure that elderly persons ended up at the optimal healthcare based, on their medical needs.

This has been done by the contributions of the aim of the four studies (*I-IV*) (*Figure 3*)

- I.* To create a feasible and safe PDS and DST to support PENs to steer the elderly patient to an optimal healthcare.
- II.* To identify and illuminate the conditions behind the assessment category “general affected health conditions” in elderly people.
- III.* To evaluate the safety and feasibility of a PDS and of a DST that allows the PEN to transport geriatric patient, depending on their medical needs, directly to an community based hospital (CH) geriatric ward (GW), community acute care centre (CCAC) or to an emergency department (ED).
- IV.* To describe patients lived experience of participating in the choice of healthcare when being offered an alternative care pathway by the EMS.

#### 3.1 OVERVIEW OF THE STUDIES

To be able to create a PDS and a DST, *Study I* is based a descriptive design to identify appropriate patient categories that can be steered to an optimal healthcare. Thereafter, the DST was validated and evaluated with a written test consisting of a questionnaire sent to the PENs. Finally, an interim analysis of the prospective, randomised trial (RCT) was made to evaluate the PDS and the feasibility and safety of the DST.

*Study II* is based on qualitative content analysis of the EMS ePCR with the perspective of caring science. The aim was to identify and illuminate the EMS assessment category “general affected health condition”, one of the conditions the experts judged as a condition allowing steering to the alternative healthcare. The reason to analyse this specific pre-determined medical condition was that it was complex and unclear what this condition was representing.

To be able to evaluate the safety and feasibility of a PDS and DST in an authentic full scale study, a prospective randomised trial was performed (*study III*).

Finally *Study IV* is based on qualitative interviews with elderly patients. The study was carried out with the perspective of caring science and a phenomenological approach was applied to describe patients’ lived experience of their choice and experiences of being offered an alternative care pathway.



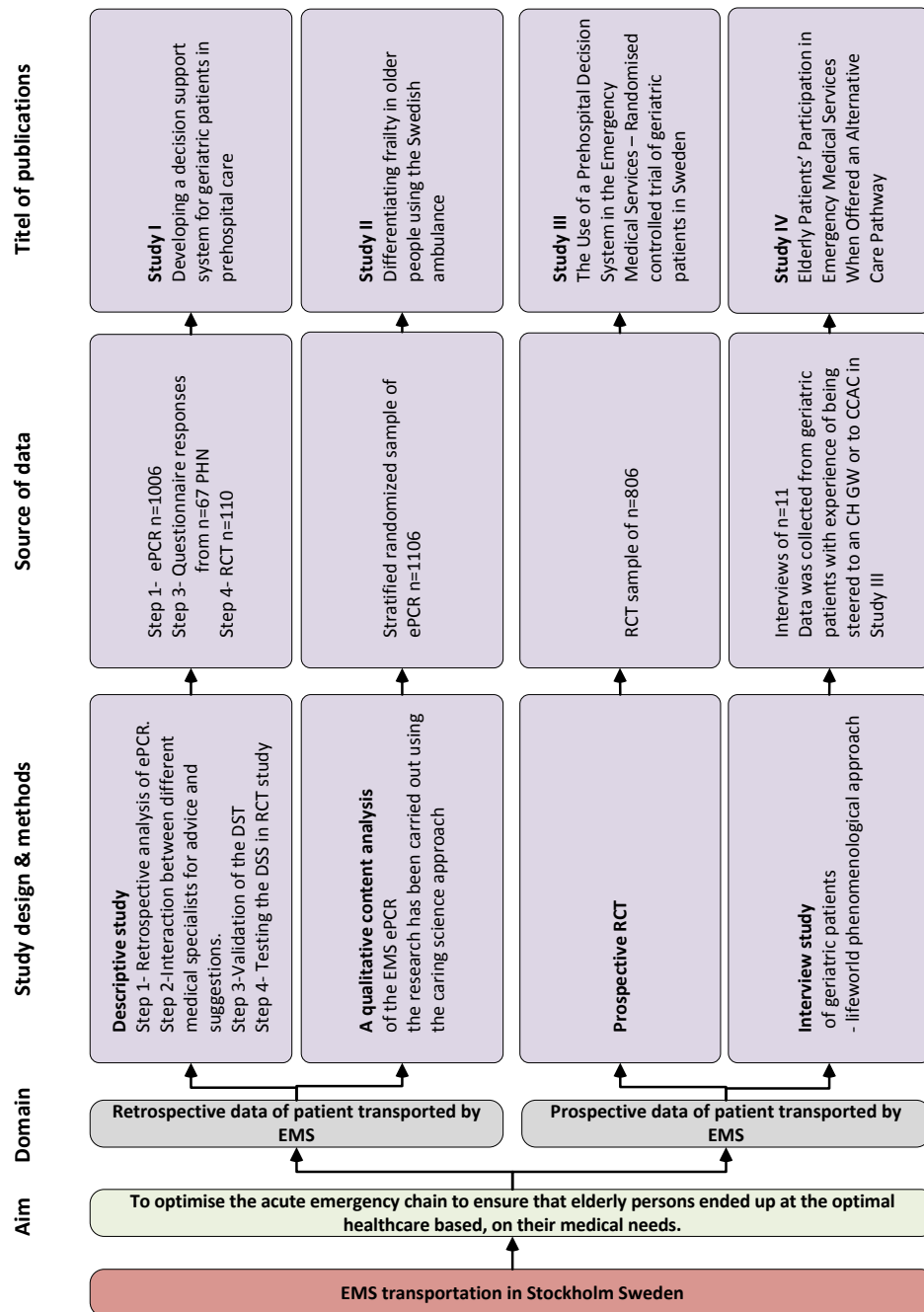


Figure 3: Overview of the overall research framework

## 4 MATERIAL AND METHODS

### 4.1 SETTING AND DATA COLLECTION

#### 4.1.1 Stockholm County Council

##### 4.1.1.1 *Geographic and Population*

Sweden has approximately 9.4 million inhabitants (2012). The country is divided into 21 county councils (CC), one of which is Stockholm County Council (SCC). SCC has approximately two million inhabitants. The SCC geographical area covers 26 municipalities including Nacka-Värmdö, which is the setting of the RCT (study *III*), with a population of about 126 000 people, 14% of whom are 65 years or older (Central Bureau of Statistics, 2012).

##### 4.1.1.2 *Healthcare in SCC*

Stockholm CC's main role and responsibility is to ensure that the residents who live in the county have access to good, well-functioning healthcare and public transportation. All healthcare is financed by taxes. This implies that medical costs are the same for all patients. Much of the healthcare administration is done by the CC itself, but there are also private practices, for example in medical and surgical specialties, geriatrics and psychiatry. These assignments are commissioned by the CC and funded by tax income.

The three possible healthcare levels to which patients could be steered, as described in *study I* and *III*, were the emergency hospital ED (tertiary care), geriatric clinic/ward (GW) (secondary care) or the Community Acute Care Centre (CCAC) (primary care).

#### **Participating caregivers**

The participating caregivers' assignment and organisational structure, patient categories ability and receiving time is presented below;

- *CCAC at primary care hospital*

This service is focused on less serious diseases such as common infectious diseases and minor trauma. Appointments booked the same day and only for cases of less severe but acute character, like smaller lacerations which must be stitched, asthma sensations or infections. Serviced by family practice physicians and nurses between the hours 08:00 – 22:00. The CCAC ran its services in the same community-based hospital as the GW.

The CCAC could also assess patients selected by the PDS.

- *GW at secondary care hospital*

Full service acute geriatric clinic with physician on-call 24 hours. Qualified and experienced multi-professional teams work with Comprehensive Geriatric Assessments (CGA) during office hours, 7 days per week. Team meetings two times per week. The clinic hold four geriatric wards (GW) with roughly 100 beds and an average length of stay (LoS) of 9.5 days per patient. The GW is situated in a community-based hospital together with a family practice, a community acute care

centre, a laboratory and a department of radiology open between the hours 08:00 – 22:00.

The GW could accept acute admittance of the patients included in this prehospital study and selected by the PDS should this be agreed upon over an initial telephone consultation between the PEN and the geriatric consultant on call.

- *ED at tertiary care hospital*

One of four university hospitals giving academic services to the Karolinska Institutet. This hospital is responsible for the same population as the GW and CCAC and there is roughly 20 km between the university hospital and the community-based hospital. The ED at the tertiary care hospital receives patients without a referral where patients turns directly to with serious acute condition, such as severe acute headache, chest pain, breathing difficulties, head injuries, unconsciousness, fractures, deep wounds and major bleeding. ED is open around the clock (Ekelund et al., 2011).

#### 4.1.2 Data collection and analysis

In the following section, the design and method for data collection and analysis for the four studies (I-IV) are presented. An overview is shown in *figure 3*.

##### 4.1.2.1 Study I

In study I data was gathered in the context to create a PDS and a DST (*Figure 4*).

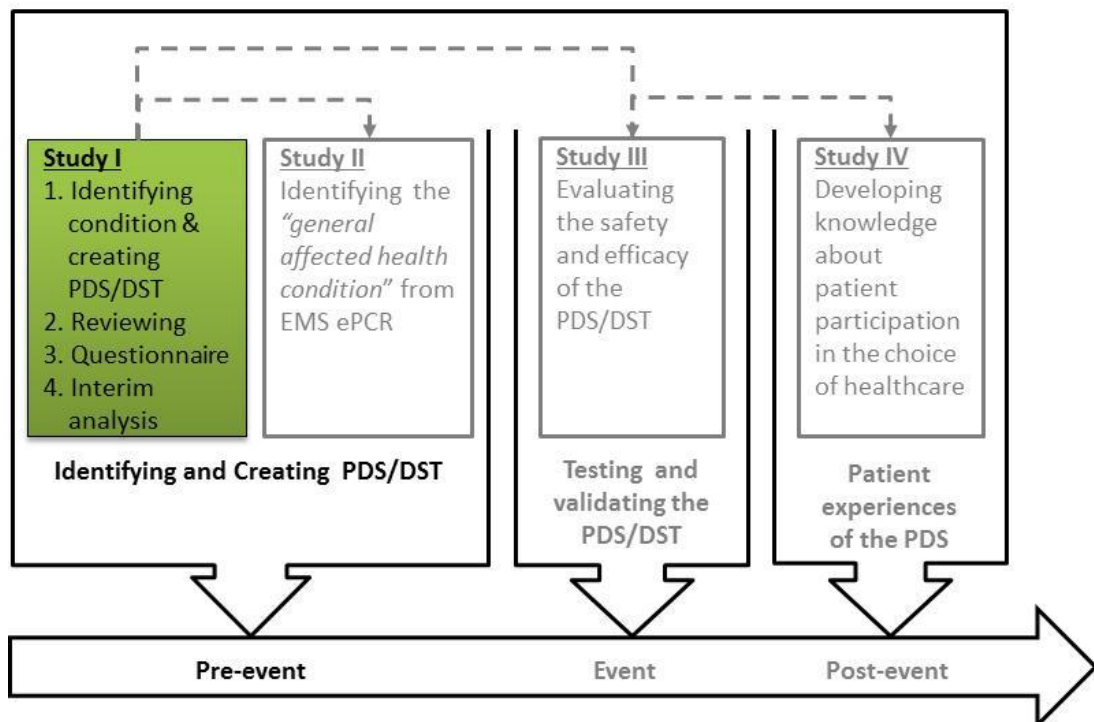
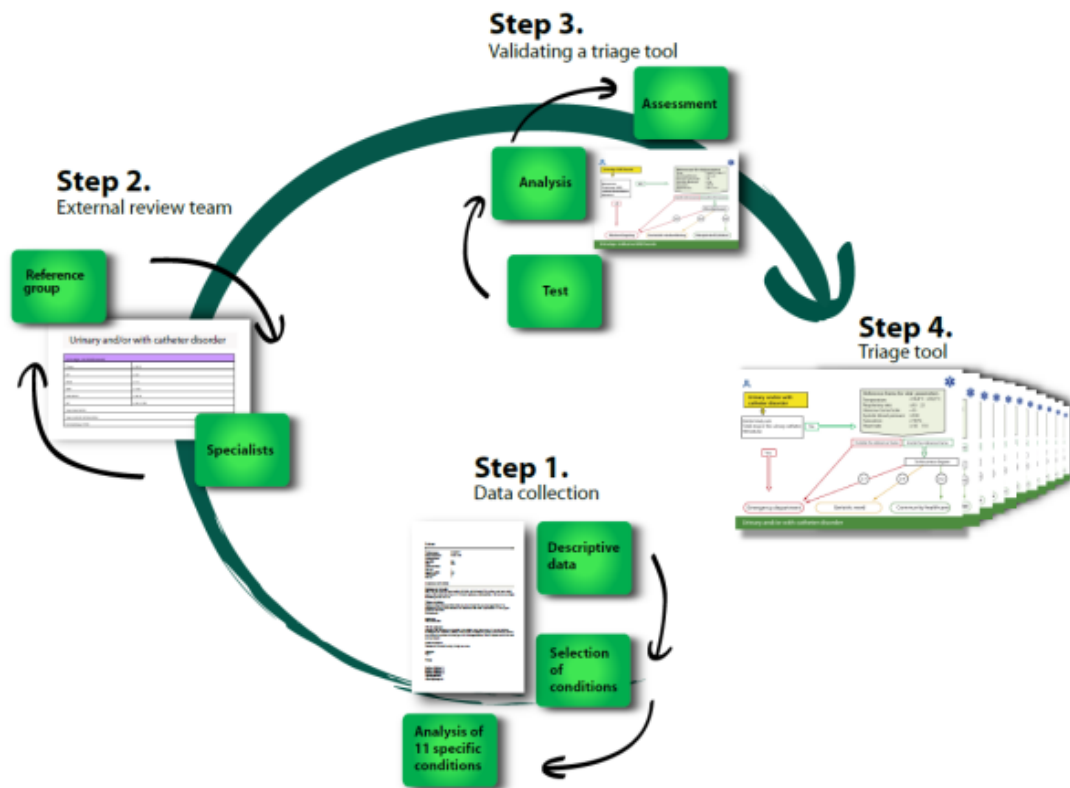


Figure 4: Focus and attributes in study I

The process contained four steps. Each step generated significant results that the following step was dependent on (*Figure 5*). In order to clarify the four steps they are presented separately as step one, step two, step three and step four.



**Figure 5: The four consecutive steps in developing process I**

### Step one

The goal of the first step was to develop a PDS by identifying geriatric patients with medical conditions in the EMS ePCR system, as potential candidates for assessment and triage to a GW or to a CCAC. Furthermore, based on analysis of the medical conditions, to develop a DST.

#### *Data collection*

Data was collected from the EMS ePCR. Inclusion criteria were;

- Patients 65 years of age or older
- Resident in the specified geographical area of SCC, Nacka-Värmdö
- Transported to ED
- Priority level 2 or 3
- Transported between the hours 08:00 -22:00 (access to laboratory, radiology and medical staff)

### *Data analysis*

The data was descriptively analysed in the first step from a sample that fulfilled the inclusion criteria of a total of 1006 EMS records.

Furthermore was sub-analysis of these medical records by adjusting for the following exclusion criteria performed;

- Acute conditions requiring an assessment by a non-geriatric specialist in, for example neurology, cardiology, surgery or orthopaedics and conditions as stroke, cardiac infarction, fractures
- Vital parameters outside a set of references
- NACA score over 4
- Conditions not in concordance with the definition of geriatric care

### **Step two**

The goal of the second step was to develop the PDS and DST further, by engaging a group of experts. Their task was partly to, from an organisational perspective, think cross-border in order to identify what was required to optimize patient flow through the acute emergency chain of healthcare, logistical and contractual abilities. Their other task was to come up with advice and suggestions for changes in the content and structure of the preliminary DST.

### *Data collection*

The expert group was selected by a written and oral request that was forwarded to the directors of the different clinics in tertiary care, GW, CCAC, and of the EMS. Each director chose a specialist with clinical and research experience from the respective areas of expertise.

### *Data analysis*

The selected specialists received detailed information on the steering process and the preliminary prehospital DST. After going through the material they provided the research team with advice and suggestions for changes in the content and structure of the preliminary DST and also suggestions on specific implementation requirements. After the revision of the DST, the expert group confirmed the final product.

### **Step three**

The goal of the third step was to validate (theoretically) the PENs compliance and feasibility of the DST.

### *Data collection*

This was done by a written test consisting of a questionnaire based on 22 authentic clinical cases. The test was performed in the ambulance intranet learning system, which was well known to each user. The questionnaire was sent to the entire PEN staff (n=67). They had three weeks to complete the test. Participation was voluntary and they received no education or training in using the DST before the test. The PENs were asked to work on at least one of the 22 cases. Each case had a set of five questions. The task was to identify the relevant DST for each medical condition presented in the

authentic patient cases and to use the DST as an aid to decide how to triage each patient. The questions were as follows;

1. What medical condition do you judge the patient to have?
2. What severity level is applicable for this specific patient?
3. Where would you steer the patient: ED, CCAC or GW?
4. Was there anything in the DST that was difficult to understand or to use?
5. Any other comments?

#### *Data analysis*

The questionnaires were descriptively analysed to provide a summary of the results. Each question was compared and analysed separately. There was only one correct answer per question and patient case. The answer to the first question had to show that the PEN had identified the patient's medical condition based on the patient case. For example, in the first patient case, the PEN had to have the answer "Urinary and/or with catheter disorders" to get a correct answer to the question. This structure applied to all questions except for the last one. This question was covered by free-text responses.

#### **Step four**

The goal of the fourth step was to validate the entire PDS and the DST in an interim analysis of the main study *III*.

#### *Data collection*

The study was a safety study for study *III* that is an interim analysis. This study was continued for three months and 110 geriatric patients were randomised into the study. The EMD at the EMCC randomised the patients between the hours of 08:00–22:00, using sealed envelopes. The inclusion criteria were as follows;

- Patients 65 years of age or older
- Resident in the specified geographical area of SCC, Nacka-Värmdö
- Priority levels 2 or 3

If the patient was randomised to the control group, the usual care processes were followed and the geriatric patient was transported to the ED of a tertiary care hospital.

If the patient was randomised to the intervention group, the PEN with help of the DST could steer the patient to an optimal healthcare based on the patient's medical needs. Only patients with one of the identified 11 medical conditions could be steered. Informed consent was obtained from the patients by the PENs and the patients were given both written and oral information for their approval of participation in the study. Before steering the patient, the PENs also had to get approval from the physician at the receiving unit (by telephone).

Before starting the study, all the PENs who were involved received training. The curriculum included: 1. a lecture about common geriatric problems, 2. a lecture about the PDS, 3. a theoretical test, and 4. a lecture on the clinical application and operation of the system.

### Study endpoints

The primary endpoint was the number of patients that could by-pass the ED and instead go directly to the CH (effect). The secondary endpoint was the number of secondary transports (safety). The definition of secondary transport was if a patient required a second transport, from the CH to the ED within 24 hours, which could indicate an incorrect clinical decision based on the DST.

### Data analysis

A statistical analysis was used. The analysis of the primary and secondary outcomes, effect and safety of steering geriatric patients to an optimal healthcare, was performed using a Mann-Whitney U test. Additional results are expressed as risk ratios with 95% confidence intervals, and compared using X2. All reported P values are 2-sided.

#### 4.1.2.2 Study II

In study II data was gathered to identify and illuminate the EMS assessment category “general affected health condition” (Figure 6).

