Helsedirektoratet
Norwegian Directorate of Health

The Nordic Emergency Medical Services

PROJECT ON DATA COLLECTION AND

BENCHMARKING 2014 - 2018

Report
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CONTENT

Summary

The Nordic countries are among the top-ranking health care services[1] and have a long tradition of collecting data, documenting and publishing their outcomes for the patients. However, we've learned that for the Nordic countries' Emergency Medical Services (EMS) this is not the case. Below you'll find a summary of findings of the project and identified challenges ahead.

Lessons learned:
- There is a need for Nordic standardizing of EMS data, classification of terminology and the out of hospital patient pathway, to be able to compare and exchange experiences internationally and among the Nordic countries.
- To collect nationwide reliable and valid patient related data in the field of EMS is challenging in all the Nordic countries.
- There is a lack of common classification systems to describe "reason for care" for patients treated by EMS.
- The criteria for urgency and priority in the emergency medical dispatch centers (EMD) varies between the Nordic countries.

Achievements:
- Nordic EMS patient pathway has been defined and described.
  - Data structure is developed.
  - Terms and definitions needed for the quality indicators are defined.
  - First set of Nordic quality indicators was agreed and results are presented in the report.
- A subset of the classification system ICPC2 to be used as a "reason for care" in EMS was agreed.

Identified developments for the future:
- The Nordic project group suggests including EMS as a new area of statistics in the Nordic Ministry Council.
- Continued formalized Nordic collaboration on quality and patient safety issues for EMS patients is needed
- To be able to collect and compare valid patient data, national electronic patient records and registries for the EMS should be implemented nationally.
- A Nordic manual for using a subset of ICPC 2 classification for EMS is needed and should be implemented.
- Developing common Nordic criterion and definitions of urgencies and priorities for the same type of incidents to be implemented in the emergency medical dispatch centers.

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[1] Health at a Glance 2017: OECD Indicators

National tasks to reach the identified developments for the future:

NO:

- Implement an electronic patient care record in the EMS, compatible with other hospital information technological systems.
- Implement a new information communication technology- system (ICT-system) in the EMD.
- Further developing of the national medical quality registries including the prehospital data, in the registries for i.e. trauma, stroke, AMI.

SE:

- Legal inclusion of prehospital individual data in the national patient registry.
- A revised national regulation for EMS on education level and training for ambulance personnel.
- Development of a patient care record for EMS, compatible with other hospital information technological systems.

DK:

- EMS personnel ability for prehospital diagnostic and treatment demands improved qualifications for the prehospital personnel.
- Identify the data on the patients' pathway from the 112-call to arrival hospital, or to release without hospitalization and to standardize the patient data output from the electronic prehospital patient record on a national level.
- Standardize EMS registration practice across regions to increase data quality and completeness.
- Optimizing patient pathway data sharing by integrating the prehospital patient care record (ePCR) with hospital electronic patient care record systems to facilitate continuity of patient care.
- Need for prehospital classification system (ICPC-2) to register symptoms in ePCR.

FI:

- There is a process to establish a national EMS database from 2019.
- Two national data systems: the new 112-data system and the national electronic command and control data system that includes national electronic patient care record for EMS.

ICL:

- Establish a central national EMS agency with responsibility for structuring the EMS system and ensuring quality control for both land and air transports.
- Establish a national electronic patient care record system for the ambulance service and a national database.

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.

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 exceeding the population increase.[2] 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 diagnostic and treatment demands improved qualifications for the prehospital personnel to enable them to start advanced medical treatment to patient groups suffering from different complex health condition. 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.

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.[3]

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[2] NOU 2015: 17, Først og fremst — Et helhetlig system for håndtering av akutte sykdommer og skader utenfor sykehus
[3] JEMS December 2017: Quality Indicators. Measuring EMS quality in the Nordic countries

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.[4] That report has been an inspiration for the Nordic countries and lead to joined forces.

1.3   Organizing of the project

1.3.1.   Health Director Generals in the Nordic Countries

In 2014 the meeting endorsed the proposal for the project and each country was encouraged to appoint their government representative in the project. The project has yearly reported progress and results to the Health Director Generals meeting.

1.3.2.   Participating countries and representatives

All the Nordic countries decided to join the project with the following government representatives:

Norway	Steinar Olsen, The Norwegian Directorate of Health.
Finland	Lasse Ilkka,The Ministry of Social Affairs and Health.
Denmark	Peter Anthony Berlac, Capital Region of Denmark, representing the Danish Health Authority
Sweden*	Mats Granberg, Sweden, The National Board of Health and Welfare, 2014-2015. Elizabeth Åhsberg, Sweden, The National Board of Health and Welfare, 2016-2018.
Iceland	Leifur Bárðarson, Directorate of Health Iceland.

* Only as observers.

Experts from different parts of the EMS in the Nordic countries and researchers have contributed in the project:

Lasse Ilkka, FI,	The Ministry of Social Affairs and Health	2014-2018
Jouni Kurola, FI,	The Hospital District of Kuopio University Hospital	2014-2018
Tom Silfvast, FI	The Hospital District of Helsinki and Uusimaa	2014-2018
Ari Ekstrand, FI,	The Emergency Response Centre Administration	2014-2015
Peter Anthony Berlac, DK	Emergency Medical Services, Capital Region of Denmark	2015-2018
Poul Anders Hansen, DK,	Emergency Medical Services, North Denmark Region	2014-2018
Ingunn Riddervold, DK	Emergency Medical Services, Central Denmark Region	2015-2018
Erika Frischknecht Christensen, DK	Center for Prehospital and Emergency Research, Aalborg University	2015-2018
Mats Granberg, SE	The National Board of Health and Welfare	2014-2015
Elizabeth Åhsberg, SE	The National Board of Health and Welfare	2016-2018
Thomas Blomberg, SE	The Federation of Leaders in Swedish Ambulance and Emergency services (FLISA)	2014-2018
Stig Holmberg, SE,	The Federation of Leaders in Swedish Ambulance and Emergency services (FLISA)	2014-2018
Dag Gjesteby, SE	Helseplan Consulting Group AB	2014-2018

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[4] European Emergency Data Project 2006: Health Monitoring & Benchmarking of European EMS Systems: Components, Indicators, Recommendations.

Lars Engerström, SE	SOS Alarm	2014-2017
Leifur Bárðarson, ICL	Directorate of Health Iceland	2014-2018
Bergur Stefánsson, ICL	National Director for Pre-hospital Emergency Services	2014-2016
Viðar Magnússon	National Director for Pre-hospital Emergency Services	2016-2018
Steinar Olsen, NO,	The Norwegian Directorate of Health	2014-2018
Håkon Haaheim, NO,	The Norwegian Directorate of Health	2014-2018
Jon Erik Steen-Hansen, NO	The Norwegian Directorate of Health	2014-2016
Taran Borge, NO	The Norwegian Directorate of Health	2014-2015
Janne Kristin Kjøllesdal, NO	The Norwegian Directorate of Health	2014-2018
Jim Yang, NO	The Norwegian Directorate of Health	2014-2015
Lars Myrmel, NO	Haukeland University Hospital	2014-2018

Steinar Olsen has been the project manager and Janne Kristin Kjøllesdal has been the secretariat of the project.

1.3.3. 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.

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 with chair and authors:
- Assess, treat and release, chair Erika F. Christensen
- Out of Hospital Cardiac Arrest (OHCA), AMI, and stroke, chairs Jon Erik Steen Hansen and Jouni Kurola
- Key statistics, chair Dag Gjesteby
- Classification of reason to care ICPC 2, chair Jouni Kurola.

The Nordic project group has held two meetings a year, in addition to meetings in the working groups.

Data collection has been processed in three pilot sessions.

The concept of work has been sharing and discussion with EMS colleagues around the world. This collaboration has been an inspiration along the way. Our work in progress has been presented in workshops at the following international conferences; EMS Today USA 2016, EMS Copenhagen 2016 and 2017. The Nordic Ministry council funded our EMS-seminar in connection to the Nordic Welfare States and Public Health conference in Helsinki in 2016. This has also resulted in an international research collaboration on the patient group Assess, treat and release.

The project has been presented in American Journal of Emergency Medical Services (JEMS) December 2017[5] and in the Nordic Ministry Councils anniversary publication 2018.

To secure the data validity and reliability for the Nordic EMS quality indicators, a procurement was arranged and Helseplan AS was the chosen tender, see the report in attachment 11.

1.4   Other data collection initiatives

EMS Compass, a two-year (2014-2016) US effort to develop EMS performance measures. The National Association of State EMS Officials (NASEMSO) has managed the project and was funded by The National Highway Traffic Safety Administration (NHTSA) Office of EMS[6].

The EMS Compass team released candidate measures for public testing late in 2016 and anticipates that the EMS community will continue to develop performance measures using the initiative's process.

The scope of measures included ways to assess the quality of patient care and outcomes, personnel, financial, and other measures to evaluate administrative and operational performance.

Moreover, several European countries (amongst others: Germany, France, Netherland and U.K.) and Australia and Asia are working on and develop EMS quality indicators.

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[5] http://www.jemsdigital.com/jems/201712/?pg=27&pm=1&u1=friend
[6] https://www.ems.gov/projects/ems-compass.html

2 THE EMS SYSTEMS IN THE NORDIC COUNTRIES

2.1 Norway

The population in Norway is 5, 2 million inhabitants and covers 324 000 km^2.

The public funded health care is divided in primary health care in 426 municipalities and specialized health care in 4 health regions.[7] 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.
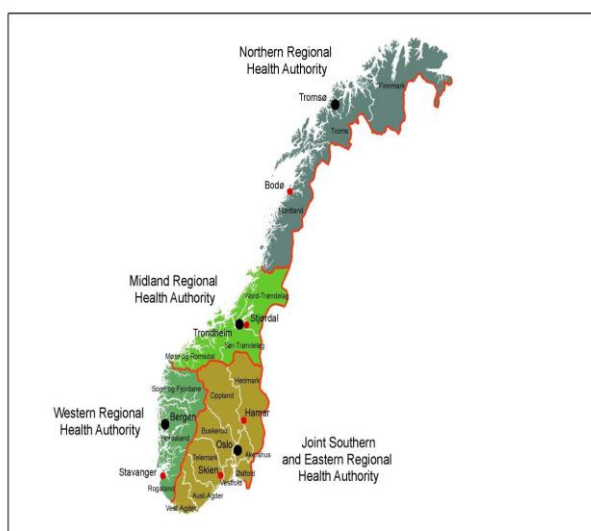
The health care regions are responsible for hospitals and specialized health care, 519 car ambulances[8], 9 planes and 13 helicopters[9], 43 ambulance boats and 16 EMDs.

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.

2.1.1. Strengths and weaknesses

The Norwegian prehospital system is highly trusted by its inhabitants. 95 percent of the population knows the medical number and 87 percent is confident that they will receive the medical help when needed.[10]

In handling calls, the EMD operators use the Norwegian criteria based guidelines to decide what medical help is needed to what urgency and what resources should be dispatched.[11] The system

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[7] Statistics Norway per 1.1.2017
[8] Ibid.
[9] National Air Ambulance Services of Norway, Yearly report 2015
[10] Befolkningens holdninger til nødmeldetjenesten, TNS Gallup 2014
[11] Norwegian Index for Medical Emergency Assistance (Index)

gives them information about geographic position of the scene, and if they know the patient identity, they have access to the patient critical medical information.

The EMD's operators are registered nurses and Emergency Medical Technicians (EMTs)/paramedics with additional training,[12] but the training differs throughout the country. There are no national education training requirements to the operators. However, national educational requirements on the ambulance services were implemented in 2005[13], and bachelor paramedic studies have been offered since 2016.

As for information communication technology (ICT), Norway is lacking a national electronic patient care record (ePCR) in the ambulance services. A national infrastructure for electronic information exchange of text, pictures and video between health care providers treating the patient is lacking too. The ICT-systems in the EMDs are outdated, but a process for implementing a new national system has started. With a national prehospital ePCR and new ICT-system, national clinical guidelines and standards will ensure coordination in the prehospital services.[14]

The available national data on the prehospital services is reported from the EMDs. This data gives important information on prehospital activities; numbers, type of medical problem, urgency and response time. However, Norway lacks clinical outcome results on a national level. One exception is cardiac arrest registry, which provides clinical data on this patient group on a national level.

2.1.2. Identified developments for the future
- Implement a national electronic patient record in the prehospital services.
- Implement a new ICT system in the EMD.
- Further developing of the national medical quality registries including the prehospital data, in the registries for i.e. trauma, stroke and AMI.

