

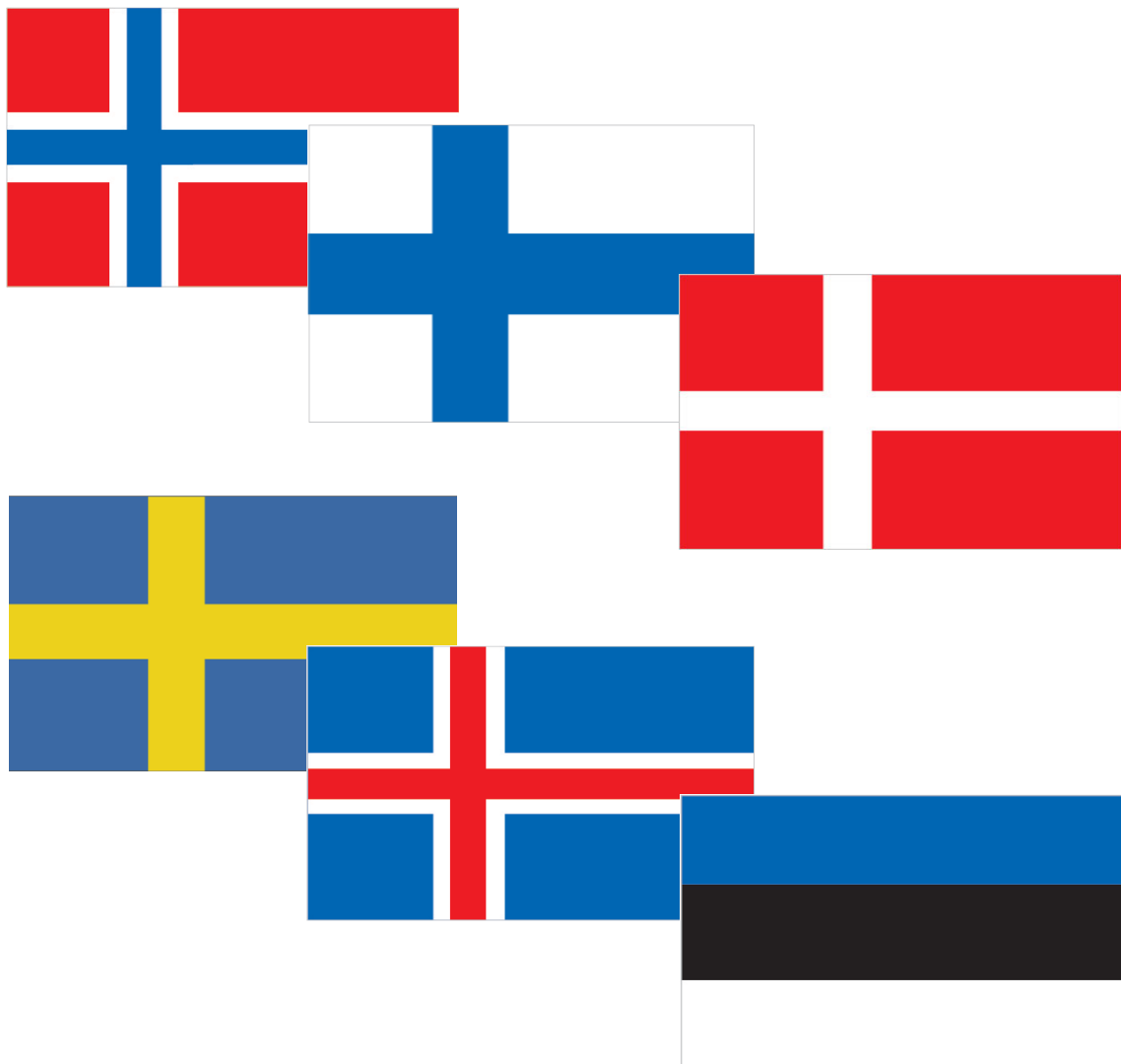
# THE NORDIC PREHOSPITAL EMERGENCY MEDICAL SERVICES (NORDIC-EMS)

PROJECT ON DATACOLLECTION AND BENCHMARKING

2021 12 30

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## Report 2



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# 1 BACKGROUND

## 1.1 Nordic-EMS project – data collection and benchmarking

Emergency Medical Services (EMS) or prehospital services consist of the Emergency Medical Dispatch (EMD), the ambulance services, medical doctors, first responders and other prehospital resources. In this report the focus is on the EMD and the ambulance service.

This co-operation between the Nordic countries started in 2013 and was formalized in 2014 through a mandate from the respective countries' health directors (/equivalent). Estonia joined the cooperation in 2020.

A first report from this group was published in 2019 - The Nordic Emergency Medical Services - PROJECT ON DATA COLLECTION AND BENCHMARKING 2014 - 2018. Parts of the text and descriptions in this new report (Report 2) are taken from the first report.

Link to the first report: [The Nordic Emergency Medical Services Benchmarking Report 2014-2018.pdf \(helsedirektoratet.no\)](https://helsedirektoratet.no/Link?cid=124023&cid2=124023)

The EMS are in transition in the Nordic countries with similar trends worldwide. Increase in population, longer life expectancy and a rapidly growing elderly population increase the need for health care services, including EMS out of hospital. The percentage of growth in the number of calls to the emergency medical number has exceeded the population increase.<sup>1</sup> Centralizing and specializing, both in hospital health care and primary health care, also strengthens the need for well-organized EMS in the future. In most countries the expenditure on EMS is increasing as a result of this trend.

The health care services are increasingly being transferred out of the hospital setting, and the ability for prehospital assessment, diagnostic and treatment demands improved qualifications for the prehospital personnel to enable them to start advanced and appropriate care and medical treatment to heterogeneous patient groups often with complex medical background. This improvement in qualification could prevent unnecessary hospitalization and improve quality of care and prevention for the patient.

## 1.2 Why quality indicators are important

The established EMS systems provide important benefits to the public. The EMS provides immediate medical care in response to individual health emergencies and they also play an important role in responding to disasters that threaten the health and safety of the public at large. EMS have not traditionally received the same recognition and support from policymakers as other parts of specialized health care services or hospital services, despite its relevance to health care access and medical outcomes. However, we recognize there has been a shift in policy the last couple of years and are now more often identified as one of the key elements in reshaping and planning tomorrow's healthcare.

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<sup>1</sup> NOU 2015: 17, Først og fremst – Et helhetlig system for håndtering av akutte sykdommer og skader utenfor sykehus

The Nordic EMS, just like EMS worldwide, have a limited tradition of measuring performance and quality indicators to health effects. There is scarce documentation on survival and limited scientific publications and few quality indicators except for those that relate to response time.<sup>2</sup>

A European Emergency Data project published in 2006, identified developments for the future for five quality indicators to be included in the European Community Health Indicators (ECHI) short list.<sup>3</sup> That report has been an inspiration for the Nordic countries and lead to joined forces.

## 1.3 Organizing of the project

### Participating countries and representatives

All the Nordic countries and Estonian decided to join the project with the following government representatives and experts from different parts of the EMS in the countries and researchers have contributed in this part of the project:

Lasse Ilkka, FI,	The Ministry of Social Affairs and Health
Jouni Kurola, FI,	The Hospital District of Kuopio University Hospital
Tom Silfvast, FI	The Hospital District of Helsinki and Uusimaa
Palle Juelsgaard, DK	Emergency Medical Services, North Denmark Region
Erika Frischknecht Christensen, DK	Center for Prehospital and Emergency Research, Aalborg University
Thomas Blomberg, SE	The Federation of Leaders in Swedish Ambulance and Emergency services (FLISA)
Stig Holmberg, SE	The Federation of Leaders in Swedish Ambulance and Emergency services (FLISA)
Glenn Larsson, SE	The Federation of Leaders in Swedish Ambulance and Emergency services (FLISA)
Viðar Magnússon, IS	National Director for Pre-hospital Emergency Services
Steinar Olsen, NO	The Norwegian Directorate of Health
Håkon Haaheim, NO	The Norwegian Directorate of Health
Janne Kristin Kjøllestad, NO	The Norwegian Directorate of Health
Ragnar Vaiknemets, EE	Ministry of Social Affairs, Dep. Health System Development
Marko Tähnas, EE	Estonian Health Insurance Fund, Dep. Partner Communication
Mariliis Jukk, EE	Health Board, Dep. Emergency medicine
Dag Gjestebý	Helseplan Consulting Group AB Norway
Amanda Gyllenswärd	Helseplan Consulting Group AB Sweden

Lasse Ilkka and Steinar Olsen has been the project managers and Dag Gjestebý and Amanda Gyllenswärd has been the secretariat of the project.

## 1.4 Objective and organization

The objective of the Nordic EMS project was to identify and develop common quality indicators of the EMS systems to develop comparable data to support improvement of patient safety and quality in the Nordic EMS systems.

<sup>2</sup> JEMS December 2017: Quality Indicators. Measuring EMS quality in the Nordic countries

<sup>3</sup> European Emergency Data Project 2006: Health Monitoring & Benchmarking of European EMS Systems: Components, Indicators, Recommendations.

A common framework was created including definitions of concept and terms, common use of medical classification, data collection structures for EMS and template for description of the identified Nordic EMS quality indicators.

The work has been organized in four working groups:

- Assess, treat and release, chair Erika F. Christensen
- Out of Hospital Cardiac Arrest (OHCA), AMI, and stroke, chair Jouni Kurola
- Key statistics, chair Dag Gjestebø
- Classification of reason to care ICPC 2, chair Jouni Kurola.

The Nordic project group usually holds two meetings annually. Each working group has worked in parallel with its areas of responsibility. During these "corona times" in 2020-21, the meeting frequency has been reduced and in connection with this report, one physical meeting has been held in January 2020 and one meeting has been held via Teams in May 2021. The working groups did not have separate meetings during this period.

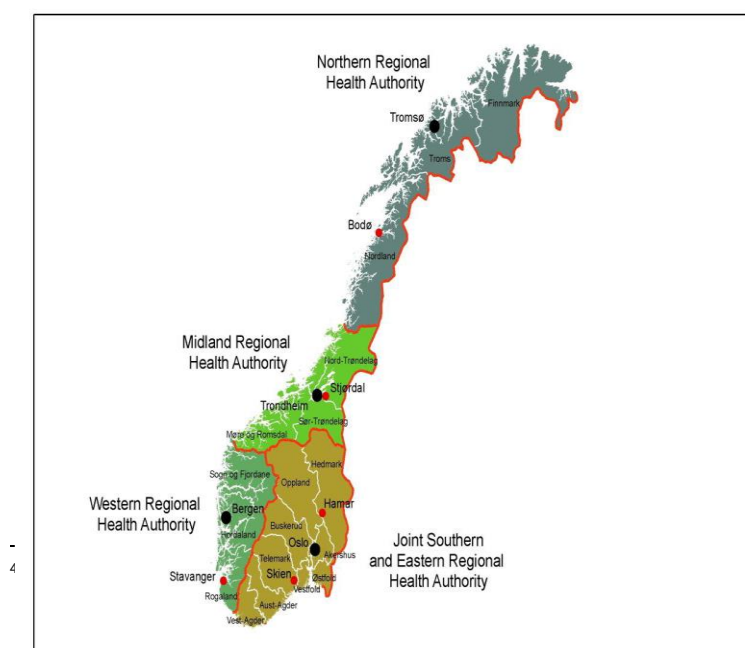
In this report we focus on two from original four topics: Firstly on key statistics and secondly on assess, treat and release.

Data for 2019 and 2020 have been collected by the Helseplan based on the same definitions and data layouts as for the year 2018. Respective countries have themselves produced and submitted data to the Helseplan. The data quality has been examined in each country in dialogue with the Helseplan.

During the work on the report, Helseplan has "blanked" certain key figures based on data that have indicated unlikely deviations from previously reported data.

Helseplan has compiled the report and the presentation of data. Part of the text and descriptions in this report are taken from the group's first report. The report has been reviewed by the group before it was published.

## 2. THE EMS SYSTEMS IN THE NORDIC COUNTRIES



### 2.1 Norway

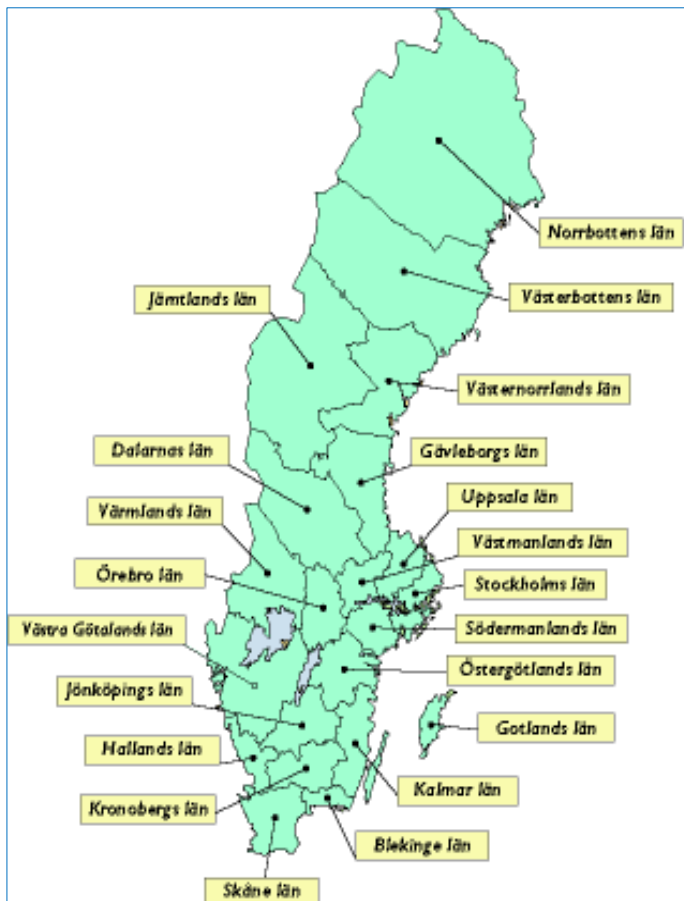
The population in Norway is 5,3 million inhabitants and covers 324 000 km<sup>2</sup>.