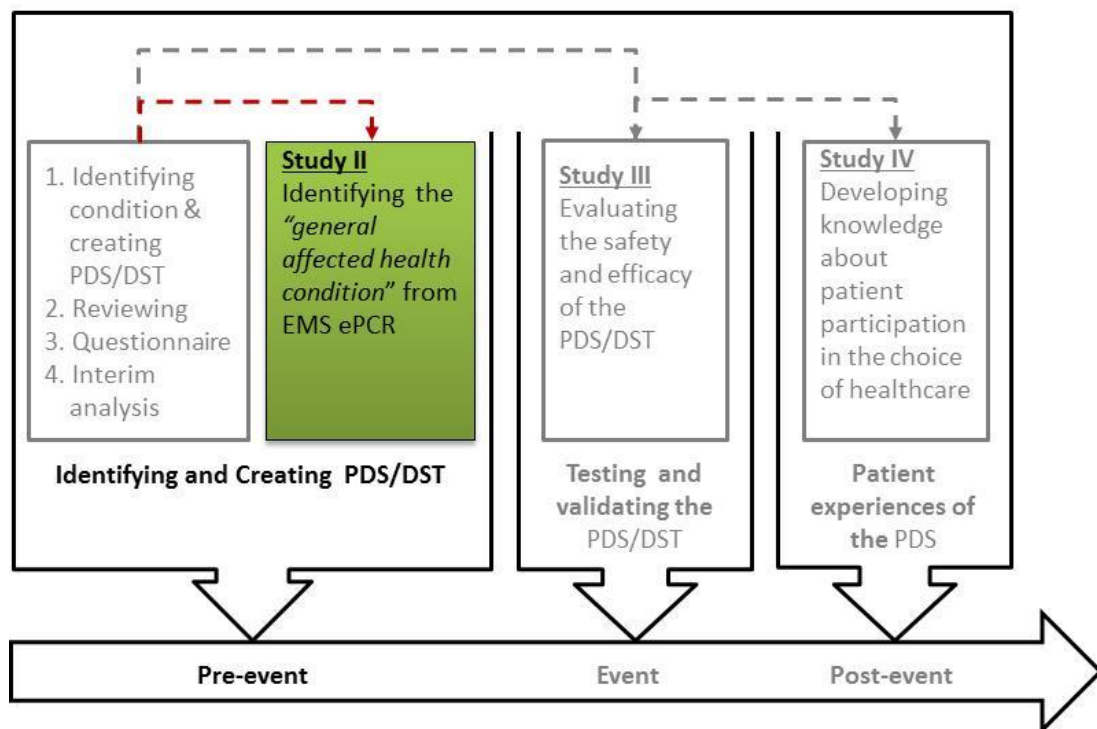


Figure 6: Focus and attributes in study II

### *Data collection*

The EMS in Stockholm CC classifies patients by using 144 predetermined medical conditions based on symptoms; one of these is the assessment category “general affected health condition”.

Data was collected from the EMS ePCR system from the year 2006. Inclusion criteria were;

- Patients 65 years of age or older
- Transported by ambulance
- Assessed “general affected health condition”

A total of 1106 EMS medical records were identified according to the inclusion criteria. Furthermore, the records were divided into 12 piles according to month and date (12 months per year), which generated 92 records per month. From each month a stratified randomised sampling was made (Krippendorff, 2004, Polit and Beck, 2008). This randomisation process generated 120 records, from which 32 were excluded because these were about transports between hospitals, leaving a total of 88 records for the qualitative content analysis.

### *Data analysis*

A qualitative content analysis with application of the Elo and Kyngäs (2008) framework was performed on the selected EMS records. Inductive analysis was chosen to describe the content.

The analysis processes was carried out in three main phases: preparation, organisation and reporting. The first phase was to prepare the EMS records. The free text was examined in order to get an idea of whether the content was sufficient to constitute data for analysis. Text that was not relevant on the basis of the study purpose, such as "Phone number of the district/primary nurse" or "AP-dose integrated", was excluded. The second phase was to organise the qualitative data in three steps: open coding, creating categories, and abstraction. The aim of the analysis was to answer the questions "what" and “how” in relation to find out what characterises the patients’ condition and care needs. Open coding involved making notes and creating headings in the text while reading. The headings described different aspects of the content and were collected on coding sheets. The coding resulted in a kind of new thinking regarding the content, which led to the identification of similarities and differences. The codes were condensed and then grouped into sub-categories and generic categories, and further into a main category. The categories were formulated based on a caring science approach. The main category was the latent content and the most abstract understanding of the research question.



#### 4.1.2.3 Study III

In study *III* data was gathered to evaluate the safety and feasibility of transporting geriatric patients to an optimal healthcare (*Figure 7*).

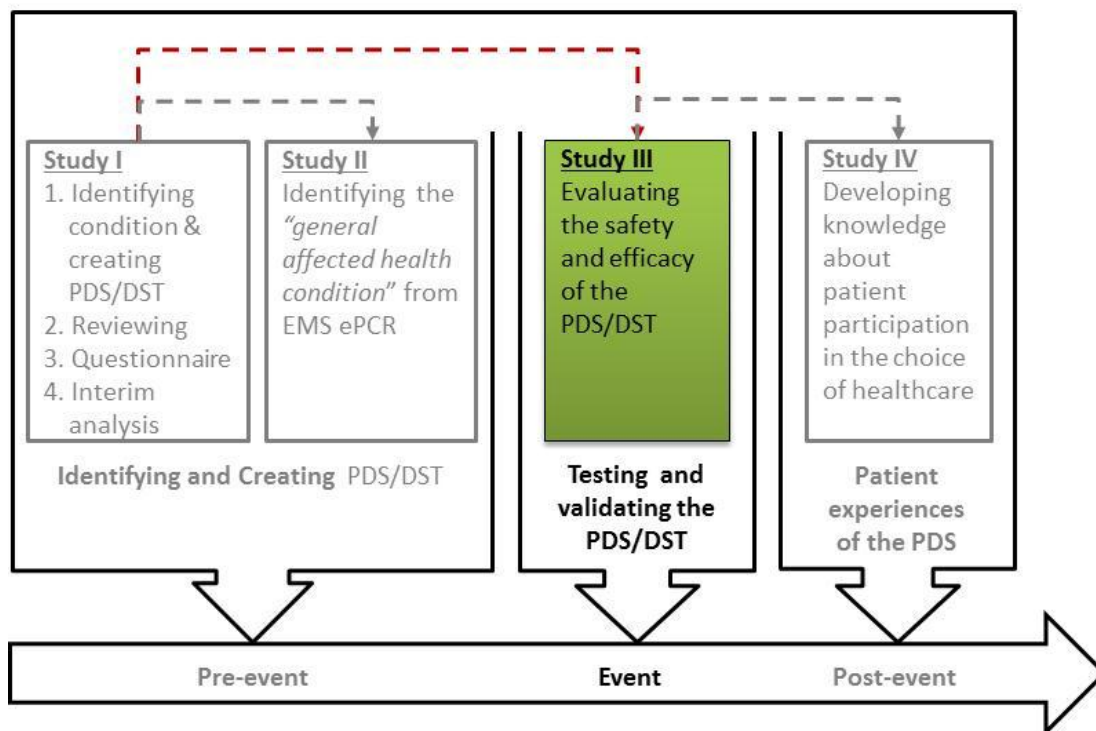


Figure 7: Focus and attributes in study *III*

#### Data collection

This RCT was performed between 21<sup>st</sup> October 2008 and 31<sup>st</sup> December 2009. Two ambulance companies participated in the study. These two were the ones that have most of the EMS assignments in this specific area.

The EMD at the EMCC randomised the patients between the hours of 08:00–22:00 using sealed envelopes. The inclusion criteria were as follows;

- Patients 65 years of age or older
- Resident in the specified geographical area of SCC, Nacka-Värmdö
- Priority levels 2 or 3

A total of 806 geriatric patients were randomised into the study. After exclusion, 666 patients remained in the study.

#### Study endpoints

The primary endpoint was the number of patients that could by-pass the ED and instead go directly to the CH (effect). The secondary endpoint was the number of secondary transports (safety). The definition of secondary transport was when a patient required a second transport, from the CH to the ED within 24 hours, which could indicate an incorrect clinical decision based on the DST.

### Data analysis

The study zero hypotheses were that all patients transported by ambulance to the ED get to the right healthcare providers based on their medical needs. The sample size calculation was set to capture at least 20% of all of the patients that could benefit from directly being assessed at the CH, thus by-passing the ED. Given 600 patients in the study (300 in each group) an observed proportion of 20% would yield a 95% confidence interval (CI) between 15 and 25%, which is deemed narrow enough to match the objective. Assuming a 25% exclusion rate, 100 patients in each group, a total of 800 patients needed to be included. All reported p values are based on 2-sided tests.

Descriptive analyses has been done on the emergency department data such as compliance with the PDS, number of secondary transports and total time outcome regarding ambulance assignments time, patient visit hours at the ED and patient LoS time to see a doctor. The detailed descriptions of secondary transportation are presented in individual case reports (*Table 4*).

#### 4.1.2.4 Study IV

In study *IV* data was gathered to describe patient participation in the choice of healthcare when being offered an alternative care pathway by the EMS (*Figure 8*).

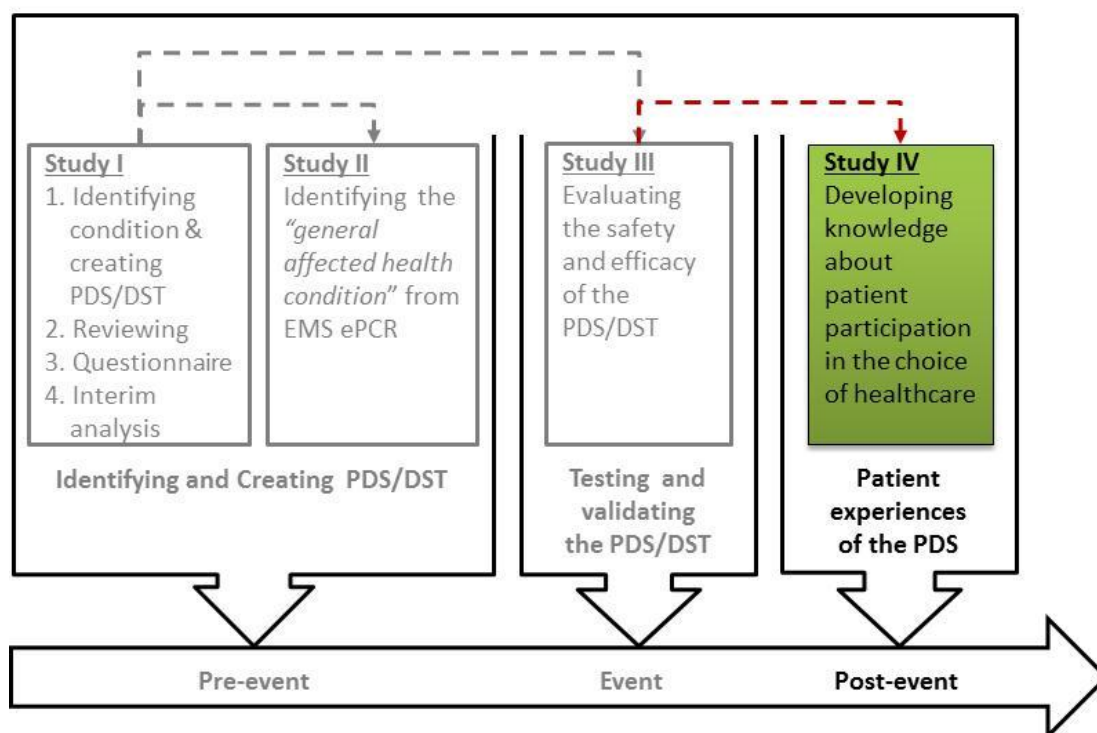


Figure 8: Focus and attributes in study *IV*

### *Data collection*

All participants (*Table 1*) were geriatric patients included in the randomised study (*III*) in 2009-2010. They all chose GW or CCAC healthcare instead of being transported to tertiary hospital ED.

When these patients were cared for by the EMS, and participated in the clinical RCT study, they also received a request consisting of an invitation to an interview. Furthermore, a week before the interview the research secretary took contact by telephone to make sure that the patients were still interested in participating.

In order to achieve variation in the data the participants represent three different periods in relation to the care pathway via the EMS, *see table 1*. The inclusion criteria for participation in this study, apart from being included in study *III*, was that the elderly patient also had to understand the Swedish language and to be orientated with regard to time and space. Of 26 patients contacted, 11 agreed to be assigned to this study. The main reasons for refusal were weakness and frailty.

	<b>Participants n=11</b>
Age (years; mean $\pm$ S.D.)	81 $\pm$ 16
Gender	
Female	9
Male	2
Location for the interview	
Alternative healthcare	4
Patients' homes	7
Interview in relation to an alternative care pathway	
$\leq$ 1 week	3
$\geq$ 1 month to $\leq$ 4 months	3
$\geq$ 5 to $\leq$ 12 months	5

**Table 1: Socio-demographic and patient characteristics of the participants (n=11)**

The interviews took place in two different locations depending on the time of the interview. Four took place at the CH GW or at the CCAC, with those patients that were still receiving care. The other seven were interviewed in their homes.

### *Interviews*

The interviews were semi-structured and open-ended in order to give the informant the opportunity to recall and reflect on her/his experience in the meeting with the EMS. The initial question was "How did you experience the healthcare that you received from the ambulance service?" This first question was supplemented by follow-up questions that lead the dialogue towards patient participation such as "Did you then participate in any way?", "What did you think about that?" and "Can you explain it more". The follow-up questions were dependent upon the informant's answers. The interviews were tape-recorded and the audio-tapes were transcribed verbatim.

### *Data analysis and its theoretical consideration*

This study has been carried out within a caring science context, which is based on the patient perspective with the general aim to describe care that strengthens and supports health (Dahlberg and Segesten, 2010) and recognises the patient's suffering as a motivation for care (Morse, 2001, Eriksson, 2002). The study has practised the reflective lifeworld research (RLR) approach as described by Dahlberg, Dahlberg and Nyström (2008). The method is based on phenomenological epistemology and its lifeworld perspective that understands human lives, health, suffering and well-being as they are experienced in daily life. The phenomenon which is the focus of this study is patient participation in choice of healthcare, as it is experienced by elderly patients. In order to explore the phenomenon as it is lived the approach meets the criteria of studying patients' experiences with openness and flexibility. The researcher then strives to use a reflective and sensitive attitude, which means taking plenty of time for her-/himself in the process of understanding the phenomenon from a new perspective.

This analysis is characterised by a tripartite structure, which can be described as a movement between the whole – the parts – the whole. This is a process of understanding that includes a movement between different abstract levels of meaning. The analysis started with a reading of the transcript in its entirety, to facilitate a first understanding. It was a careful reading until the requirement of familiarity with the material was met. When the initial reading was completed the transcript was slowly reread and divided into meaning units – the parts. The meaning units were clustered into patterns of understanding. By relating the clusters to each other, a pattern of meanings slowly emerged, which generated a meaning structure that is the essence of the phenomenon and its constituents. When describing these constituents the aim was to be truthful to the complexity of data, and consequently the meanings may slightly overlap each other. The essence of the phenomenon that is the essence of patient participation in the choice of healthcare, as it is experienced by elderly patients when they are offered an alternative care pathway, instead of going to the ED, followed by constituents.

## 4.2 ETHICAL CONSIDERATIONS

The studies (*I-IV*) adhere to the principles outlined in the Helsinki Declaration (Helsinki, 2012) and were approved by the Regional Ethics Committee at the Karolinska Institutet, Stockholm [nr. 2008/1167-31]. Study *III* was also approved by the CC EMS Medical director and by the EMS companies' directors.

Particular attention was paid to the fact that participation should be voluntary and the participants, both the PENs and the patients, should be anonymous.

Study *I* was based on an anonymous questionnaire where no one of the EMS personal registrations nor any collected data could be connected to an individual, such as name and responses. In studies *I*, *III* and *IV* all patients were assured confidentiality. They were informed that the data was kept in strict confidence, their anonymity was protected in a way that their identity would not be accessible to others, neither caregivers nor public.

Patients and their next of kin in studies *III* and *IV* were given verbal and written information regarding the study. Verbal and written information illuminated that the research was not tied to the caregiver where the patients were enlisted and no feedback was given by the researchers to the healthcare staff regarding patients' willingness or unwillingness to participate. The patients also had to give written consent that they agreed to take part in the study. In study *IV*, in order for the patient not to feel obligated to participate in the study, an independent person (research secretary) made the call to the patients and asked if they wanted to participate in the study in a hope to reduce the risk of persuasion.

## 5 MAIN FINDINGS

The findings are grouped into two parts. The first, those related to the creation of a feasible PDS and the DST (*I, II*). The second, those concerned with the evaluation of the PDS and the DST (*I, III, IV*).

### 5.1 FINDINGS OF CREATING A PDS WITH A DST

Studies *I* and *II* found organisational and logistical factors that are central prerequisites for steering older patients directly from home to the optimal healthcare. The determining factors that were identified (*I*) were;

- Receiving unit capacity
- Appropriate medical conditions for steering
- Safety of the DST and the steering process

#### 5.1.1 Receiving unit capacity

The findings (*I*) showed that the group of experts identified personnel competency, organisations resources and patient categories (medical condition) based on the political assignment from SCC was crucial factors affecting how patients from the EMS were received.

Regarding personnel competence, patients with a total blockage of the urinary catheter were untreatable at GW and CCAC. Reasons for this were that all receiving specialists must be able to insert a supra-pubic catheter, and since not all geriatricians have this competence these patients were not suitable for steering to GW and CCAC.

Further, the findings showed based on the patient safety perspective, that the availability of radiology and laboratory tests was crucial, since these patients are frequently suffering from multiple diseases which increase the risk of incorrect medical assessment.

#### 5.1.2 Appropriate medical conditions for steering

The findings (*I*) of the analysis identified eleven suitable medical conditions for triage and steering of geriatric patients to GW or to a CCAC. These were;

1. Urinary and/or catheter disorders
2. Dizziness
3. Respiratory disorders/chronic obstructive pulmonary disease
4. Respiratory disorders/pneumonia
5. Diabetes (except for hypoglycaemia, because of the need for extended investigation)
6. Fever
7. Hypotension

8. Frailty (“*general affected health condition*”)
9. Back pain/back contusion
10. Fall/injury and accident
11. Hip trauma (without suspicion of a fracture)

These medical conditions also correlated with GW and CCAC political assignment from SCC. Patients with acute illness, for example; myocardial infarction, stroke, need for surgery, could not be steered to CH GW or CCAC since they needed the facilities of an acute hospital.

The findings (*II*) showed that “general affected health condition” in elderly people in the EMS setting could be understood as referring to a patient with frailty. The identification and illuminating of the conditions behind this EMS assessment category is described below.

Elderly patients seek care because their everyday life in some way has become more difficult or impossible to manage without additional support. Age weakness, lack of nutrition, inactivity and suffering from a disease were identified as reasons for the increased weakness that caused the inability of these patients to manage their everyday life. The findings showed that when older people experience confusion they lose their bearings in life and in their surroundings. This makes them vulnerable, and they may not understand what is best for them and may not see their own need for help. Confusion and disorientation, and lack of understanding related to dementia were identified as reasons for the increased weakness. Growing weakness and frailty can limit daily living because the person’s self-care becomes inadequate, and this in turn leads to increased dependence. The condition becomes unmanageable and at worst it can threaten life itself. This causes chaos and prevents a controlled and functioning life. The elderly patients seek help related to progressive weakness and increased dependence, which in turn led to overturning a controlled and functioning life (main category).

### **5.1.3 Safety of the DST and the steering process**

#### *DST safety levels*

A DST was created for each of eleven specific conditions (*see appendix 8.1*) in study I. The DST is divided into three patient security levels. The first is the differential diagnosis square/box that is acute conditions/symptoms that require acute emergency hospital resources and increased need for screening analysis. The second level is the frame of reference for vital signs, these are developed based on the triage system used in Stockholm. Within the reference frame for vital signs according to the triage system green presents patients suitable to be steered to GW and CCAC. The only exception was saturation level (level yellow- orange) can be steered. The third security level is the severity of the patient’s condition. The NACA score is based on the EMS personnel's clinical suspicion of the patient's illness and injury severity. This level provides the opportunity for EMS personnel to increase the severity score of the patient, even if the patient is within the reference frame for vital signs.

