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REVIEW

Existing Data Sources in Clinical Epidemiology: The Danish Prehospital Medical Record System

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Background: The Danish Prehospital Medical Record (DPMR) represents a pioneering nationwide electronic prehospital medical record system. While routinely collected data from the DPMR are increasingly used for research, a comprehensive description of its system and content is needed.

Objective: To provide an overview of the DPMR as a tool for research, including its structure, variables, and current volume of records.

Methods: We examined the DPMR's history, data structure, content, and data usage. We also analyzed aggregated DPMR data from 2016 to 2023 for selected key variables. Further, we searched MEDLINE to identify studies utilizing this data source in the past decade.

Results: Since 2016, the DPMR system has grown to include 1.8 million unique prehospital patients with over 6 million associated patient contacts. For each patient contact, the DPMR compiles information on the emergency medical call (dispatch criteria, level of urgency, and pre-arrival treatment), characteristics of the incident (patient examination, treatment, response time, on-scene time, and transport time), emergency medical services units (ambulances, rapid response vehicles with paramedics, anesthesiologists in ground-based mobile emergency care units and/or helicopters, or patient transports without treatment capability), and extensive patient-related data. The system currently encompasses 528 variables, standardized across all emergency medical services units. There are a limited number of studies on the data quality of the system and the proportion of patients with missing civil registration numbers has varied between approximately 5% and 9%, which should be taken into account when using it for research.

Conclusion: The DPMR is growing in importance as a research tool in Denmark. It provides nationwide patient-related and logistical prehospital data going back to 2016, enabling linkage with national registries for outcome research.

Plain Language Summary: We conducted this study to provide a detailed description of the Danish Prehospital Medical Record (DPMR) that can help researchers plan future studies. The DPMR is a nationwide system used in ambulances and other medical emergency units in Denmark to document patient care. Our study examined its structure, data volume, and use in research. Since 2016, it has recorded over six million patient contacts, including details on emergency calls, patient conditions, and prehospital treatments, focusing on individual-level, patient-related data. The description provides researchers with a clearer foundation when designing future studies on patient care before hospital arrival as the DPMR is growing in importance as a research tool in Denmark.

Keywords: emergency medical services, data collection, computerized, registry data, Denmark

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Introduction

Prehospital emergency medicine encompasses patient examination and medical care provided after emergency medical services are activated and before arrival at a treatment facility.[1] Historically, the prehospital phase of patient care was seen primarily as transportation, lagging behind in-hospital care in terms of financial prioritization and pace of clinical advancement.[2]

Globally, the shift from paper-based to electronic health records has facilitated the use of routinely collected clinical data for low-cost epidemiological research studies involving large populations.[3] In Denmark, nationwide implementation of electronic medical record systems was achieved in all public hospitals in 2008.[4] However, widespread digitalization of data collected in the prehospital setting is a recent development. Full nationwide implementation of an electronic prehospital medical record system was accomplished in 2016. In the same year, the Danish Quality Database for Prehospital Emergency Medical Services was established.[5] However, because this database is part of the Danish Healthcare Quality Institute, it contains data only for the purpose of evaluating the database's selected quality indicators, ie, quantitative measures of health services performance.

Several countries have electronic prehospital medical record systems. Norway[6] and Estonia[7] have nationwide systems, while Sweden[8] and Finland[9] collect regional prehospital data in national quality registries and are progressing toward more unified digital documentation. The United States National Emergency Medical Services Information System (NEMSIS)[10] similarly functions as a national registry and represents one of the largest collections of patient-level prehospital data globally.

A comprehensive description of the DPMR may help researchers and clinicians better understand the data source's structure and content and assess its strengths and limitations, thereby improving the planning of future research. Here, we provide an overview of the Danish Prehospital Medical Record (DPMR) system as a more comprehensive data resource, including its structure, key variables, current volume of records, completeness of registration of vital signs (such as blood pressure, heart rate, and respiratory rate), and publications using this data resource.

Setting

The Danish Healthcare System and Registries

Denmark covers an area of 42,952 km^2 and its population was 5.97 million in 2024.[11] The country is divided into five administrative regions of varying size and population density, as shown in Table 1. Denmark's civil registration system assigns unique identification numbers to all residents at birth or immigration.[12] These are used to identify claims, link administrative and health records, and are included as a primary variable in many high-quality Danish health registries.[13]

Each region operates tax-funded public health services, including out-of-hours and emergency medical care, with no out-of-pocket expenses for patients.[14] Prehospital emergency medical services are reached via the official European

Table 1 The Five Administrative Regions of Denmark and Frequency of 1-1-2 Emergency Medical Calls, 2022–2023