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[12] Forskrift om krav til og organisering av kommunal legevaktordning, ambulansetjeneste, medisinsk nødmeldetjeneste mv. 2015, § 15 bokstav l
[13] Forskrift om krav til og organisering av kommunal legevaktordning, ambulansetjeneste, medisinsk nødmeldetjeneste mv.
[14] Meld. St. nr 11 (2015-2016) Nasjonal helse- og sykehusplan (2016-2019)

2.2   Sweden

Sweden has a population of 10, 1 million inhabitants[15] and an area of 528 449km^2. [16] The public funded health care is divided into 290 municipalities and 21 county councils.
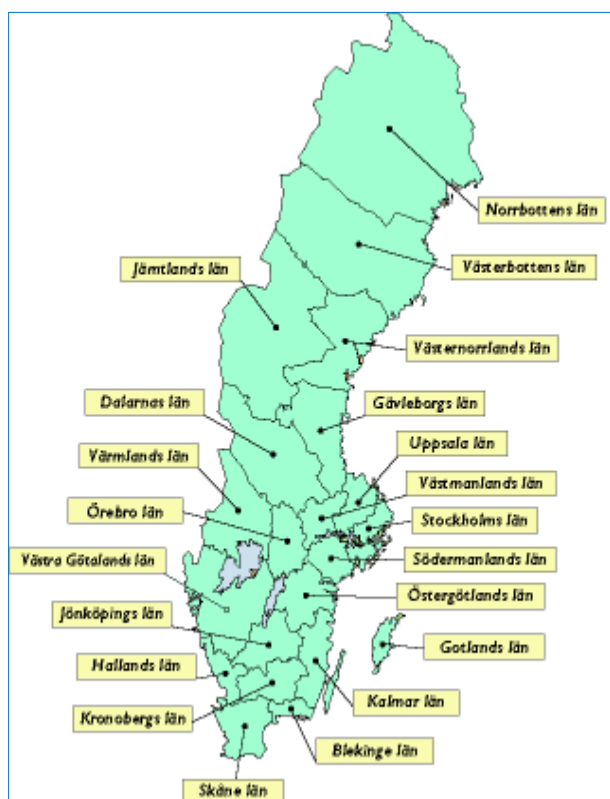
Each municipality and county council is autonomous and governed by their respective political leadership, which also includes the right to deduct tax. Medical health care in hospitals and primary care, including EMS, are administered by county councils. Other health care may be provided in municipalities, 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[17] [18]. Some county councils have access to 5 search and rescue (SAR) helicopters (Swedish Maritime Administration is responsible) which can be staffed with medical crew for high priority cases and sea rescue[19]. The ambulances are mainly staffed with a specialized nurse (registered nurse with additional training) and a nurse or a 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.

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.[20] Present national regulation[21] 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.

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[15] SCB, 2018
[16] SCB, 2017
[17] NYSAM 2017 and different websites, reliability unclear
[18] Vård på vingar. Nationell samordning av luftburen ambulanssjukvård, SKL, 2012
[19] http://www.sjofartsverket.se/sv/Sjofart/Sjo--och-flygraddning/Administration/Projekt-SamSAR/
[20] www.sosalarm.se
[21] SOSFS 2009:10 (M) Ambulanssjukvård m.m.

2.2.1. Strengths and weaknesses

A majority (80%) of the general population has reported a large confidence in the EMS.[22] Data on several measures of response times for ambulances are routinely registered and national data on response time (EMD called up – Unit stops at scene) is published annually.[23] Initiatives to collect prehospital data, including patient variables, have been started by The Swedish organization for Leadership in Ambulance Services (FLISA)[24] in association with Register Center South in Sweden, which collects test data from 19 of 21 county councils. Further, a national concept for prehospital on scene management,[25] a network for medical director (SLAS) within FLISA develops national treatment guidelines as well as a national common communication system (RAKEL) for organizations involved in larger emergencies,[26] have been developed.

However, there is no common patient record in ambulance services, and different information technology systems are used in different regions. No national prehospital data is collected[27]. Therefore, neither content of care in ambulances, nor outcomes for patients receiving both prehospital and hospital care, is possible to describe. Also, it is unknown to what extent available resources vary between regions, for example regarding staffing and number of ambulances per inhabitant. Another main issue of concern is the recruitment of staff, particularly in rural areas[28]. In addition to this a lack of training and challenges in off road terrain may be mentioned.

2.2.2. Identified developments for the future
- Legal ability to include prehospital individual data in the national patient registry.
- A revised national regulation for EMS, including for example necessary education level and training for ambulance service staff.
- Development of a patient record for EMS, compatible with other hospital information technological systems.

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[22] SKL & MSB, Öppna jämförelser trygghet och säkerhet 2014
[23] http://www.socialstyrelsen.se/indikatorer/sokiindikatorbiblioteket/ojhs/responstidforambulans
[24] http://www.flisa.nu
[25] https://www.psconcept.se/om-ps
[26] https://www.msb.se/sv/Produkter--tjanster/Publikationer/Publikationer-fran-MSB/Nationella-riktlinjer-for-samverkan-i-Rakel/
[27] The National Board of Health and Welfare has only lawful right to collect individual data from records made by medical doctors in hospitals and specialized primary care.
[28] NYSAM, Ambulanssjukvård. Nyckeltal 2016

2.3   Denmark

The Population in Denmark is 5, 7 million and covers 43 000 km^2. 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.
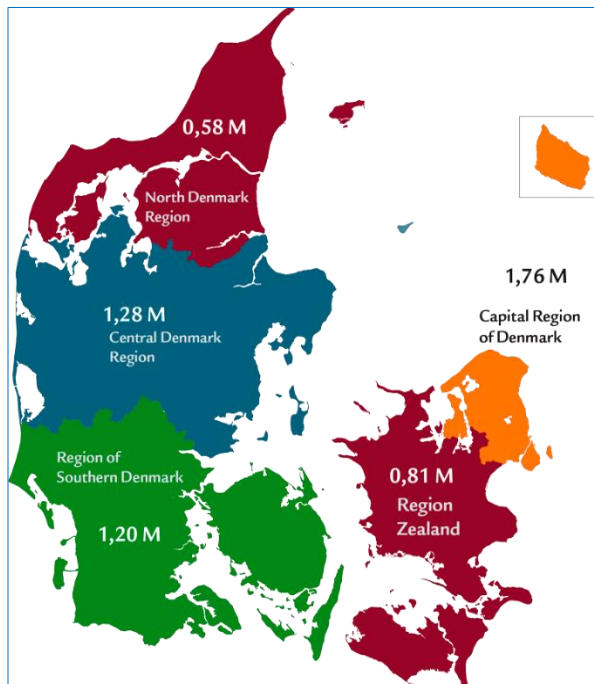
The 5 regions currently have 319 emergency ambulances, 19 rapid response vehicles staffed with EMTs, nurses or paramedics, 23 physician-staffed mobile critical care units, 3 physician-staffed Helicopter-EMS (HEMS) and 5 regional EMDs.

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 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.[29] 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 Indicator database, with information collected from the ePPR.

2.3.1. Strengths and weaknesses

Each regional prehospital organization is responsible for the patient pathway, from call-taking at the EMD until the patient is handed over to hospital staff or the patient is assessed, treated, and released at the scene. Dispatch data and ePPR data provide valuable logistical information based mostly on time stamps, but do not provide relevant aggregated clinical data regarding quality of treatment, patient outcomes etc. Solving this issue is the purpose of the new national clinical database mentioned above.

A potential weakness of the Danish system is the lack of direct access to 112-emergency medical care. Police, Fire and EMS are not co-located in Denmark. The Police (and Copenhagen Fire Brigade) answer all 112–calls and divert health-related calls to the regional EMD. This may cause a delay in providing medical help to patients, which can be harmful to some patients with time-critical conditions.

2.3.2. Identified developments for the future

EMTs and Paramedics are currently not certified health-care professionals in Denmark. Parallel to the increasing and ongoing integration of EMS as part of the Health Care System, certification of prehospital personnel is a necessary and natural evolutionary step. Breaking down the barriers between the Emergency Departments and the prehospital arena will facilitate smoother and safer patient-pathways with fewer system-handovers, loss of information and continuity in patient care. Institutionalizing prehospital personnel as part of the health-care system will enable paramedics to work in Emergency Departments alongside nursing staff and emergency physicians.

A closer collaboration and synergy between the hospital/EMS sector and the municipal/GP-system is necessary to prevent unnecessary admissions and re-admissions.

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[29] http://www.rkkp.dk/om-rkkp/de-kliniske-kvalitetsdatabaser/prahospitalsdatabasen/

2.4 Iceland

The population in Iceland is 340,000 inhabitants and covers 103 000 km^2.

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.
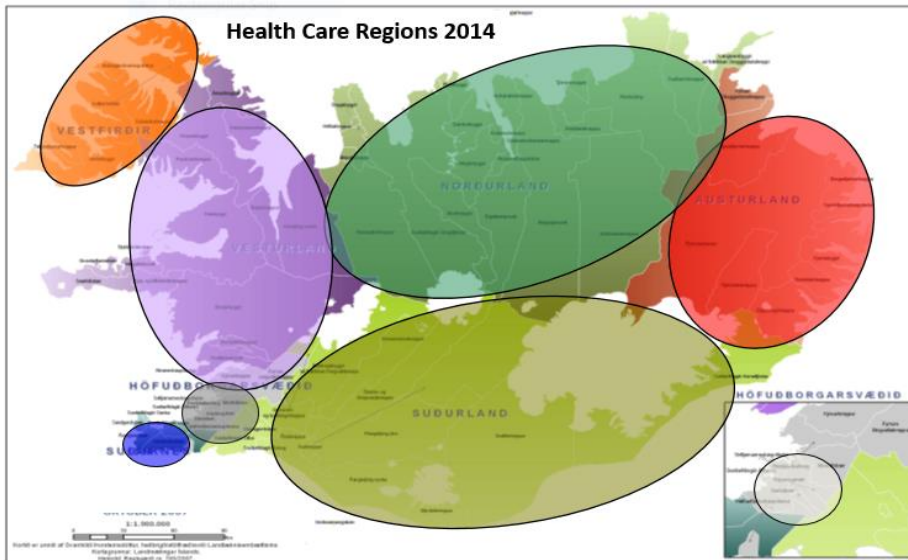
The health care regions are responsible for regular GP service (within office hours) and GPs on-call (outside office hours). The regions are also responsible for the emergency service in their regions except in Reykjavik and Akureyri where the service is provided by the hospitals.

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 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.

2.4.1. Strengths and weaknesses

The importance of the prehospital emergency medical systems has generally been underappreciated by the administrative government in Iceland. This is reflected in a system that lacks a holistic structure and is therefore serviced by many entities that are not always coordinated. The EMS system in Iceland is challenged by long distances and a small population. The country is, however, well covered by ambulances, but the ambulance crews tend to have limited training and experience. This is improving as Iceland has announced aims to have the EMT-I/AEMT stage as a requirement for EMT licensure in Iceland. Also, with increased availability of hybrid training programs for paramedics in the USA, many are seeking additional training through these means. There is no system for paramedic training in Iceland. There is considerable variability in terms of who provides EMS service. Most of the larger areas are serviced by fire department based EMS, while ambulances in the smaller more rural areas, tend to be run by the health care stations and are staffed by part-time EMTs. This means that few individuals have EMS as their full-time occupation. There is a good fixed-wing retrieval system which has been operating over the past decade out of the northern township of Akureyri where the main rural/district hospital is located. There is no HEMS system, although this is currently under consideration. There is a SAR helicopter run by the Icelandic Coast Guard which covers some of the medical evacuation needs.

The communications system for the country is well developed. There are few "dark spots" without GSM coverage and most of the country is covered by TETRA, which is in use by all the emergency services, except the coast guard.

EMDs are trained as dispatchers guided by a computer aided dispatch system (CAD), but this system is developed in-house and needs considerable refinement.

Response time data is registered electronically by the EMD for the entire country. Clinical data, however, is lacking, but the authorities have allocated funding of an ePCR in the EMS. There is a set of national procedures within the EMS, which needs revising together with quality assurance and development within the EMS system.

2.4.2. Identified developments for the future

Provide government support for developing the EMS and supporting services to ensure access to emergency health care is available to everyone in the country within a reasonable timeframe. This requires a more concerted effort between dispatch, ambulances and air ambulance/SAR helicopter.

Establish a central national EMS agency with responsibility for structuring the EMS system and ensuring quality control for both land and air transports. Ideally this agency would have control over the EMS vehicle fleet and the EMD CAD-protocols and EMT clinical/operational protocols.

Establish a national electronic patient care record system for the ambulance service and a national database.

2.5   Finland

The population in Finland is 5, 5 million inhabitants and covers 338 000 km^2.
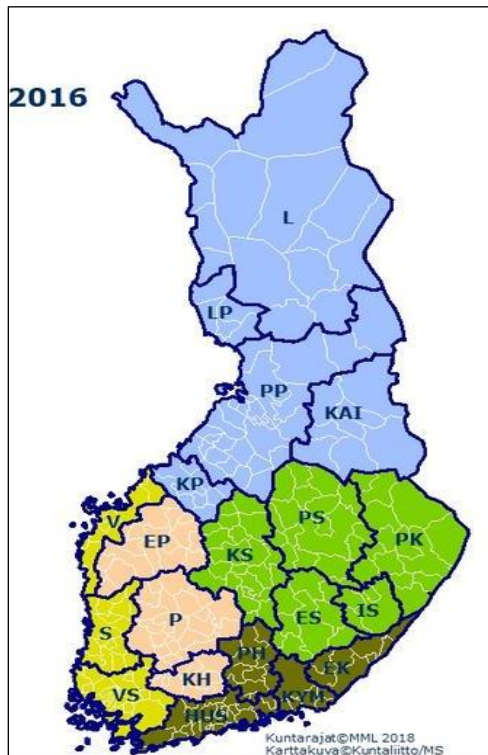
Health care is publicly funded with primary health care provided by 311 municipalities and specialized health care by 20 hospital districts (owned by the municipalities; dark blue borders on the map). Hospital districts are organized into five university hospital catchment areas, which coordinate advanced specialized care, helicopter emergency care and nationally centralized services. Municipal social welfare and health care services, implemented with government support, form the basis of the social welfare and healthcare system. Private companies also provide services alongside the public sector.