*DST is used as follows:*

The process of using the DST is described below for the example “Urinary and/or catheter disorder” (*Figure 11*). The PEN asked the patient if she/he had abdominal pain, complete blockage of their urinary catheter, chest pain or hematuria. If they answered “Yes” to any of these questions, the patient had to be transported to the ED. If they answered “No” to these questions, the PEN assessed the vital parameters against the reference and followed the flowchart.

If the vital parameters of the patient violated the reference, she/he had to be transported to the ED, but if the parameters were within the reference frame, the PEN followed the flowchart and graded the patient’s illness and injury severity (NACA-score).

If the patients were assessed as having a NACA-score between 0-2, they had to be transported to primary care, which meant to CCAC at the CH. If the patient’s severity level was between 3-4, they had to be transported to secondary care, GW. Finally, if the patient’s severity level was between 5-7, they had to be transported to the ED at the tertiary care hospital.

Deceased patients with a NACA score of 7 had to be transported to the ED unless the dispatch centre gave other instructions. In most cases, deceased patients were left where they had died, after consultation with the dispatch centre.

*Steering process between the organisations*

Once the PEN gets to the patient, they make a full assessment of the patient’s condition, based on a careful anamnesis and status.

If the patient has one of the eleven predetermined medical conditions and they are aged 65 years or more, the PEN takes up the DST and assesses the patient based on the tool’s safety levels. This is done to determine which healthcare destination is optimal for the patient. If the decision is made that GW or CCAC is the optimal destination, the PEN will make direct telephone contact with the receiving unit and their senior physician. It is the receiving unit’s senior physician, after direct telephone contact with the PEN, that decides whether admission is possible or not. If the PEN cannot establish direct telephone contact despite repeated attempts, the patient without delay will be transported to the ED.

During the ambulance transportation, the EMS medical guidelines for treatment are applied. This is to minimize confusion regarding the medical responsibility for the patient. Should the patient’s condition change or deteriorate, the patient will become appropriate for to triage to the ED. The EMS personnel hands over the patient at the ward of the receiving unit. The EMS personnel give a report on the patient to the receiving physician. It is not until after reporting and handing over the patient to the GW or CCAC that the attending physician takes over the medical responsibility for the patient. Thereafter, EMS personnel write up the patient’s medical record (ePCR) at the receiving unit.



## 5.2 THE FINDINGS OF EVALUATING THE PDS AND DST

### 5.2.1 Enrolment and characteristics of the patient

The findings of the base line characteristics of the patients enrolled in studies *I* and *III* were similar in almost all the major characteristics including *age*, *vital parameters*, *Glasgow Coma Scale* (GCS) and *NACA score*.

In study *I*, the variable *male* was significantly higher in intervention group compared to the control group ( $p=0.015$ ) and variable *systolic blood pressure* was significantly higher ( $p=0.051$ ) in the control group (*I*). Furthermore, the variable *priority level in* was significantly more urgent ( $p=0.005$ ) in the intervention group compared to the control group (*I*).

In Study *III* the *saturation* variable was significantly higher in the intervention group compared with the control group ( $p=0.003$ ), and the variable *priority level out* was significantly more urgent ( $p=0.001$ ) in the intervention group compared to the control group (*III*). However, after the PEN had met the patient and evaluated the clinical situation, the *priority levels in* (*III*) assigned did not differ between the intervention and control groups.

### 5.2.2 Number of randomised patients

#### *Interim study I*

Study *I* continued for three months and 110 geriatric patients were randomised into the study. After exclusion, 94 patients remained in the study, 62 (65.9%) were assigned to the intervention group, and 32 (34.0%) patients received standard treatment (control group). The reason for exclusion was aborted assignment; 16 patients were not in need of the EMS. Approval for continuation of the study was received after a follow-up analysis on the primary and secondary endpoints.

#### *RCT study III*

In study *III* a total of 806 geriatric patients were randomised. After exclusion, 666 patients remained in the study. Reasons for the exclusion are listed in the flowchart (*Figure 9*). Of the 666 patients, 449 (67.4%) were assigned to the intervention group and 217 (32.6%) patients received standard treatment (control group).

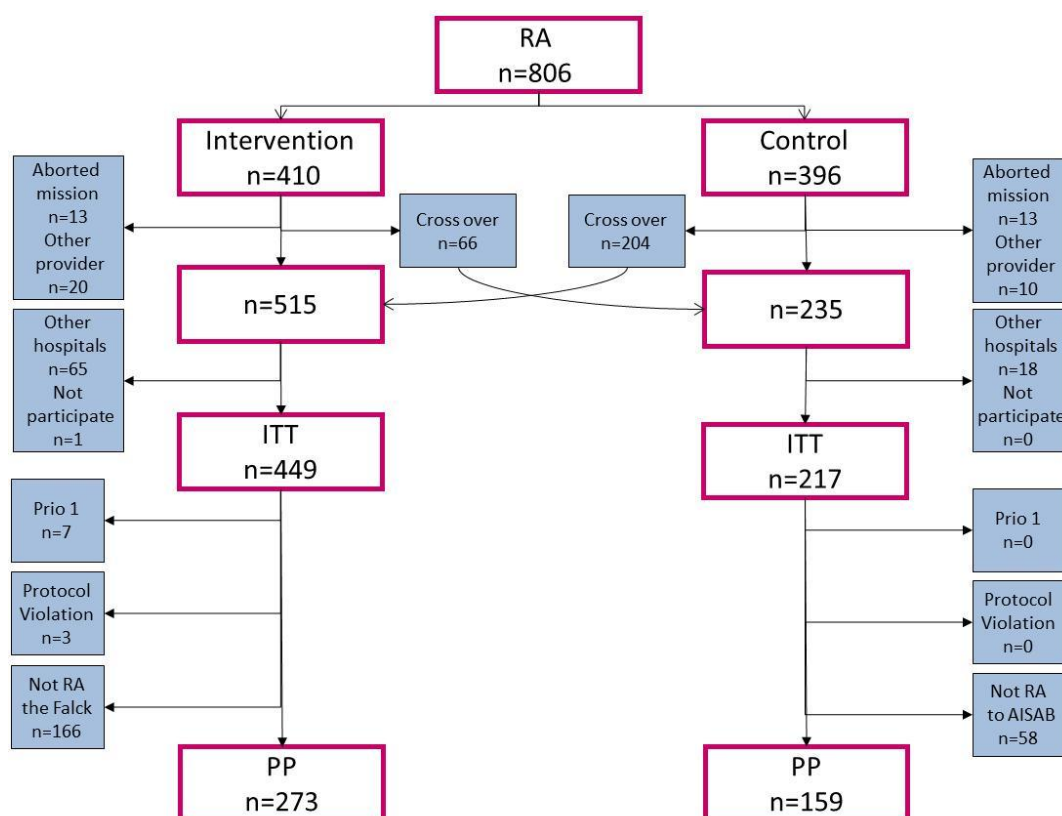


Figure 9: Flowchart of Randomised Control Trial n=806

### 5.2.3 Primary outcome (Effect)

#### Interim study I

The findings of the analysis showed that 21 patients in the intervention group were steered to the CH GW or the CCAC with the help of the PDS and DST. The proportion (CI) was 33.9% (23.3 to 46.3) (Table 2).

#### RCT Study III

The findings showed that 90 patients in the intervention group were steered to the GW or the CCAC with the help of the PDS and the DST. The proportion (CI) was 20% (16.6 to 24.0) (Table 2).

### Primary outcome (Effect)

Interim analysis study I		Main RCT study III		
Proportion (95% CI)	n/N		n/N	Proportion (95% CI)
33.9% (23.3-6.3)	21/62	<b>Intention to Treat</b> (Intervention group)	90/449	20.0% (16.6-4.0)
33.3% (20.6-9.0)	13/26	<b>Per Protocol</b> (Intervention group)	56/273	20.5% (16.1-5.7)

\* Per Protocol is a subgroup of Intention to Treat. The subgroup followed the triage process and including randomisation straight through (without crossovers).

Table 2: Primary outcomes, patients steered to the Geriatric clinic or the Community Acute Care Centre by the Prehospital nurse

## 5.2.4 Secondary transports (Safety)

### Interim study I

The findings of the secondary outcome (safety analysis) showed that no patient was secondary transported within 24 hours from the CH to the ED at the tertiary hospital (*Table 3*). No medical inaccuracies were identified.

### RCT Study III

The findings of the secondary outcome (safety analysis) showed that six patients in the intervention group required a secondarily transport within 24 hours from the CH to the ED at the tertiary hospital (*Table 3*). The proportion was 6.7% (3.1 - 13.8).

### **Secondary outcome (Safety)**

Interim analysis study I		Main RCT study III	
Proportion (95% CI)	n/N		
0.0%	0/21	<b>Intention to Treat</b> (Intervention group)	6/90 6.7% (3.1-13.8)
0.0%	0/13	<b>Per Protocol</b> (Intervention group)	4/56 7.1% (2.8-17.0)

\* *Per Protocol* is a subgroup of *Intention to Treat*. The subgroup followed the triage process and including randomisation straight through (without crossovers).

**Table 3: Secondary outcomes, patient's secondary transport to the Emergency Department from the Geriatric clinic or the Community Acute Care Centre**

The reason for secondary transport was as described in *table 4*. The median length of stay (LoS) for those six patients at the CH was 2 hours and 7 minutes (1h 23min to 3h 06min) before having the secondary transport.

Identified condition (EMS)	DST Inside/Outside the reference frame	Compliance with the DST criteria (Yes/No)	Time until secondary transport (safety $\leq 24h$ )	International Classification of Diseases, ICD - 10 diagnosis
1. Urinary and or catheter disorder	Outside Saturation 89%	No	1h 23 min	Urinary tract infection, without giving localizing
2. Frailty	Inside	Yes	2h 05 min	Hyposmolalitet and hyponatremia And decreased fluid volume
3. Fall injury and accident	Inside	Yes	3h 06 min	Multiple fractures of ribs
4. Hip trauma	Outside Missing documented measuring of respiratory rate, temperature, GCS	No	2h 10 min	Two part un-displaced collum fracture
5. Respiratory Disorders Pneumonia	Outside Missing documented measuring of Glasgow Coma Scale	No	2h 17 min	Chest pain, unspecified
6. Hip Trauma	Outside Missing documented measuring of respiratory rate, temperature, GCS	No	1h 41 min	Two part un-displaced collum fracture

**Table 4: Patient required a secondary transport within 24 hours from the Community-based Hospital to the Emergency Department at the tertiary hospital n = 6**

### 5.2.5 Compliance with the prehospital DST

#### Study I

In the theoretical evaluation and validation of the DST, 37% of the PEN answered a total of 234 questionnaires. Of these responses 23 were excluded because of missing data. A total of 211 surveys were analysed. The findings of the validation showed a high degree of compliance with the DST. No patient was triaged incorrectly. The majority of the PENs thought that the PDS was comprehensible, feasible and easy to use.

#### RCT Study III

The findings of evaluation of DST showed good compliance (*Figure 10*), as the PENs had correctly identified the patients' medical conditions in all cases. In 22 patients the vital parameters were not documented. Despite this, these patients were transported to the CH, a type of decision that violated the study protocol. However, and as with every case, the PENs discussed and got approval from the senior physician consultant to steer these patients to their CH. Fifteen patients were denied admission to the CH because of a lack of hospital beds or a closed radiology department (during the summer months).

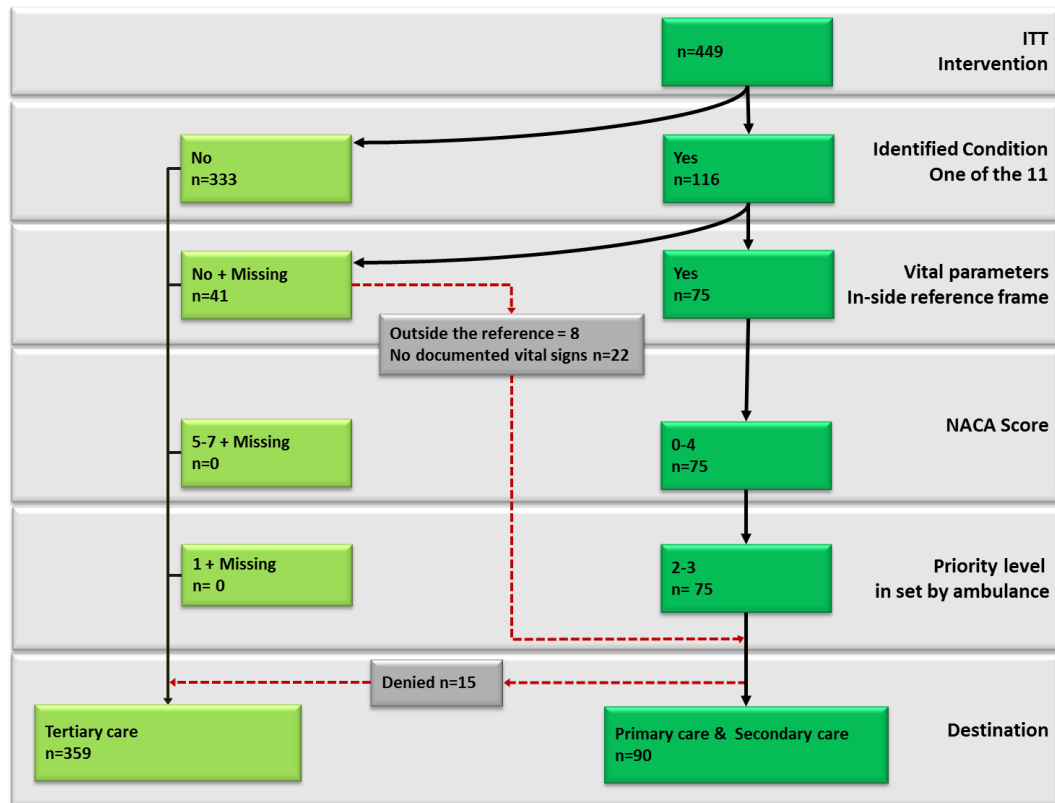


Figure 10: Compliance with the decisions support system

## 5.2.6 Time outcomes

### *Ambulance assignment times*

The findings (III) overall the ambulance assignment times for the 557 patients that had been transported to tertiary care (both intervention and control groups) was similar for both groups. There was no difference in assignment time for the intervention group considering patients transported to the CCAC (55 minutes, 16 to 98 minutes) or to the GW (57 minutes, 29 to 125 minutes) (Table 5).

### *Patient length of stay at the ED*

The findings (III) between the two groups considering “arrival time – doctor time” showed that the intervention group had a median time of 68 minutes (0 to 621) and the control group 89 minutes (0 to 624) ( $p=0.024$ ). Also the “arrival time – discharge time” showed a difference between the two groups with the intervention group having a median time of 262 minutes (8 to 765) and the control group 288 minutes (65 to 1394) ( $p=0.021$ ) (Table 5).

	<b>Intervention (n=359)</b>	<b>Control (n=198)</b>	<b>P- value</b>
<b>Ambulance assignment time to Primary care (CCAC)</b>	55 (16-98)		
<b>Ambulance assignment time to Secondary care (GW)</b>	57 (29-125)		
<b>Ambulance assignment time to Tertiary care (ED)</b>	54 (17-131)	55 (24-147)	0.692
<b>Patient time in ED: Arrival – Doctor (ED)</b>	68 (0-621)	89 (0-624)	0.024
<b>Patient time in ED: Arrival- Discharge (ED)</b>	262 (8-765)	288 (65-1394)	0.021

*The values presented are median minutes (min-max). P-values are from the Mann-Whitney U test.*

**Table 5: Time outcomes - Ambulance assignments time and Patient Length of Stay in Emergency Department**

### **5.2.7 Elderly patients' experiences of participating in the choice of healthcare**

The findings (IV) showed that the meaning of the phenomenon is to choose healthcare where there is hope of being treated like a unique human being. Unless, the elderly person in need of help will experience her-/himself as a 'thing' which can be pushed around in the ED not knowing if anyone cares. Quotations from the informants (can be read in their entirety in the original study IV) are included in order to provide further clarification of the meaning. The findings of the analysis emerged in the five meaning constituents: endurable waiting, speedy transference, a concerned encounter, trust in competence and choice based on suffering caused by care. The essence of the phenomenon is described below.

When an acute need for healthcare arises, it reveals vulnerability and fragility in old people's lives. Insufficient insights into one's own health condition underpin the understanding of the need for help. A battle for one's independence is fought, which turns into a life of suffering underlined by existential powerlessness. Eventually, the suffering becomes overwhelming and the elderly patient capitulates. With their energy and vitality depleted they meet the care-givers in the EMS. The elderly patient is then invited to a caring encounter which is focused on the patient's health condition. The aim is to promote a feeling of wellbeing and participation in the choice of healthcare offered; however the demands are kept low. Care and treatment are expected to start in the hospital. At the same time, a paradox appears showing that the elderly patient fully relies on the PEN's professional competence when she/he makes her/his choice about receiving care in different healthcare units. That choice means that the risks of ending up in the wrong unit and being objectified are supposedly reduced. Elderly patients carefully and with thoughtfulness choose healthcare and deselect suffering caused by healthcare and the risk of being inhumanely treated.

## 6 DISCUSSION

### 6.1 FINDINGS

This thesis describes the development and implementation of a new acute healthcare chain for the geriatric patients cared for by the EMS in Stockholm Sweden. The thesis is an organisational study that refers to clinical and practical aspects and safety of how the PDS, with its supplementary DST, can be used to ensure that the elderly person ends up in optimal healthcare.

The focus has been on the EMS, the Swedish PEN and on the elderly patients' steering and caring process. The complexity lies in both satisfying the multi-diseased elderly patients' need of optimal care and in creating environments for healthcare providers to collaborate across boundaries between their professions. The discussion below will also demonstrate the need of combination of a PDS with patient participation.

#### 6.1.1 It is possible to steer geriatric patients to an optimal healthcare

The findings in this study showed that with the help of the PDS and DST, PENs could triage 20% (16.6-24.0) of all the assigned geriatric patients' to GW or the CCAC at the CH to be treated. These findings agree with Cheney et al. (2008) reported that EMS providers with appropriate training and oversight could effectively triage patients at low risk directly to a psychiatric unit, without ED. The ambulance personnel used an EMS protocol, a total of 696 psychiatric patients 25% (CI. 22-28) were transported to a psychiatric emergency service. In Sweden, to let the PEN triage and by-pass the ED in favour of alternative caregivers in the controlled way shown in this present study is unique since all geriatric patients traditionally and routinely are transported to the ED. To our knowledge this is the first study that demonstrates these findings with geriatric patients. EMS has become an important focus of research, as the number of visitors to hospital EDs is increasing and the ED crowding problem is also increasing. Another issue that we have to take into consideration is the dramatic general increase in the population and in particular, the elderly population aged 75 years and above is expected to occur (Roberts et al., 2008). This rise will lead to the challenge of finding a clinical, organisational, qualitative and ethical approach to devising safe solutions for patients. In the frame of this problem the numbers of potential alternative destinations have to increase in the future.

This study showed, regarding EMS assignment time to the ED, no significant difference in time-outcomes between the two groups in study *III*. In the intervention group there was an insignificantly (three minute) longer assignment time for those patients that were steered to a CH compared to those patients steered to the ED. These are unique findings as compared with earlier studies (De Luca et al., 2009, Hagiwara et al., 2011, Woollard et al., 2001). These earlier studies shown that using DST in the prehospital context increases the EMS assignment time, but in the long run decreases the time for the patient to ending up on the final healthcare. We can only speculate on why the EMS assignment times did not differ in our study. Had it to do with the CH location? Or had it to do with some aspect of the patients' assessment?

This study showed a statistical significance longer ED waiting times for the geriatric patients the control group comparing to the intervention group. Both regarding the admittance-physician's assessment time ( $p=0,024$ ) and the patient LoS time ( $p=0,021$ ). What do these findings tell us? Though this finding strengthens that the patients who were transported to GW or CCAC at the CH (intervention group) ended up in the right place? Would these patients if they ended up, like the patients in the control group, at the ED instead, have received similar waiting times? Can we measure the patients ED waiting times versus the right patient at the right place? If you turn the thought around, and think of these elderly patients who ended up in the ED (control group), after assessment by the physician at the ED, were secondary transported to a GW? Unfortunately, we can only speculate on these questions, but we have to take these in consideration in further research.