Region	Population	Area km^2	Population per km^2	1-1-2 calls	1-1-2 calls per 100,000 population
North Denmark Region	592,754	7,884	75	47,814	8,066
Central Denmark Region	1,366,791	13,012	105	80,853	5,916
Region of Southern Denmark	1,238,736	12,266	101	98,585	7,959
Capital Region of Denmark	1,918,011	2,563	748	133,349	6,952
Region Zealand	853,482	7,227	118	75,907	8,894
Total	5,969,774	42,952	139	436,508	7,312

Notes: Population data reflect the second quarter of 2024. The "1-1-2 calls" column shows the number of 1-1-2 emergency medical calls obtained from the annual report of the Danish Quality Database for Prehospital Emergency Medical Services (June 2022 through May 2023). An exception was Region Zealand, where data on 1-1-2 calls span July 2022 through May 2023.
Abbreviation: km^2, square kilometers.

emergency number "1-1-2", ensuring access to universal emergency medical care for all people living in or visiting Denmark.[15]

Danish Prehospital Emergency Medical Services

Five regional emergency medical dispatch centers manage all 1-1-2 emergency medical calls. After initial triage by emergency operators (police officers or firefighters), the calls are forwarded to emergency medical dispatchers (registered nurses or paramedics). They assess the severity of the callers' conditions and decide on level of urgency based on the Danish Index for Emergency Care,[16] a criteria-based dispatch decision support tool. The Danish criteria-based dispatch system has undergone revisions since 2013, with the most recent update (10th revision) implemented in April 2022 and further revisions planned for 2025. In addition to calls from the public, these professionals coordinate requests for prehospital care and transport from general practitioners and hospitals, including general practitioners' out-of-hours services.

Denmark's three-tiered emergency medical services system includes publicly operated and privately contracted ambulance services.[17] Ambulances staffed by two emergency medical technicians or paramedics comprise the first tier, with a paramedic in a rapid response vehicle as the second tier. In most regions, the third tier includes clinical specialists in anesthesiology in ground-based mobile emergency care units and/or helicopters.

The Danish Prehospital Medical Record

History

An electronic prehospital medical record system was initially developed as a local project in one county.[18] In the years following the establishment of Denmark's five administrative regions (including healthcare administration) in 2007, a nationwide collaboration produced a tender for a unified national system. This system was implemented across all regions in 2015. Unlike hospital records, which vary across regions, the DPMR was standardized nationwide, ensuring uniform data collection. The DPMR replaced nearly all paper-based documentation in the prehospital setting, with full nationwide implementation in all ground-based EMS units (ie, ambulances, rapid response vehicles with paramedics, anesthesiologists in ground-based mobile emergency care units and/or helicopters, or patient transports without treatment capability) achieved in 2016. In 2021, the nationwide Danish helicopter emergency medical services adopted the system.

Structure and Data Management

In its basic form, the DPMR is a system integrated into tablets designed for personnel working in EMS units. The system allows manual input, aided by standardized templates with a finite number of possible values chosen from lists or restricted strings. A few input fields allow for free text. Data from patient monitors, such as vital signs, eg, blood pressure and heart rate, as well as electrocardiography data from defibrillators, are automatically transferred to the system.

As an EMS unit is dispatched or upon first patient contact with the EMS unit (not standardized across regions), a record is generated and linked to logistical data from regional dispatch systems. Data are accessible in real time either online or integrated into the receiving hospital's medical record system.

The North Denmark Region hosts the DPMR system's infrastructure and serves as its system administrator and data processor. Daily, a one-to-one copy of the content on the system's operational server is transferred to a staging server, which comprises the DPMR data repository. This simplified system structure overview is depicted more fully in Figure 1.

DPMR's Content

Data elements recorded in the DPMR represent three primary data sources: "incident", "task", and "medical record." Incident refers to the specific incident that led to a request for emergency medical services. The task component contains information about the ambulances and other EMS units involved in the prehospital care. Both incident and task data originate from dispatch systems at the regional emergency medical dispatch centers. The medical record component contains all patient-level information recorded in the prehospital setting, eg, findings from physical examinations, vital