Out-of-hospital emergency medical services (EMS) are organized by the 20 hospital districts. According to the legislation, EMS includes:

- Urgent treatment of patients who have suffered an injury or a sudden onset of an illness primarily outside health care facilities, subsequent transport of patients to appropriate medical care when indicated, and in acute cases inter-hospital transfers when advanced care is needed.
- Preparedness for the provision of EMS.
- Referral of patients, their relatives, and other individuals involved in incidents to psychosocial support services, where necessary.
- Drafting of regional contingency plans for dealing with major accidents and exceptional medical emergencies together with other public authorities and organizations.
- Giving executive assistance to the police, rescue services, border control authorities, and maritime rescue authorities.

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 hospital districts shall determine the standard of EMS services. The service standard defines, among other things, the scope of the services, the qualifications required of personnel, response

time targets. The standard decision shall ensure that the service is provided efficiently, and expediently and taking into consideration situations where demand for EMS exceeds normal supply.

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, although most of these calls are made to 112. The ERC Agency and the Border Guard are operatively and administratively in close co-operation.

A national social and health care reform is currently being planned, scheduled to be implemented in 2020. The responsibility for organizing health and social services, including the EMS, will be transferred to the 18 new counties. There will be five university hospital/collaboration areas to coordinate e.g. EMS in a larger context.

2.5.1. Strengths and weaknesses

The Finnish prehospital system has undergone a fundamental reform after 2010. Prior to the Health Care Act, which was passed in 2010, the 300+ municipalities were responsible for providing EMS. The Health Care Act defined out-of-hospital emergency medical service and EMS personnel, and the responsibility was transferred to 20 hospital districts. EMS thus became an integrated part of social- and health care. The hospital districts determine the standard of service required of EMS, and the criteria are prepared together within the university hospital catchment areas. Legislation allows collecting and analyzing local ERC and EMS data on a national level, and national EMS dispatch data are available. Also, the collaboration between hospital districts is a strength. The weakness is due to the lack of a national EMS database which only focusing on measuring time stamps of EMS, not the quality variables of patient treatment.

Future national ICT-systems for EMS (112 data system ERICA and the control system KEJO with national ePCR for EMS) make national patient registries via EMS-database possible. ERICA will be implemented in 2019. The introduction of KEJO is still without an exact time schedule. The Finnish EMS system lacks a national patient registry until both ERICA and KEJO have been nationally implemented.

2.5.2. Identified developments for the future

There is evident lack of national database for EMS data. EMS data is gathered and stored in a non-unified national form. Some hospital areas use ePCR in the EMS, but most areas use paper form ePCR. There is a process to establish a national EMS database from 2019, and the main data sources will be two national data systems; the new 112 data system and national electronic command and control data system, which include national ePCR for the EMS.

3 COMMON NORDIC DEFINITIONS

3.1   The Emergency Medical Dispatch center

Emergency Services in the Nordic countries 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 and Sweden 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 Nordic countries use criteria-based dispatch systems for emergency medical response, based on level of medical urgency.

Table 3.1: Organizing of the EMD in the Nordic countries

		Denmark	Norway	Sweden	Finland	Iceland
Emergency Medical Dispatch (EMD)	National number	112	113	112	112	112
	Initial operator	Police	Health	SOS Alarm	Specific dispatch-exam	
	EMD Operator	Nurse	Nurse			
Priority[30]	Life-threatening	A,	A	1	A	1, 2
	Acute	B	H	2	B	3
	Other	C, D, E	V	3, 4	C, D	4
Acute mission resources	Ambulance cars	319	519	820		
	Ambulance boats	0	43			
	HEMS	3 (4)	13	9	6	
	SAR	3	12	5	3	
Other acute health resources	GP on-call	Yes	National number 116117	No GP. National number 1177	No GP. 116117 under imple-mentation	
	Emergency wards	Yes				
	Municipality acute bed-posts	Yes1)	600	No		
Country	Population	5.700 000	5 200 000	10.100 000	5.400 000	348 580
	Land area (km^2)	43 000	324 000	528 449	338 000	103 000

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[30] According to HL-7, Nemsis

Table 3.2: Legislation on data in the Nordic EMS

		Denmark	Norway	Sweden	Finland	Iceland
Collect data from EMD	Anonymous	Yes	Yes	Yes, but only time stamps for 18 of the 21 county councils through SOS-Alarm	Yes	
	Personal identifiable	Yes	Yes. Pursuant to law and regulation.	Yes. Via EMD-number and ePCR	No	
Collect data from Ambulance services	Anonymous	Yes	Yes, not implemented	Yes, data can be collected from the EMD or each caregiver	Yes	
	Personal identifiable	Yes	Yes. Pursuant to law and regulation.	No, but attempts are ongoing to develop a national quality registry Patient journals belong to each caregiver	For own use (quality assurance, supervision)	
Use of data for research and comparison	Anonymous data	Yes	Yes.	Yes	Yes	
	Personal identifiable data	Yes, after positive approval from The Danish Data Protection Agency, The National Committee on Health Research Ethics, and for some studies also from The Danish Patient	Yes, after positive decisions from Ethical board and owner of data registry	Yes, after appropriate permission	Yes, after appropriate permission	

	Personal identifiable data from several data-sources	Yes, after positive approval from The Danish Data Protection Agency, The National Committee on Health Research Ethics, and for some studies also from The Danish Patient Safety Authority	Yes, after positive decisions from Ethical board and owners of data registries	Yes, after appropriate permission	Yes, after appropriate permission	
		Safety Authority				

3.2   Data availability and data collection

Each country has been responsible for the data collection process and the working group Key statistics has coordinated, assessed and presented the results of the data collection pilots.

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. You'll find a list of these quality indicators in chapter 8.

3.3   Quality indicator template

To present the proposed quality indicators we have adapted a template from the Norwegian template for defining quality indicators.[31]

- 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[32]. Time points that are used in the definitions of the proposed quality indicators (time intervals) refer to the time points in this drawing[33]. See chapter
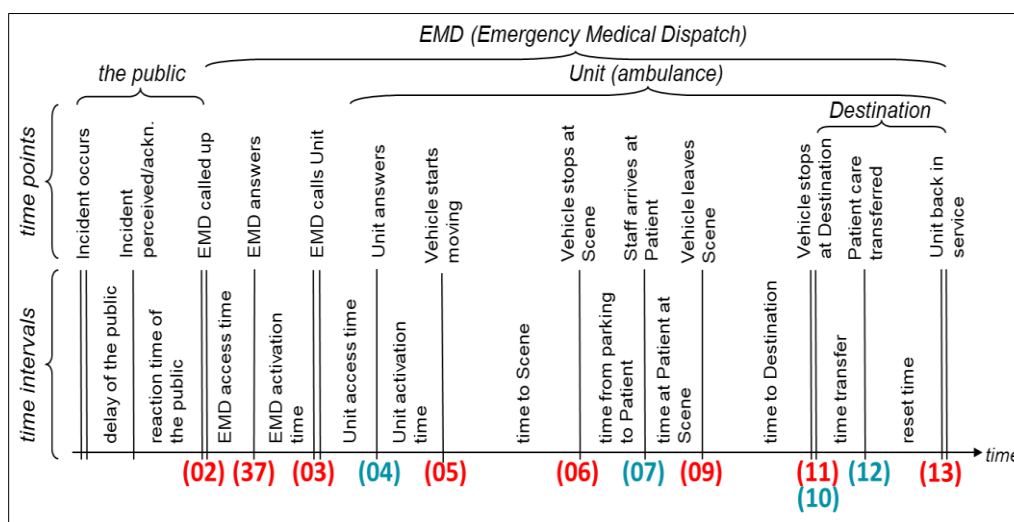
Figure 3.1: Common Nordic prehospital EMS time line.

NOTE: The time points marked red are time points that can be registered in relevant computer systems in all Nordic countries today. Thus, the agreed common Nordic time points include both the time points in red and blue.

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[31] Other elements that are not shown are e.g. administrative elements such as version, status, date of approval etc.
[32] Norwegian Catalogue of EMS terms and definitions, 2012
[33] Time point no. 37 in the drawing does not exist in NEMSIS. This is though chosen to be a Common Nordic Time Line.

Figure 3.2: Common Nordic time intervals and indicators for response quality

The time points and time intervals have given the following list of Nordic quality response indicators, which are presented in chapter 4. The quality indicators on Assess, treat and release are presented in chapter 5.

3.5   Data structure and definitions

The project developed a structure for data collection corresponding with the process in EMS, see figure 3.3 below.
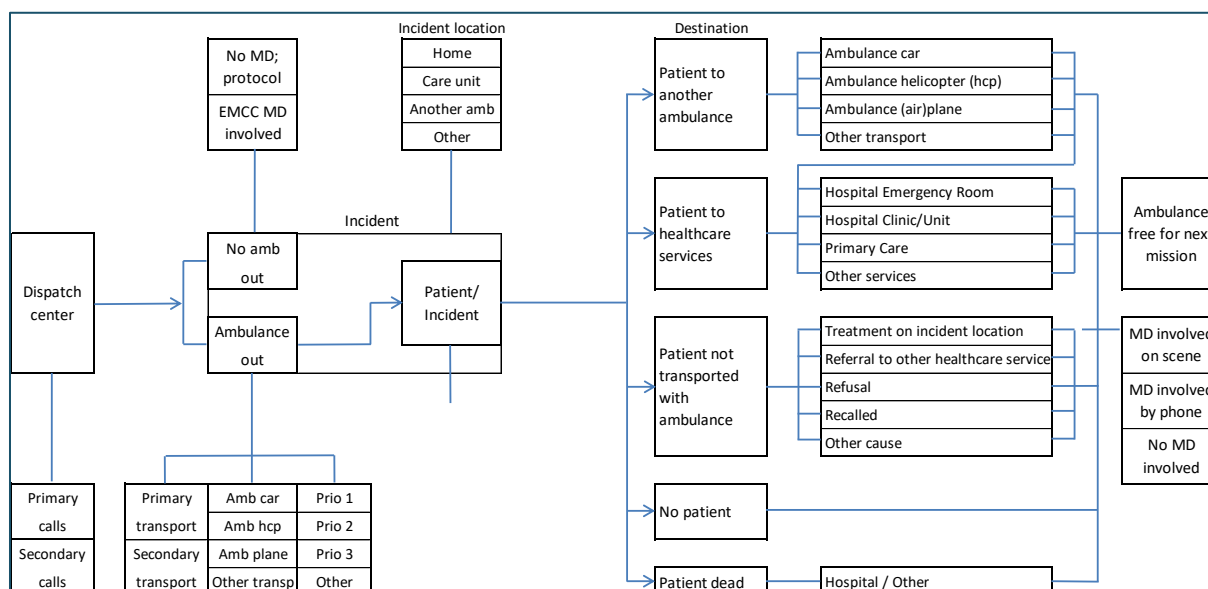
Figure 3.3: Data structure for patient pathways in EMS
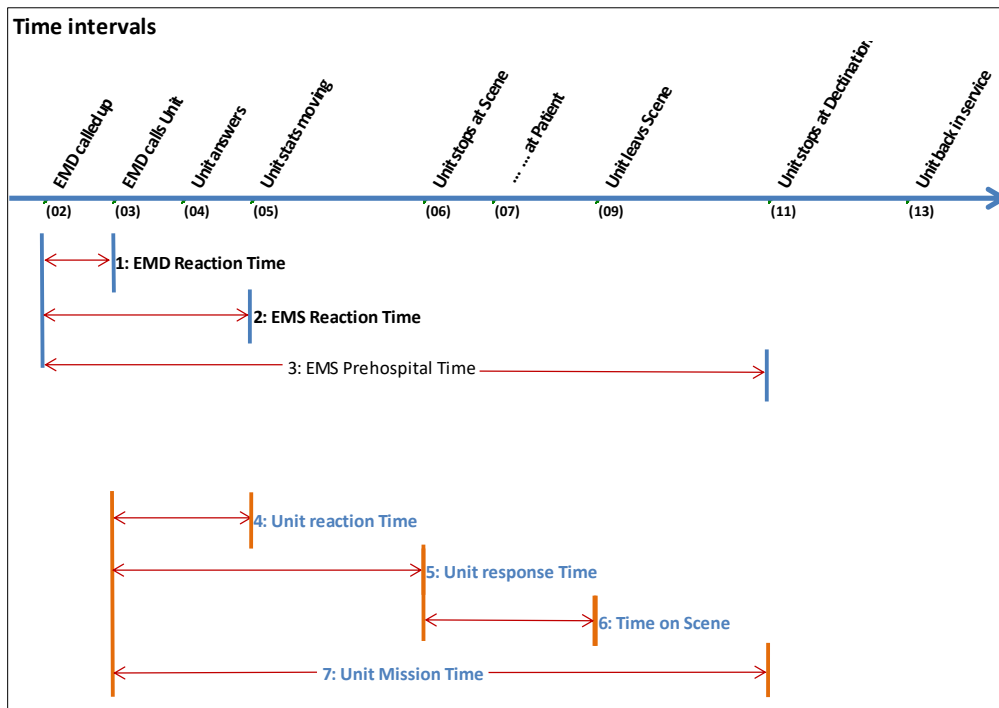
3.6   Preconditions

3.6.1.   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.