Overall, a big portion of the geriatric patients admitted to the ED is considered to be non-urgent patients. The definition of "non-urgency" is defined according to Durand et al. (2011); a problem not likely life-threatening, does not require immediate attention and is considered as non-urgent because the care can be delayed for several hours or days. This study showed that the geriatric patients had a long average waiting time at the ED. Looking at Singal et al (2012) the elderly patients released from ED, spent significantly ( $p= 0,003$ ) more time in the ED compared to the younger patients. This is not to say that the elderly were not in need of medical care; quite in the opposite. Compared with younger adults, elderly ED visitors were generally characterised by a higher level of urgency and more serious medical illness (Salvi et al., 2007, Samaras et al., 2010). Reasons why the elderly patients waiting time at the ED were longer were associated with their complex atypical signs and symptoms and multiple comorbidities that complicated diagnosis and treatment (Aminzadeh and Dalziel, 2002). Often, this situation was compounded by the fact that the physician at the ED had not been trained in specific geriatric approaches and was being less comfortable dealing with older patients (Grief, 2003).

Long LoS and a crowded ED have been associated with negative health outcomes and a decrease in quality of care (Beniuk et al., 2011). So how was the time outcome for the geriatric patients (intervention group) transported to the CH? We showed that they had no waiting time at all. These patients entering CH received immediately contact with a physician and those patients that were admitted to the geriatric unit also received immediately a hospital bed at the GW. This was a crucial aspect that we processed during the developing process (*I*) of the PDS. We gained insights regarding logistical demands so that the elderly patient throughout the steering process under no circumstances would be unsupervised in the transmission between the different organisations. After the telephone conversation between the physician with the EMS personnel and given approval of admission the organisational procedures started to enable an available bed and physician time. PDS improve in this way the quality of care since the created system reduced waiting times for the elderly patient.

The healthcare model to let the PENs triage and steer patients with different medical conditions and to specific facilities is now being under strong developing progress in different countries (Larsson and Holgers, 2011, Oredsson et al., 2011, Salvi et al., 2007, Cheney et al., 2008). According to these studies we suggest that it is not



defendable that all patients in an uncontrolled way are transported to the ED when more and more studies show that the EMS in fact can take a greater responsibility for transporting patients directly to specialist care even if it means by-passing the ED, as in this study.

#### ***6.1.1.1 Why has it been possible to steer?***

Currently, there is no clear definition of the optimal healthcare or, in other words, what constitutes ‘the right patient in the right place’. We challenged this question by involving several medical experts from different disciplines when developing the PDS, and this generated a local Swedish consensus expressed in the PDS.

The findings identified that, to make it possible to steer geriatric patients to an optimal healthcare, it is necessary to have a consensus on what is the “right patient” and clarify the interaction and medical responsibility in the steering process between the healthcare providers. This study has clarified this and has generated a clear and unified picture of what the elderly patients need and how we can meet these needs. Furthermore, PEN in their decision-making could optimise the geriatric patient care in an acute emergency situation by steering patients to the optimal healthcare.

#### **Consensus regarding the patient medical condition**

The findings showed that regarding the “right patient”, a first step towards giving optimal care is to clarify which conditions can be treated at the GW or the CCAC at the CH. This is in line with the findings of Grumbach and colleagues (1993). They report that patients that are seeking care at the ED, had conditions that could be managed in primary care facilities. In order to gain access to alternative healthcare services that offer continuity of care for a full spectrum of acute and chronic care needs, it is necessary to identify the different healthcare needs of the patients who use the ED. They also report that, to be able to redirect patients through the different healthcare providers required a greater level of communication and coordination between the caregivers.

In the developing process we came to a consensus regarding the eleven identified medical conditions that were relevant to steer to CH. These conditions were the most common conditions in elderly patients in the ED; dehydration, dizziness, syncope, frailty, infection, back pain and chronic pulmonary disease (Ross et al., 2003).

Furthermore, in the findings of the development process the medical condition “general affected health condition” was more complex than the other ten conditions. This condition required a deeper analysis in order to clarify whether it was appropriate to direct to the CH or not. This motivated us to seek a deeper understanding and to find out if these patients were suitable for steering to the GW or the CCAC. This study found, with the perspective of caring science, that the characteristics of the “general affected health condition” can be understood as referring to a patient with frailty. Since the patient’s condition and care needs are unclear and unspecific, the concept of frailty could clarify the characteristics which typify this specific condition and could therefore be of great help for ambulance personnel to understand and meet the patient’s need of care.

The present findings of this complex condition, has given a clarified picture which led to a consensus regarding this patient group to be able to be steered to CH, GW or CCAC. These findings open up a nuanced picture of elderly people and their needs of prehospital acute emergency care. These elderly patients are high consumers of healthcare and are in great need of support and help.

According to Lally and Crome (2007), older people who experience frailty often have times when they cannot manage their daily living activities and have reduced capacity to withstand environmental stress. There are a number of conceptual and operational definitions of frailty (Bortz, 2010, Bortz, 2002, Campbell and Buchner, 1997, Fried et al., 2004, Fried et al., 2001, Gobbens et al., 2010, Lally and Crome, 2007, Winograd et al., 1991). Gobbens et al. (2010, p 85) define frailty as follows;

*'Frailty is a dynamic state affecting an individual who experiences losses in one or more domains of human functioning (physical, psychological, social) that are caused by the influence of a range of variables and which increase the risk of adverse outcomes.'*

Factors contributing to frailty are identified both in the theoretical and empirical literature, and are often associated with lost strength, illness and increasing age. These factors in turn lead to weakness, which is the major contributor to frailty according to our findings, corroborated by Levers et al. (2006). In what direction and how the sub-categories in present findings are related to each other is not possible to determine or identify. However, the present findings show that the patient's condition can be understood as weakness that is like a health-related problem. Not being able to carry out activities of daily living, regardless of the reasons, can be devastating for elderly people.

Consequently, and based on the present findings, we emphasise that older patients in need of EMS could suffer from frailty, and therefore must be treated and cared for as if they had weakened health. Accordingly, frailty is a common condition among the elderly population (Morley et al., 2006). Frailty is not a diagnosis; it is more of a clinical concept. We argue that frailty is a complex condition and should be included in "The International Statistical Classification of Diseases and Related Health Problems" (ICD-10). Concepts, for example in the form of diagnosis, are the basis for specific treatment, further investigation strategies and advice on lifestyle. Without a formulated diagnosis it can be difficult for the person experiencing either illness or ill health to be able to claim their rights to get help and support from relatives, healthcare professionals and society.

These findings of the complex condition have given a clearer picture and led to a consensus that this patient group could be able to be steered to the CH, GW or CCAC.

### **Clarified medical responsibility and interaction in the steering process between the healthcare providers**

In the developed PDS and DST, by input and reflection on key issues, we gained insights regarding medical responsibilities and the hand-over process. While creating a clear and shared standardised method we obtained a common and clear picture of the patient's holistic needs for treatment and care. This was crucial for the steering process.

These findings clarified the medical responsibility and hand-over process of the patient between EMS and the receiving units (GW or CCAC). The medical responsibility is always in the caregiver's hands, since that is where patient is located, even though the senior physician at the receiving unit has clarified admission during the telephone communication with the EMS personnel. In practice this means that during the EMS assignment, the medical responsibility always lies in the hands of the PEN.

Further on, the responsibility of the elderly patient is not shifted until the patient is in place, handed-over and has been properly over-reported to the receiving unit. Through clarity about who has to transfer the medical responsibility of the patient, and when, the risks of medical errors are minimized and the patient's safety will not be compromised.

The present findings regarding "right place" showed that a specific and critical issue in the EMS steering process is the willingness of the receiving unit to accept the patient. This finding has not been discussed in previously published studies. This (right place) is not only based on competence, medical, radiological and laboratory resource needs but also on overall political assignment and financial contracts with the receiving unit. We strongly suggest that healthcare providers address these questions and encourage collaboration between different professions and between different specialties.

### **The PEN's decision-making**

Professional prehospital emergency care – as shown in these findings – requires that the PEN make a advanced assessment of the patient's whole situation, not only based on physiological parameters. With openness to the situation and to the patient's needs the observations and clinical assessments power patient security. It is shown and according to Wireklint Sundström (2005), that the seemingly time-consuming dialogue with the patient facilitates understanding and decision-making regarding the patient's medical needs and simultaneous comforting the patient. Even in an acute and stressful situation, the patient perspective must be taken into consideration.

The PDS and use of the DST requires openness to the patient's lifeworld which creates understanding for the patient's situation of suffering and vulnerability. This caring approach creates possibility to avoid routines and overall assessment templates (Wireklint Sundström and Dahlberg, 2011). Prerequisites for obtaining the patient's confidence are a genuine wish by the caregiver to get close to the person behind the patient and support the person health and well-being. Such a caring encounter creates an environment where the patient dares to show himself and his dependence. The trustful climate can encourage the patient to provide richer information about her/his whole situation. This is important in order not to miss essential information that may be important for the PEN in deciding if the optimal healthcare for the geriatric patient is the GW or the CCAC at the CH. Furthermore, the patients' perspective in the EMS rejects all forms of polarisation of the medical care and caring science knowledge

(Hagiwara et al., 2011, Wireklint Sundström, 2005). For the patient there is only one assessment and treatment. The patient perspective implies that the act of PEN is based on a multi-disciplinary knowledge.

### **Assessment based on a mutual interaction**

In these findings it is made obvious that the decision-making concerning the geriatric patient and the optimal healthcare is based on interaction between the patient and the PEN. A well-functioning relationship between the caregiver and the patient is characterised by both parties being active in assessing and willing to listen and find agreement. With such an attitude willingness is adopted to meet a unique human being in the patient and the patient will experience more than one professional role in the caregiver (Nyström and Herlitz, 2009).

However to build a mutual interaction could be challenging. According to Toombs (1993) there can be a difference in the understanding perspective between caregiver and patient and the distance between them can be large. In such sensible situations – shown in present findings – most caregivers operates based on knowledge and empathy, which means assuming the responsibility for both the patient and the situation. The encounter must take place in the common understanding though the patient is dependent on the caregivers' actions (Lögstrup, 1994 ). In a constructive interdependence the power will be used to let the other person be autonomous (Strandberg et al., 2002). To further stimulate well-functioning relationship between the caregiver and geriatric patient, both should create a mutual picture of the patient's illness. This requires a willingness to listen and receive in dialogue.

## **6.1.2 It was safe to steer**

### **6.1.2.1 How was it safe to steer?**

Steering geriatric patients is an advanced assessment process, and the PDS and DST were developed to secure the patient's safety and to guide the PENs to make the correct decisions. The PENs in this study experienced that the steering DST was easy to use and it helped them to make the decision regarding which healthcare was most appropriate for the patient. Hagiwara et al. (2011) and Halter et al. (2011) indicate that DST is required in the EMS if steering is to be performed, and it improves the EMS personnel's clinical assessment and diagnostic.

### **Compliance with the system**

The findings showed that the PENs had a 71.4% compliance with the PDS, similar to Cheney et al. (2008) with a reported compliance of 71%. Non-compliance with the PDS and DST is issue of concern. The main reason why there was not a higher compliance was that PENs failed to consider all of the vital parameters on these patients, although the guidelines and protocols require it. Further on in 8 patient cases the patient vital signs were outside the reference frame. These reasons are similar to Cheney et al. (2008). We can only speculate that the senior physician at the receiving unit was comfortable with patients being steered to the unit. Direct admission was approved in all cases, even when the vital parameters were not measured.

Several published studies (Hauswald, 2002, Levine et al., 2006, Pointer et al., 2001, Porter et al., 2007, Snooks et al., 2005) have shown that paramedics and EMT have a limited ability to make decisions about which patients require admission to the ED and which require admission to alternative healthcare. Our study showed, in fact that the PEN has ability though a significant part (20%) of the non-urgent transportations of elderly patients could be steered by using a well-designed PDS and DST. With the correct PDS and DST, designed on the basis of the competence level of the prehospital nurse (nurse with advanced education) and the resources available at the receiving units, we now reports that it is indeed possible.

### **The number of secondary transports**

In this study there were 6.7 % secondary transports from the CH to the tertiary hospital, which indicates that these patients ended up with the wrong type of caregiver. The consequences of secondary transport are that these already vulnerable patients are exposed to an increased level of suffering. What makes the patient particularly vulnerable is if they are in need of an acute medical intervention only provided by the tertiary care; for example surgery and intensive care. It is important to point out that, in all of these patient cases, the PEN received approval for admission from the receiving physician and the time for the secondary transport was rather short. Furthermore, these complex patients received a good clinical comprehensive assessment from the CH that could later be used by the receiving clinic in the tertiary hospital. All six patients could be optimised for upcoming treatment at the tertiary hospital and all patients were discharged home after treatment was completed in the tertiary hospital. The numbers of secondary transports are similar to what Cheney et al. (2008) reported, 5.2% (2.7-9.5).

Can we require zero tolerance in secondary transport? Today transfers are a common phenomenon, after assessment in ED, among elderly patient. They often are transferred back and forth between different healthcare facilities (Kihlgren, 2005). We do not believe that a zero tolerance is possible but evaluation of secondary transports must focus on serious medical incidents with deadly outcome; for example cardiac infarction. To highlight patient (SFS, 2010:659) security, is of extra ordinary importance regarding EMS when supporting geriatric patient to optimal healthcare.

### **6.1.3 The patient's experiences of the choice of healthcare**

#### ***6.1.3.1 How the patient experienced the choice of care?***

This study discovered the complexity of the elderly patients' lived experiences when being offered an alternative care pathway, instead of traditional emergency healthcare at the ED. Their choice was to be treated as a unique human being, based on their previous experiences of acute emergency healthcare as well as on confidence in the PENs' advanced assessment and recommendations.

#### **Encounter with the EMS**

The findings show that the EMS was seen only as a transport for quick access to healthcare [hospital]. When an elderly person realizes that her/his self-help is no longer sufficient, it creates anxiety and insecurity. Their fear makes them immediately want to go to hospital for help, as uncertainty about their survival grows in intensity (Bowman, 2001). An ambulance is requested when the patients are incapable of making the journey on their own and the ambulance's arrival is perceived as a guarantee of getting to hospital (Ahl and Nyström, 2012).

Furthermore, a paradox emerged in the findings and showed that the elderly had low expectations concerning the EMS on the one hand, while on the other hand they had high expectations regarding the ability of the PENs competence to make healthcare decisions. One underlying clarification could be that this stands for some kind of traditional attitudes towards the EMS.

However, these findings also demonstrate that the elderly experienced that they were invited to a meaningful caring encounter and felt they were 'in good hands'. The elderly patients felt that they were the centre of the PEN's attention, which in turn led to a feeling of receiving good and secure healthcare. This could be understood to mean that one aim of the caring encounter was reached, that the help-seeker has the right to expect respect and help, which Svenaeus (2003) expresses as disease evoking the carer's responsibility. In agreement with Melby and Ryan (2005) and based on the present findings, it is strongly suggested that the ambulance care of elderly patients should include holistic assessment and care. This means that the carer, in her/his special assignments, is responsible by virtue of her/his medical and nursing knowledge and skills, for enhancing and promoting the patient's health and wellbeing.

#### **The patient's choice**

In accordance with Gadamer (1998), health is silent and when illness disturbs our life we are no longer free to participate in everyday activities and our life become limited. Consequently, this study shows how elderly patients' vulnerability findings in the, having total dependency on healthcare when health is failing. Disease in its more severe forms always reveals the helplessness and fragility of life. This is one of the main reasons why elderly patients choose to go to a CH instead of to the ED; they distance themselves from being treated inhumanely. In this study it is shown that when elderly patients were given the option of choosing healthcare performed by PEN, the patients saw this approach as a positive invitation to help. Thus it is shown that the elderly relied on the PEN's assignment, even though they could see the potential risk of the recommendation proving to be wrong. The elderly patients reflected on and weighed

the risks. Their previous memories of ED meetings, of experiencing unnecessary suffering, made them reject having to subject themselves to similar humiliations.

Complementing the findings of Dahlberg et al. (2009) and Berglund, Westin, Svanström and Johansson Sundler (2012), we therefore strongly suggest the application of a lifeworld-led care approach, which is more than merely patient-led care. Based on the present finding, we argue that the healthcare of elderly people must be lifeworld-centred both in the EMS and the ED as well as in the CH.

### **Patient participation**

The latest healthcare organisation models are based on a combination of the pursuit of improved efficiency (Mazzocato et al., 2010) and increased patient focus by giving the patient information and enabling them to participate in planning for healthcare (SFS (SFS, 2010:659), as well as respect for the individuals self-determination and integrity (SFS, 1982:763). In Sweden, there are on-going discussions about patients' free choice of care, which in practice means that patients have the right to choose healthcare provider they want to turn to for their medical needs. The central goal of the healthcare service is to increase the responsibility and decision-making by the patients, through increased patient participation.

However, our findings show that patient participation is still abstract and complex, despite extensive implementation. From a caring science perspective, patient participation means that the patient receives information individually, which is intended to encourage and empower the patient to become involved in her/his own healthcare and which requires focus on the interpersonal relationship between the patient and the caregiver (SFS, 2010:659). This highlights the requests of a caring atmosphere that enables the patient to be treated as a human being. The present findings underline how vital it is not to infringe the integrity of the patient. It is essential to avoid the patient becoming merely a spectator in her/his own care context, since this runs counter to the central goals of the healthcare service (SFS, 1982:763).

Complementing the findings of Eldh (2006), Sahlsten et al. (2007) and Johansson, Ekwall and Wihlborg (2011) it is strongly suggested that patient participation is about an admission of responsibility and it is also important to allow patients to gain a deeper understanding of their medical situation. Unfortunately, healthcare today consists of complex organisational structures that make it difficult for those seeking help to know where to turn in order to obtain optimal care. Furthermore, these complex organisations have difficulties taking into account the individual patient's needs, requirements and prerequisites to be able to influence and get involved in their own healthcare.

### **Memories of suffering from care**

The findings in this study made 'old' memories of suffering from care visible. Such suffering is, from a caring science perspective, unnecessary and meaningless and a result of healthcare actions that neglected the patients' perspective and experience (Arman et al., 2004, Nåden and Eriksson, 2004). Suffering from care has its origins in the care relationship or in the circumstances of care, such as medical errors or time delays, which create feelings of powerlessness. Consequently, a feeling of exclusion is



created, which in turn results in lack of opportunity for elderly patients to be involved in their own care. Complementing the findings of Berglund et al. (2012) we therefore argue that suffering from care needs to be understood as being caused by barriers to patient participation.

Complementing the findings of Nyström (2002) we found a lack of a holistic perspective. The elderly patients experienced the absence of holistic nursing care in the ED and they were abandoned to the arbitrariness of the caregiver when it came to willingness to provide care. This has been expressed as anxiety about the everyday routines that must be carried out regardless of other circumstances. The patients' anxieties about obtaining something to eat and drink, about routine medication, and other daily and fundamental human needs emerged; patients' powerlessness was made visible. Furthermore the results in these findings show how these feelings of powerlessness result in elderly patients growing resignation. Thus, when an elderly patient has to lie and wait for a long time to be attended to, she/he will probably avoid asking the emergency personnel for help with daily routine tasks. As Sahlsten et al. (2005) note, one hindrance to patient participation in nursing practice is shortcomings in building a trustful relationship. They discuss lack of insight, lack of knowledge and a paternalistic attitude as such shortcomings. Therefore it is crucial that an interpersonal encounter can develop making it possible for patients to express their needs. According to Nyström et al. (2002) and Wireklint Sundström and Dahlberg (2011b), nursing practices need to take account of patients' contribution to the care and decision-making processes. Consequently, and based on the present findings, we argue that healthcare must be lifeworld-centred, with special attention given to vulnerable old people.