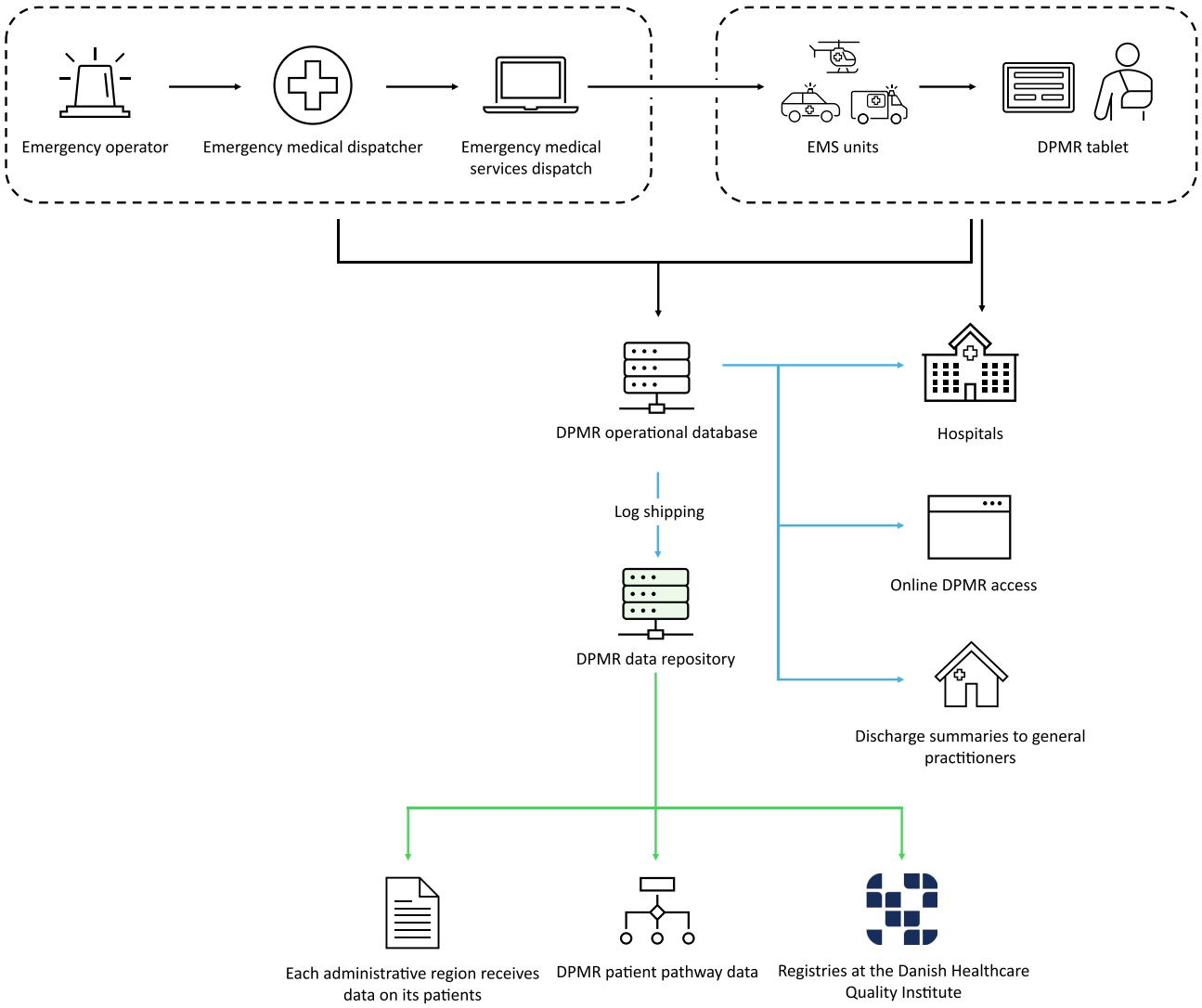

Figure 1 Schematic overview of dataflow within the Danish Prehospital Medical Record system.
Abbreviation: DPMR, Danish Prehospital Medical Record; EMS, emergency medical services.

signs, and treatments. As such, multiple 1-1-2 emergency medical calls may be linked to a single incident, with several EMS units (tasks) dispatched and medical records generated for one or more patients.

To enhance the usability of DPMR data, a framework has been designed to organize the data chronologically, to transform data from multiple records into a single record per patient contact, and to provide summary data. Data based on this framework are called "DPMR patient pathway" data. The organization of these data is based on a data structure defined by the five regional emergency medical services organizations, along with a national group of data managers, prehospital physicians, and researchers. This approach ensures that each patient encounter can be tracked individually, from the initial contact to hospital admission or release at the scene, focusing specifically on the patient rather than EMS units. Currently, DPMR patient pathway data includes 528 variables. The number of variables may change, as the DPMR is continually updated and revised. A summary of key variables currently in the DPMR is presented in Table 2. At the time of writing, the North Denmark Region's website provides detailed, up-to-date variable descriptions in Danish.[19]

Number of Records and Selected Characteristics

From January 2016 through 2023, over 6 million patient contacts involving 1.8 million unique patients have been recorded as DPMR patient pathway data. These records include all emergency medical services responses, including

Table 2 Simplified Overview of Types of Variables Available as DPMR Patient Pathway Data in 2025