3.6.2.   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. These are included in the templates in chapter 10.

3.6.3.   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 9.

4 WORKING GROUP KEY STATISTICS

4.1   Introduction

In this chapter *some* common Nordic quality indicators are presented regarding time intervals along the typical prehospital EMS time line.[34]

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:

Datastructure ambulanceperspective

Quality indicators for different levels

- 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.
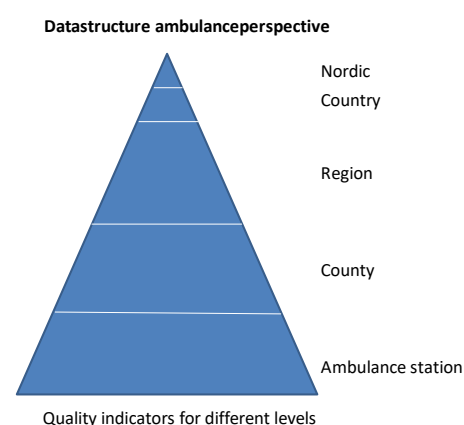
4.2   Selecting Nordic quality indicators

We have used the OECD definition of quality indicators on health care services.[35]

- 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.[36] The working group has also used definitions developed in other parts of the Nordic collaboration on EMS-data when applicable. The

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[34] Norwegian Catalogue of EMS terms and definitions, 2012
[35] OECD, DELSA/HEA/WD/HWP (2006)3, Health Care Quality Indicators Project
Conceptual Framework Paper
[36] Nysam rapport 2015: Ambulanssjukvård

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. 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. Later, it may be appropriate to expand the comparisons to include other emergency codes.

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 (≤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 75% and 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".
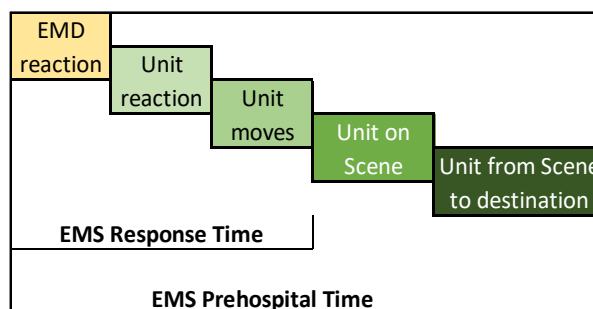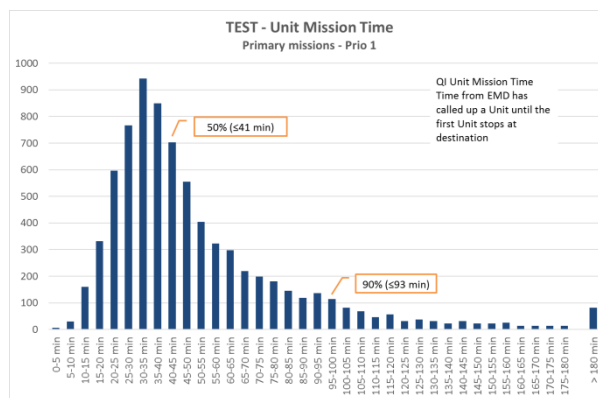
- EMS Response Time describes the time it takes from the EMD has received the first call until an ambulance has arrived at the patient.
- EMS Prehospital Time describes the time it takes from EMD has received the first call until an ambulance arrives at the hospital or the destination.

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.

The Working group recommended that the development continues to increase comparability so that more data can be published in the future.

4.3 Key statistics and process indicators recommended by the Working group

The table below shows data availability in the Nordic countries.

Table 4.1: Data availability per country

Nordic Quality Indicators	Den	Fin*	Swe-18**	Icl	Nor
Number of Primary calls to EMD for health assistance	Yes	Yes	Yes	Yes	Yes
Number of incidents	Yes	Yes	Yes	Yes	Yes
Number of missions - All Units	Yes	Fin-South	Yes	Yes	Yes
Number og patients delivered to hospital	Yes	Fin-South	Yes	Yes	Yes
Number of patient assessed/treated and left on scene	Yes	Fin-South	Yes	Yes	No
Number of incidents where no amb. is dispatched	Yes	Yes	Yes	No	Yes
EMS response time	Yes	Fin-South	Yes	Yes	Yes
EMD reaction time	Yes	Fin-South	Yes	Yes	Yes
Unit reaction time	Yes	Fin-South	Yes	Yes	Yes
Unit response time	Yes	Fin-South	Yes	Yes	Yes
EMS prehospital time	Yes	Fin-South	Yes	Yes	Yes
Unit time on Scene	Yes	Fin-South	Yes	Yes	Yes
Unit time from scene to destination	Yes	Fin-South	Yes	Yes	Yes

*South Region, ** 18 counties out of 21.

4.4 Preliminary 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.

General comments to all tables concerning the Danish data collection: The data collection in Denmark was performed on an anonymized, aggregated national dataset, which had not been validated by each of the five regions. Therefore, the results are to be interpreted very cautiously. Presently, the five regions and The Danish Clinical Registries (RKKP) work together to improve the quality of EMS data both on the regional and national level.

General comments to all tables concerning the Swedish data collection: The Swedish data collection has been from SOS Alarm's database and includes data from all county councils, except Uppsala, Västmanland and Uppsala. Data quality is based on SOS Alarm's general quality assurance procedures.
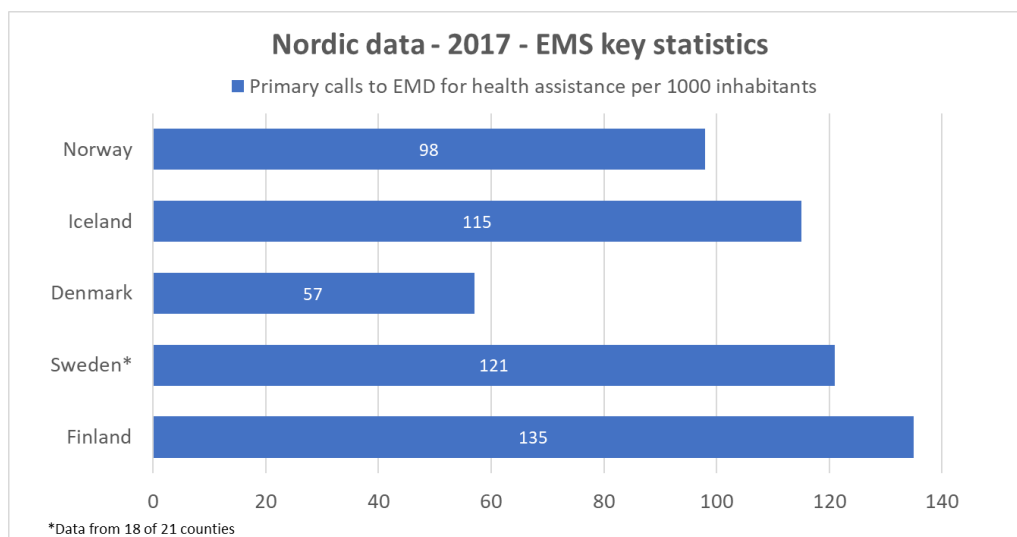
Figure 4.1: Number of primary calls to EMD for health assistance per 1000 inhabit.
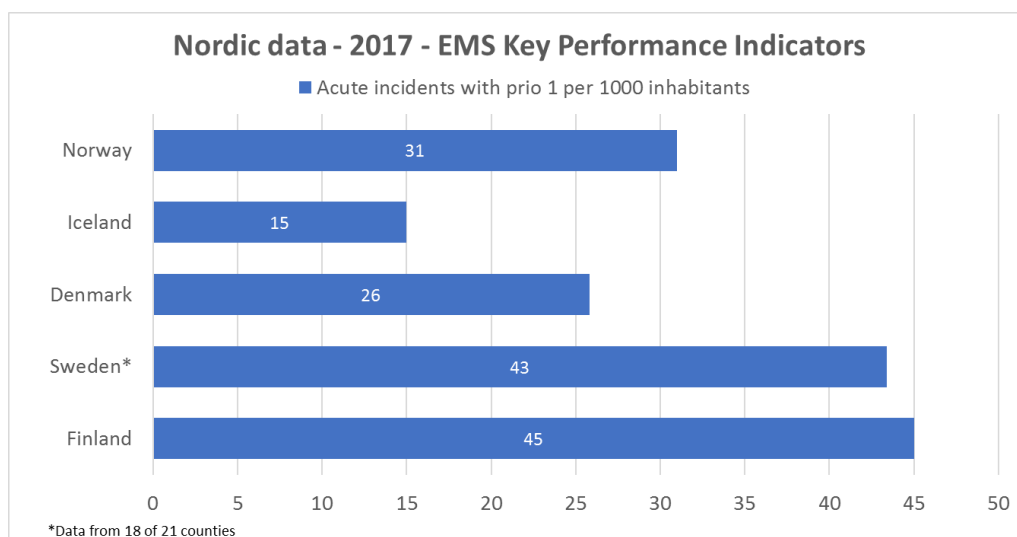
Figure 4.2 Number of acute incidents per 1000 inhabit.

This includes all kinds of incidents based on primary calls.

Nordic data - 2017 - EMS key statistics

■ Acute missions with prio 1 per 1000 inhabitants

Country	Value
Norway	30
Iceland	21
Denmark	37
Sweden*	52
Finland**	31

*Data from 18 of 21 counties; **Data from Southern Finland
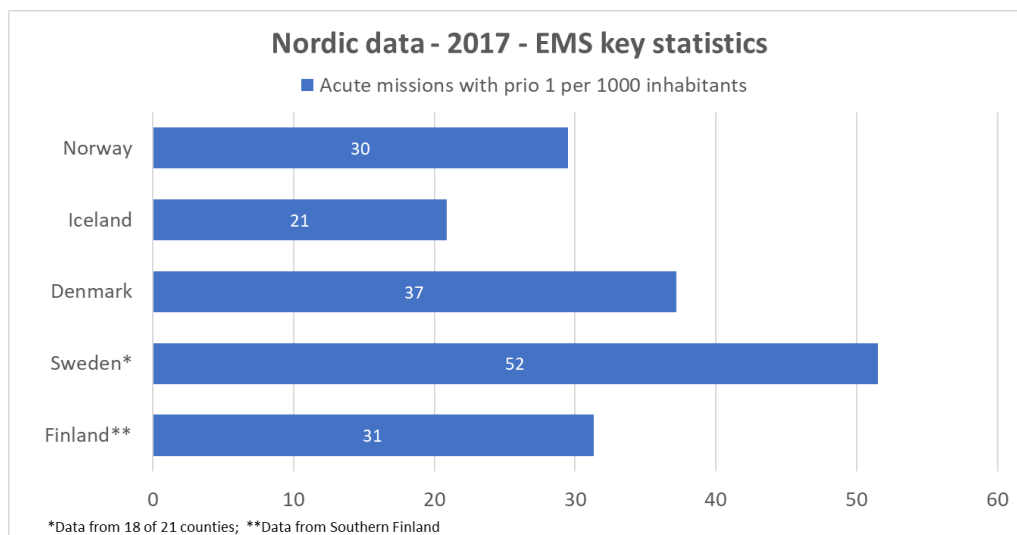
Figure 4.3: Number of acute missions per 1000 inhabit.

Ambulances/units are dispatched with lights and sirens to the acute incidents. Might include more than one unit per Incident. Includes all units.