Finally, our findings show that the elderly patients were satisfied with the choice of healthcare when it turned out to be the right decision for the individual, and they experienced that their choice fulfilled their care needs. According to Dahlberg et al. (2009) it could be understood as a lifeworld-led healthcare when elderly patient said that they felt respected by and properly attended by the caregiver. Such a caring approach led to the elderly feeling in control of their situation. The patients' integrity was respected – which increased patient participation - by creating an atmosphere where the patients gained the courage to express both their need for care and their basic human needs. This is clarified by one elderly patient's experiences that the caregiver is coming when she needed help. This response led to a feeling of being treated as a unique human being.

## 6.2 METHODOLOGICAL CONSIDERATIONS AND LIMITATIONS

Both qualitative and quantitative methods have been used to develop and evaluate a safe and feasible PDS for (I-III) PENs and to increase knowledge about patient participation (IV) in the new steering process. Multiple resources and methods have been used to allow the authors to draw conclusions about the acute emergency chain for geriatric patients. The methodological approach has addressed the development, validation and evaluation of the research findings. The qualitative data gives nuances to the findings that are impossible to catch with quantitative methods. But qualitative data is qualitative and should not be mixed up with any kind of conclusions that are obvious in quantitative methods. Overall, the generalisability of the findings is limited, but parts may be transferable into similar situations and context.

The collection of data from EMS ePCR (step one) might be considered as a limitation, when this type of data considered as the weakest form of collecting data, since there is a risk of bias and there is no way of evaluating that bias (Polit and Beck, 2008). Gathering retrospective data, in this study, from the ePCR system is consistent with the limitation that the data may have been incorrectly filled in and by analysing previously compiled information, inherent biases may exist. However, the strength in the analysis method was that we could select systemically and analyse data to gain a deeper understanding of the characteristics of the different medical conditions for this specific population.

The theoretical (step three) evaluation and validation of the PDS and DST showed a high degree of compliance, were no patients were triaged incorrectly by the PEN. The findings of the survey indicate that from theoretical point of view upon a high reliability. Reliability, criteria for assessing a quantitative instrument, is the degree of consistency or accuracy with an instrument measures an attribute. The higher the reliability of an instrument is, the lower the amount of error in obtained score (Polit and Beck, 2008). The survey was designed to obtain information about the prevalence, distribution, and interrelations of the variables within the PEN ability to triage and steer patients to optimal healthcare. The greatest advantage of survey research is that the respondents read the questionnaire on a written form and give their answers in writing (Polit and Beck, 2008). The questions in the survey were constructed on concrete response options, which have minimized the need to make a deeper interpretation of the responses. The questionnaire generated out in a quantitative data that was descriptively analysed.

Furthermore, in the questionnaire, the response rates of the PEN cannot be considered high, although they are probably as high as can be expected, considering that participation was voluntary. That 37% PEN responded and participated in the survey could be seen as a limitation. However, looking at the number of 211 answered surveys, we considered the rate acceptable. Patient security and safety has been a high priority in this study. Final decision on the validity and reliability of the PDS and DST was agreed upon in consultation with the group of external peer reviewers (selected specialists received from directors of the different clinics in tertiary care, GW, CCAC, and of the EMS).

The knowledge we gain from study *I* research steps I-III gave us confidence to the PDS and DST quality and safety. From this we started to evaluate the system in a clinical trial. The researches should continuously monitor the quality of their techniques by interim analysis. An interim analyses detect trends, needs of protocol modifications and in an early phase in the study process reveals safety and efficacy factors that can have negative impact on the patients' well-being and treatment (Armitage, 1991). Such awareness is of particular importance if the trial treatment leads to considerable patient suffering. Therefore an interim analysis was conducted in the beginning of this clinical trial. The interim analysis was also limited in that it was carried out using only two ambulance companies and included only one large city; consequently, the studied groups are quite different in size. Moreover, one specific issue regarding assessment and decisions is that the EMS personnel can have different qualifications in different countries and even within one country. We have only studied the potential for a Swedish PEN, with the competence that requires, using the PDS described in this study.

Study *II*, have made it possible to identify the complexity of the medical condition "general affected health condition" as a person experience frailty. The data was gathered from the ePCR and has a lot of limitations (see above study *I*). The selection offers however the major benefit of a large volume of original data, which is the basis for variation in the qualitative analysis (Krippendorff, 2004). Further, content analysis method was used to analyse the PEN written medical assessment and of the patients' experience of illness and discomfort. Content analysis method analysis narrative data to identify prominent themes and patterns among the themes (Polit and Beck, 2008). The gathered sample were representative for geriatric patients and the sample was large enough to be considered as a whole and small enough to be kept as a context for meaning unit during the analysis process. To increase reliability, the text was initially analysed independently by the first three authors (authors in study *II*, VV, BWS, ME). Continuing the analysis process, the research group discussed the findings, this being an awareness effort to maintain a balance between the researchers' pre-understanding and their openness to the content. Further analysis was then performed until consensus was reached.

The documentation in EMS ePCR should be considered as relatively poor, and these circumstances can be seen as limitations to the study design. In spite of this, we must be aware that it is a challenge to capture the patients' condition from a caring science perspective because the data relies on the ambulance personnel's abilities to understand and interpret the patients' conditions.

The interim analysis in study *I* analysis and findings strengthened the study *III* strategies, in particular regarding the design and patient safety. Weaknesses and strengths of the steering approach were laid out in a clear way. This brought to a directional information and education enhancing the security thinking and validity of the RCT.

The study *III* has been performed in a real-world clinical situation with significant clinical relevance. This study was conducted by a RCT. Randomisation involves placing objects into treatment conditions at random. This method is the most

trustworthy and acceptable method of equalizing groups. The strength of letting the EMD at the EMCC randomised the patients was that they only had three inclusion criteria, they did not have to take the patient medical condition in consideration. Furthermore, the inclusion criteria were standard question they normally ask the patient during the telephone contact. We believe the simplicity in the randomisation process made it easier for the EMD to remember to draw the randomisation envelop. There is also an additional factor to take into account, the EMCC dispatchers which are not trained in geriatrics and cannot evaluate these patients with very complex care needs in other ways than delivered over the phone.

A study limitation is also that only eleven medical conditions were included in the study.

We chose to add a randomisation process to get a clear separation between the two ambulance companies and to reduce the risk of selection bias in this complex heterogeneous group of elderly patients. Due to the decision of not letting one company use the PDS and DST, we have not been able to make comparisons between the two groups on the issue of primary and secondary outcomes. This might be considered as a limitation, however on the other hand it has been the strength. As earlier mentioned, patient security and safety has been a high priority in this study. The strength lies in having two ambulance companies so we could separate and receive two pure streamlined groups. This has meant that we could focus on the intervention group and follow it through the timeline. Furthermore, this has also been an important safety factor, though this steering method is new and that we previously have no research evaluation of triage and steer geriatric patients to a CH GW or to CCAC.

The study was limited to a sub-area of the capital of Sweden. Our study sample would only be generalisable to the geriatric patients' population at large in an urban or semi-urban environment. It may not be a viable option in smaller, more rural communities, since there is not the same range of geriatric units with specially trained geriatric competencies. However, the PDS method can be generalisable on other patient groups. For this to be a possibility it requires that healthcare providers interact and define which patients should be steered and to what destination.

The trustworthiness of the study *IV* was reinforced by the fact that two authors (VV, BWS) read the interviews independently of each other. The meanings were clustered into a meaning structure by the two authors and reflected on by the whole research team. This multi-professional team is a further guarantee for the analysis that has been carried out. Furthermore, the first author (VV) works as a PEN and has experience of taking care of elderly people in the EMS.

The RLR approach (Dahlberg et al., 2008) puts great demands on the researcher both in gathering data and in analysing it. There is a strong risk of applying preconceived understanding too soon, when the objective in phenomenological research is to reveal the lived experiences of the participants. Therefore, we practised one form of endurance throughout the research process by being 'uninformed' and 'not knowing' during interviews as well as during analysis. This approach involves maintaining openness to what the participants say or indicate, that is being observant and sensitive to the informants' lifeworld of experience. However, a qualitative researcher must recognise that one can never completely capture another person's experiences in the same way as

the person her-/himself. On the other hand, qualitative research has been neglected when it comes to patients' perspectives in the EMS, perspectives that underpin the value of the findings.

### **6.3 FURTHER RESEARCH**

Future research should be focused on prehospital management and organisation of acute emergency chain flows, finding solutions where the other care seekers, directly from homes can gain access to optimal healthcare, without passing the ED. Additionally research on safely PDS and DST is needed, adapting for new healthcare chains that goes towards other clinics such as infection, medical, surgery and psychiatry. And further conditions regarding elderly patients (addition to the eleven conditions) that could be possible for steering are needed to research and develop.

It is clearly necessary to gain deeper knowledge of how to increase elderly patients' participation; including how to promote their power in caring relations and their awareness of the EMS's opportunities regarding both medical and nursing care. The EMS in Sweden, staffed with PEN, should develop advanced assessments and documentations for elderly patients. The entire healthcare organisation will be forced to create healthcare systems which facilitate for the elderly patients to obtain healthcare.

## 7 CONCLUSIONS

- With the help of the created PDS and DST – developed for eleven medical conditions – the Swedish PEN could safely decide upon which optimal healthcare elderly patient should be steered and treated at. The PDS offer a reduced risk for being exposed for suffering from care for elderly patients.
- The concept of frailty can clarify the state of "general affected health condition", as either illness or ill-health. This offers a new assessment category and outlines care and treatment that strengthen and support the health and well-being of the individual elderly person. Furthermore, the concept of frailty ought to be included in "The International Statistical Classification of Diseases and Related Health Problems" (ICD-10).
- Patient participation in the choice of a healthcare when being offered an alternative care pathway by the EMS provides an opportunity to avoid suffering from care and being objectified.

## 8 Svensk sammanfattning (Summery in Swedish)

Ambulanssjukvården i Stockholm har cirka 165 000 uppdrag per år och cirka 52 % av patienterna är i åldern 65 år eller äldre (AISAB, 2009). Ambulansuppdragen kommer från larmoperatörerna på prioriterings- och dirigeringscentralen (SOS Alarm AB). Ambulans tilldelas beroende på patientens akuta tillstånd och den symtombild som patienten uppger. Ambulansuppdragen kan ha olika prioriteringsgrad från högsta prioritet (blåljus och siren) till transportuppdrag. Nästan alla ambulanspatienter transporteras idag till en akutmottagning och detta är oavsett patientens hälsotillstånd eller allvarlighetsgrad (SOSFS, 2009:10). Prehospital akutsjukvård och behandling påbörjas redan där patienten befinner sig, exempelvis vid olycksplatsen eller i patientens hem. Svenska ambulanssjuksköterskor är specialistutbildade och har en bred bas av kunskaper och färdigheter för att ge bästa möjliga prehospitala akutsjukvård (Elmqvist et al., 2008, Suserud, 2005, Wireklint Sundström and Dahlberg, 2012, Wireklint Sundström and Dahlberg, 2011).

Äldre personer nyttjar ambulanssjukvården mer frekvent jämfört med yngre personer. Cirka 20% av alla akuta besök på en akutmottagningen görs av äldre ( $\geq 65$  år) och dessa patienter har längre vistelsetid på akuten än de yngre patienterna (Samaras et al., 2010). Studier visar att äldre multisjuka patienter utgör en utsatt patientgrupp, inte bara för att de oftare drabbas av flera sjukdomar med atypiska symtom, men också för att vården inte anpassas efter deras behov. Studier visar att en akutmottagning inte alltid är den optimala platsen för dessa patienter då akutpersonalen, både akutläkare och sjuksköterskor, inte är utbildade i ett geriatriskt förhållningssätt (Ellis et al., 2011, Salvi et al., 2007).

Akuta omhändertagandet av äldre måste förbättras. Inte endast genom en ökad geriatrisk kunskap (medicin och omvårdnad) på akutmottagning, utan även genom att hitta nya organisatoriska och logistiska lösningar inom hälso- och sjukvården för att möjliggöra den bästa vården för äldre patienter. Detta är en utmanande uppgift då hälso- och sjukvården under det senaste decenniet blivit mer och mer komplex. Vårdgivare tar emot och behandlar patienter i enlighet med tilldelat uppdrag från beställarna (HSF). Vissa sjukhus har samma patientuppdrag som tidigare men utlokaliserade på olika upptagningsområden och andra sjukhus bedriver specialistsjukvård, till exempel inom traumavård (Robertson-Steel, 2006).

Mot bakgrund av att nästan alla ambulanstransporter går till närmaste akutmottagning medför det att vissa patienter blir förflyttade till ett annat sjukhus med specifika behandlingsmöjligheter utifrån patientens vårdbehov.

Ambulanssjukvården kan genom prehospital patientstyrning ta ett centralt ansvar för det akuta omhändertagandet av äldre patienter. Det skapar förutsättning för att äldre snabbt får tillgång till specifik sjukvård anpassad efter deras medicinska tillstånd och vårdbehov.

Avhandlingsarbetets övergripande syftet var att optimera det akuta omhändertagandet av äldre patienter och säkerställa att de får vård på optimal vårdnivå baserat på medicinskt vårdbehov. Avhandlingens delsyften är att:

- I. Skapa ett genomförbart och säkert prehospitalt styrningssystem (PDS) och beslutsstöd (DST), för att stödja specialistutbildade ambulanssjuksköterskor till att kunna styra den äldre patienten till en optimal vård.
- II. Identifiera och tydliggöra tillståndet bakom bedömningskategorin ”påverkat allmäntillstånd” hos äldre.
- III. Utvärdera säkerheten och genomförbarheten av ett PDS med tillhörande DST, som medför att PEN kan transportera geriatriska patienter, beroende på deras medicinska behov, direkt till antingen en geriatrisk vårdavdelning, närakut eller till en akutmottagning.
- IV. Beskriva äldre patienters levda erfarenhet av patientdelaktighet i vårdvalet när de av ambulanssjukvården blivit erbjudna en alternativ vårdinstans.

Studiernas ansatser har varit dels kvantitativa (studie *I* och *III*) och dels kvalitativa (studie *II* och *IV*). Samtliga studier genomfördes i Stockholm, Sverige.

**Delstudie I:** För att kunna skapa ett PDS och DST genomfördes fyra konsekutiva steg, där första steget var en deskriptiv analys av 1006 ambulansjournaler med syfte att identifiera lämpliga patientkategorier för styrning till en närakut eller en geriatrisk klinik. Detta resulterade i elva bedömda tillstånd, 1. Urinvägsbesvär, 2. Yrsel, 3. Andningsbesvär KOL, 4. Andningsbesvär/Lunginflammation, 5. Diabetes, 6. Feber, 7. Hypotoni, 8. Påverkat allmäntillstånd, 9. Ryggsmärta/ryggkontusion, 10. Fall/skador och olycksfall i samma plan, 11. Höfttrauma. Vidare i steg två, rådförades en expertgrupp, bestående av läkare inom medicin, kirurgi, geriatrik och ambulanssjukvård. Syftet var att bland annat från ett organisatoriskt och logistiskt perspektiv identifiera praktiska krav för att säkert kunna styra patienter till optimal vård. Vidare diskuterades utifrån ett medicinskt perspektiv, konsensus kring vad som krävdes för att tillmötesgå den äldre patientens medicinska och omvårdnadsbehov. Krav på kompetensen hos mottagande personal, resurskapacitet och uppdragets karaktär diskuterades. Resultatet frambringade ett PDS med tillhörande DST. DST valideras och utvärderas i steg tre, med ett skriftligt prov bestående av en enkät som skickades till ambulanssjuksköterskorna. Trettiosju procent av de tillfrågade ambulanssjuksköterskorna svarade. Totalt inkom 234 enkätsvar var av 211 analyserades. Resultatet av valideringen av PDS och DST visade en hög följsamhet till systemet, då inga patienter blev triagerade eller styrda felaktigt. I steg fyra, utvärderades genomförbarhet och säkerhet genom en interimanalys av den prospektiva randomiserade studien (RCT) (*III*). Interimanalysens syfte var att identifiera negativa trender, behov av protokollrevideringar, att i ett tidigt skede i randomiseringsstudien stärka säkerheten i styrningsprocessen och identifiera möjliga negativa faktorer som kunde inverka på patienternas välbefinnande och medicinska behandling. Resultatet, utifrån primär endpoint, av totalt 110 randomiserade geriatriska patienter (interventionsgrupp) visade att 33,9 procent (95 % Konfidensintervall; 23.3 till 46.3)



kunde säkert och effektivt styras till närakut eller geriatrisk klinik. Inga sekundärtransporterade inom 24 timmar från närakut eller geriatrisk klinik förekom.

**Delstudie II:** För att kunna identifiera och tydliggöra ambulanspersonalens tillämpning av bedömningskategorin ”påverkat allmäntillstånd” hos äldre patienter, baseras studie II på en kvalitativ innehållsanalys av Elo och Kyngäs (2008) där ambulanspersonalens journalanteckningar analyserades utgående från ett vårdvetenskapligt perspektiv. Anledningen till att detta bedömda tillstånd analyserades var att det var oklart vad tillståndet företrädde. Av totalt 1106 ambulansjournaler analyserades 88 efter en stratifierad randomisering. Resultatet visade att det bedömda tillståndet kan förstås och refereras till patienter med skörhet. Det framkom att en progressiv svaghet och ett ökat beroende kunde orsaka att äldre sökte vård, vilket i sin tur ledde till att deras kontrollerade och fungerande liv omkullkastades. Orsaker till ökad svaghet identifierades i analysen som ålderssvaghet, brist på näring, inaktivitet och sjukdomslidande. Förvirring, desorientering och brist på förståelse i samband med demens identifierades också som orsaker till patienternas ökade svaghet. I vilken riktning (orsaken till svagheten) och hur underkategorierna i denna studie är relaterade till varandra är inte möjligt att identifiera. Utifrån detta resultat avgjordes att patienter bedömda som påverkat allmäntillstånd var lämpliga att inkludera i styrning mot närakut eller geriatrisk klinik.

**Delstudie III:** Studien genomfördes för att utvärdera om den specialistutbildade ambulanssjuksköterskan (PEN) med stöd av PDS och DST säkert kunde styra geriatriska patienter till en optimal vård på närakut eller geriatrisk klinik. Säkerhet och genomförbarhet utvärderades i en prospektiv randomiserad studie i Stockholm (även kallad GEPARD studien).