The public funded health care is divided in primary health care in 426 municipalities and specialized health care in 4 health regions.<sup>4</sup> At the primary care level, emergency and acute primary care services in most municipalities are provided by

regular GPs (within office hours) and on-call GPs (outside office hours) supported by the telephone services 116 117.

The health care regions are responsible for hospitals and specialized health care, 519 car ambulances<sup>5</sup>, 9 planes and 13 helicopters<sup>6</sup>, 43 ambulance boats and 16 EMDs.

The EMDs receive calls to the emergency number (113) and provide advice on emergency medical procedures to callers and mobilize and coordinate the needed resources. These are staffed with nurses, ambulance coordinators and a consulting medical doctor on call.



## 2.2 Sweden

Sweden has a population of 10,3 million inhabitants<sup>7</sup> and an area of 528 449km<sup>2</sup>.<sup>8</sup>

The public funded health care is divided into 290 municipalities and 21 county councils. Each municipality and county council is autonomous and governed by their respective political leadership, which also includes the right to deduct tax. Medical health care in hospitals and primary care, including EMS, are administered by county councils. Other health care may be provided in municipalities, mainly by nurses (no medical doctors, according to law). Rescue services and social care are administered by the municipalities. Both medical and social care can be provided by private caregivers in all sectors.

There are approx. 820 ambulance vehicles, 9 helicopters and 5 aircrafts (for long distance medical transports)

in Sweden<sup>9 10</sup>. Some county councils have access to 5 search and rescue (SAR) helicopters which can be staffed with medical crew for high priority cases and sea rescue<sup>11</sup>. The ambulances are mainly staffed with a specialized nurse and a nurse/nurse assistant (locally trained). There are some examples of vehicles staffed with medical doctors or specially trained nurses, but without possibilities to transport patients. There are also examples of ambulances purely for non-acute transports.

<sup>5</sup> Ibid.

<sup>6</sup> National Air Ambulance Services of Norway, Yearly report 2015

<sup>7</sup> SCB, 2021

<sup>8</sup> SCB, 2017

<sup>9</sup> NYSAM 2017 and different websites, reliability unclear

<sup>10</sup> Vård på vingar. Nationell samordning av luftburen ambulanssjukvård, SKL, 2012

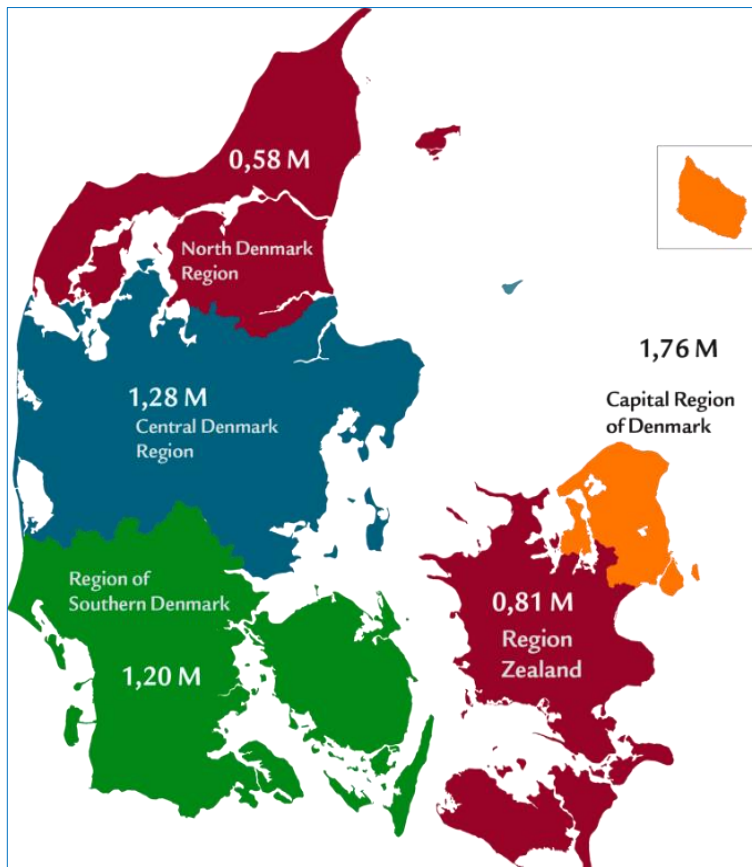
<sup>11</sup> <http://www.sjofartsverket.se/sv/Sjofart/Sjo-och-flygradning/Administration/Projekt-SamSAR/>

The 14 EMD receive calls on the national emergency number 112. These centers coordinate ambulance assignments for all of Sweden, except for three county councils who operate separately. The operators receive local medical training.<sup>12</sup> Present national regulation<sup>13</sup> for EMS primarily regulate that each county council must establish a dispatch center and plan for ambulance services. The regulation also states what types of interventions may be performed in an ambulance.

## 2.3 Denmark

The Population in Denmark is 5,8 million and covers 43 000 km<sup>2</sup>.

The health care system in Denmark is public and financed by general taxes. Denmark is divided into 5 regions and each region is responsible for its own health care system, including provision of the EMS. Each of the 5 health care regions have a politically elected regional council.



The 5 regions currently have 319 emergency ambulances, 19 rapid response vehicles staffed with EMTs, nurses or paramedics, 23 physician-staffed mobile critical care units, 3 physician-staffed Helicopter-EMS (HEMS) and 5 regional EMDs.

The regional councils are mandated to organize the EMS according to local context, but national laws regulate education and ongoing training of EMTs and paramedics. Ambulance services are the responsibility of the individual regions and are traditionally outsourced after a tender process. Currently, ambulance services are either provided by the municipal fire brigade, private corporations or by the region itself. Requirements

and specifications are determined by the regional councils.

Each region has an independent prehospital organization responsible for the entire regional EMS, including the EMD where all the health related 112-calls are handled. EMDs are staffed with specially trained nurses, EMTs and paramedics, and to varying degree doctors. In handling calls, EMD operators use the Danish Index for Emergency Care, a criteria based dispatch system for decision support regarding what medical help is needed and which

<sup>12</sup> [www.sosalarm.se](http://www.sosalarm.se)

<sup>13</sup> SOSFS 2009:10 (M) Ambulanssjukvård m.m.

resources should be dispatched. The index provides a common response for the same condition in every region.

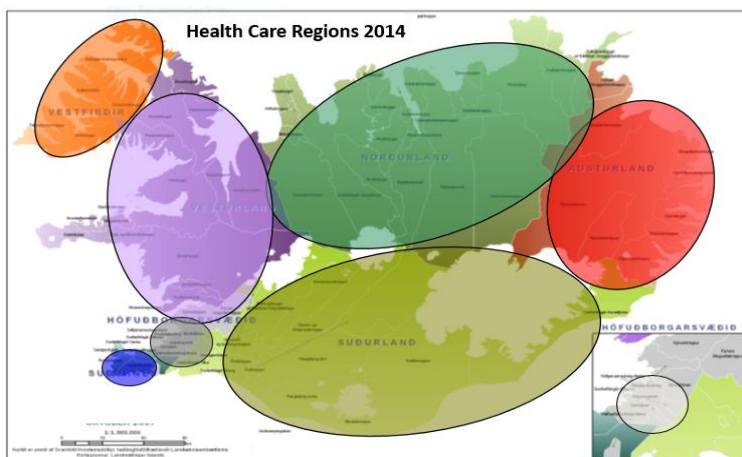
There is mutual recognition among the regions of the need for national education of EMD call-takers and a joint course to improve and develop training. Since 2004 there has been a national EMT and Paramedic education program.

All regions use the same electronic Prehospital Patient Record (ePPR), which was introduced nationally in 2015. All prehospital data is collected from the EMD's dispatch system and the ePPR. Each region has its own database that provides important information on prehospital activities; numbers, type of medical problem, urgency, response time etc.

There is a national Prehospital Quality Indicator Database.<sup>14</sup> The EMS are reporting on certain indicators, of which many concern ambulance response times, and until now without any clinical outcomes available. The first public annual report for 2017 will be available ultimo 2018. Clinical data on a national level will, in the near future, be provided through the national Prehospital Quality Indicator database, with information collected from the ePPR.

## 2.4 Iceland

The population in Iceland is 370,000 inhabitants and covers 103 000 km<sup>2</sup>.



The public funded health care is divided in primary health care in 7 health care regions with between 2 - 18 health care centers in each region.

Specialized health care is delivered in 2 hospitals, in Reykjavík and Akureyri. The health care regions are responsible for regular GP service (within office hours) and GPs on-call (outside office hours). The

regions are also responsible for the emergency service in their regions except in Reykjavik and Akureyri where the service is provided by the hospitals.

The EMS system is government funded for the first 85 percent of cost, with 15 percent being charged to the individual as a deterrent fee. The EMS services are provided by various operators throughout the country, either by the local fire brigades (larger towns) or by ambulances contracted to the primary health care stations directly. There are approximately 70 ambulances owned and run by the Icelandic Red Cross in a cooperative contract with the Ministry of Health.

In larger centers, such as Reykjavík, the ambulances are staffed by full-time EMTs and paramedics. In Reykjavik there is no direct physician involvement in the EMS. In smaller centers, EMTs may be part-time, or even on call. Outside Reykjavik local GP's respond to priority-1-calls together with the ambulance service. In remote areas the transportation may

<sup>14</sup> <http://www.rkkp.dk/om-rkkp/de-kliniske-kvalitetsdatabaser/prahospitalsdatabasen/>



be provided by ICE-SAR (Icelandic Association for Search and Rescue) which is a powerful independent search and rescue organization of volunteers.

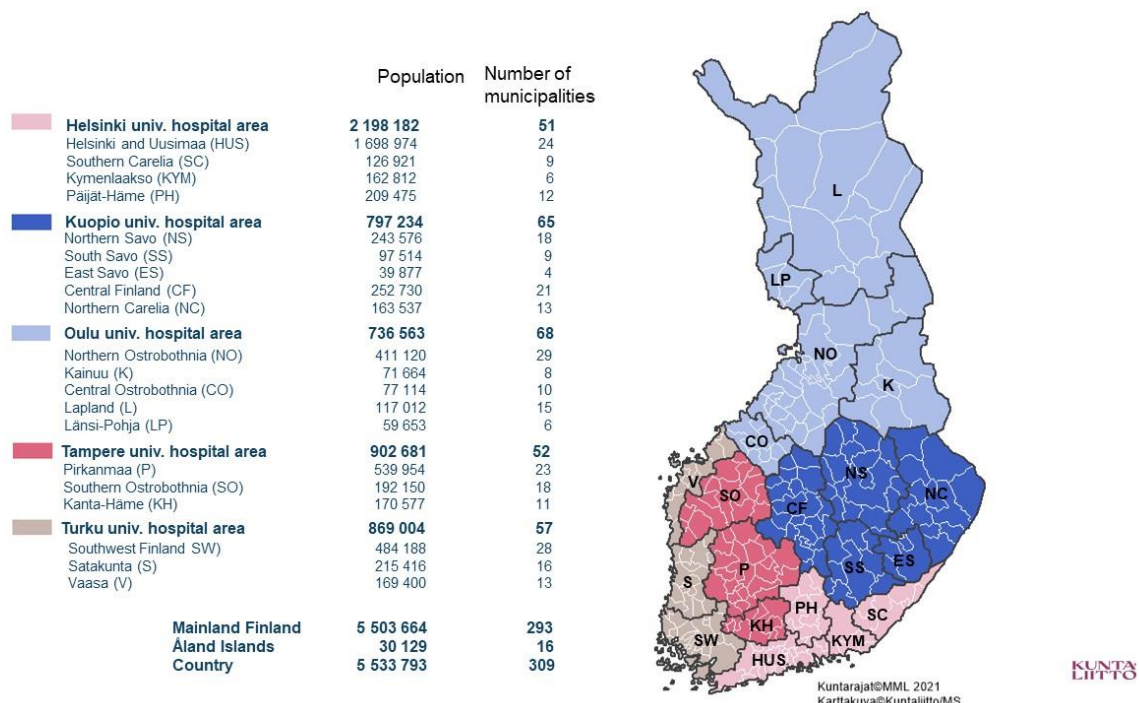
Most air ambulance service in Iceland is accomplished using fixed-wing aircraft situated in Akureyri, the northern part of Iceland. Transports have increased steadily over the past few years and are now around 800 per year, with physicians going on 1/3 of these. Helicopter service when needed, is provided by the Icelandic Coast Guard, running around 300 missions per year with physician staffed helicopters.

## 2.5 Finland

Finland has the population of about 5.5 million, and the number of inhabitants has been slowly growing. The area of Finland is 338 000 km<sup>2</sup>. The density of population is 18 persons / km<sup>2</sup>, i.e. Finland is sparsely populated. Forty percent of the population is living in the 10 biggest cities. Helsinki is the capital city with the population of about 655 000.

Nowadays, health care is based on the provision of municipalities. In 2021, there are 309 municipalities in Finland, 107 of whom use the term “city” and 202 municipalities. Municipalities organise primary health care either on their own, in a joint municipal authority model or in a municipal authority model.

In addition, municipalities organise social services – either by a municipality or a joint of municipalities. The number of organisers in social care is nowadays about 200. The trend is that municipalities organise health and social services in a county area, on “broader shoulders” as it is often referred.



The geographical structure of the 20 hospital districts and the five university hospital areas including population and the number of municipalities in each. White lines = municipalities. Black lines = hospital districts. Colours = five university hospital areas. Population in 31.12.2020. Source: The Association of the Finnish Municipalities and the National Land Survey of Finland.