Nordic data - 2017 - EMS Key Performance Indicators

■ Amb-mission prio 1 with patient delivered to hospital in procent of all prio 1 missions

Country	Value
Norway	33%
Iceland	56%
Denmark	64%
Sweden*	65%
Finland**	68%

*Data from 18 of 21 counties; **Data from Southern Finland
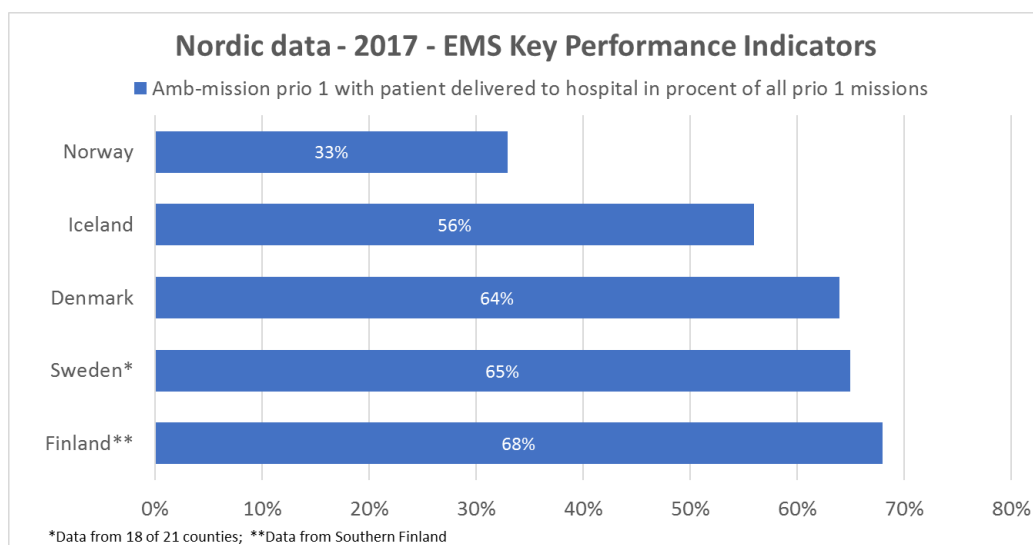
Figure 4.4: Percentage of ambulance missions with patients delivered to hospital.
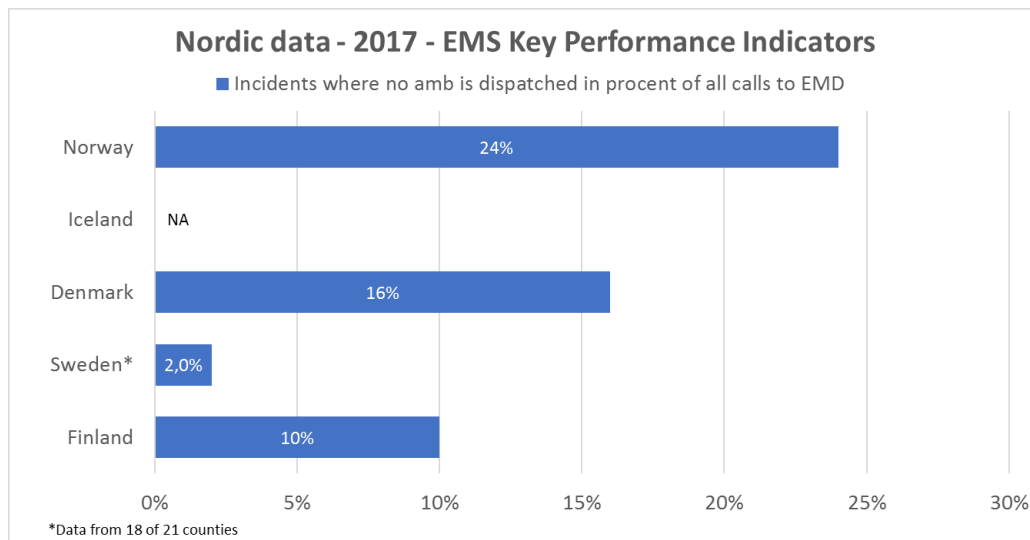
Figure 4.5: Percentage of incidents where EMD did not dispatched an ambulance.
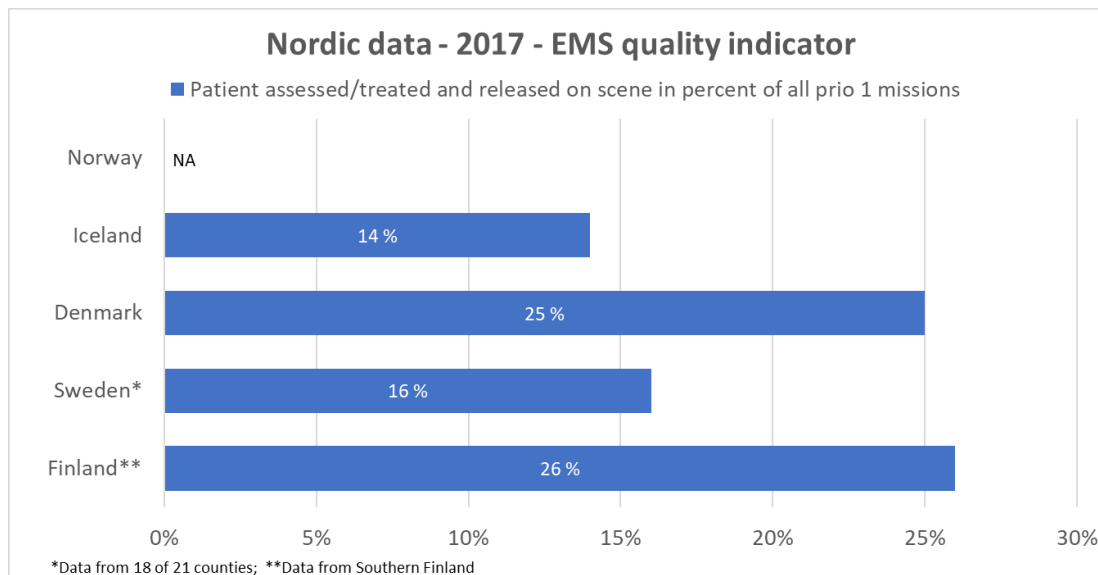
Figure 4.6: Percentage of patients assed and/or treated and released on scene.

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.
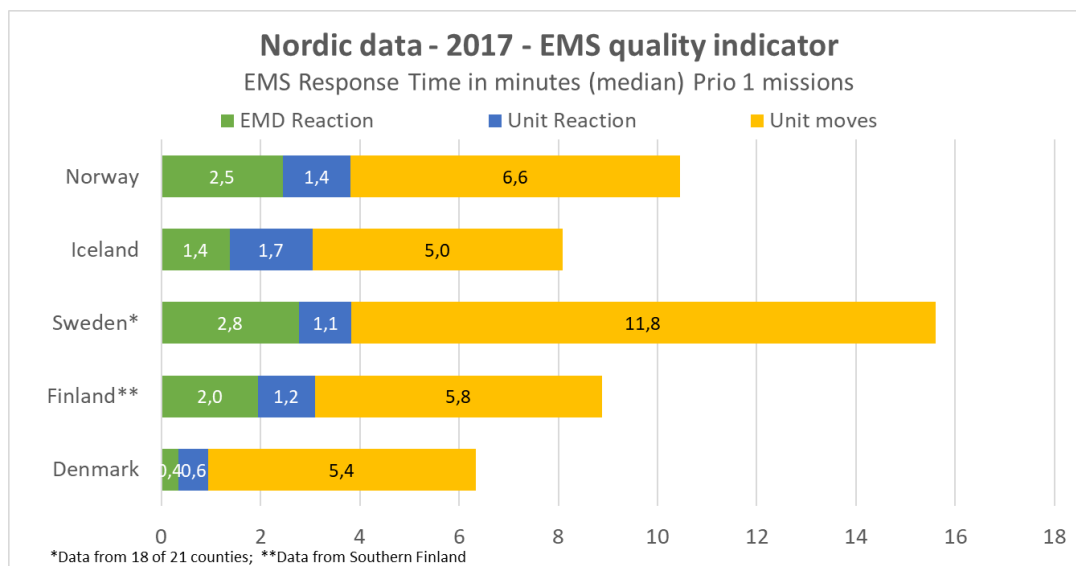
Figure 4.7: EMS response time

Comment from Denmark: The very short EMD reaction time in Denmark, is not reflecting the entire process, as the 112 call is first answered by the police or the Copenhagen Fire Brigade who identifies the location and then the call is forward to the EMD.
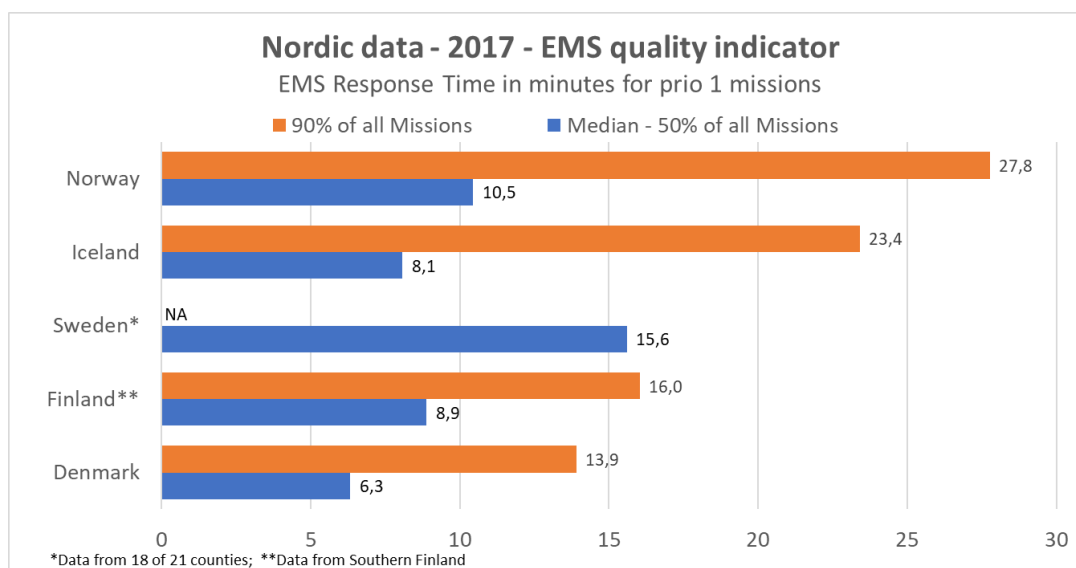
Figure 4.8: EMS prehospital response time

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.
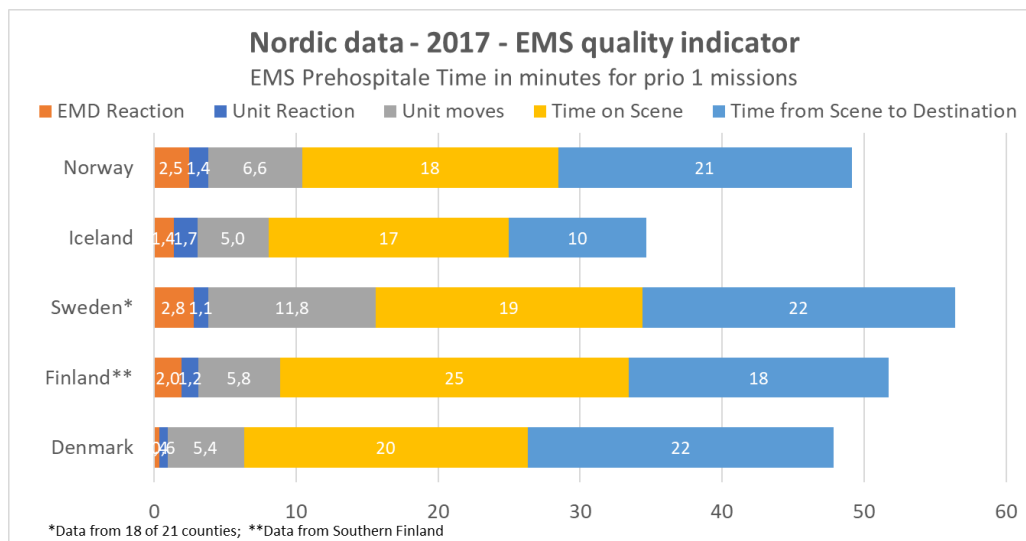
Figure 4.9: EMS prehospital median time includes all the time intervals.

Comment from Denmark: The very short EMD reaction time in Denmark, is not reflecting the entire process, as the 112 call is first answered by the police or the Copenhagen Fire Brigade who identifies the location and then the call is forwarded to the EMD.

Figure 4.10: EMS prehospital time, 90 and 50 percentiles.

5 WORKING GROUP ASSESS, TREAT AND RELEASE

5.1 Quality indicators for patient group Assess treat and release

5.1.1. Introduction

In the prehospital patient care pathway, the possibilities are assessing the patient's emergency call, or by the prehospital professionals assessing, treat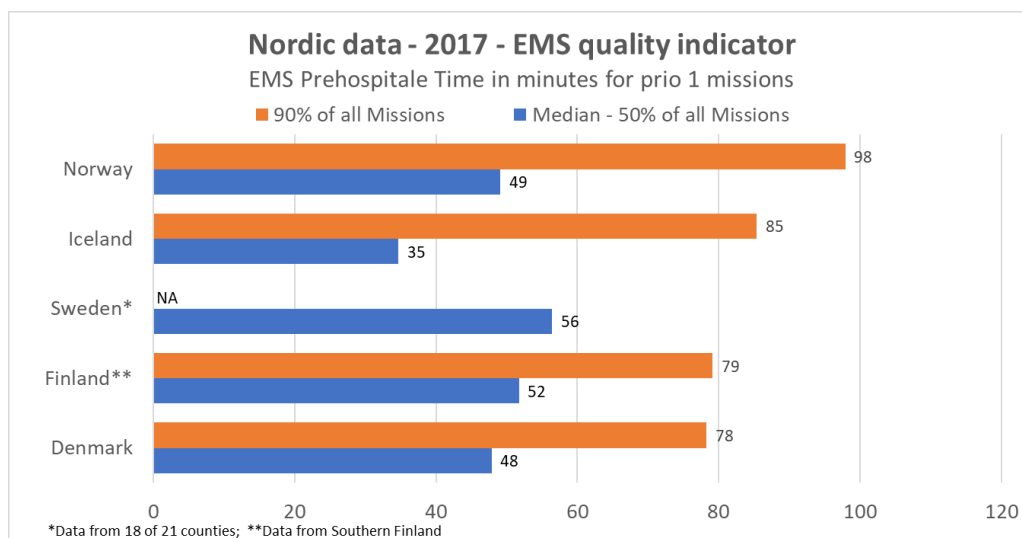ing and releasing the patient at the scene. The decision not to dispatch an ambulance and not to transport an emergency patient to hospital made by the professionals, either the call-taker or the paramedic or doctor on scene, can be more difficult than merely sending an ambulance and bringing the patient to hospital. Especially, as both the professional background and the legal aspects of the medical decisions in these situations differ, no studies have described these basic structures in the prehospital arena.