Totalt 806 geriatriska patienter randomiserades in i studien och efter exkludering kvarstod 666 patienter. Skälen till exkludering framkommer i figur 9. Av de 666 patienterna randomiserades 449 (67,4%) till interventionsgruppen och 217 (32,6%) patienter fick standardbehandling (kontrollgrupp). Resultatet visade att 90 patienter i interventionsgruppen kunde styras till närakut eller geriatrisk klinik vilket motsvarar andelen styrda 20% (95% Konfidensintervall; 16,6 till 24,0). Vidare visade resultatet att sex patienter i interventionsgruppen krävde sekundärtransport inom 24 timmar från närakut eller geriatrisk klinik till akutsjukhusets akutmottagning. Andelen var 6,7 % (95 % Konfidensintervall; 3,1 till 13,8). Anledningen till sekundärtransporterna presenteras i tabell 4. Sekundärtransport indikerar att dessa sex patienter vårdades av fel vårdgivare. Det är viktigt att påpeka att i samtliga dessa patientfall, fick ambulanssjuksköterskan godkännande av bakjour att styra till mottagande enhet. Samtliga sex patienter blev medicinskt optimerade inför kommande sekundärtransport och behandling till akutsjukhuset. Samtliga blev utskrivna efter avslutad behandling. Utvärderingen av ambulanssjuksköterskans följsamhet till PDS och DST visade på en god överensstämmelse och följsamhet (se figur 10). Ambulanssjuksköterskan identifierade korrekt patienternas medicinska tillstånd i alla patientfall. Dock visade resultatet att i 22 patientfall saknades dokumenterade vitala parametrar, trots att detta var ett krav i styrningsprocessen. Trots avsaknad av dokumentation i samtliga av dessa patientfall, fick ambulanssjuksköterskan godkännande av bakjour att styra till mottagande enhet. Vidare nekades 15 patienter tillträde till närakut eller en geriatrisk

linik. Detta på grund av brist på vårdplatser eller stängd röntgenavdelning (under sommarmånaderna). Uppdragstiden för ambulansuppdragen mot akutmottagningen på akutsjukhuset visade inga skillnader mellan interventionsgrupp, som var 54 min (95 % Konfidensintervall; 17-131 min) och kontrollgrupp, som var 55 min (95% Konfidensintervall; 24-147 min). Uppdragstiden för ambulansuppdragen i interventionsgruppen visade en uppdragstid mot närakuten i genomsnitt på 55 minuter, (95% Konfidensintervall; 16 till 98 minuter) och mot geriatrisk klinik i genomsnitt på 57 minuter (95% Konfidensintervall; 29 to 125 minuter) (Tabell 5). Orsakerna till att tiderna inte skilde sig från varandra kan vi bara spekulera kring. Det kan ha med närakutens eller en geriatrisk vårdavdelnings geografiska placering att göra. Till sist visade resultatet att patienternas vistelsetid på akuten varierade signifikant mellan interventions- och kontrollgruppen. Patientens "ankomsttid – läkare tid" visade att interventionsgruppen hade en mediantid på 68 minuter (95 % Konfidensintervall; 0 till 621) och kontrollgruppen 89 minuter (95% Konfidensintervall; 0 till 624) ( $p = 0,024$ ). Även "ankomsttid – urladdningstid" visade en skillnad mellan de två grupperna med interventionsgruppens mediantid på 262 minuter (8 till 765) och kontrollgruppens 288 minuter (65 till 1394) ( $p = 0,021$ ) (se tabell 5).

**Delstudie IV:** För att kunna beskriva äldre patients levda erfarenheter av deltagande i vårdvalet av alternativ vårdinstans användes kvalitativa intervjuer av 11 geriatriska patienter som erfarit av att bli styrda mot en närakut eller en geriatrisk vårdavdelning. Studien genomfördes utgående från ett vårdvetenskapligt perspektiv och en fenomenologisk ansats där data analyserades för att beskriva innebörden av fenomenet. I analysen framkom det fem meningsbärande konstituenten: uthärdlig väntan, snabb förflyttning, ett möte som berör, professionell kompetens och vårdval grundat på vårdlidande. Resultatet påvisade att den äldre väljer bort ett vårdlidande och risken av att bli inhumant bemött.

### Slutssats

- Med hjälp av det utformade prehospitla styrningssystemet (PDS) och beslutstödet (DST) – utvecklat för elva medicinska tillstånd – kan den svenska ambulanssjuksköterskan säkert besluta om vilken optimal vård som geriatriska patienter ska styras mot och behandlas på utifrån deras medicinska vårdbehov. Det prehospitla styrningssystemet minskar risken för den äldre patienten att utsättas för vårdlidande.
- Begreppet skörhet (frailty) kan klargöra tillstånd "allmänt påverkade hälsotillstånd", som antingen sjukdom eller ohälsa. Detta möjliggör en ny bedömningskategori och beskriver vård och behandling som stärker och stödjer hälsa och välbefinnande för den enskilde äldre personen. Vidare rekommenderas att skörhetsbegreppet inkluderas i "The International Statistical Classification of Diseases and Related Health Problems" (ICD-10).
- Patientdelaktighet i vårdvalet, när patienten av ambulanssjukvården blivit erbjuden en alternativ vårdinstans, tillhandahåller en möjlighet att undvika vårdlidande och bli objektiviserad.

## 9 ACKNOWLEDGEMENTS

I have been fortunate, during my years as PhD student, to meet many people that have given me support and encouragement. I would like to express my sincere gratitude to all of you and I would especially like to thank:

**Maaret Castrén**, my supervisor, for sharing your wisdom. You have rubbed off your passion for improving EMS healthcare. It has not always been easy but you showed me to never give up, *“it going to be fine”* - and it has been! Like Jeanne d’Arc, the history says that she is the patron saint of soldiers, and you have been that for me.

**Birgitta Wireklint Sundström**, my co-supervisor, I do not know how I would have managed my four last years without you; you have been a rock to lean on both regarding Healthcare Science and as a senior researcher. You are my Athena.

**Fredrik Sjöstrand**, my co-supervisor, our journey has been exciting; some periods have been more intense than others. I remember how we sat for hours and worked together to find patients who could be steered to the CCAC and GW. Your geriatric knowledge has been invaluable. You’ve been there for me and I highly value your enthusiasm and encouragement.

**Katarina Bohm**, my mentor and friend, you have shared your experience of the world of research, both in front of and behind the scenes. A mentor is responsible for an adept’s personal development which you have done with honour. You have been very important in my development as a researcher, you made me strong.

**Leif Svensson**, thank you for making it possible for me to start my research career at the Stockholm Prehospital Centre at Södersjukhuset.

All in Maaret Castrén’s research group at KI-Södersjukhuset, colleagues and doctoral student, **Ahmadreza Djalali, Annika Berglund, Helena Borovszky Sjölin, Lars Stureson, Lisa Kurland, Martin Nordberg and Veronica Lindström**, thank you all for being there and for your support.

**Milka Dinevik**, you are an intellectually gifted person that has helped me throughout my doctoral journey. Thanks for all hours of discussions and reflections on life, people and especially on the ambulance service. It is a pleasure to have you as a friend and to work with you.

**Ralph Bolander**, for your invaluable medical and organizational expertise. Without it, geriatric patients steering process wouldn’t be safe. You have done a lot for me in my development in the ambulance service. Our collaboration has been extraordinary, and I have a great respect for you as a person and for your knowledge.

**Kurt Berntsson**, thank you for believing in me and for all your support during your days as director of department at AISAB. You have made me grow as a person by the humanist you are.

**Åke Östman**, you were the one who hired me on AISAB, which I do not regret for a day. Today, you are my boss. Thank you for all the good things you are doing for me. You make me feel that I together with rest of the personnel at AISAB, are an essential part on our common journey in AISABs future and development.

Thank you all ambulance personnel from **AISAB** and **Falck Ambulans AB** for your participation in my studies. With your knowledge and enthusiasm you have given the geriatric patient a better outcome.

Thank you all personnel at **SOS Alarm**, in your participation in successful GEPARD project.

Thank you all personal and hospital management at **Nacka Geriatriken** and **Nacka Närakut**.

Thank you **Göran Wåström**, **Martin Annetorp**, **Eva Henriksen** and **Camilla Olli** for being there for me and for your financial support at the end of my research period: Without your support I wouldn't be able to defend my thesis today, 31 January 2013.

Thank you **Clas Fröhling**, **Torkel Ekqvist** och **Rainer Tihvan** at Fotolabbet on SÖS, **Gabriel Kotowski** and **Allan Borg** for an excellent collaboration and for the nice pictures that you created for my research.

Thanks to all my friends, for just being a friend and for believing in me and by giving me confidence to finish this thesis, especially **Esmeralda Iversjö** and **Kvitter Javelin**.

Last but not at least my family!

My father **Antonio** and my mother **Annkattrin**. My sisters **Maria** and **Diana** and their children, **Nick**, **Nellie** and **Amanda** and my brother **Patrik**. You are the meaning of my life, I love you all.

## 10 REFERENCES

Use your Reference Managing Program or insert Endnotes, within Word, in the text to make the List of Reference. Delete this text.

- AHL, C. & NYSTRÖM, M. 2012. To handle the unexpected - the meaning of caring in pre-hospital emergency care. *International Emergency Nursing*, 20, 33-41.
- AISAB 2009. Ambulanssjukvården i Stockholm (AISAB) - Kvalitetsmål: Uppsatta kvalitetsmål för ambulanssjukvården (Ambulance service in Stockholm (AISAB) - Quality goals: The quality of ambulance service). Stockholm.
- ALTMAYER, C. A., ARDAL, S., WOODWARD, G. L. & SCHULL, M. J. 2005. Variation in emergency department visits for conditions that may be treated in alternative primary care settings. *Canadian Journal of Emergency Medicine*, 7, 252-256.
- AMINZADEH, F. & DALZIEL, W. B. 2002. Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Annals of Emergency Medicine* 39, 238-247.
- AMINZADEH, F., DALZIEL, W. B., MOLNAR, F. J. & ALIE, J. 2004. An examination of the health profile, service use and care needs of older adults in residential care facilities. *Canadian Journal on Aging* 23, 281-296.
- ARMAN, M., REHNSFELDT, A., LINDHOLM, L., HAMRIN, E. & ERIKSSON, K. 2004. Suffering related to health care: a study of breast cancer patients' experiences. *International Journal of Nursing Practice*, 10, 248-256.
- ARMITAGE, P. 1991. Interim analysis in clinical trials. *Statistics in Medicine* 10, 925-935; discussion 936-937.
- BAKER, M. S. 2007. Creating order from chaos: part I: triage, initial care, and tactical considerations in mass casualty and disaster response. *Military Medicine* 172, 232-236.
- BAKER, S. P., O'NEILL, B., HADDON, W., JR. & LONG, W. B. 1974. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *Journal of Trauma*, 14, 187-196.
- BENIUK, K., BOYLE, A. A. & CLARKSON, P. J. 2011. Emergency department crowding: prioritising quantified crowding measures using a Delphi study. *Emergency Medicine Journal* 868-871
- BERGLIN BLOHM, M., NILSSON, G., KARLSSON, T. & HERLITZ, J. 1998. The possibility of influencing components of hospital delay time within emergency departments among patients with ST-elevation in the initial electrocardiogram. *European Journal of Emergency Medicine*, 5, 289-296.
- BERGLUND, M., WESTIN, L., SVANSTRÖM, R. & SUNDLER, A. J. 2012. Suffering caused by care--patients' experiences from hospital settings. *International Journal of Qualitative Studies on Health and Well-being*, 7, 1-9.
- BORTZ, W. 2010. Understanding frailty. *The Journals of Gerontology* 65, 255-256; discussion 257.
- BORTZ, W. M., 2ND 2002. A conceptual framework of frailty: a review. *Journal of Gerontology*, 57, 283-288.
- BOSTICK, N. A., SUBBARAO, I., BURKLE, F. M., JR., HSU, E. B., ARMSTRONG, J. H. & JAMES, J. J. 2008. Disaster triage systems for large-scale catastrophic events. *Disaster Medicine and Public Health Preparedness*, 2 Suppl 1, 35-39.
- BOWMAN, G. S. 2001. Emotions and illness. *Journal of Advanced Nursing* 34, 256-263.

- BREMER, A., DAHLBERG, K. & SANDMAN, L. 2012. Balancing Between Closeness and Distance: Emergency Medical Services Personnel's Experiences of Caring for Families at Out-of-Hospital Cardiac Arrest and Sudden Death. *Prehospital and Disaster Medicine*, 27, 42-52.
- BYSZEWSKI, A. M., MOLNAR, F. J., AMINZADEH, F., EISNER, M., GARDEZI, F. & BASSETT, R. 2007. Dementia diagnosis disclosure: a study of patient and caregiver perspectives. *Alzheimer Disease & Associated Disorders*, 21, 107-114.
- CAMPBELL, A. J. & BUCHNER, D. M. 1997. Unstable disability and the fluctuations of frailty. *Age Ageing*, 26, 315-318.
- CENTRAL BUREAU OF STATISTICS. 2012. *Central Bureau of Statistics. Population statistics of different age groups in Sweden*. [Online]. Available from: <http://www.scb.se>. [Accessed 12 december 2012].
- CHENEY, P., HADDOCK, T., SANCHEZ, L., ERNST, A. & WEISS, S. 2008. Safety and compliance with an emergency medical service direct psychiatric center transport protocol. *American Journal of Emergency Medicine* 26, 750-756.
- DAHLBERG, K., DAHLBERG, H., & NYSTRÖM, M. 2008. *Reflective lifeworld research* Lund, Sweden, Studentlitteratur AB.
- DAHLBERG, K. & SEGESTEN, K. 2010. *Hälsa och vårdande- I teori och praktik (Health and caring- in theory and practice)*, Stockholm, Nature and culture.
- DAHLBERG, K., TODRES, L. & GALVIN, K. 2009. Lifeworld-led healthcare is more than patient-led care: an existential view of well-being. *Medicine, Health Care and Philosophy* 12, 265-271.
- DE LUCA, A., TONI, D., LAURIA, L., SACCHETTI, M. L., GIORGI ROSSI, P., FERRI, M., PUCA, E., PRENCIPE, M. & GUASTICCHI, G. 2009. An emergency clinical pathway for stroke patients--results of a cluster randomised trial (isrctn41456865). *BMC Health Services Research* 9, 1-14.
- DEHLIN, O. & RUNDGREN, Å. 2007. *Geriatrisk (Geriatric)*, Studentlitteratur AB.
- DI BARI, M., BALZI, D., ROBERTS, A. T., BARCHIELLI, A., FUMAGALLI, S., UNGAR, A., BANDINELLI, S., DE ALFIERI, W., GABBANI, L. & MARCHIONNI, N. 2010. Prognostic stratification of older persons based on simple administrative data: development and validation of the "Silver Code," to be used in emergency department triage. *Journals of Gerontology*, 65, 159-164.
- DURAND, A. C., GENTILE, S., DEVICTOR, B., PALAZZOLO, S., VIGNALLY, P., GERBEAUX, P. & SAMBUC, R. 2011. ED patients: how nonurgent are they? Systematic review of the emergency medicine literature. *American Journal of Emergency Medicine*, 29, 333-345.
- EKELUND, U., KURLAND, L., EKLUND, F., TORKKI, P., LETTERSTAL, A., LINDMARKER, P. & CASTREN, M. 2011. Patient throughput times and inflow patterns in Swedish emergency departments. A basis for ANSWER, A National Swedish Emergency Registry. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 19, 37.
- ELDH, A. C. 2006. *Patient participation -what it is and what it is not*. Doctoral thesis, Örebro University.
- ELLIS, G., WHITEHEAD, M. A., O'NEILL, D., LANGHORNE, P. & ROBINSON, D. 2011. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane database of systematic reviews* CD006211.
- ELMQVIST, C., FRIDLUND, B. & EKEBERGH, M. 2008. More than medical treatment: the patient's first encounter with prehospital emergency care. *International Emergency Nursing* 16, 185-192.
- ELO, S. & KYNGAS, H. 2008. The qualitative content analysis process. *Journal of Advanced Nursing* 62, 107-115.

- EMS MEDICAL GUIDELINES IN STOCKHOLM COUNTY COUNCIL. 2012. Medicinska riktlinjer för Ambulanssjukvården i Stockholms läns landsting (*Medical guidelines for ambulance care in Stockholm County Council*) Stockholm: Available from: <http://www.webbhotell.sll.se/prehospitala/Medicinska-riktlinjer/>.
- ENCYCLOPEDIA. 2012. *The Oxford Pocket Dictionary of Current English* [Online]. Available from: [www.Encyclopedia.com](http://www.Encyclopedia.com). [Accessed 12 december 2012].
- ERIKSSON, K. 2002. Caring science in a new key. *Nursing Science Quarterly*, 15, 61-65.
- FARROHKNIA, N., CASTREN, M., EHRENBORG, A., LIND, L., OREDSSON, S., JONSSON, H., ASPLUND, K. & GÖRANSSON, K. E. 2011. Emergency department triage scales and their components: a systematic review of the scientific evidence. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 19, 42.
- FRIED, L. P., FERRUCCI, L., DARER, J., WILLIAMSON, J. D. & ANDERSON, G. 2004. Untangling the concepts of disability, frailty, and comorbidity: implications for improved targeting and care. *Journals of Gerontology* 59, 255-263.
- FRIED, L. P., TANGEN, C. M., WALSTON, J., NEWMAN, A. B., HIRSCH, C., GOTTDIENER, J., SEEMAN, T., TRACY, R., KOP, W. J., BURKE, G. & MCBURNIE, M. A. 2001. Frailty in older adults: evidence for a phenotype. *Journals of Gerontology* 56, 146-156.
- GADAMER, H. 1998. The enigma of health *European Journal of Psychotherapy & Counselling*, Volume 1, 33 - 42.
- GEORGE, G., JELL, C. & TODD, B. S. 2006. Effect of population ageing on emergency department speed and efficiency: a historical perspective from a district general hospital in the UK. *Emergency Medicine Journal* 23, 379-383.
- GOBBENS, R. J., LUIJKX, K. G., WIJNEN-SPONSELEE, M. T. & SCHOLS, J. M. 2010. Toward a conceptual definition of frail community dwelling older people. *Nursing Outlook* 58, 76-86.
- GRIEF, C. L. 2003. Patterns of ED use and perceptions of the elderly regarding their emergency care: a synthesis of recent research. *Journal of Emergency Nursing* 29, 122-126.
- GRUMBACH, K., KEANE, D. & BINDMAN, A. 1993. Primary care and public emergency department overcrowding. *American Journal of Public Health*, 83, 372-378.
- GÅRDELÖF, B. 2011. Swedish anesthesiology history: From ambulance transport service to advanced emergency care - ambulance care development in Sweden. *SFAI-Tidningen*, 17, 7.
- GÖRANSSON, K. E., EHRENBORG, A. & EHNFORSS, M. 2005. Triage in emergency departments: national survey. *Journal of Clinical Nursing* 14, 1067-1074.
- HAGIWARA, M., HENRICSON, M., JONSSON, A. & SUSERUD, B. O. 2011. Decision-support tool in prehospital care: a systematic review of randomized trials. *Prehospital & Disaster Medicine*, 26, 319-329.
- HALTER, M., VERNON, S., SNOOKS, H., PORTER, A., CLOSE, J., MOORE, F. & PORZ, S. 2011. Complexity of the decision-making process of ambulance staff for assessment and referral of older people who have fallen: a qualitative study. *Emergency Medicine Journal* 28, 44-50.
- HAUSWALD, M. 2002. Can paramedics safely decide which patients do not need ambulance transport or emergency department care? *Prehospital Emergency Care*, 6, 383-386.

- HELSINKI, D. O. 2012. *World Medical Association. Declaration of Helsinki: ethical principles for medical research involving human subjects*. [Online]. Available at: <http://www.wma.net/en/30publications/10policies/b3/>. . [Accessed 15 december 2012].
- HERLITZ, J., WIREKLINT SUNDSTRÖM, B., BÅNG, A., BERGLUND, A., SVENSSON, L. & BLOMSTRAND, C. 2010. Early identification and delay to treatment in myocardial infarction and stroke: differences and similarities. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 18, 48.
- HOLMBERG, M. & FAGERBERG, I. 2010. The encounter with the unknown: Nurses lived experiences of their responsibility for the care of the patient in the Swedish ambulance service. *International Journal of Qualitative Studies on Health and Well-being*, 5.
- JOHANSSON, A., EKWALL, A. & WIHLBORG, J. 2011. Patient satisfaction with ambulance care services: survey from two districts in southern Sweden. *International Emergency Nursing* 19, 86-89.
- JONSSON, P. V., FINNE-SOVERI, H., JENSDOTTIR, A. B., LJUNGGREN, G., BUCHT, G., GRUE, E. V., NORO, A., BJÖRNSON, J., JONSEN, E. & SCHROLL, M. 2006. Co-morbidity and functional limitation in older patients underreported in medical records in Nordic Acute Care Hospitals when compared with the MDS-AC instrument. *Age Ageing*, 35, 434-438.
- KAROLINSKA INSTITUTET, S. H. 2012. Study programme syllabus, Graduate diploma in nursing. 180 Credits. In: INSTITUTET, K. (ed.). Stockholm: <http://ki.se/utbildningsprogram/1S210?academicYear=11/12>.
- KIHLGREN, A. 2005. *Older patients in transition- From home care toward emergency care*. Thesis for doctoral degree, Karolinska Institutet.
- KRIPPENDORFF, K. 2004. *Content Analysis: An Introduction to Its Methodology*, Thousand Oaks USA Sage Publications Inc.
- LALLY, F. & CROME, P. 2007. Understanding frailty. *Postgraduate Medical Journal* 83, 16-20.
- LARSSON, G. & HOLGERS, K. M. 2011. Fast-track care for patients with suspected hip fracture. *Injury*, 42, 1257-1261.
- LEVERS, M. J., ESTABROOKS, C. A. & ROSS KERR, J. C. 2006. Factors contributing to frailty: literature review. *Journal of Advanced Nursing* 56, 282-291.
- LEVINE, S. D., COLWELL, C. B., PONS, P. T., GRAVITZ, C., HAUKOOS, J. S. & MCVANEY, K. E. 2006. How well do paramedics predict admission to the hospital? A prospective study. *Journal of Emergency Medicine* 31, 1-5.
- LINDSTRÖM, V. 2012. *Feedback between dispatch centre and ambulance- Strengthening the chain of care*. Doctoral thesis, Karolinska Institutet.
- LOCKETT, D., AMINZADEH, F. & EDWARDS, N. 2002. Development and evaluation of an instrument to measure seniors' attitudes toward the use of bathroom grab bars. *Public Health Nurs*, 19, 390-7.
- LÖGSTRUP, K. E. 1994 *The ethical requirement*, Daidalos.
- MAZZOCATO, P., SAVAGE, C., BROMMELS, M., ARONSSON, H. & THOR, J. 2010. Lean thinking in healthcare: a realist review of the literature. *Quality and Safety Health Care*, 19, 376-382.
- MCCUSKER, J., BELLAVANCE, F., CARDIN, S., TREPANIER, S., VERDON, J. & ARDMAN, O. 1999. Detection of older people at increased risk of adverse health outcomes after an emergency visit: the ISAR screening tool. *Journal of the American Geriatrics Society* 47, 1229-1237.