Every municipality belongs to one hospital district. The hospital district is a joint municipal authority to organise specialised health care in its area. The number of hospital districts is 20. Hospital districts have quite different number of population to serve, ranging from about 40 thousand to 1,7 million inhabitants. EMS are organised by the hospital districts and are part of the specialised health care. The 20 hospital districts are divided into five catchment areas with one university hospital in each of them. The catchment areas of specialised care are called the university hospital areas. The hospital districts and five university hospital areas are presented geographically in the figure.

The legislation of health and social care in Finland concerns the continental Finland but not the Åland Islands. The Åland Islands constitute an autonomous and monolingual (Swedish) region of Finland.

The hospital districts may decide to incorporate first response services into EMS. First response services comprise the dispatch of units other than ambulances to respond to emergency calls to shorten the response time. EMS shall be planned and implemented in cooperation with health care facilities providing emergency medical care to form a regionally coherent system. The hospital districts may provide EMS by staffing the units with in-house personnel, in cooperation with the region's rescue services, jointly with other hospital districts or by outsourcing the services.

The national Medical Helpline 116117 is an advisory and guidance service for social welfare and health care emergency services, which was launched in September 2017 as the Ministry of Social Affairs and Health's development project. The national telephone number to Medical Help line is 116117. Currently, Medical Helpline 116117 covers 96.2 % of Finnish population. Nearly all hospital districts intend to introduce this service in 2021 at latest. The service is intended for urgent, non-emergency situations, especially during on-call hours. In the event of an emergency, the caller should always dial 112.

Finland has one national emergency number, 112. The emergency (112) calls are received and handled by the national Emergency Response Center (ERC) authority through its six regional dispatch centers. The ERC is organized by the state and directed by the Ministry of Interior and the Ministry of Social Affairs and Health together. The ERC Agency provides ERC services throughout Finland, excluding the Province of Åland (28 000 inhabitants). There is also a national emergency number for maritime rescue. The ERC Agency and the Border Guard are operatively and administratively in close co-operation with the maritime emergencies.

Currently, there are several commercial command and control information systems in Finnish EMS. Some of them include also electronic patient care record. The data content of the EMS patient care record is nationally defined, but it is old-fashioned based mainly on the transporting and reimbursement purposes. National multi-authority command and control information system (KEJO) is in the implementation phase. It includes also new national electronic patient care record with updated patient dataset based on NEMSIS. Two of the 20 hospital districts have started to use the KEJO system in November 2020, and the deployment will expand from 2022 onwards.

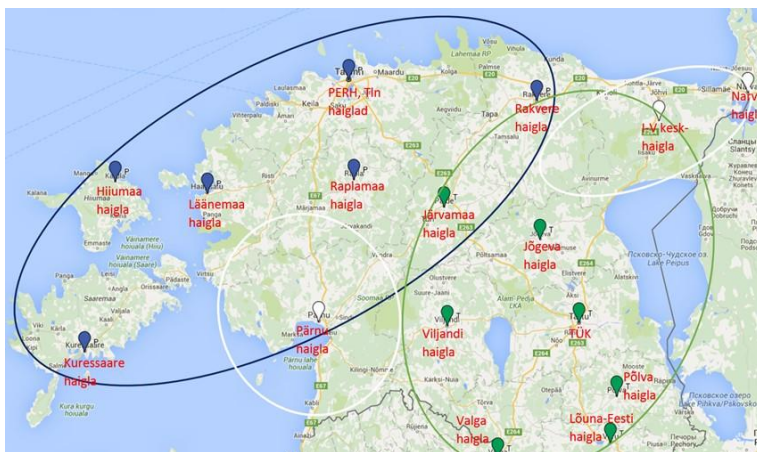
The reform of the health and social services will take place in 1.1.2023. The responsibility of organising health and social services and rescue services will be transferred from municipalities to 21 health and social services counties and to the city of Helsinki (21+1

model). The reform is not concerning the Åland Islands. The structure of five areas still remain in the reform. The five collaboration areas will have tasks in – for example – directing EMS.

The secondary use of EMS data is regulated through EU legislation (GDPR) and national data protection regulation. Within the boundaries the Finnish Institute for Welfare and Health (THL) gathers the EMS data from KEJO and the EMS patient record data through Kanta-services Patient data archive. The secondary use of the EMS data includes disseminating the data to the health districts so that they can obtain the data in their registers that is archived directly to national systems. Other secondary use of EMS data includes statistics, evaluation, steering, scientific research, innovation, development and other use by authorities as defined in various legislation regarding their rights to data – for example – The Finnish Crash Data Institute (OTI) has the right to obtain data regarding road accidents.

## 2.6 Estonia

The population in Estonia is 1.3 million people and covers 45 000 km<sup>2</sup>.



regional Children’s Hospital.

Health care is publicly funded with primary health care provided by 79 municipalities in 15 counties and specialized healthcare by 19 hospitals (4 of them in Tallinn). There are 2 regional hospitals which divide the country and its hospitals into two networks (both consisting of 1 regional hospital, central and local hospitals) and also 1



The emergency medical dispatch (EMD) in Estonia has four regions (North, East, West and South) with their centers in Tallinn, Jõhvi, Pärnu and Tartu. There are 60 ambulance bases with 104 ambulance units (including 6 reanimobiles, 3 small-island brigades and 1 telemedicine team) across the country (21 of them staffed with doctors), provided by 9 service providers. Small-island brigade consist of 2

people who are constantly ready to respond to emergencies but not on-call in the ambulance base.

Ambulances are staffed with specially trained nurses, EMTs and paramedics, and also a few teams include doctors. National emergency number is 112 (which includes EMS, police, rescue services).

All ambulance service providers use electronic Prehospital Patient Records–E-ambulance. All prehospital data from E-ambulance, primary care systems and hospital data is collected to electronic Patient Records System and is available to healthcare personnel in all stages of the care not depending on the region or service provider.

## 3. COMMON NORDIC DEFINITIONS

### 3.1 The Emergency Medical Dispatch Center

Emergency Services in the Nordic countries and Estonia are contacted through national emergency numbers and are tasked with dispatching relevant resources depending on the situation at hand. Emergency medical dispatch is the provision of prehospital medical resources as a response to health-related emergencies.

Though providing similar services, the dispatching of prehospital emergency medical resources is organized differently among the Nordic countries. Denmark, Norway, Sweden and Estonia have dedicated Emergency Medical Dispatch Centers, which are a part of the health care system and staffed with health care professionals. Finland and Iceland have joint-authority Dispatch Centers, staffed with technical non-health care professionals who dispatch emergency medical, fire brigade and law enforcement resources.

All involved countries use criteria-based dispatch systems for emergency medical response, based on level of medical urgency. The current dispatch system in Finland (the information system ERICA) is a combination of criteria-based and medical priority dispatch system characters.

### 3.2 Data availability and data collection

Each country has been responsible for the data collection process. Significant variations in data quality and challenges regarding availability of EMS data have limited the selection of Nordic quality indicators. The indicators that have been developed are mainly process indicators. Our intention was also to compare outcome or result quality indicators and "resource and cost data". Due to major differences in the countries' organization, in combination with a large variation in the participation of public and private service providers, the Nordic group has chosen not to work with these data for now.

However, the project has, for the future, identified other indicators important for measuring improvement of patient safety and quality in the Nordic EMS systems.

### 3.3 Quality indicator template

To present the proposed quality indicators we have adapted a template from the Norwegian template for defining quality indicators.<sup>15</sup>

- ID: Identifier of the quality indicator (a unique ID/number for each indicator). The IDs used in this document are just suggestions which are not necessary the final IDs for the relevant indicators.
- Name: Name (preferred term) of the quality indicator.
- Type: Type of indicator.
- Definition: Textual definition of the quality indicator.
- Remarks: Remarks or further explanations, if any.
- Indication: What the indicator is meant to indicate, or how it should be interpreted.
- Rationale: Why this indicator is important/interesting.
- Calculation: How to produce or calculate this indicator, numerator and denominator, incl. potential error sources and means of correcting errors.

### 3.4 Common Nordic EMS time points and time intervals

The following drawing is adapted and freely translated from the similar drawing in the Norwegian Catalogue of EMS terms and definitions<sup>16</sup>.

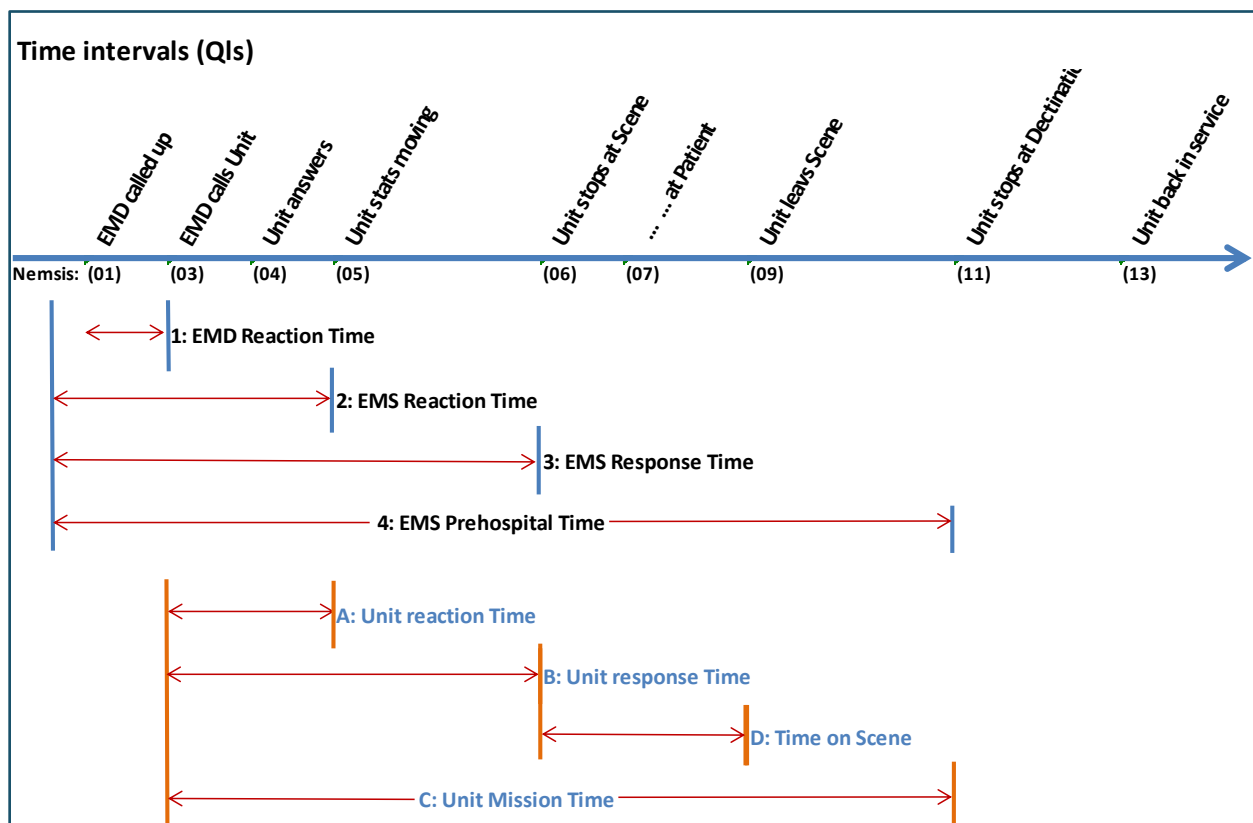


Figure 3.1: Common Nordic prehospital EMS time intervals and indicators for response quality

<sup>15</sup> Other elements that are not shown are e.g. administrative elements such as version, status, date of approval etc.

<sup>16</sup> Norwegian Catalogue of EMS terms and definitions, 2012

### 3.5 Data structure and definitions

The project developed a structure for data collection corresponding with the process in EMS, see figure 3.2 below.

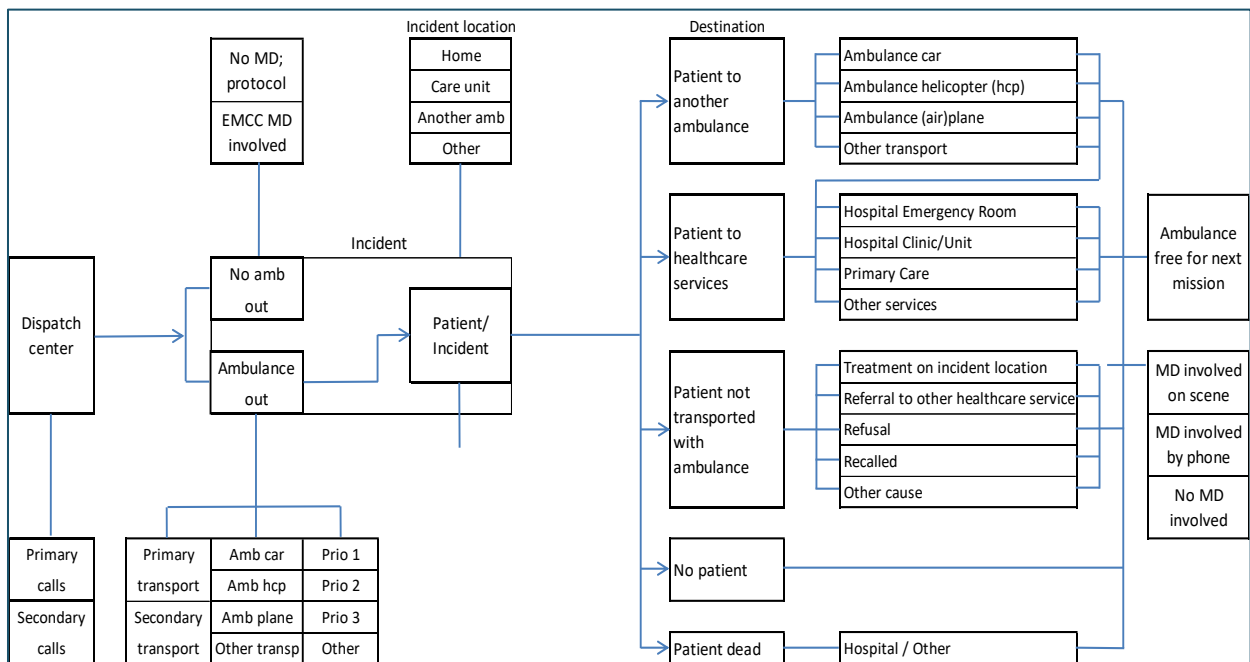


Figure 3.2: Data structure for patient pathways in EMS

### 3.6 Preconditions

#### Time stamps

Since it concerns time intervals in which several different actors with their own computer systems may be involved, it is important that the clocks in the computer systems of all these actors are synchronized.