The issue of patients either not getting an ambulance or not being brought to hospital with an ambulance turned out to reflect system differences. Mostly, due to legal aspects and practices in the decisions on 'assess, treat, and release' in the prehospital patient care pathway. Understanding of fundamental structures behind prehospital care systems and knowledge of the differences is necessary.

5.1.2. The legal aspects of the decision-making in 'Assess, treat, and release'

In all the Nordic countries, the decision of not sending an ambulance or not transporting the patient to hospital can be made, and in most cases legislation demands involvement of a physician, either directly or by delegation of the medical authority. The only exception is the Finnish dispatch system, which is not part of the health care system.

5.1.3. EMD professionals

The staffing of the EMD includes both call takers and dispatchers. EMD call-takers are health care professionals, nurses and ambulance personnel, in Norway, Denmark and Sweden, whereas they are non-health care professionals with a special training in Finland and Iceland. There are different levels, both between and within the countries, of involvement of physicians - ranging from none, to accessible by telephone or present from a few up to 24 hours.

5.1.4. Ambulance professionals

The Nordic countries have basic EMTs (Emergency Medical Technicians) and paramedics. In Finland, the EMTs are either health care professionals or fire-fighter (=lay person), and in Denmark neither EMTs nor paramedics are authorized as health care professionals, but educated according to a national legislation, and they are regarded as responsible in patients claims cases. In the

remaining four countries, EMT's are authorized health care providers. The paramedic level is not present in Sweden, instead nurses are registered. In Norway, Finland and Iceland, the paramedics are authorized as health care professionals.

There are differences between the countries, whether EMTs and paramedics, can decide to leave the patient on site after assessment and eventually treatment, table 1. The main rule is that a physician should be involved, either directly on the scene or by specific telephone consultation, by delegation in specific conditions (e.g. after treatment of hypoglycemia) and specific protocols based on delegation.

5.1.5. Quality Indicators

The most important quality indicator would be patient outcome, for patients not receiving an ambulance and for patients not brought to hospital. However, this is not at the moment achievable. Actually, it was very difficult to extract data to describe the entire patient care pathway for assessed and/or treated and released patients (as seen in figure 5.1). In the future it should be possible to describe and get data from the entire patient care pathway as shown in figure below.
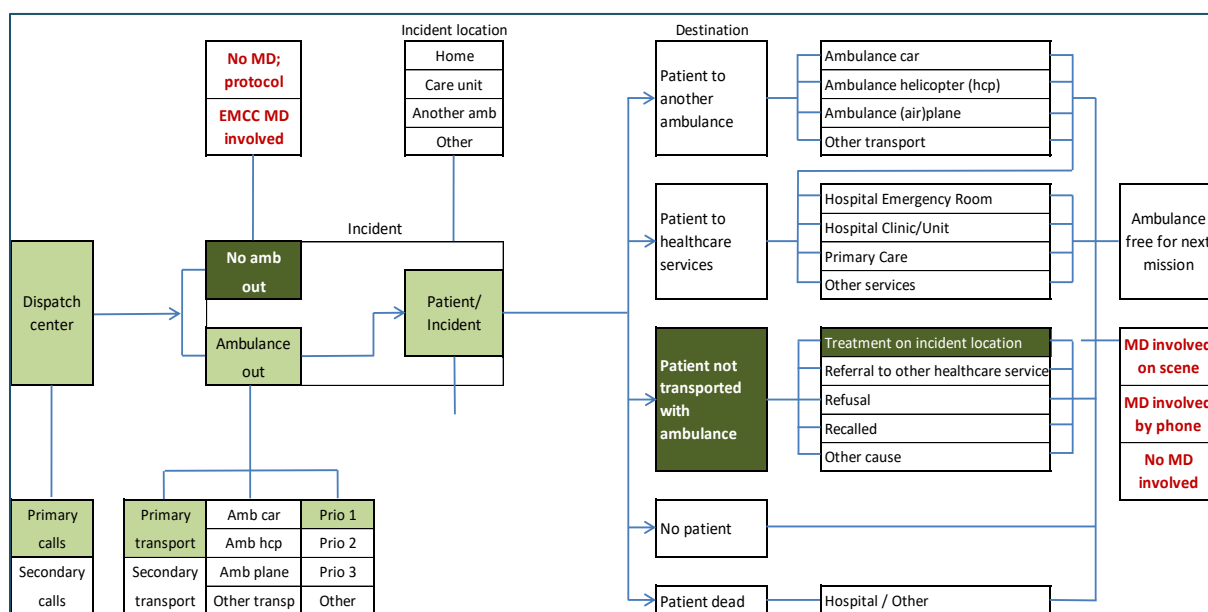

Figure 5.1: Data structure for assess, treat and release

5.2 Data structure for Assess, treat and release - patients

This group of patients constitutes important alternative patient care pathways which are of great importance in the evaluation of the quality of the entire EMS.

1. Patients, calling 112/113, where the call-taker assesses that an ambulance is not needed.
2. Patients assessed and/or treated on site by the prehospital professionals and not brought to hospital.

Together this constitute the group of 'Assess, treat and release'- patients.

5.3   Research is needed

In EMS most research concern ambulances and time intervals, whereas patient assessment, treatment and outcome only had minor attention, and in most patient focused research the focus is on four patient groups: Cardiac arrest, STEMI, stroke and severe trauma. Studies concerning the entire EMS population are few. Opposite the patients in hospital, the diagnostic picture in EMS-patients is only scarcely described, even though the number of emergency ambulance missions are increasing in western countries. There are few studies of the EMS patient population among the Nordic countries,[37][38][39][40] and it is interesting that non-specific complaints as well as non-specific diagnoses constitute a major group (20-30%) while cardiac arrest, STEMI, stroke and severe trauma constitute much less. However, mortality was not zero among the non-specific diagnoses, so the group may comprise both severely ill and patients not needing hospitalization.

The increasing number of emergency patients, also in EMS, raises the interest for the patients assessed, treated and released, either during the call or on the scene. In Nordic countries, studies[41][42][43] have shown that only few of these contact the health care system or are re-admitted. One Danish study compared the effect of a doctor, present 24/7 at the EMD and showed that the number of patients treated on scene without hospitalization increased. Patients were satisfied and felt safe.[44]

However, studies on 'assess, treat and leave' are few, and it was not possible for the working group to compare these patient groups across the Nordic countries. Thus, the working group suggests this as a major research topic. Initiatives have already been taken: there is on-going research in

[37] Møller TP, Ersbøll AK, Tolstrup JS, Østergaard D, Viereck S, Overton J, Folke F, Lippert F. Why and when citizens call for emergency help: an observational study of 211,193 medical emergency calls. Scand J Trauma Resusc Emerg Med. 2015 Nov 4;23:88. doi: 10.1186/s13049-015-0169-0.

[38] Andersen MS, Johnsen SP, Sørensen JN, Jepsen SB, Hansen JB, Christensen EF. Implementing a nationwide criteria-based emergency medical dispatch system: a register-based follow-up study. Scand J Trauma Resusc Emerg Med. 2013 Jul 9;21:53. doi: 10.1186/1757-7241-21-53.

[39] Christensen EF, Bendtsen MD, Larsen TM, Jensen FB, Lindskou TA, Holdgaard HO, Hansen PA, Johnsen SP, Christiansen CF. Trends in diagnostic patterns and mortality in emergency ambulance service patients in 2007-2014: a population-based cohort study from the North Denmark Region.
BMJ Open. 2017 Aug 21;7(8):e014508. doi: 10.1136/bmjopen-2016-014508.

[40] Christensen EF, Larsen TM, Jensen FB, Bendtsen MD, Hansen PA, Johnsen SP, Christiansen CF.
Diagnosis and mortality in prehospital emergency patients transported to hospital: a population-based and registry-based cohort study. BMJ Open. 2016 Jul 4;6(7):e011558. doi: 10.1136/bmjopen-2016-011558.

[41] Hoikka M, Länkimäki S, Silfvast T, Ala-Kokko TI. Medical priority dispatch codes-comparison with National Early Warning Score. Scand J Trauma Resusc Emerg Med. 2016 Dec 3;24(1):142.

[42] Højfeldt SG, Sørensen LP, Mikkelsen S. Emergency patients receiving anaesthesiologist-based pre-hospital treatment and subsequently released at the scene. Acta Anaesthesiol Scand. 2014 Sep;58(8):1025-31. doi: 10.1111/aas.12347. Epub 2014 May 29.

[43] Lehm KK, Andersen MS, Riddervold IS. Non-urgent Emergency Callers: Characteristics and Prognosis. Prehosp Emerg Care. 2017 Mar-Apr;21(2):166-173. doi: 10.1080/10903127.2016.1218981. Epub 2016 Sep 14.

[44] Raaber N, Bøtker MT, Riddervold IS, Christensen EF, Emmertsen NC, Grøfte T, Kirkegaard H.
Telemedicine-based physician consultation results in more patients treated and released by ambulance personnel. Eur J Emerg Med. 2018 Apr;25(2):120-127. doi: 10.1097/MEJ.0000000000000426

Norway (K. Bakkelund) and a collaboration with a research group in the Netherlands has started.[45] [46]

Moreover, there is a need for EMS research on patient groups and outcomes in our countries. Epidemiological, descriptive studies of the diagnostic pattern and demographics among prehospital patients are the fundament for comparing prehospital patient outcomes. Improvement of patient outcome is the ultimate goal for quality improvement.

[45] Ebben RHA, Vloet LCM, Speijers RF, Tönjes NW, Loef J, Pelgrim T, Hoogeveen M, Berben SAA. A patient-safety and professional perspective on non-conveyance in ambulance care: a systematic review. Scand J Trauma Resusc Emerg Med. 2017 Jul 17;25(1):71. doi: 10.1186/s13049-017-0409-6.
[46] Van de Glind et al.: A national research agenda for pre-hospital emergency medical services in the Netherlands: a Delphi-study. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine (2016) 24:2 DOI 10.1186/s13049-015-0195-y

6 WORKING GROUP AMI, CARDIAC ARREST AND STROKE

6.1   Introduction

Time-critical patient groups represent small but important part of EMS missions. These patient groups include out-of-hospital cardiac arrest (OHCA), myocardial infarction (AMI), stroke, major (severe) trauma, and severe respiratory distress. These are called First Hour Quintet (FHQ) in previous EU funded project.[47]

These patient groups demand high quality and time-dependent performance from the EMD and EMS. Dispatching and EMS should be able to recognize these incidents and patients ideally with high specificity and sensitivity. EMS and, to some extent dispatching, should be able to assess these conditions, start treatment and notify the receiving facility to ensure patient centered and chain-oriented emergency care.

For Nordic quality indicators, this working group decided on three-time critical patient groups: ST-elevation AMI, OHCA and Stroke. This decision was based on well-defined patient groups, that morbidity in cardiovascular diseases is significant among Nordic population and timestamps and data of these conditions are collectable.

To be specific, one has to remember that the "diagnosis" related to ST-elevation AMI and stroke is confirmed normally during initial phase of hospital treatment (emergency department). Therefore, these two QIs are called "suspected".

6.2   Pre-assumptions

Firstly, the incident should be initiated by a call to the EMD in each country. The timestamp is when EMD is called up. It should be noted that in Denmark there is a delay before the call reaches the EMD, because the 112-call is first answered by the police (in Copenhagen, by the fire brigade). Secondly, only "primary calls/incidents" are included. If the patient is already in hospital and medical condition occurs during the phase of that treatment, these incidents are excluded even if the patient is transported later to another hospital (secondary transport). Note: Because treatment facilities for these conditions are not in place in "assisted living/nursing homes", these are included.

Thirdly, it's assumed that for these three patient groups, one incident equals one patient.

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[47] http://ec.europa.eu/health/ph_information/indicators/docs/ev_20040325_co05_en.pdf

Regarding "OHCA" three QIs are identified:

- Bystander CPR
- Survival to ROSC (admitted with ROSC to hospital)
- Survival to hospital discharge.

7 WORKING GROUP   ICPC-2

7.1   Introduction

Reason for care during EMS phase of acute care is internationally not well described nor coded in a systematic or consequent manner. In Nordic countries there either does not exist any coding system or it is merely based on dispatch coding.

The work of the EMS provider during one incident/mission is based on information collected from bystanders, patient and clinical assessment. After assessment and initial treatment, EMS providers should be able to formulate a "main reason for care". This describes mainly patient related signs and symptoms and in some incidents mainly the mechanisms causing the mission.

Internationally the NEMSIS organization has been using a condensed "favorite list" from ICD-10. According to discussions this has not been well adopted because ICD-10 is mainly used for setting a diagnose even if one uses the non-specific categories or favorite list.