- MCCUSKER, J., CARDIN, S., BELLAVANCE, F. & BELZILE, E. 2000. Return to the emergency department among elders: patterns and predictors. *Academic Emergency Medicine*, 7, 249-259.
- MELBY, V. & RYAN, A. 2005. Caring for older people in prehospital emergency care: can nurses make a difference? *Journal of Clinical Nursing* 14, 1141-1150.
- MELDON, S. W., MION, L. C., PALMER, R. M., DREW, B. L., CONNOR, J. T., LEWICKI, L. J., BASS, D. M. & EMERMAN, C. L. 2003. A brief risk-stratification tool to predict repeat emergency department visits and hospitalizations in older patients discharged from the emergency department. *Academic Emergency Medicine* 10, 224-232.
- MORLEY, J. E., HAREN, M. T., ROLLAND, Y. & KIM, M. J. 2006. Frailty. *Medical Clinics of North America* 90, 837-847.
- MORSE, J. M. 2001. Toward a praxis theory of suffering. *Advances in Nursing Science journal* 24, 47-59.
- NORO, A., POSS, J. W., HIRDES, J. P., FINNE-SOVERI, H., LJUNGGREN, G., BJORNSSON, J., SCHROLL, M. & JONSSON, P. V. 2011. Method for Assigning Priority Levels in Acute Care (MAPLe-AC) predicts outcomes of acute hospital care of older persons--a cross-national validation. *BMC Med Inform Decis Mak*, 11, 1-14.
- NYSTRÖM, M. 2002. Inadequate nursing care in an emergency care unit in Sweden. Lack of a holistic perspective. *J Holist Nurs*, 20, 403-17.
- NÅDEN, D. & ERIKSSON, K. 2004. Understanding the importance of values and moral attitudes in nursing care in preserving human dignity. *Nursing Science Quarterly*, 17, 86-91.
- OLOFSSON, P., GELLERSTEDT, M. & CARLSTRÖM, E. D. 2009. Manchester Triage in Sweden - interrater reliability and accuracy. *International Emergency Nursing* 17, 143-148.
- OREDSSON, S., JONSSON, H., ROGNES, J., LIND, L., GÖRANSSON, K. E., EHRENBORG, A., ASPLUND, K., CASTREN, M. & FARROHKNIA, N. 2011. A systematic review of triage-related interventions to improve patient flow in emergency departments. *Scandinavian Journal of Trauma, Resuscitation and Emergency*, 19, 43.
- OXFORD REFERENCE, E. 2012. *Dictionaries & Reference online* [Online]. Available from: [http://www.oxfordreference.com.proxy.kib.ki.se/views/SEARCH\\_RESULTS.html?x=0&y=0&q=triage&ssid=1312448121&scope=global&time=0.714773404137169](http://www.oxfordreference.com.proxy.kib.ki.se/views/SEARCH_RESULTS.html?x=0&y=0&q=triage&ssid=1312448121&scope=global&time=0.714773404137169). [Accessed 12 december 2012].
- POINTER, J. E., LEVITT, M. A., YOUNG, J. C., PROMES, S. B., MESSANA, B. J. & ADER, M. E. 2001. Can paramedics using guidelines accurately triage patients? *Annals of Emergency Medicine* 38, 268-277.
- POLIT, D. & BECK, C. 2008. *Nursing research- Generating and Assessing Evidens for Nursing Practice*, Philadelphia, Lippincott Williams & Wilkins.
- PORTER, A., SNOOKS, H., YOUREN, A., GAZE, S., WHITFIELD, R., RAPPORT, F. & WOOLLARD, M. 2007. 'Should I stay or should I go?' Deciding whether to go to hospital after a 999 call. *Journal of Health Services Research & Policy*, 12 Suppl 1, 1-32-38.
- ROBERTS, D. C., MCKAY, M. P. & SHAFFER, A. 2008. Increasing rates of emergency department visits for elderly patients in the United States, 1993 to 2003. *Annals of Emergency Medicine* 51, 769-774.
- ROBERTSON-STEEL, I. 2006. Evolution of triage systems. *Emergency Medicine Journal* 23, 154-155.

- ROSS, M. A., COMPTON, S., RICHARDSON, D., JONES, R., NITTIS, T. & WILSON, A. 2003. The use and effectiveness of an emergency department observation unit for elderly patients. *Annals of Emergency Medicine* 41, 668-677.
- ROWLAND, K., MAITRA, A. K., RICHARDSON, D. A., HUDSON, K. & WOODHOUSE, K. W. 1990. The discharge of elderly patients from an accident and emergency department: functional changes and risk of readmission. *Age Ageing*, 19, 415-418.
- PROCUREMENT OF EMS IN STOCKHOLM COUNTY COUNCIL. 2011. Uppshandling av prioritering och dirigerande av prehospitala enheter SLL 1140 (*Procurement of prioritization and directing prehospital unit SCC1140*). Stockholm: Available from: <http://www.sll.se/upload/Bilaga%201%20Specifik%20uppdraagsbeskrivning%20och%20uppf%C3%B6ljning.pdf>
- RUNCIMAN, P., CURRIE, C. T., NICOL, M., GREEN, L. & MCKAY, V. 1996. Discharge of elderly people from an accident and emergency department: evaluation of health visitor follow-up. *Journal of Advanced Nursing* 24, 711-718.
- RUTSCHMANN, O. T., CHEVALLEY, T., ZUMWALD, C., LUTHY, C., VERMEULEN, B. & SARASIN, F. P. 2005. Pitfalls in the emergency department triage of frail elderly patients without specific complaints. *Swiss Medical Weekly*, 135, 145-150.
- SAHLSTEN, M. J., LARSSON, I. E., PLOS, K. A. & LINDENCRONA, C. S. 2005. Hindrance for patient participation in nursing care. *Scandinavian Journal of Caring Sciences* 19, 223-229.
- SAHLSTEN, M. J., LARSSON, I. E., SJÖSTRÖM, B., LINDENCRONA, C. S. & PLOS, K. A. 2007. Patient participation in nursing care: towards a concept clarification from a nurse perspective. *Journal of Clinical Nursing* 16, 630-637.
- SALVI, F., MORICHI, V., GRILLI, A., GIORGI, R., DE TOMMASO, G. & DESSI-FULGHERI, P. 2007. The elderly in the emergency department: a critical review of problems and solutions. *Internal and Emergency Medicine*, 2, 292-301.
- SAMARAS, N., CHEVALLEY, T., SAMARAS, D. & GOLD, G. 2010. Older patients in the emergency department: a review. *Annals of Emergency Medicine* 56, 261-269.
- SCHUMACHER, J. G. 2005. Emergency medicine and older adults: continuing challenges and opportunities. *American Journal of Emergency Medicine*, 23, 556-560.
- SFS 1982:763. Hälso- och sjukvårdslagen. (The Health and Medical Services Care Act, Revised 1998: 1659). . In: National Board of Health and Welfare (ed.). Stockholm, Sweden: Available from: <http://socialstyrelsen.se>.
- SFS 2010:659. Patientsäkerhetslag (The patient security law) In: National Board of Health and Welfare. (ed.). Stockholm, Sweden: Available from: <http://socialstyrelsen.se>.
- SINGAL, B. M., HEDGES, J. R., ROUSSEAU, E. W., SANDERS, A. B., BERSTEIN, E., MCNAMARA, R. M. & HOGAN, T. M. 1992. Geriatric patient emergency visits. Part I: Comparison of visits by geriatric and younger patients. *Annals of Emergency Medicine* 21, 802-807.
- SNOOKS, H. A., KEARSLEY, N., DALE, J., HALTER, M., REDHEAD, J. & FOSTER, J. 2005. Gaps between policy, protocols and practice: a qualitative study of the views and practice of emergency ambulance staff concerning the

- care of patients with non-urgent needs. *Quality and Safety Health Care*, 14, 251-257.
- SOSFS 2009:10. Socialstyrelsens föreskrifter om ambulanssjukvård. Socialstyrelsens föfattningssamling (*Regulations from the National Board of Health and Welfare about the Ambulance Service*). Available from: [http://www.socialstyrelsen.se/sosfs/Sidor/sosfs-search.aspx?q=Socialstyrelsens%20f%C3%B6reskrifter%20om%20ambulanssjukv%C3%A5rd.%20&defqe=hidden%3A\(url%3Asosfs%2F\\*%20AND%20-meta%3Asiteseeker.archived%3Aarchived\)](http://www.socialstyrelsen.se/sosfs/Sidor/sosfs-search.aspx?q=Socialstyrelsens%20f%C3%B6reskrifter%20om%20ambulanssjukv%C3%A5rd.%20&defqe=hidden%3A(url%3Asosfs%2F*%20AND%20-meta%3Asiteseeker.archived%3Aarchived)).
- STRANDBERG, G., ÅSTRÖM, G. & NORBERG, A. 2002. Struggling to be/show oneself valuable and worthy to get care. One aspect of the meaning of being dependent on care--a study of one patient, his wife and two of his professional nurses. *Scandinavian Journal of Caring Sciences* 16, 43-51.
- SUSERUD, B.-O. 1998. *The role of the nurse in Swedish prehospital emergency care*. Doctoral thesis, University of Göteborg.
- SUSERUD, B. O. 2001. Emergency nursing in Sweden. *Emergency Nurse*, 9, 10-13.
- SUSERUD, B. O. 2005. A new profession in the pre-hospital care field--the ambulance nurse. *Nursing in Critical Care* 10, 269-271.
- SVENAEUS, F. 2003. Hermeneutics of medicine in the wake of Gadamer: the issue of phronesis. *Theor Med Bioeth*, 24, 407-431.
- SÄFWENBERG, U. 2008. [Emergency care physicians gaining ground. 162 internships already one year after the new specialty was established]. *Läkartidningen*, 105, 205-206.
- THE NATIONAL BOARD OF HEALTH AND WELFARE. 2005. *Folkhälsorapport (Public Health Report)*.
- THE NATIONAL BOARD OF HEALTH AND WELFARE . 2006. Hur tas äldre patienter om hand på akutmottagning, en nationell verksamhetstillsyn 2006 (*How are elderly care in the emergency department, a national operations supervision 2006*).
- THE NATIONAL BOARD OF HEALTH AND WELFARE. 2008a. *Vård och omsorg om äldre: Lägesrapport (Health and social care for older people:Status report)*.
- THE NATIONAL BOARD OF HEALTH AND WELFARE. 2012. *Kompetensbeskrivning, legitimerad sjuksköterska med specialistsjuksköterskeexamen med inriktning mot ambulanssjukvård. (Description of Competence for Registered Nurse with Graduate Diploma in Specialist Nursing - Ambulance medical service). In: NURSING, N. A. F. A. N. A. T. S. S. O. (ed.). Available from: <http://www.socialstyrelsen.se/Sidor/SimpleSearchPage.aspx?q=Kompetensbeskrivning,%20legitimerad%20sjuksk%C3%B6terska%20med%20specialistsjuksk%C3%B6terskeexamen%20med%20inriktning%20mot%20ambulanssjukv%C3%A5rd.%20&defqe=hidden:-meta:siteseeker.archived:archived>.*
- THE NATIONAL BOARD OF HEALTH AND WELFARE. 2008b. *Nationella riktlinjer för hjärtsjukvård, Bilaga 3 till beslutsstödsdokument– Metod (National guidelines for cardiac care Appendix 3 to the decision document- Method)*.
- TOOMBS, K. 1993 *The meaning of illness - a phenomenological account of the different perspectives of physician and patient.*, Boston Philosophy and Medicine, 42, Kluwer Academic Publishers.
- WHO, W. H. O. 2012. *Definition of an older or elderly person* [Online]. Available from: <http://www.who.int/healthinfo/survey/ageingdefnolder/en/index.html>. [Accessed 12 december 2012].
- WINOGRAD, C. H., GERETY, M. B., CHUNG, M., GOLDSTEIN, M. K., DOMINGUEZ, F., JR. & VALLONE, R. 1991. Screening for frailty: criteria

- and predictors of outcomes. *Scandinavian Journal of Caring Sciences* 39, 778-784.
- WIREKLINT SUNDSTRÖM, B. 2005. *Förberedd på att vara Oförberedd. En Fenomenologisk Studie av Vårdande Bedömning och dess Lärande i Ambulanssjukvård (Preperd to be Unpreperd. A Phenomenological Study of Assessment with a Caring Approach and How it can be Learned in the Ambulance Services)* PhD, University of Växjö of Sweden.
- WIREKLINT SUNDSTRÖM, B. & DAHLBERG, K. 2011. Caring assessment in the Swedish ambulance services relieves suffering and enables safe decisions. *International Emergency Nursing* 19, 113-119.
- WIREKLINT SUNDSTRÖM, B. & DAHLBERG, K. 2012. Being prepared for the unprepared: a phenomenology field study of Swedish prehospital care. *Journal of Emergency Nursing* 38, 571-577.
- WIREKLINT SUNDSTRÖM, B. & EKEBERGH, M. 2012. How caring assessment is learnt –reflective writing on the examination of Specialist Ambulance Nurses in Sweden. *Reflective Practice Journal*, 1-17.
- WOOLLARD, M., SMITH, A. & ELWOOD, P. 2001. Pre-hospital aspirin for suspected myocardial infarction and acute coronary syndromes: a headache for paramedics? *Emergency Medicine Journal* 18, 478-481.