#### Inclusion and exclusion criteria

When using the quality indicators for benchmarking, it has been important to agree upon and define the necessary inclusion/exclusion criteria, to have meaningful comparisons.

#### Means, medians or percentiles

When comparing the response time indicators that are proposed in this document, we found medians or percentiles might be the best measures for most response time indicators.

Definitions of basic terms and concepts in the EMS and definitions of the time points that are used for the quality indicators are presented in chapter 6.

## 4. The Key statistics

### 4.1 Introduction

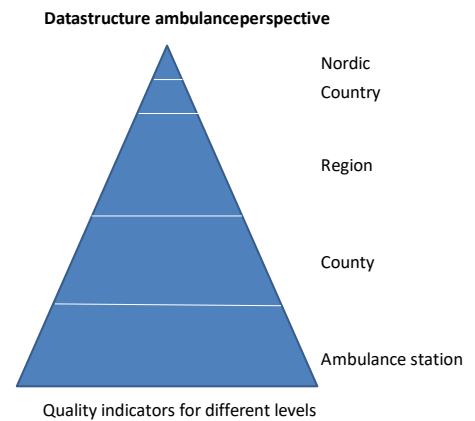
In this chapter *some* common Nordic quality indicators are presented regarding time intervals along the typical prehospital EMS timeline.<sup>17</sup>

The mandate for the working group on defining dataset for key statistics has been:

“The working group shall present a proposal for defining a dataset for key statistics on EMS in the Nordic countries. The key statistics will be used for Nordic benchmarking according to decisions from The Nordic group on EMS-data.”

The focus for the quality indicators proposed in this document has been:

- Only prehospital (out-of-hospital) EMS.
- At the incident level, i.e., not at the level of each individual unit involved.
- On the performance, i.e., primarily on *the first* response in connection to an incident and not necessarily on the completion of the whole process of handling an incident.



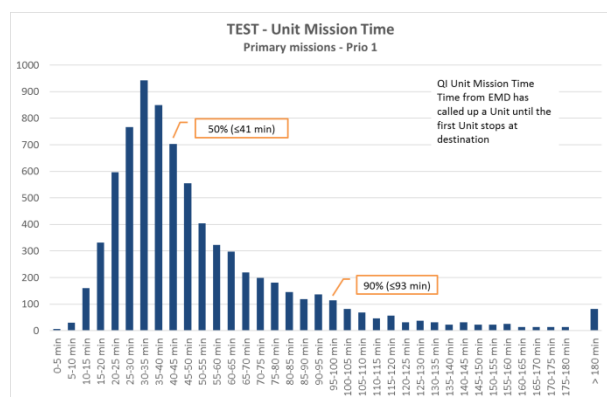
### 4.2 Selecting Nordic quality indicators

We have used the OECD definition of quality indicators on health care services.<sup>18</sup>

- Structure indicators, i.e. number of ambulance missions.
- Process indicators, i.e. response time.
- Result indicators, i.e. survival.

The defining dataset is based on the Swedish proposal.<sup>19</sup> The working group has also used definitions developed in other parts of the Nordic collaboration on EMS-data when applicable. The working group has ensured a highest possible degree of comparability in shared data. The group has also developed procedures for sharing data.

Each of the Nordic countries have their own EMS system with unique organization of reception of emergency calls, different systems and routines for data retrieval and data aggregation (ICT-systems) and various national codes and practices for use of emergency codes. Comprehensive testing of relevance and consistency has had a major impact on the working group's choice of indicators.



<sup>17</sup> Norwegian Catalogue of EMS terms and definitions, 2012

<sup>18</sup> OECD, DELSA/HEA/WD/HWP (2006)3, Health Care Quality Indicators Project Conceptual Framework Paper

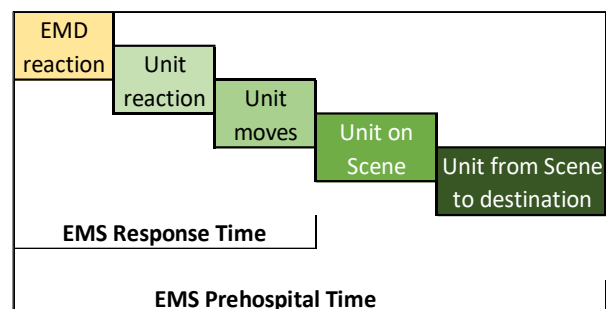
<sup>19</sup> Nysam rapport 2015: Ambulanssjukvård

It is the working group's opinion that at the beginning one should limit the comparisons to incidents / missions / patients / etc. which have been given priority 1 (/A) by EMD. In the future, the common minimum definition will be "lights and sirens" instead of priority A. I.e. Prio 1 = mission with lights and sirens.

For the process indicators, the working group has after comprehensive testing, recommended using "median time" and use a data-cleaning process that exclude numbers less or equal to zero ( $\leq 0$ ).

Median time means that 50% of the respective values (/ times) have a smaller value and 50% have a greater value than the median value. In addition, the group recommended collecting the values of 90%.

The working group recommended collecting all basic data to obtain all proposed process indicators. In the beginning, the group recommended that the public presentation of data is limited to "EMS Response Time" and "EMS Prehospital Time".



- EMS Response Time describes the time it takes from the EMD has received the first call until an ambulance has arrived at the patient.
- EMS Prehospital Time describes the time it takes from EMD has received the first call until an ambulance arrives at the hospital or the destination.

In the perspective of a population, the time indicators are important for the population's sense of security regarding the society's ability to respond when acute illness and severe accidents occur. For health services, all intervals are important to secure a high-quality performance that will provide an optimal medical outcome for the patient in each incident.

#### Comments from Norway on data quality:

Results from Norway are not complete prior to 2021. This is due to an issue with national and local EMS codes resulting in a lack of statistical comparativeness. The four regional health authorities and the Norwegian Directorate of Health made substantial improvements in coding practice procedures during 2020. During 2021, older data was also transformed using the improved coding practice procedures, all data sets dating back to 2010 will re-submitted and comparative statistics made available for Nordic benchmark during 2022.

Results prior to 2021 from Norway are not comparable and shown as preliminary findings.



## 5. Results on key statistics and process quality indicators

A specially designed template has been used for collection of data. Each country has collected data from its national, regional or local databases and submitted the data to the project. All data has been quality assured through internal controls in each country.

All countries reported difficulties in collecting valid data. Together with the major differences between the countries concerning the EMS systems, this means that interpretation of the preliminary results on key indicators is difficult. However, all countries went through a learning process and this has led to ongoing projects aiming at improving collection EMS data in all countries.

### Primary calls to EMD for health assistance

Number of primary calls to Emergency Medical Dispatch Center (EMD) for health assistance  
 Inclusion criteria: Answered calls only. The first call per incident. Use calls to 112/113 only.  
 Primary calls include calls from a nursing home. Exclusion criteria: Calls with no caller present when answering the call. Unanswered calls. Second, third, ... calls for one and the same incident.

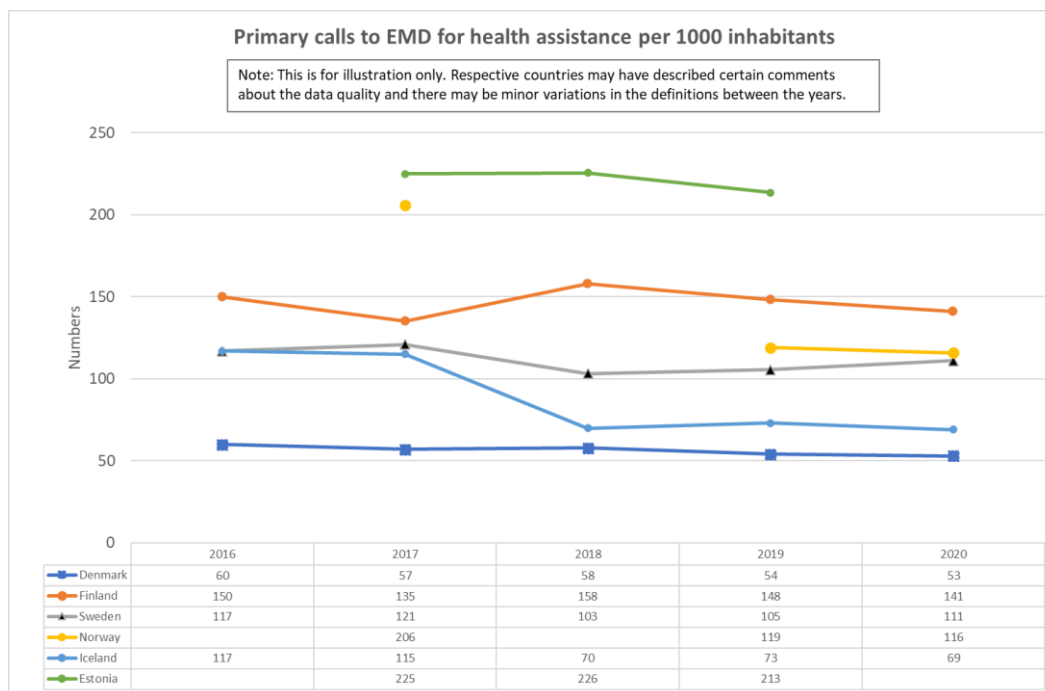


Figure 5.1: Number of primary calls to EMD for health assistance per 1000 inhabitants.

Comments from Finland: Due to the exchange of the ERC information system during 2018-2019, the indicators are not comparable. In 2018, the primary calls to EMD for health assistance are included. In 2019-2020, the number of primary calls do not include primary calls that did not lead to the dispatch of the EMS units. From 2021, the total number of primary calls can be analysed.

## Acute Incidents

Number of different acute incidents based on primary calls. This includes all kinds of incidents based on primary calls. Priority set by EMD. Inclusion criteria: Incidents based on primary calls to 112/113.

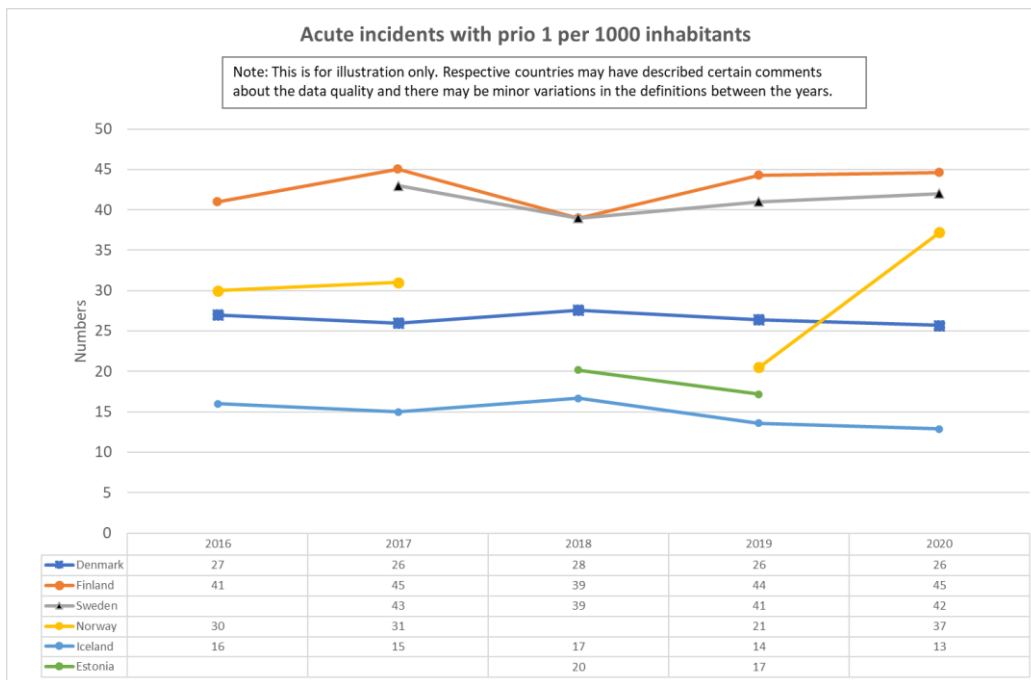


Figure 5.2 Number of acute incidents per 1000 inhabit.

## Acute missions

Number of acute missions with ambulances/units with light and sirens to the acute incidents. Might include more than one Unit per Incident. Includes all kind of Units. Priority set by EMD.