International Classification of Primary Care, second edition (ICPC-2) is a classification system developed for primary care.[48] The WHO has approved its use and states as follow:

"WHO has accepted ICPC-2 within the WHO FIC mainly as a reason for encounter classification, and users may use it as a classification for primary care or general practice wherever applicable.[49]

ICPC-2 classifies patient data and clinical activity in the domains of General/Family Practice and primary care, considering the frequency distribution of problems seen in these domains. It allows classification of the patient's reason for encounter (RFE), the problems/diagnosis managed, interventions, and the ordering of these data in an episode of care structure"

Because it is developed for primary care, the ICPC-2 mainly refers to signs and symptoms as the main reason for patient encounter to primary care. During the formulation of a Finnish dataset for nationwide EMS-ePCR, ICPC-2 was applied to describe "main reason for care", and from the original list of ICPC-2, a "favorite" list was generated by an expert panel and pilot use was initiated during 2016.

7.2   Use of ICPC-2 in EMS

During a Nordic Collaboration meeting in November 2017 in Aalborg a WG was pointed out to hold a consensus meeting for the use of ICPC- in all Nordic countries as a "reason for care" in EMS.

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[48] http://www.globalfamilydoctor.com/groups/WorkingParties/wicc.aspx
[49] http://www.who.int/classifications/icd/adaptations/icpc2/en/

The WG meeting took place in Helsinki February 2018 and agreed upon a «favorite» list from the original ICPC-2 for EMS (attached). The use and future work was stated as follows:

1. This is a favourite list for EMS that should be annually evaluated and defined in Nordic context.
2. EMS -ICPC-2 refers to main reason for care based on from signs, symptoms, incident, diagnostic tools and clinical course during the EMS phase of care. Therefore ICPC-2 can in some cases be defined only after all this information is available to the care provider.
3. In some cases, two ICPC-2 codes are needed to more accurately describe main reason for care (eg. Cardiac Arrest and suspected pulmonary embolism).
4. Original ICPC-2 definitions are followed but for EMS use these can be further specified.
5. Code K98 was added to define «cardiac arrest with attempted resuscitation». This should be presented to WONCA for approval.
6. Code A88 was divided into four (4) individual codes to specify physical factors causing an adverse event. These should be separated from each other via software solutions.
7. A «master file» and «manual» will be formulated in English and after that each Nordic country will translate them to its national language.
8. WG group members should contact their national ICPC-2 «network» for information and future work.

Comment from Sweden: Sweden does not use ICPC2, there is therefore no agreement within the Swedish EMS to adopt ICPC2. Furthermore, there is also no requirement from the authorities to have a common prehospital code structure.

8 FUTURE WORK

8.1   Publishing of the report

The project will present this report on the Nordic Ministry Council's web site NOWbase and the following updated results in the future. The project will be presented in the Nordic Ministry Council anniversary publication 2018.

The project was presented on the meeting of the comities for Nordic statistics on the social and health area under the Nordic Ministry Council (Nomesco and Nososco) in September 2017.

8.2   Follow up in a Nordic Ministry Council

These two comities coordinate the social and health statistics in the Nordic countries. The Nordic project suggests including EMS as a new area of statistics in the Nordic Ministry Council. We think continued formalized Nordic collaboration on quality issues for EMS patient is needed. We recommend that the Finnish delegation follow up this initiative.

Table 8.1: List of Nordic EMS key statistics and quality indicators.

No	Nordic EMS key statistics and quality indicators
Key statistics presented in this report	
I	Number of primary calls to EMD
II	Number of incidents
III	Number of ambulance missions
IV	Number of patients delivered to hospital
QI results presented in this report	
1	EMD reaction time
2	EMS reaction time
3	EMS prehospital time
4	Unit reaction time
5	Unit response time
6	Time on scene
7	Unit mission time
8	Incidents where no ambulance is dispatched
9	Patients assessed by ambulance on scene and not transported with ambulance to hospital or GP
QIs for the future	
10	Bystander CPR
11	ROSC to hospital
12	Survival from OHCA when discharged
13	AMI
14	Ischemic stroke
15	Incidents where no ambulance is dispatched after advice by med. dr.
16	Patients where no ambulance is dispatched according to EMD protocol

17	Patients assessed by ambulance personnel and delivered to primary care
18	Patients assessed by ambulance personnel and delivered to hospital
19	Patients that are calling back, within 4 hours and 24 hours
20	Available ambulance hours per year and/or week
21	Ambulance work hours per year and/or week

8.3   Challenges for the future

The major challenge is that we are not yet able to report valid patient outcome measurements. We recommend each country to develop data on the suggested quality indicators for the future, see the list below.

To be able to collect and compare valid patient data, national electronic patient record and registries in the prehospital services should be implemented in the Nordic countries.

Today there is no internationally classified definition on "reason to care". A Nordic manual for using a subset ICPC 2 classification for EMS is needed and should be implemented.

The Nordic countries have different criteria and definitions for urgency and priorities for the same type of incidences. Common Nordic criteria and definitions for urgencies and priorities for the emergency medical dispatch should be developed.

9 DEFINITIONS OF TERMS

9.1 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 9.1: 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/*actually* 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, *planned* 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[50]). 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

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[50] Public-safety answering point, also called Public-safety access point.

EMS	EMS out of hospital includes EMD and ambulance/Unit services in this context.
EMT	Emergency Medical Technician
GP	General Practitioner
HEMS	Helicopter-EMS
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 of other kinds of resources.

Time points that the time intervals are based on, are defined in chapter 3.

Table 9.2: 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 NEMSIS.eTimes.02, see chapter 3.4.
Time when EMD calls Unit	Date/time when EMD calls a Unit. Remark: Corresponding to NEMSIS.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 NEMSIS.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 NEMSIS.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 NEMSIS.eTimes.11, see chapter 3.4 Remark 2: For helicopter, airplane and suchlike, this is the landing-time at Destination (corresponding to NEMSIS.eTimes.10).

10 ATTACHMENT

10.1 Descriptions of the Nordic quality indicators

In this chapter we present the descriptions of the Nordic quality indicators presented in chapter 4.

Nordic Emergency Medical Services

Nordic QI 1-7	Response time
Definitions	
1. EMD reaction time	Time from EMD is called up for health assistance until EMD calls a Unit to an acute mission.
2. EMS reaction time	Time from EMD has been called up for health assistance and dispatches a Unit until the first Unit starts moving.
3 EMS prehospital time	Time from EMD is called up for health assistance until the dispatched Unit stops at destination
4 Unit reaction time	Time from EMD has called up a Unit to an incident until the first Unit starts moving
5 Unit response time	Time from EMD has called up a Unit until the first Unit stops at the scene
6 Time on scene	Time from the first Unit stops at the scene until the last Unit leaves the scene
7 Unit mission time	Time from EMD has called up a Unit until the first Unit stops at destination
2. Type of QIs	Process
Approval	
3. First approval date	8th of May 2018
4. Approved by	The Nordic project group
Objective/goal/medical justification/grounds	
5. Justification for choice	The time from a serious incident occurs until a patient has received health assistance can have crucial significance for the patient's survival and future health condition and functional level. It's also important for the public's perception of patient safety to know that the emergency calls are quickly answered. The goal is to give the public quick, competent and coordinated medical assistance in acute situations.

6. Objectives	There is no common Nordic demand or standard, but the objective for the EMD is to respond quickly to calls for health assistance to emergent incidences.
7. Definition and clarification of terms and concepts	**EMD reaction Time:** Time in seconds from the incoming call is first registered (in a computerized system) at EMD, regardless of when the call is answered, until the EMD calls a Unit. **EMD or EMCC:** Emergency Medical Dispatch Center or Emergency Medical Communication Center receives, answers, acts and registers calls for acute medical assistance. They also give medical advice and dispatches ambulance units. **Primary calls:** 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. **Primary mission:** A mission to a patient/incident based on a primary call. **Mission:** The priority is set by the EMD and tells you how urgent the incidents are. The Nordic EMDs uses three, four or five priorities: • Priority 1/Red (acute): Mission with lights and sirens • Priority 2/Orange (semi acute): Mission with lights and sirens • Priority 3/Yellow (serious): Mission with or without light and sirens. • Priority 4/Green (none urgent): Without sirens. • Priority 5/Blue: No need for triage/medical help. **Acute mission:** • Priority 1/Red: Mission with lights and sirens **Unit:** All Units are included.
Calculation	
8. Numerator	Total number of incidents where: - EMD has answered a primary call and - dispatched a Unit on an acute mission (priority 1) - only the first dispatched Unit per incident Time in seconds from EMD is called up for health assistance until; 1- EMD calls a Unit 2 - the first Unit starts moving 3 - the first Unit stops at destination Time from EMD has called up a Unit until; 4- the first Unit starts moving 5- the first Unit stops at the scene 6- Time from the first Unit stops at the scene until the last Unit leaves the scene

	7- the first Unit stops at destination
9. Denominator	-
10. Measure	1) Median/mean EMD reaction time in seconds 2) Median/mean EMS reaction time in minutes 4) Median/mean EMS prehospital time in minutes 4) Median/mean Unit reaction time in minutes 5) Median/mean Unit response time in minutes 6) Medan/mean Unit mission time in minutes 7) Median/Mean seconds on scene in minutes
11. Inclusion and exclusion	Inclusion: • Primary call to EMD in need for health assistance • First primary call per incident • Acute mission • First Unit per incident • All kind of Units Exclusion: • Transport missions without need for medical assistance. • Transport of patients between health care facilities. • Calls with no caller present when answering the call • Time ≤ 0, standard deviation for mean time +/- 2,5%.
12. Level of publication	National and regional
13. Standard classification	n.a.
Collection of data/data sources
14. Data sources	Norway: Norwegian Patient Registry Finland: Health Regions Denmark: Health Regions Sweden: SOS Alarm Iceland: Directorate of Health
15. Frequency of publication	Every third year
Interpretation of the data
16. Comparability over time and level	The data are comparable over time and level.
References
20. References	A Proposal to Common Nordic Quality Indicators (Time Intervals) in Prehospital EMS, Draft version 1.0, 2014-10-14. Norwegian Directorate of Health.

[Nordic QI 8]	**Incidents where no ambulance is dispatched**
1. Definition	Incidents where EMD, in response to primary calls, do not dispatch an ambulance or other prehospital emergency unit.
2. Type	Process
Approval

3. First approval date	8th of May 2018
4. Approved by	Nordic EMS project group

Objective/goal/medical justification/grounds	
5. Justification for choice	The situations of patients, either not getting an ambulance or not being brought to hospital with an ambulance, reflect system differences. Mostly, due to legal aspects and practices in the decisions on 'assess, treat, and release' in the prehospital patient care pathway. Understanding of fundamental structures behind prehospital care systems, and knowledge of the differences is necessary.
6. Objectives	No studies have described these basic structures in the prehospital arena. Understanding of the fundamental structures behind prehospital care systems and knowledge of the differences, is necessary.
7. Clarification of terms and concepts	**EMCC or EMD:** Emergency medical communication center or Emergency Medical Dispatch Center receive and register calls for acute medical assistance and give medical advice to the caller. **Primary calls:** Call to EMD in need of health assistance and the patient is not in a health care facility and regardless of who is calling (patient, health personnel). Primary calls include calls from a nursing home because this is the home of the patient by law. **Mission:** The priority is set by the EMD and tells you how urgent the incidents are. The Nordic EMDs uses three, four or five priorities: • Priority 1/Red (acute): Mission with lights and sirens • Priority 2/Orange (semi acute): Mission with lights and sirens • Priority 3/Yellow (serious): Mission with or without light and sirens • Priority 4/Green (none urgent): Without sirens • Priority 5/Blue: No need for triage/medical help **Acute mission:** • Priority 1/Red (acute): Mission with lights and sirens

Calculation	
8. Numerator	Number of incidents: -where the EMD has answered a primary call -the EMD has given advice to the patient/caller -no ambulance is dispatched
9. Denominator	Total number of incidents: - where the EMD has answered a primary call

10. Main measure	Number of incidents where no ambulance is dispatched per 1000 inhabitants.
11. Other measures	Percentage of incidents where no ambulance is dispatched. Measure for the future: • No ambulance is dispatched after advice by medical doctor (N). (when available data in the future) • No ambulance is sent according to EMD protocol (N) (when available data in the future)
12. Inclusion and exclusion	Inclusion: • Primary call • The EMD has given advice to the patient or caller • All priorities are included Exclusion: • Any ambulance or prehospital emergency unit-mission • Transport missions without need of medical assistance • Transport of patients from and between health care facilities
13. Level of publication	National and regional
14. Standard classification	n.a.
Collection of data/data sources	
15. Data sources	Norway: Norwegian Patient Registry Finland: Health Regions Denmark: Technical dispatch database and Danish Prehospital Quality Database. Sweden: SOS Alarm and 21 counties Iceland: Directorate of Health
16. Frequency of publication	Every third year
Interpretation of the data	
17. Comparability over time and level (national/regional)	The data are comparable over time.
18. Related indicator	QI 10: Patients assessed by ambulance on scene and not transported with ambulance to hospital or GP
References	
19. References	