# 11 APPENDIX

## 11.1 ELEVEN PREHOSPITAL DECISION SUPPORT TOOLS

### 11.1.1 Urinary disorder with/without catheter

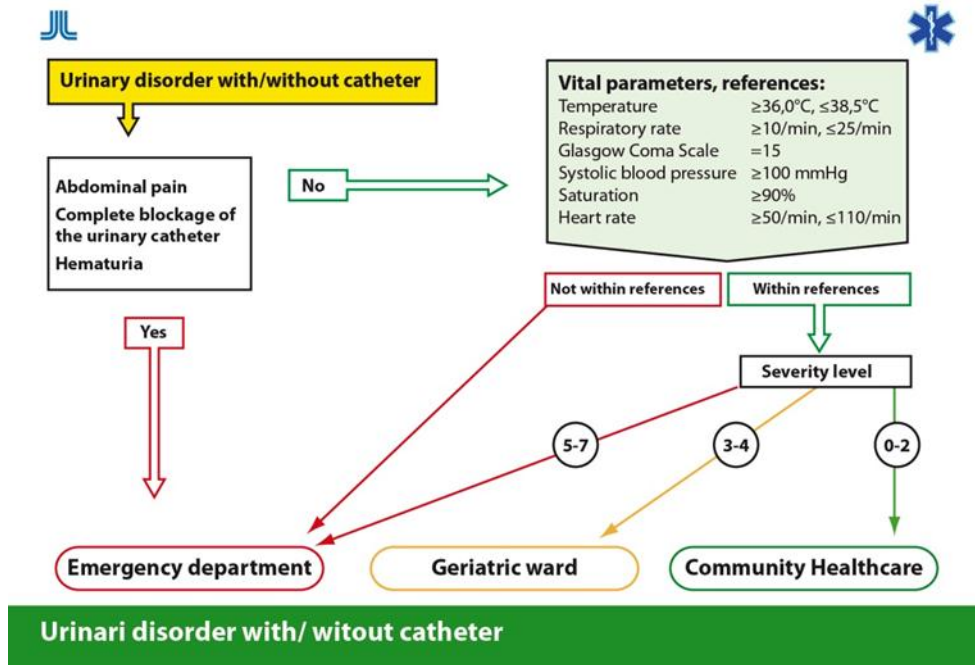


Figure 11: DST- Urinary disorder with/without catheter

### 11.1.2 Fever

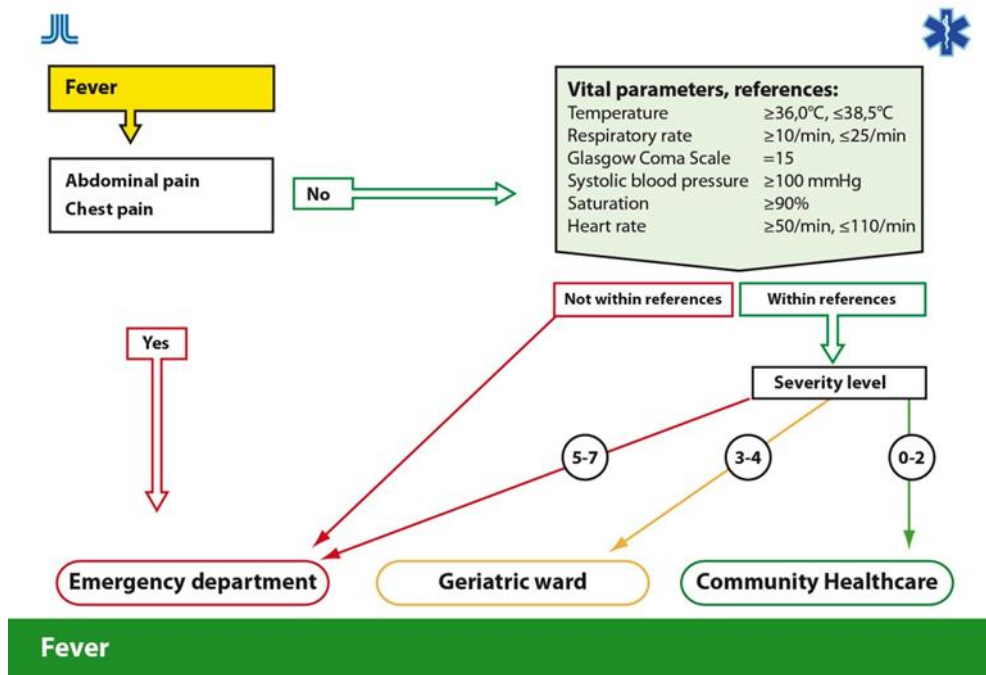


Figure 12: DST- Fever

### 11.1.3 Diabetes

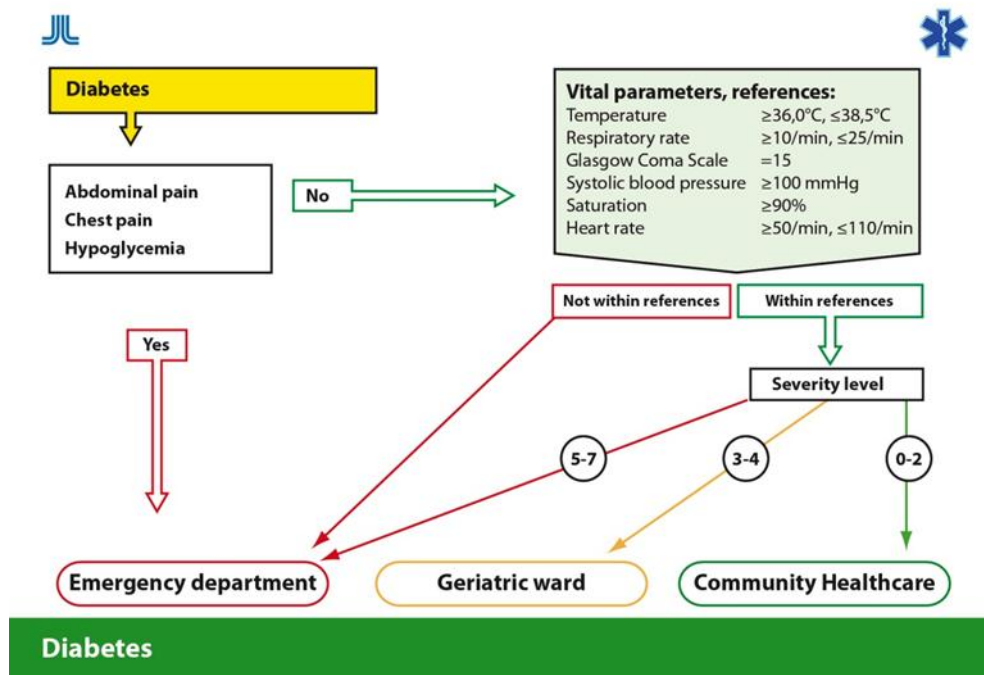


Figure 13: DST- Diabetes

### 11.1.4 Dizziness

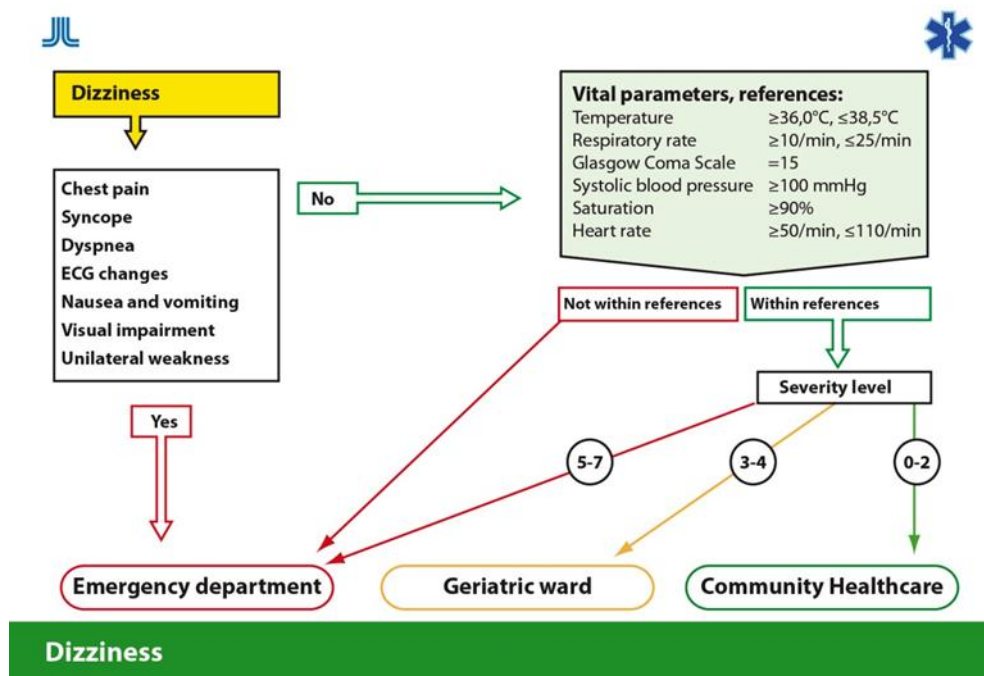


Figure 14: DST- Dizziness



### 11.1.5 Pneumonia

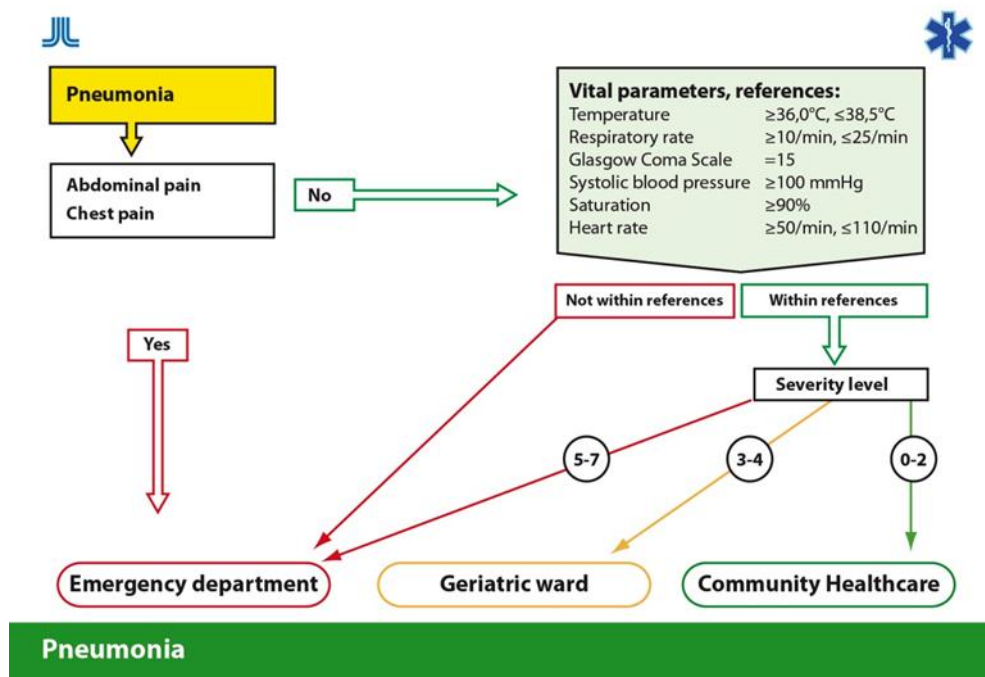


Figure 15: DST- Pneumonia

### 11.1.6 COPD

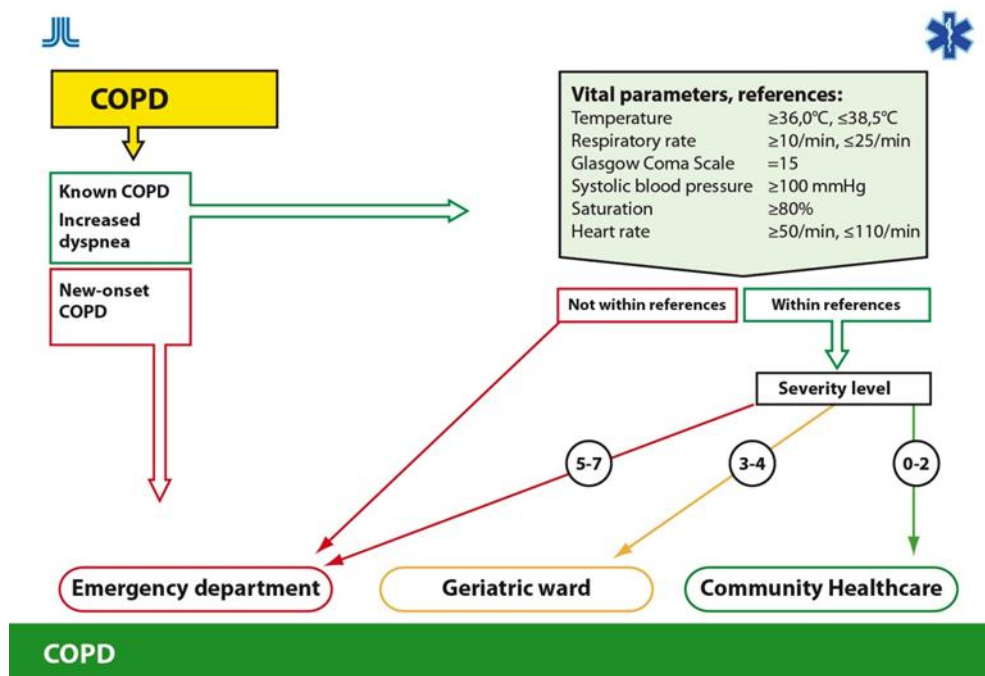


Figure 16: DST- Chronic Obstructive Pulmonary Disease

### 11.1.7 Frailty

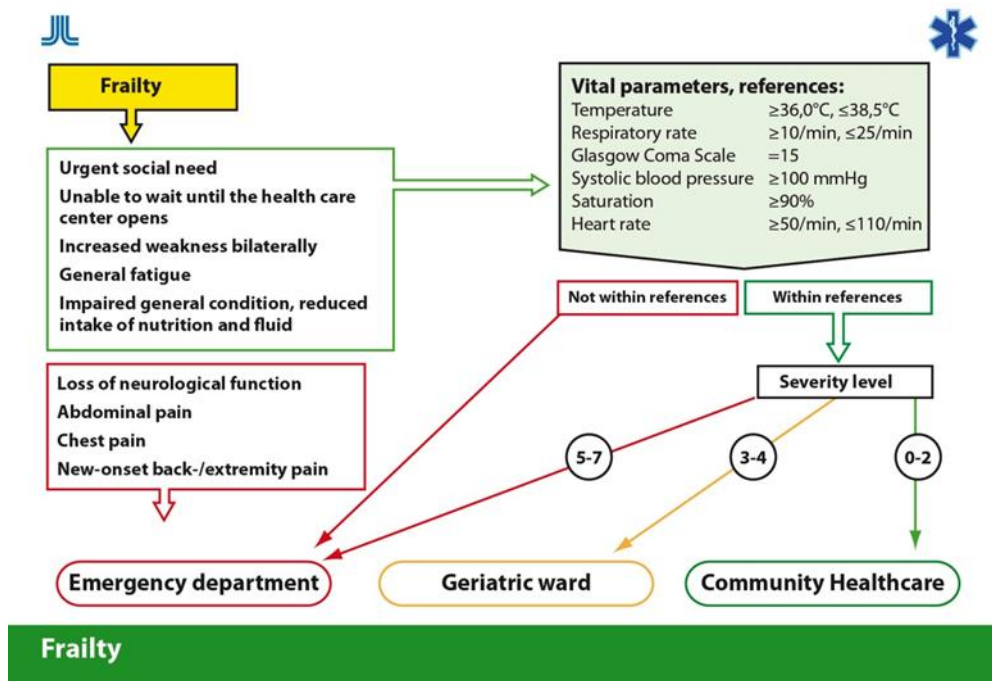


Figure 17: DST- Frailty

### 11.1.8 Population criteria: Frailty

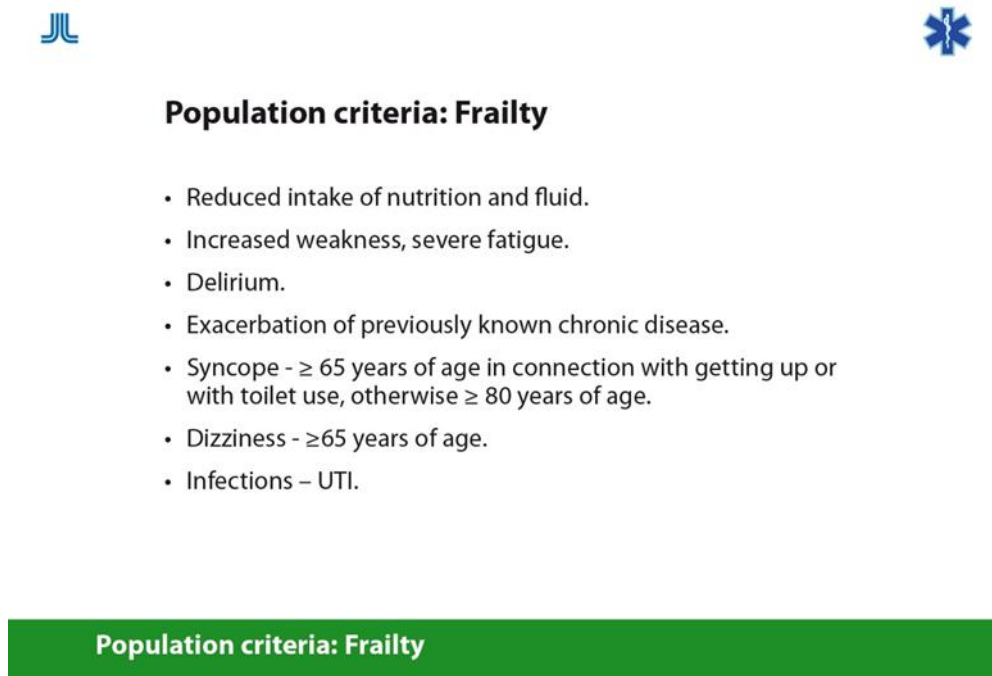


Figure 18: DST- Population criteria: Frailty



### 11.1.9 Back pain/Contusion of back

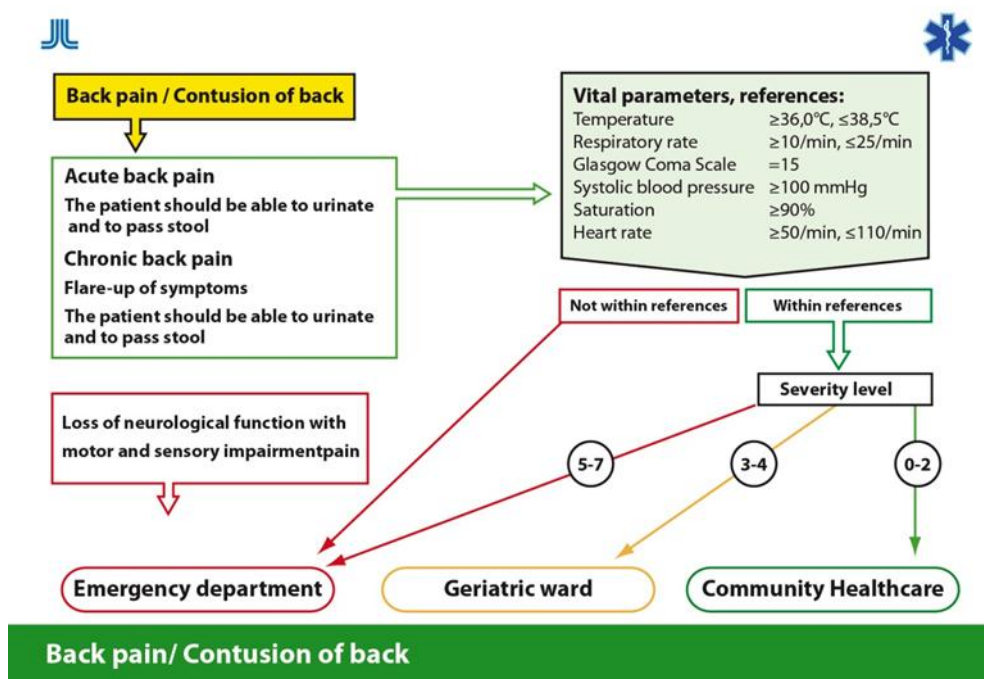


Figure 19: DST- Back pain/Contusion

### 11.1.10 Falls on the same level (low-energy trauma) And Hip trauma (without suspicion of femur fracture)

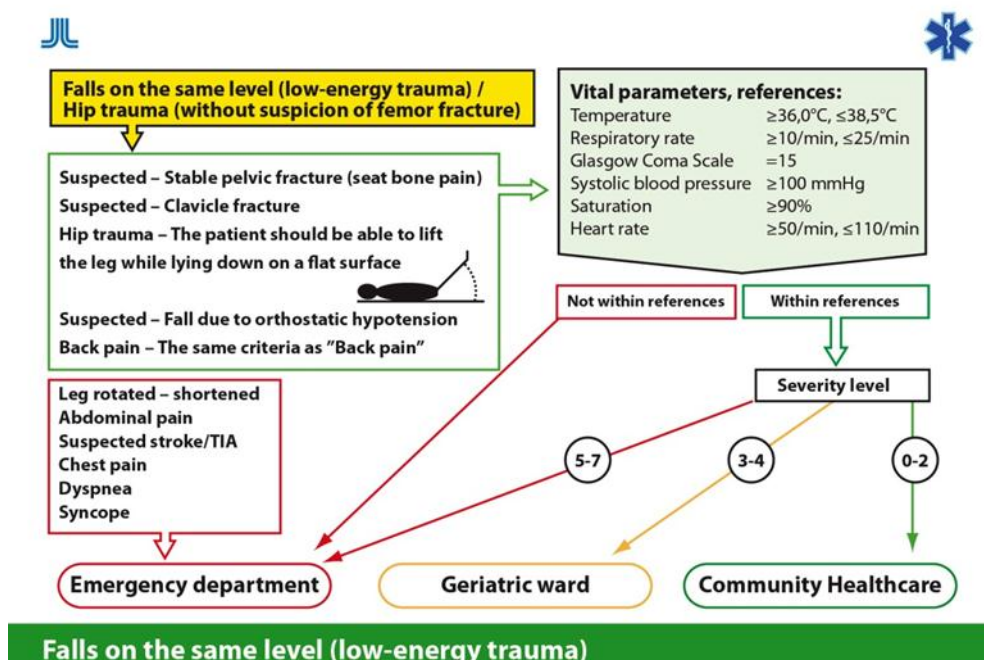


Figure 20: DST- Falls on the same level (low-energy trauma) And Hip trauma (without suspicion of femur fracture)

### 11.1.11 Hypotension

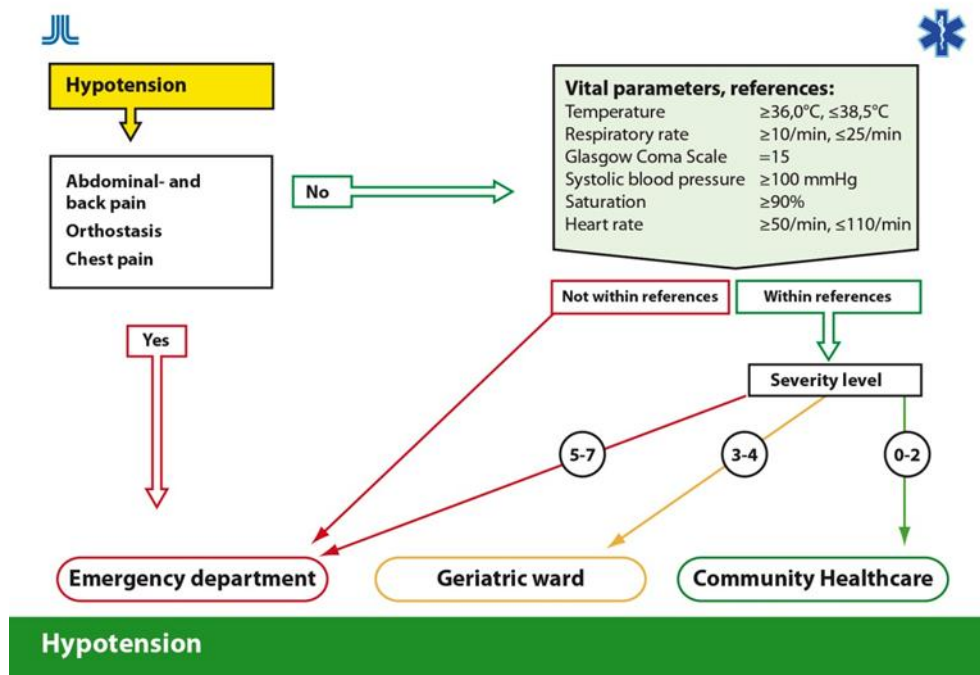


Figure 21: DST- Hypotension