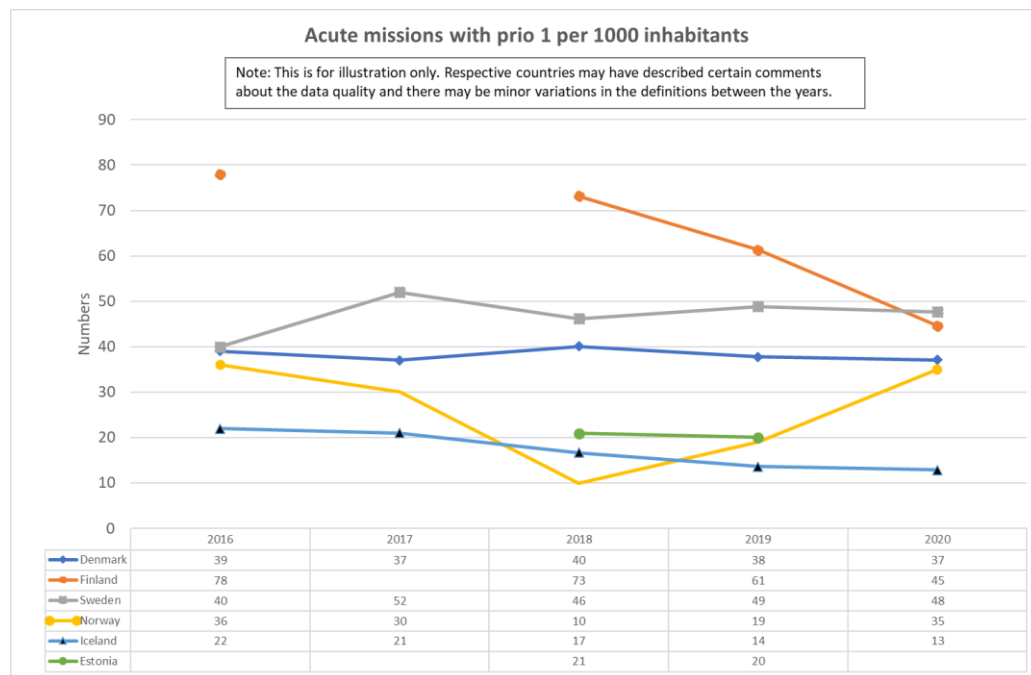


Figure 5.3: Number of acute missions per 1000 inhabit. NB-Finland's result 61 of the year 2019 is an estimate due to the transition of the ERC information systems in 2019 and is maybe not correct.

### Patients delivered to hospital

Incidents where EMD is called up for health assistance and the ambulance personnel assess and treat and delivered the patient to hospital. Priority set by EMD. Inclusion criteria: Primary missions only. All Units.

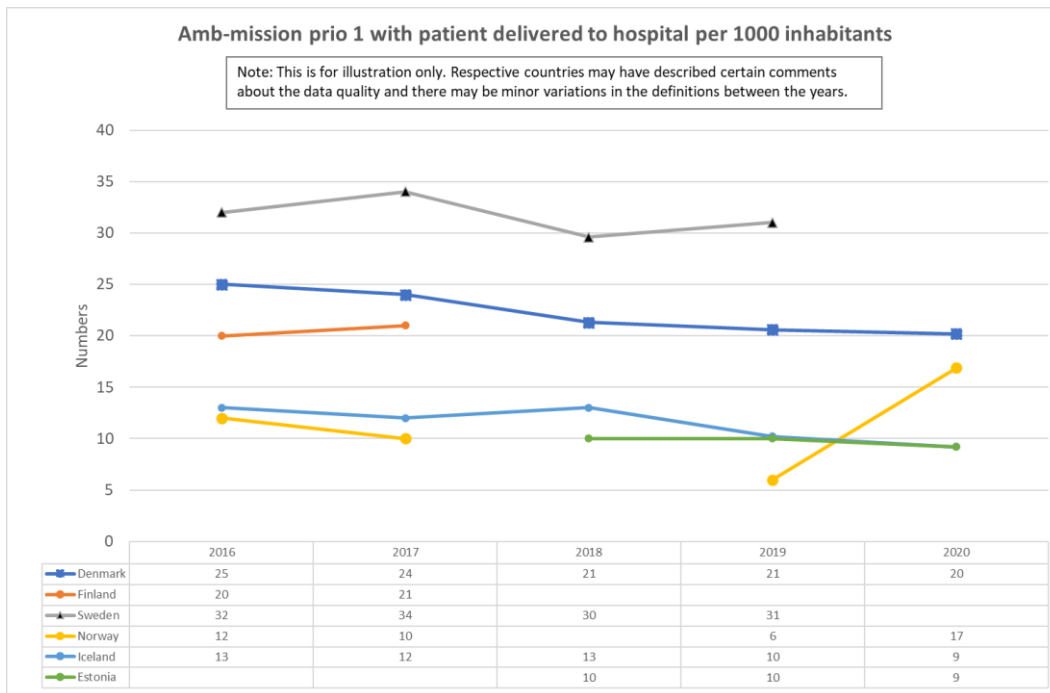


Figure 5.4: Ambulance missions with patients delivered to hospital per 1000 inhabitants.

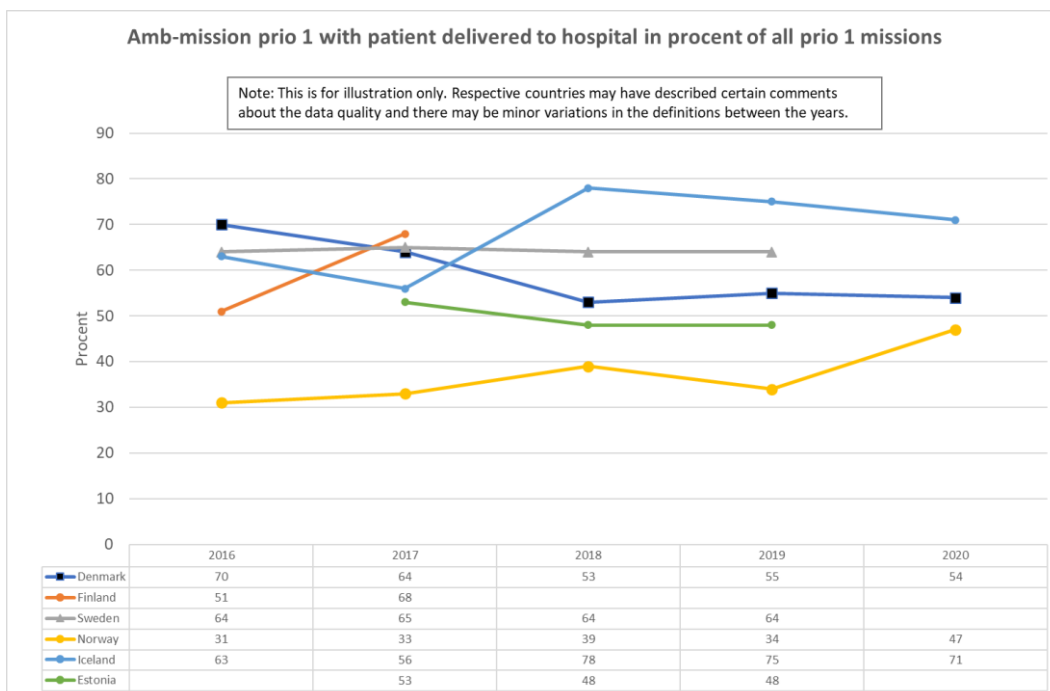


Figure 5.5: Percentage of ambulance missions with patients delivered to hospital.

### Incidents where no ambulance is dispatched

Number of Incidents where EMD, in response to primary calls, do not dispatch an ambulance or other prehospital emergency unit. Priority set by EMD. Inclusion criteria: Answered primary calls only.

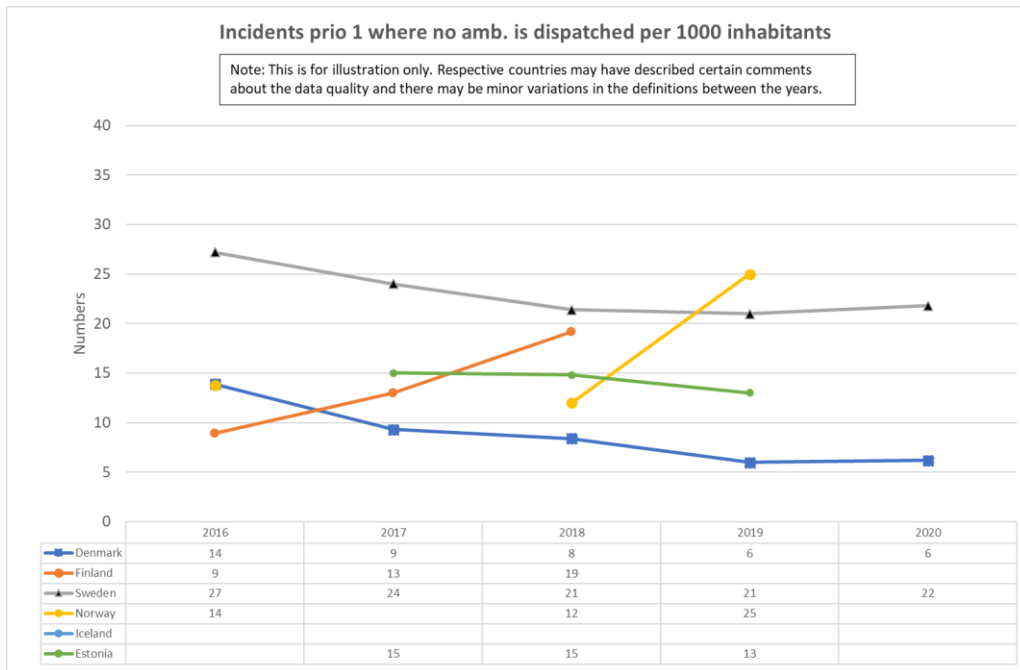


Figure 5.6: Incidents where EMD did not dispatched an ambulance per 1000 inhabitants.

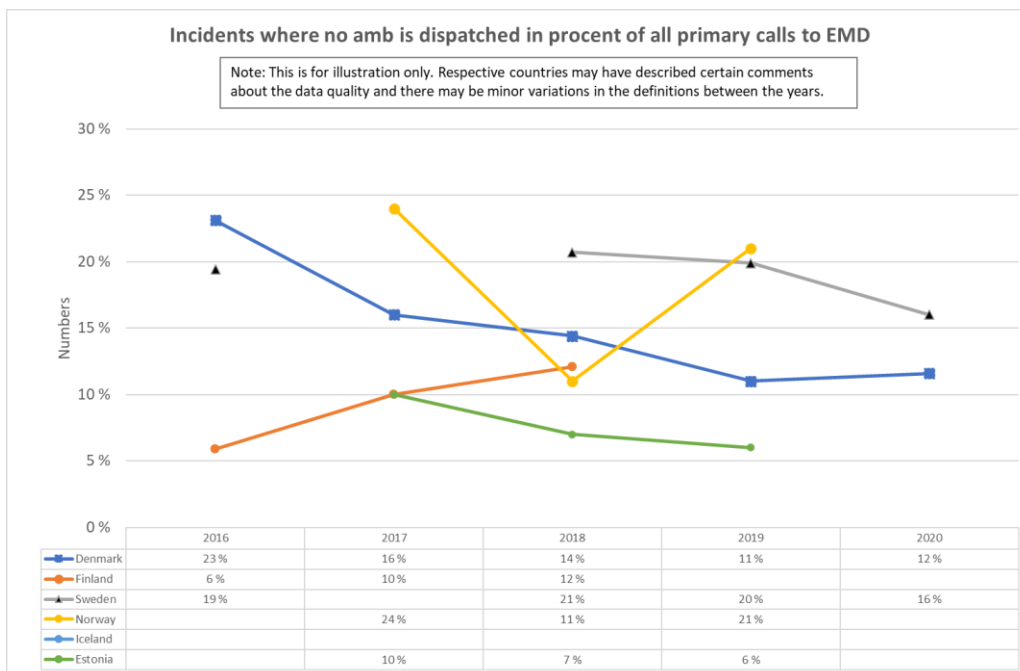


Figure 5.7: Percentage of incidents where EMD did not dispatched an ambulance.

Comments from Iceland on Figures 5.6 and 5.7: Iceland has not any data for number of calls where no ambulance is dispatched, because in Iceland the dispatchers do not have the training or authority to divert emergency calls to other resources. Therefore all emergency calls of a medical nature get an ambulance dispatched unless the patient does not wish for an ambulance. This is not logged separately and is difficult to extract from the system.

### Patient assessed by ambulance on scene and not transp. with ambulance to hospital or GP

Number of Patients where EMD, in response to primary calls, dispatch an ambulance unit. The patient was assessed and/or treated and released the patient on scene. Priority set by EMD. Inclusion criteria: Answered primary calls only. Primary missions only. All units. All patients including death on scene.

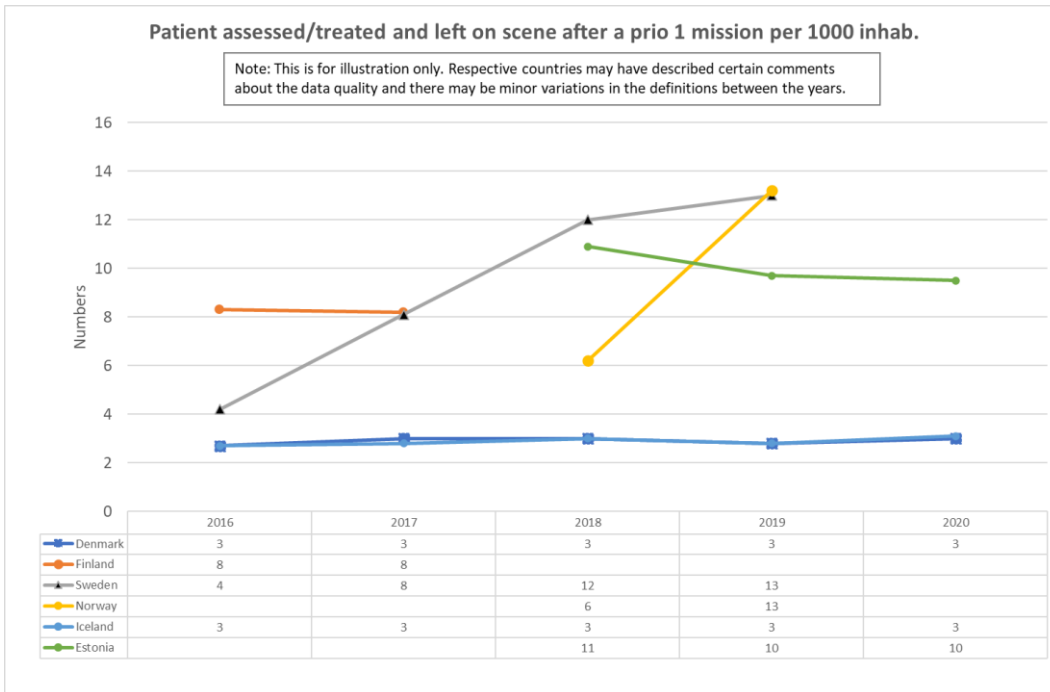


Figure 5.8: Patients assessed and/or treated and released on scene per 1000 inhabitants.