Nordic QI 9	Patient assessed and released on scene
1. Definition	Incidents where EMD, in response to primary calls, dispatch an ambulance Unit. Patients are assessed by ambulance on scene and not transported with ambulance to hospital or GP
2. Type	Process
Approval	
3. First approval date	8th of May 2018
4. Approved by	The Nordic EMS project group
Objective/goal/medical justification/grounds	
5. Justification for choice	The situations of patients, either not getting an ambulance or not being brought to hospital with an ambulance, reflect system differences. Mostly, due to legal aspects and practices in the decisions on 'assess, treat, and release' in the prehospital patient care pathway. Understanding of fundamental structures behind prehospital care systems, and knowledge of the differences is necessary.
6. Objectives	No studies have described these basic structures in the prehospital arena. Understanding of the fundamental structures behind prehospital care systems and knowledge of the differences, is necessary.
7. Clarification of terms and concepts	**EMCC or EMD:** Emergency medical communication center or Emergency Medical Dispatch Center receive and register calls for acute medical assistance and give medical advice to the caller. **Primary call:** Call to EMD in need for health assistance and the patient is not in a health care facility and regardless of who is calling (patient, health care personnel). Primary calls include calls from a nursing home because this is the home of the patient by law. **Mission:** The priority is set by the EMD and tells you how urgent the incidents are. The Nordic EMDs uses three, four or five priorities: • Priority 1/Red (acute): Mission with lights and sirens • Priority 2/Orange (semi acute): Mission with lights and sirens • Priority 3/Yellow (serious): Mission with or without light and sirens. • Priority 4/Green (none urgent): Without sirens • Priority 5/Blue: No need for triage/medical help **Acute mission:** • Priority 1/Red (acute): Mission with lights and sirens **Unit:** Only ambulance cars are included. **MD:** Medical doctor

Calculation	
8. Numerator	Number of incidents: -where the EMD has answered a primary call -ambulance is dispatched -the patient is assessed and treated and released on scene
9. Denominator	1000 inhabit.
10. Main measure	Number of incidents per 1000 inhabit. where the patient is assessed and released on scene.
11. Other measures	Percentage of incidents where the patient is assessed and released on scene. Measure for the future: • The patient is left on scene after being assessed by a MD on scene (N). • The patient is left on scene after being assessed by a MD over telephone (N). • The patient is assessed and left on scene without involving or consulting a MD (N). • Patients that are calling back, within 4 hours and 24 hours (N) • The patient is assessed by ambulance personnel and delivered to primary care (N).
12. Inclusion and exclusion	Inclusion: • Primary call • An ambulance car is dispatched on a mission with priority 1, 2 or 3 • The patient is assessed and/or treated and released on scene Exclusion: • Transport missions without need for medical assistance • Transport of patients between health care facilities
13. Level of publication	National and regional
14. Standard classification	n.a.
Collection of data/data sources	
15. Data sources	Norway: Norwegian Patient Registry Finland: Health Regions Denmark: Technical dispatch database and Danish Prehospital Quality Database. Sweden: SOS Alarm and 21 counties Iceland: Directorate of Health
16. Frequency of publication	Every third year
Interpretation of the data	
17. Comparability over time and level (national/regional)	The data are comparable over time
18. Related indicators	QI 9: Incidents where no ambulance is dispatched
References	
19. References	

![Helsedirektoratet — Norwegian Directorate of Health]

Nordic QI 10	**Patient assessed and brought to GP or hospital**
1. Definition	Incidents where EMD, in response to primary calls, and dispatch an ambulance Unit. Patients are assessed by ambulance on scene and transported with ambulance to GP or hospital.
2. Type	Process
Approval
3. First approval date	8th of May 2018
4. Approved by	The Nordic EMS project group
Objective/goal/medical justification/grounds
5. Justification for choice	The situations of patients, either not getting an ambulance or not being brought to hospital with an ambulance, reflect system differences. Mostly, due to legal aspects and practices in the decisions on 'assess, treat, and release' in the prehospital patient care pathway. Understanding of fundamental structures behind prehospital care systems, and knowledge of the differences is necessary.
6. Objectives	No studies have described these basic structures in the prehospital arena. Understanding of the fundamental structures behind prehospital care systems and knowledge of the differences, is necessary.
7. Clarification of terms and concepts	**EMCC or EMD:** Emergency medical communication center or Emergency Medical Dispatch Center receive and register calls for acute medical assistance and give medical advice to the caller. **Primary call:** Call to EMD in need for health assistance and the patient is not in a health care facility and regardless of who is calling (patient, health personnel). Primary calls include calls from a nursing home because this is the home of the patient by law. **Mission:** The priority is set by the EMD and tells you how urgent the incidents are. The Nordic EMDs uses three, four or five priorities: • Priority 1/Red (acute): Mission with lights and sirens • Priority 2/Orange (semi acute): Mission with lights and sirens • Priority 3/Yellow (serious): Mission with or without light and sirens. • Priority 4/Green (none urgent): Without sirens • Priority 5/Blue: No need for triage/medical help **Acute mission:** • Priority 1/Red (acute): Mission with lights and sirens **Unit:** Only ambulance cars are included. **MD:** Medical doctor

	Calculation		
8. Numerator	Number of incidents: -where the EMD has answered a primary call -ambulance is dispatched -the patient is assessed and treated and left on scene
9. Denominator	Per 1000 inhabit.
10. Main measure	Number of incidents per 1000 inhabit. where the patient is assessed and left on scene.
11. Other measures	Percentage of incidents where the patient is assessed and left on scene. Measure for the future: • The patient is released on scene after being assessed by a MD on scene (N). • The patient is left on scene after being assessed by a MD over telephone (N). • The patient is assessed and released on scene without involving or consulting a MD (N). • Patients that are calling back, within 4 hours and 24 hours (N). • The patient is assessed by ambulance personnel and delivered to primary care (N).
12. Inclusion and exclusion	Inclusion: • Primary call • An ambulance car is dispatched on a mission with priority 1, 2 or 3 • The patient is assessed and/or treated and left on scene Exclusion: • Transport missions without need for medical assistance • Transport of patients between health care facilities
13. Level of publication	National and regional
14. Standard classification	n.a.
	Collection of data/data sources		
15. Data sources	Norway: Norwegian Patient Registry Finland: Health Regions Denmark: Technical dispatch database and Danish Prehospital Quality Database. Sweden: SOS Alarm and 21 counties Iceland: Directorate of Health
16. Frequency of publication	Every third year
	Interpretation of the data		
17. Comparability over time and level (national/regional)	The data are comparable over time
18. Related indicators	QI 9: Incidents where no ambulance is dispatched
	References		
19. References	

11 Validation report

Quality assurance of data - Introduction and background

In parallel with the ongoing Nordic cooperation on standardization, data collection and benchmarking in EMS and the current development of indicators, Helseplan has been assigned to validate the relevant quality indicators and assure data quality of these indicators.

The project has followed the subsequent phases:

- Indicators and definitions

The project group and the working groups have been responsible for selecting indicators and defining the data and terms included in each indicator. For each indicator, definitions have been made based on an adaptation of the current Norwegian model for defining quality indicators.

- Quality assurance

All data is provided by the responsible data handler in the Nordic countries and data quality assured through internal controls in each country.

- Data collection

Each country has collected data from its national or local data records and submitted the data to the project.

- Presentation of data

Relevant indicators have been identified and presented.

The main part of Helseplan's quality assurance work has consisted of participation in and close follow-up of the project work, as well as influencing the data quality through all phases of the project:

1)In the selection of indicators and definitions, Helseplan has assisted in the interpretation and description of which data must be provided given specified inclusion and exclusion requirements. Throughout this work process, definitions as well as inclusion and exclusion requirements have been tested and adapted continuously.

2) Helseplan has, in addition to the national quality assurance, assisted with reception control and review of data, specifically related to the interpretation of definitions and criteria for inclusion

and exclusion. Through this participation, Helseplan has monitored the quality assurance of data. This work has consisted of participation in meetings and continuous contact with those who have reported data from each country. It has also entailed adaptation to definitions, as well as a review of preliminary inequalities and other issues that have arisen in connection with the audit.

3) As a contribution to the most uniform data collection, Helseplan has prepared forms specially designed for data collection. Helseplan has assisted with arrangements and practical work related to data reporting and calculation of the current indicators.

4) Helseplan has presented selected indicators and contributed to discussions internally within the project group, focusing on a smaller number of indicators that all or most countries can develop.

Helseplan has observed that data quality has gradually improved during the course of work through the national development of internal systems and routines related to data collection, in addition to an increased adaptability of the indicators. The quality may still vary for the specific indicators. In case national data coverage is not possible, data has been retrieved for a limited geographic area. Alternatively, this indicator will not be defined for the country in question.

The working group Key statistics

The working group's tasks have included work with Key Performance Indicators and Key Process Indicators. The indicators have been deliberated in terms of extent and degree of detail, as well as if each country has the ability to produce good quality data given the definition of the indicator.

The working group has, based on their conclusions, made the following proposal:

No	Nordic EMS key statistics and quality indicators
Key statistics presented in this report	
I	Number of primary calls to EMD
II	Number of incidents
III	Number of ambulance missions
IV	Number of patients delivered to hospital
QI results presented in this report	
1	EMD reaction time
2	EMS reaction time
3	EMS prehospital time
4	Unit reaction time
5	Unit response time
6	Time on scene
7	Unit mission time
8	Incidents where no ambulance is dispatched
9	Patients assessed by ambulance on scene and not transported with ambulance to hospital or GP

The working group has proposed the collection of basic data in order to
calculate all the 9 quality indicators. Basic data for all quality indicators demonstrate sufficient
quality for publication.
For the process indicators however, data quality has varied, as well as the ability to produce
"single data". The working group has therefore proposed the publication of only two process
indicators; "EMS Response Time" (EMD Reaction Time + Unit Response Time) and EMS
Prehospital Time (EMD Reaction Time + Unit Mission Time).

Helseplan has examined the data quality of the latest data collection and has not found anything
that indicates that the selected indicators should not be published given the comments provided
for each indicator.

The working group Assess, treat and release
The working group has discussed data to develop a number of indicators in this area, resulting in
the following proposal for mandatory QI that are measurable currently or in the near future:

QI presented in this report:
- Incidents where no ambulance is dispatched
- Patients assessed/treated and left on scene

QI for the future:
No ambulance sent:
- Number and percentage of calls where no ambulance is sent.
- Number and percentage of calls where no ambulance is sent after advice by MD
- Number and percentage of calls where no ambulance is sent according to EMCC protocol

Ambulance sent:
- Number and percentage patients assessed by ambulance personnel/paramedic and delivered
  to primary care.

Ambulance sent and patient released on scene:
- Number and percentage patients released on scene.
- Number and percentage patients released on scene assessed by a MD* on scene.
- Number and percentage patients released on scene assessed by a telephone consultation
  with a MD* (not on scene, e.g. MCC MD) consulted.
- Number and percentage patients released on scene, assessed without involving or
  consultation with a MD (not on scene, e.g. EMCC MD*) involved or consulted.

The working group has examined and discussed opportunities for developing basic data in each
country. The group has concluded that, at this time, it is necessary to limit the collection of basic
data for two indicators; «Patients, calling EMD, where the call-taker assesses that an ambulance
is not needed» and «Patients assessed and/or treated on site by the prehospital professionals

and not brought to hospital». Data collection has shown that only «Patients assessed and/or treated on site by the prehospital professionals and not brought to hospital» has sufficient data for being published at this time.

Helseplan has examined the data quality of the latest data collection and has not found anything that indicates that the selected indicator should not be published with given the comments provided for the indicator.

The Working group AMI, cardiac arrest and stroke
The working group has discussed several patient groups that may be relevant to highlight in the form of QI for EMS. For Nordic Quality Indicators, the working group decided on three time-critical patient groups: AMI, OHCA and Stroke.
Data collection and testing has been completed, but differences in identification, encoding, etc. has made it impossible to collect similar data in all Nordic countries at the present time. Work on this will continue.

As part of a further development and as a prerequisite for presenting joint Nordic data in this area, a working group for "ICPC-2" has been established to describe the main reason for care. Work on this will continue in each country.

Data structure model
Early in the work process the project group made a data structure model to describe the EMS process and illustrate the selected quality indicators. Helseplan has analyzed the model and deems that the project group has systematically followed the description throughout the process and demonstrated consistency with regards to initial intentions.

All the process and time indicators fits within the original structure, which indicates a sustainable quality in that part of the work.

EMS datastructure - access, treat and release perspective

Q 16 — No MD; protocol

Q 15 — EMCC MD involved

Incident location
- Home
- Care unit
- Another amb
- Other

Destination

Patient to another ambulance

Ambulance car
Ambulance helicopter (hcp)
Ambulance (air)plane
Other transport

Q 8 — No amb out

Q III

Incident

Patient/Incident

Patient to healthcare services

Hospital Emergency Room
Hospital Clinic/Unit — Q 18
Primary Care — Q 17
Other services

Ambulance free for next mission

Dispatch center

Q IV — Ambulance out

Q 9 — Patient not transported with ambulance

Treatment on incident location
Referral to other healthcare service
Refusal
Recalled
Other cause

MD involved on scene

MD involved by phone

No MD involved

Q II

Primary calls
Secondary calls

Primary transport
Secondary transport

Amb car — Prio 1
Amb hcp — Prio 2
Amb plane — Prio 3
Other transp — Other

No patient

Patient dead

Hospital / Other

Timeline:
- Q1
- Q2
- Q5
- Q6
- Q3