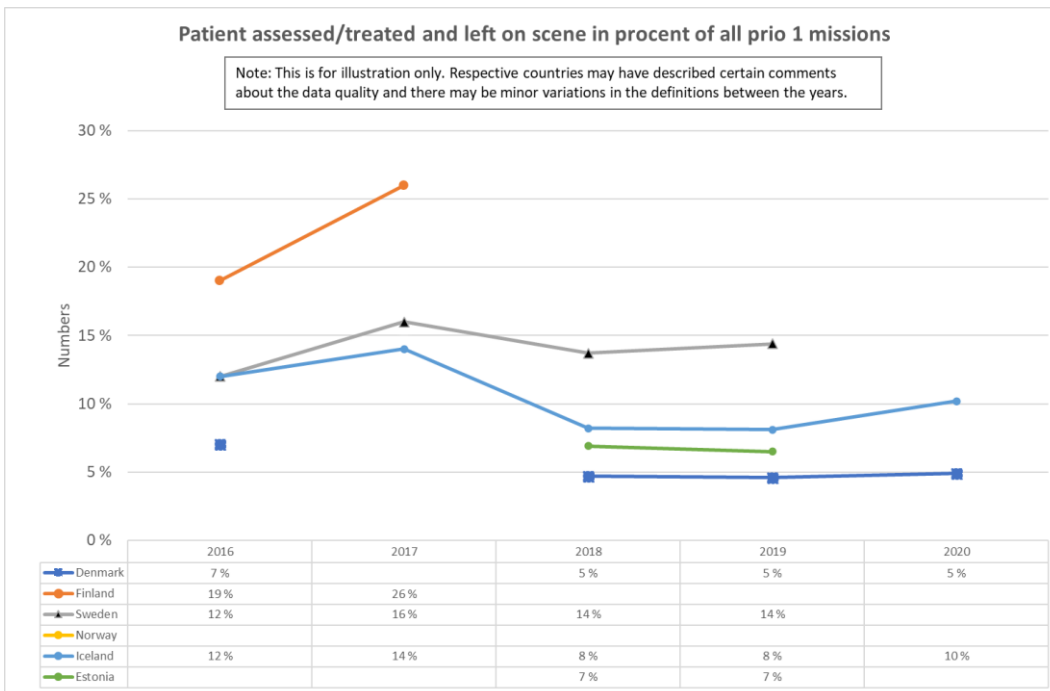


Figure 5.9: Percentage of patients assessed and/or treated and released on scene.

## EMS Response Time

EMS Response Time describes the time it takes from the EMD has received the first call until the first ambulance has arrived at the scene of the incident. The EMS Response time consists of part-times; EMD reaction time, ambulance/unit reaction time and the ambulance/unit's driving time up to the incident.

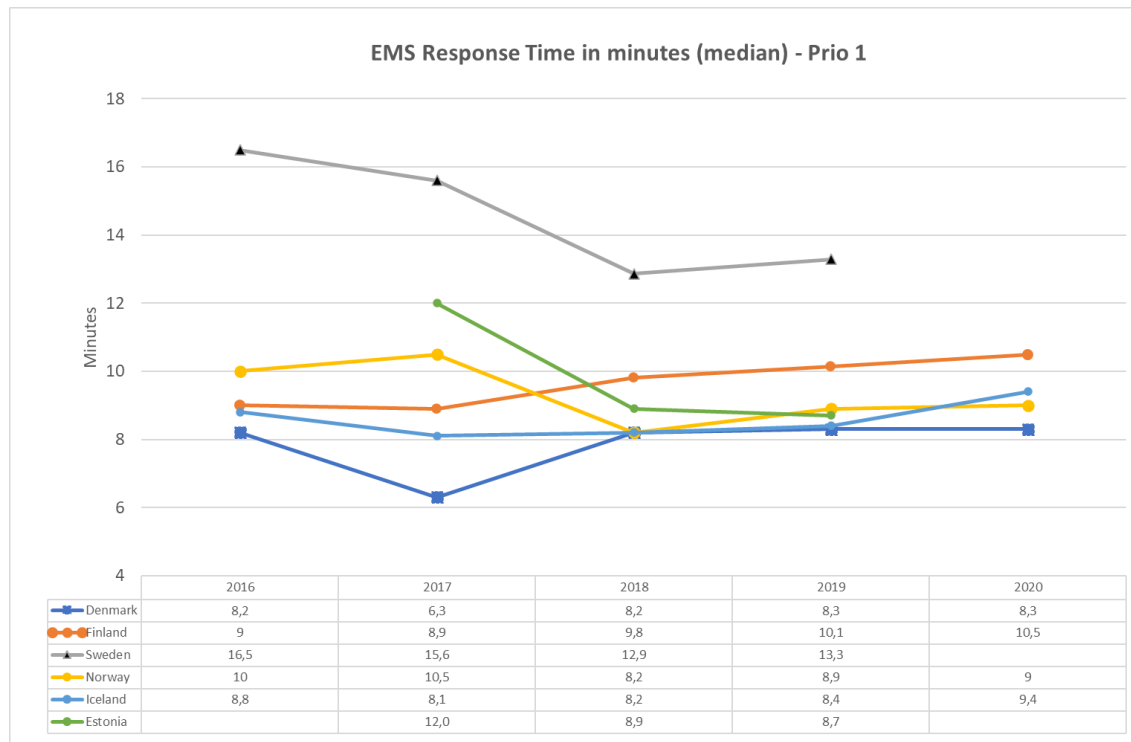


Figure 5.10: EMS prehospital response time

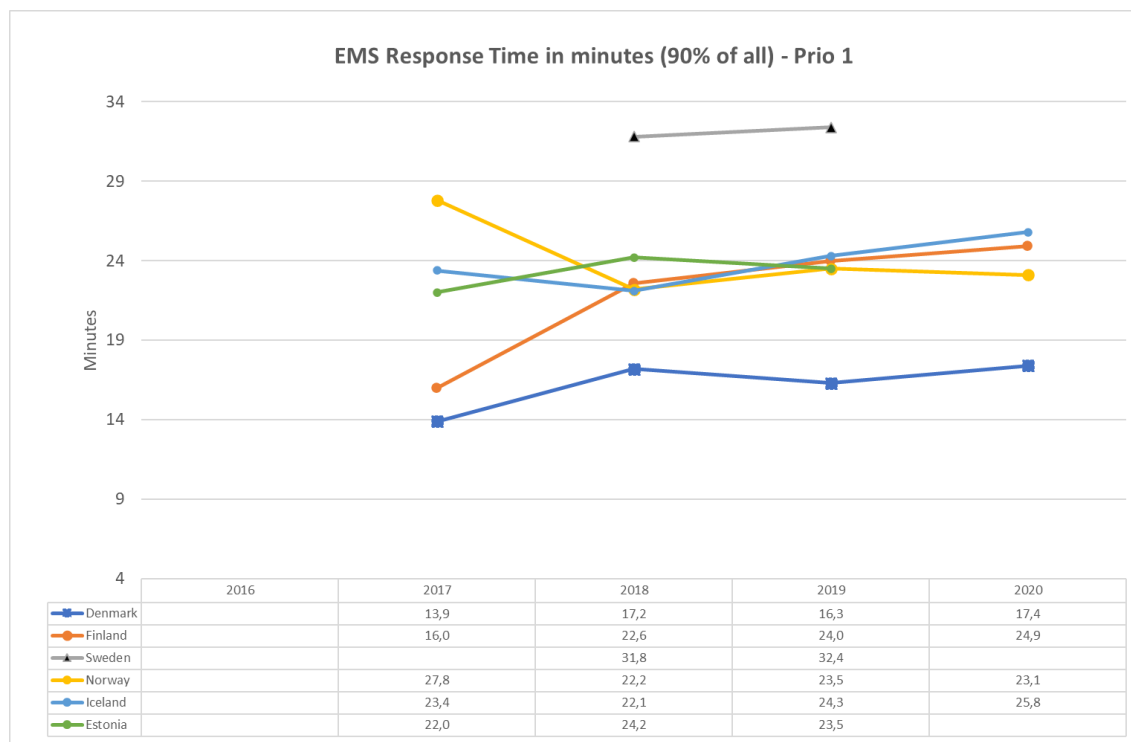
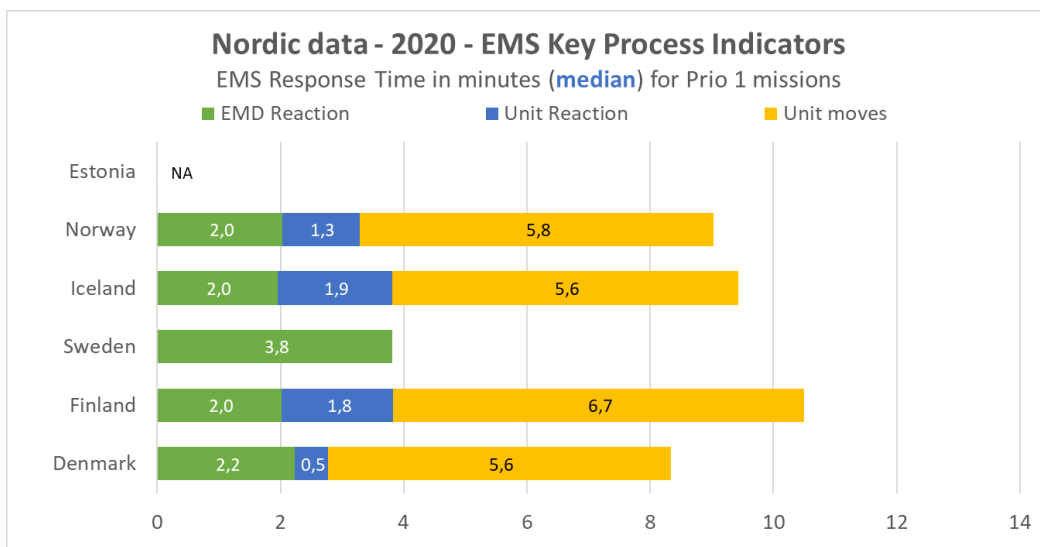
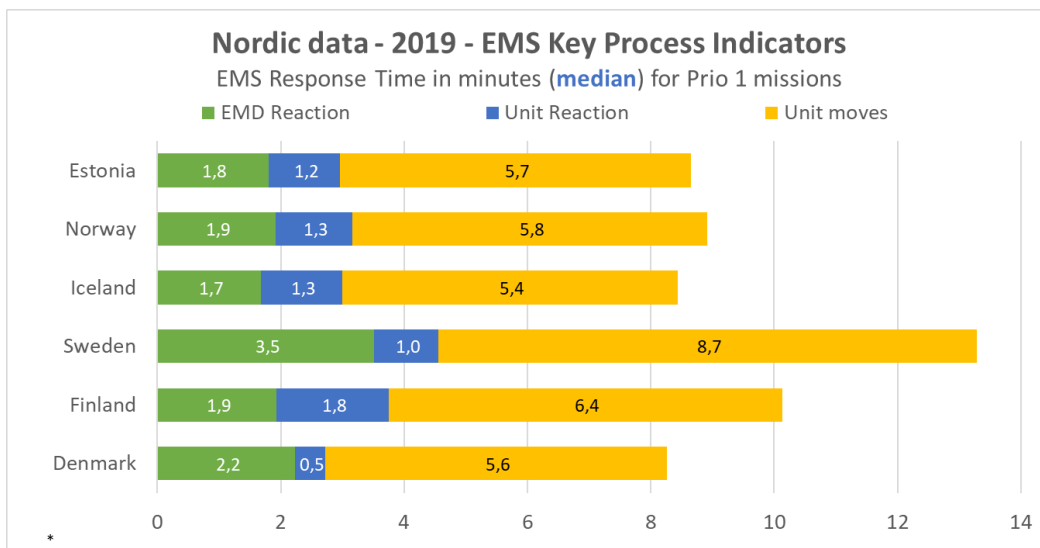
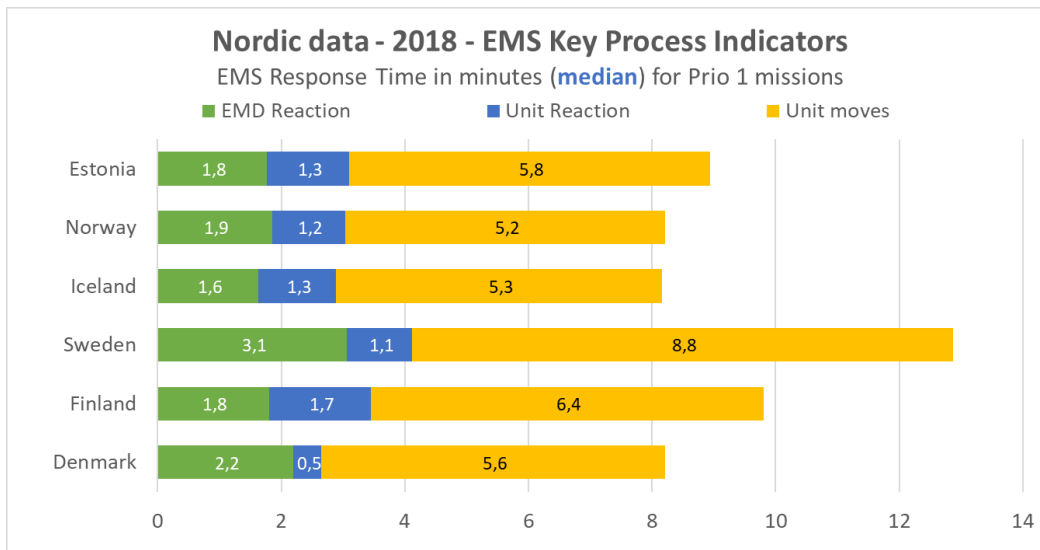
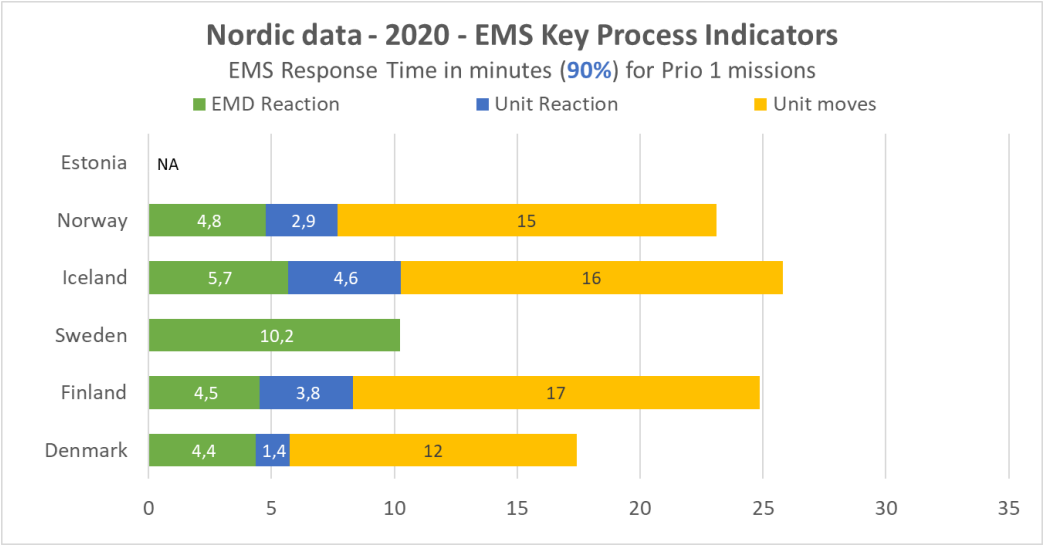
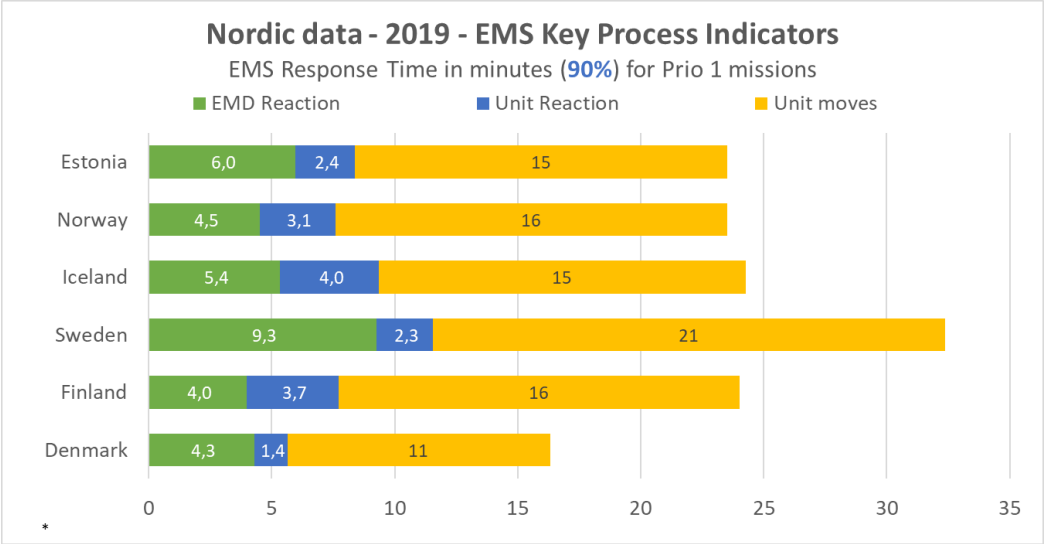
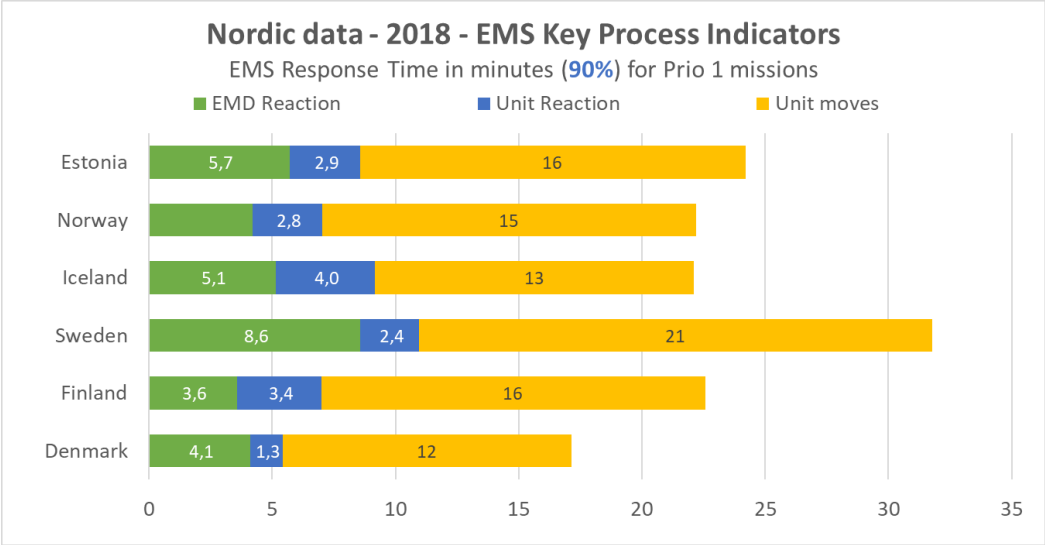


Figure 5.11: EMS prehospital response time – 90 percentiles.

## EMS prehospital response time



EMS prehospital response time – 90 percentiles





## EMS Prehospital Time

EMS Prehospital Time describes the time it takes from EMD has received the first call until the first ambulance arrives at the hospital or the destination with a patient. The EMS Prehospital time consists of part-times; EMS Response time (EMD reaction time, ambulance/unit reaction time and the ambulance/unit's driving time up to the incident) and the ambulance/units time on scene and the ambulance/unit's driving time to the destination.

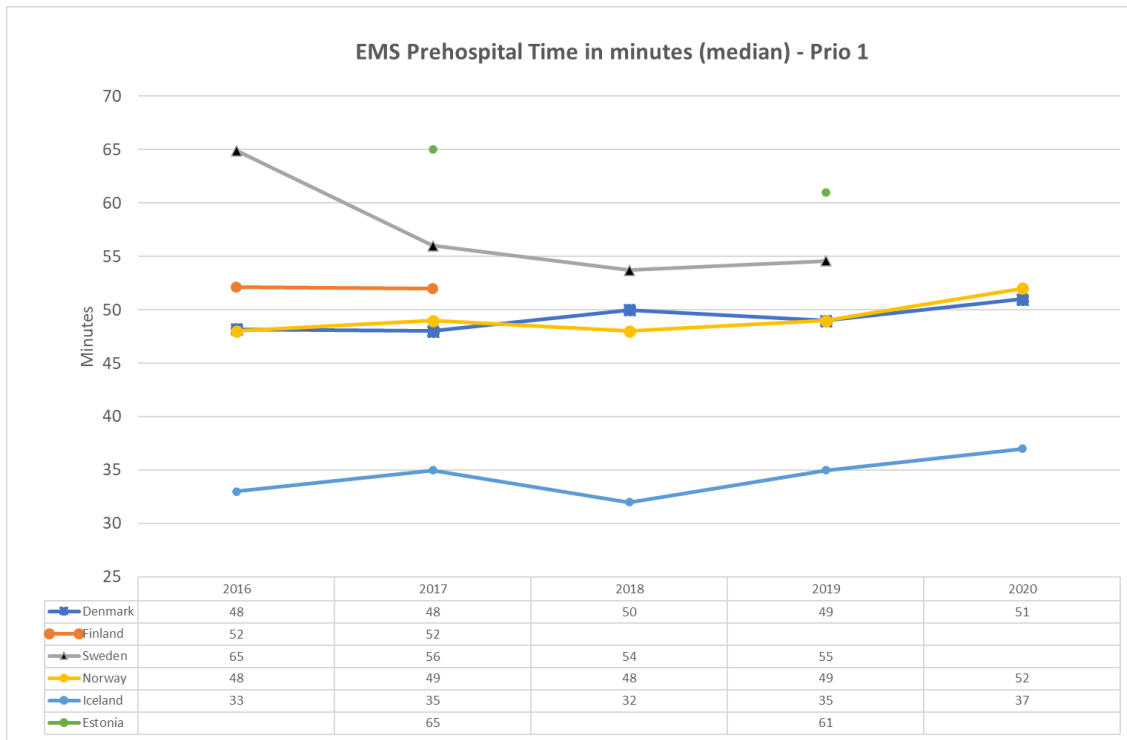


Figure 5.12: EMS prehospital median time includes all the time intervals.

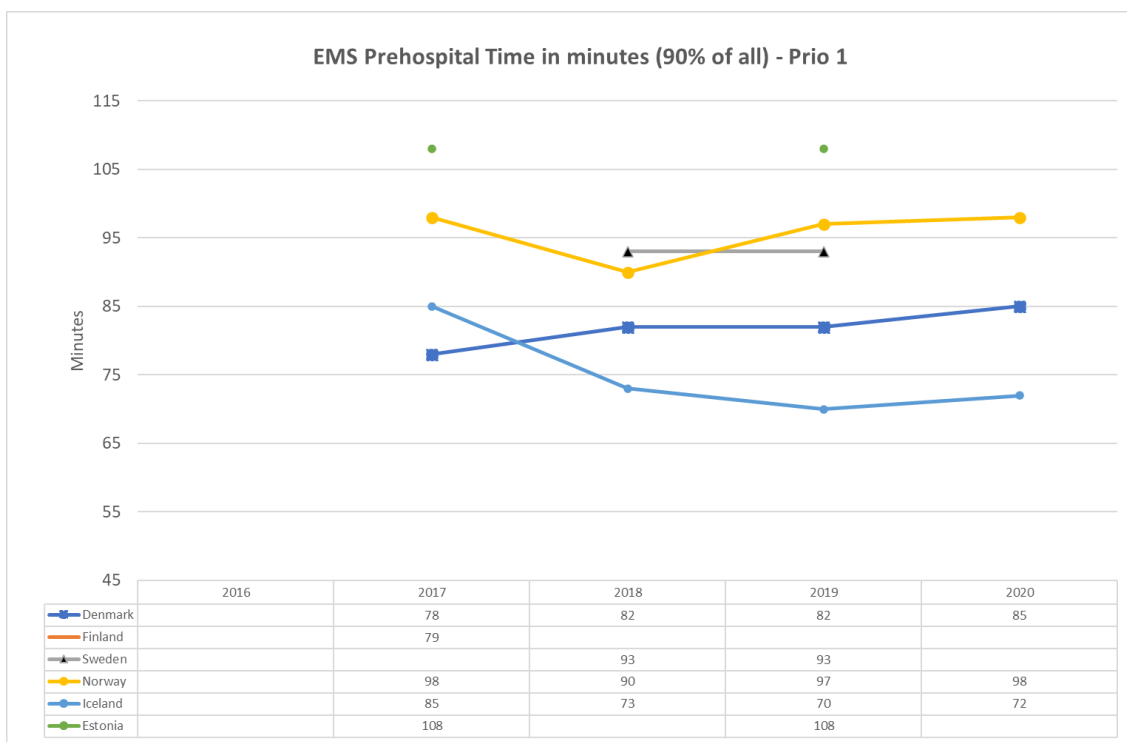
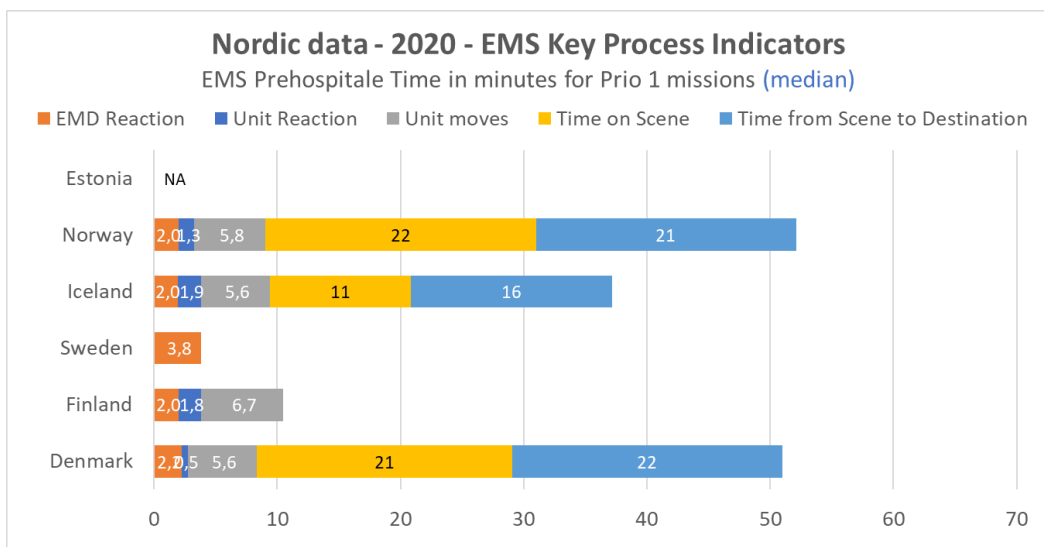
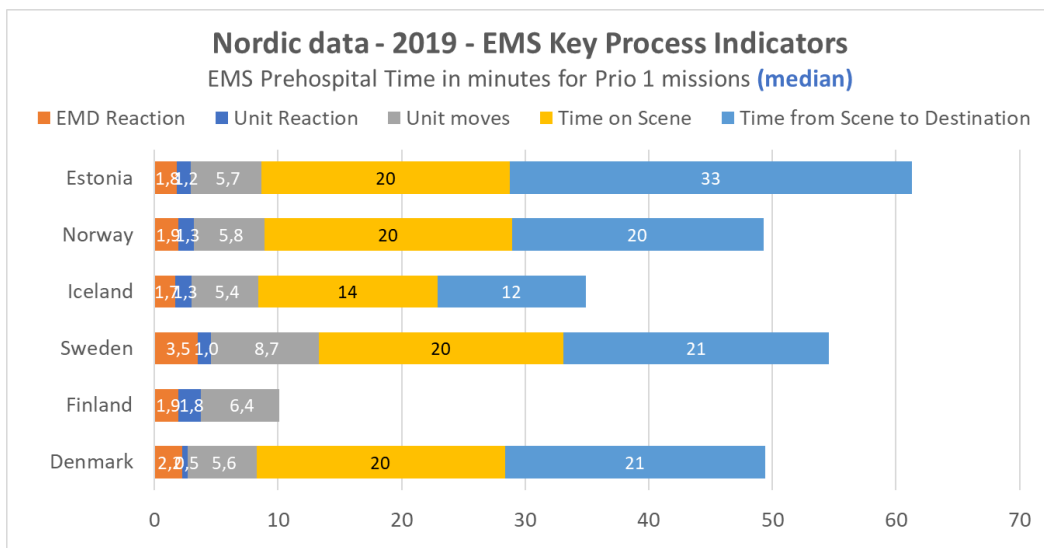
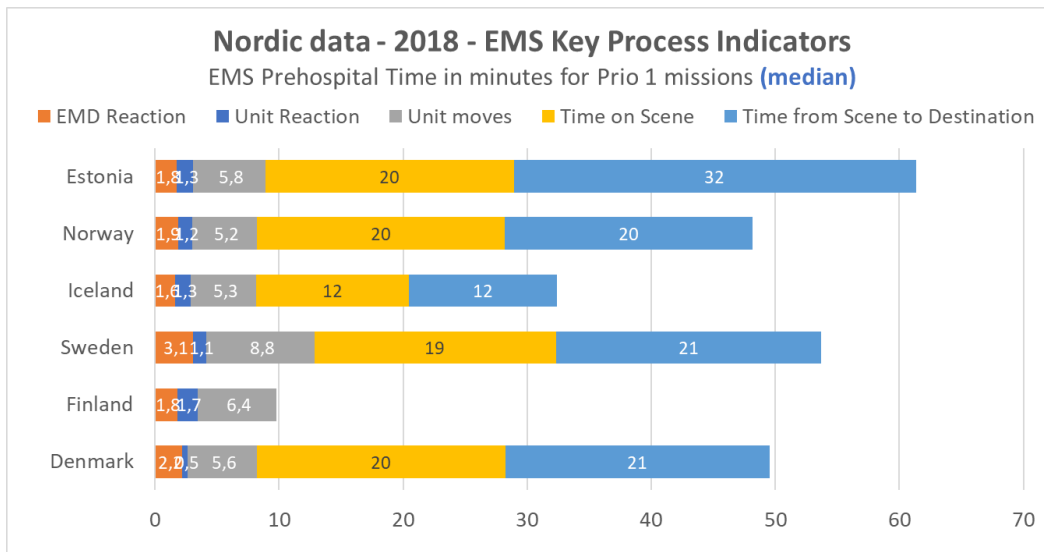
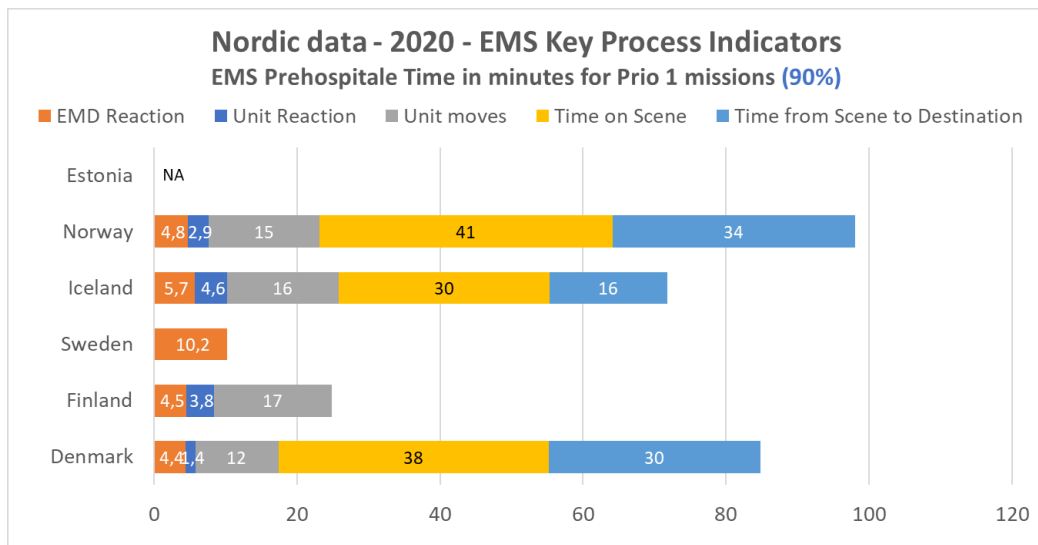
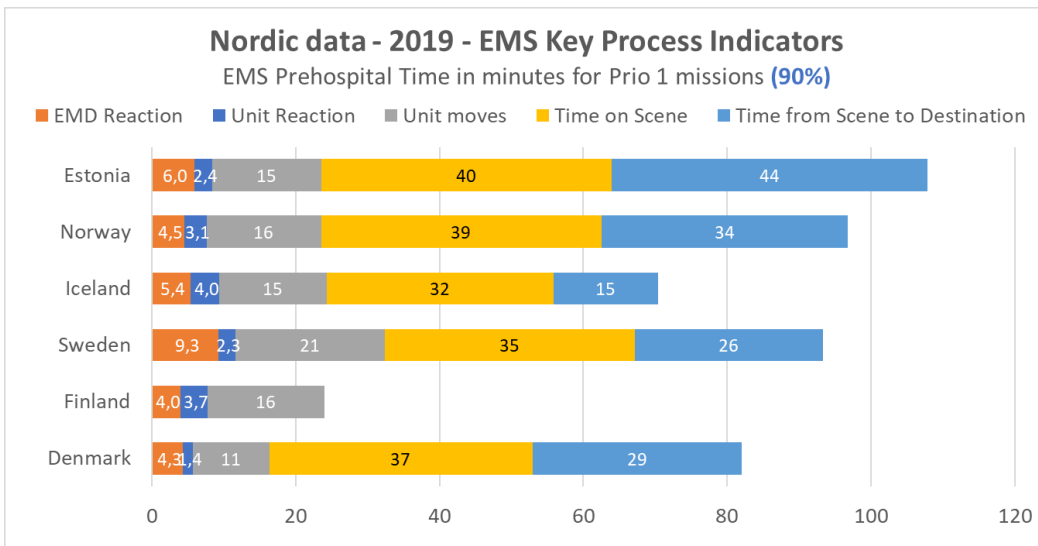
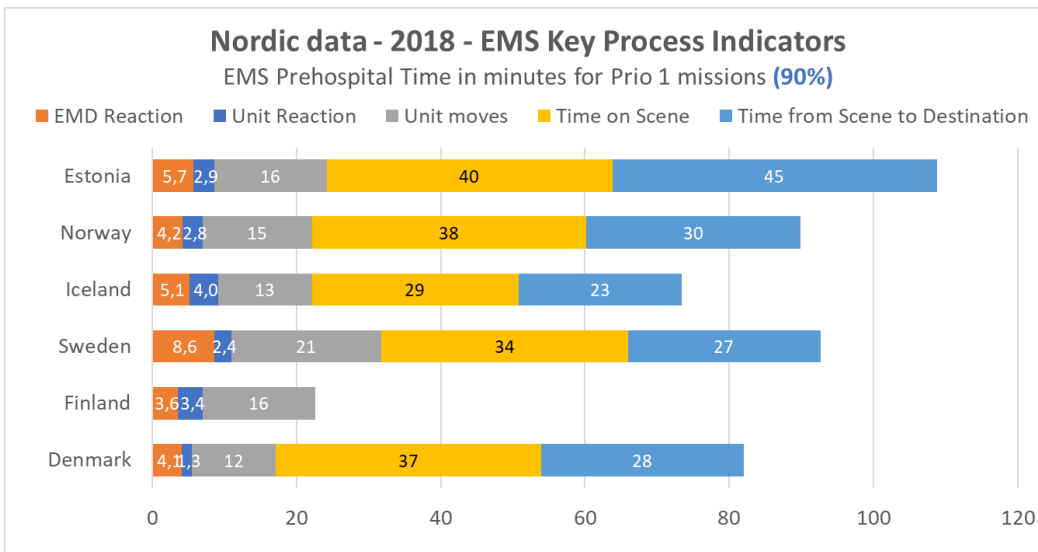


Figure 5.13: EMS prehospital time includes all the time intervals - 90 percentiles.

## EMS prehospital time includes all the time intervals – Median



EMS prehospital time includes all the time intervals - 90 percentiles



## 6. Attachment

### 6.1 Definition of basic concepts and terms

In the table below, you'll find the definitions of the concepts and terms use in this report.

Table 6.1: Definition of basic concepts and terms

Term	Definition
Acute mission	Priority 1/red mission with lights and sirens
Ambulance	Vehicle or craft intended to be crewed by a minimum of two appropriately trained staff for the provision of care and transport of at least one stretchered patient.  Remark: Vehicles/crafts include boats, helicopters, airplanes etc., i.e., not only cars.  See also Unit.
AMI	Myocardial infarction
Destination	Where the patient is (to be) delivered.  See also Actual destination, Planned destination.
Destination – actual	Where the patient is finally/ <i>actually</i> delivered to.  Remark: Patient may be transported to another destination than the Planned destination, because of e.g. weather/road conditions on the way, or the authorized personnel at the Planned destination decides to transport the patient to a higher/lower level of treatment/care than initially planned.
FHQ	First Hour Quintet, i.e. patient groups demanding high quality and time-dependent care. The patient groups are cardiac arrest, AMI, stroke, major trauma and severe respiratory distress.
Destination - planned	Where the patient is, at the beginning of a mission, <i>planned</i> to be delivered to.  See also actual destination.
EMD	Emergency Medical Dispatch/Emergency Medical Coordination Center/ Emergency Medical Communication Center  Remark 1: In countries where dispatch of various emergency services (fire, police and health) is handled at the same dispatch center (PSAP <sup>20</sup> ). EMD is a separate call and dispatch center for medical emergencies only.  Remark 2: Dispatch centers do the call-handling and assessing the severity and urgency of the calls. Then a technical dispatch of the unit collects the request for ambulance services by telephone handling and organizing the response by coordinating movements and dispatch all available resources, cars and personnel. In other words, dispatch center is about getting the right resources, to the right patients, in the appropriate amount of time.
ePCR	Electronic Patient Care Record
ePPR	Electronic Prehospital Patient Record
ERC	Emergency Response Center
EMS	EMS out of hospital includes EMD and ambulance/Unit services in this context.
EMT	Emergency Medical Technician
GP	General Practitioner
HEMS	Helicopter-EMS

<sup>20</sup> Public-safety answering point, also called Public-safety access point.

MD	Medical doctor
Mission	A mission to a patient/incident based on a primary call
OHCA	Out of hospital cardiac arrest
ICT	Information communication technology
ICPC 2	International Classification of Primary Care 2
Incident	Situation where need for EMS is perceived/acknowledged.
Primary call	Call to EMD where the caller, regardless of who is calling (patient, health personnel), for health assistance and the patient is not in a health care facility. Primary calls include calls from a nursing home
ROSC	Return of spontaneous circulation
SAR helicopter	Seek and rescue helicopter
Scene	Location where the incident has occurred
Unit	Recourse that EMD dispatches to the Scene.  Remark: It is usually a medical resource in terms of an ambulance, but it could in some cases also be police, fire brigade or other kinds of resources.

## Time points.

Table 6.2: Definition of time points

Time point	Definition
Time when EMD is called up	Date/time when the incoming call is first registered (in computerized system) at the EMD, regardless of when the call is answered. Remark: Corresponding to NEMESIS.eTimes.01, see chapter 3.4.
Time when EMD calls Unit	Date/time when EMD calls a Unit.  Remark: Corresponding to NEMESIS.eTimes.03, see chapter 3.4.
Time when Unit starts moving (towards Scene)	Date/Time when Unit starts moving towards Scene.  Remark 1: Corresponding to NEMESIS.eTimes.05, see chapter 3.4. Remark 2: For helicopter, airplane and suchlike, this is the take-off-time.
Time when Unit stops at Scene	Date/time when the Unit stops at Scene.  Remark 1: Corresponding to NEMESIS.eTimes.06 Remark 2: For helicopter, airplane and suchlike, this is the landing-time at Scene. Remark 3: This is not always the same time as the time when Staff arrives at the patient's side.
Time when Unit stops at Destination	Date/Time when the Unit stops at Destination.  Remark 1: Corresponding to NEMESIS.eTimes.11, see chapter 3.4 Remark 2: For helicopter, airplane and suchlike, this is the landing-time at Destination (corresponding to NEMESIS.eTimes.10).