Administrative	
CPR number[a,b]	A unique Danish personal identifier, assigned at birth or upon immigration.
Region ID[a,b]	The administrative region in which the prehospital contact took place.
Contact and medical record ID	Unique identifiers for each patient contact and prehospital treatment course.
Incident	
Emergency medical call[a,b]	Unique identifiers for incidents and information regarding criteria-based dispatch codes, date and time of emergency call, and level of urgency.
Task	
EMS units logistics[a,b]	Date and time of first unit assignment to incident, unit arrival at scene, arrival at hospital, and departure for hospital for each unit involved, as well as information on physician involvement, type of EMS units, and receiving hospital department.
Medical record	
Patient examinations	Variables related to findings from primary and secondary physical examinations.
Vital signs	Time and value of first, last, highest, and lowest values of SpO_2, pulse, respiratory rate, blood glucose, peak flow, temperature, $etCO_2$, heart rate, blood pressure, SpCO, SpMet, Glasgow Coma Scale score, pain scale score, and cardiac rhythm.
Diagnosis code	Primary prehospital diagnosis according to ICD-10. Only provided when a physician is on scene.
Prearrival treatment	Treatment given (eg, none, positioning, airway management, spinal stabilization) and who provided it (eg, layperson, community first responder[d], off-duty healthcare professional, police/fire)
Treatment	Various variables regarding interventions in categories such as airway management (eg, tracheal intubation, tracheotomy), oxygen delivery methods and flow rate, circulation (eg, vascular access, external pacing), and stabilization (eg, spinal stabilization, fracture management).
Medication	Specific medications registered under principal therapeutic categories, including antibiotics, opioids, steroids, inter alia.
Triage[c]	Danish Regions' Triage Model (DaR-T) triage criteria for adults and children, including vital signs and symptoms, used to standardize emergency response prioritization.
Accident classification	Incident context, cause, mechanism of injury, apparent severity, patient location, and safety equipment used in case of motor vehicle collision.
Incident report card	Used for major incidents. Includes variables such as airway status, respiration, circulation, bleeding, level of consciousness, treatment and transport priorities, contamination, specific injuries, and special requirements.
Trauma	Level of trauma alert, respiratory function, circulatory status, thorax and abdomen condition, spinal and extremity injuries, and potential risk factors due to age or comorbidities.
Out-of-hospital cardiac arrest[a]	Witness status, bystander cardiopulmonary resuscitation initiation, primary rhythm detected, defibrillation use and energy, cardiac arrest location, mechanical compression use, along with timing of interventions and resuscitation outcomes such as return of spontaneous circulation.

Notes: [a]Most variables are available through the Danish Cardiac Arrest Registry. [b]Most variables are available through the Danish Quality Database for Prehospital Emergency Medical Services. [c]Another system is used in the Central Denmark Region. [d]Alerted by an emergency medical dispatch center.
Abbreviations: CPR number, civil registration number; EMS, emergency medical services; $etCO_2$, end-tidal carbon dioxide; ICD-10, World Health Organization's *International Classification of Diseases, Tenth Revision*; SpCO, carboxyhemoglobin; SpMet, methemoglobin; SpO_2, arterial oxygen saturation (pulse oximetry).

urgent and non-urgent patient transports. Of these, 2.2 million (37%) were triggered by 1-1-2 emergency medical calls. Patient contacts not triggered by 1-1-2 emergency medical calls include requests from general practitioners, out-of-hours services, and hospitals for ambulances to transport patients to and between hospitals. Registration practices differ between regions due to variations in dispatch and logistical systems, and some regions include patient transports without treatment capability. The extent of such regional variation is unclear. In 2023, 436,000 1-1-2 emergency medical calls[20] resulted in EMS units being dispatched to 329,000 patients in Denmark.

Among all patient contacts triggered by 1-1-2 emergency medical calls since 2016, ambulances were involved in 97.5% of cases. An anesthesiologist was present on the scene via a ground-based mobile emergency care unit in 14.3% of cases and via helicopter in 0.9% of cases. Table S1 provides an overview of the frequency with which different EMS units were on the scene.

Table 3 shows the distribution by levels of urgency per Danish Index for Emergency Care[17] for patient contacts triggered by 1-1-2 emergency medical calls during 2016–2023. Most contacts were classified as A (acute, potentially life-threatening) or B (urgent, not life-threatening), together accounting for 86.7% to 93.8% of cases across all years, except in 2017 (78.1%), when a system update led to a high proportion of missing data for this variable. In contrast, C (scheduled, non-acute with possible need for prehospital treatment), D (transport, non-acute supine transport without treatment), and E (other services such as taxi transport) were assigned to a small proportion of cases (ranging from 2% to 4% in recent years). A notable proportion of cases had missing urgency data, varying from 20.5% in 2017 to 3.8% in 2021.

Table 3 Distribution of Level of Urgency After 1-1-2 Emergency Medical Calls, Recorded as Danish Prehospital Medical Record Patient Pathway Data, 2016–2023

Variables	Number (Percent of Year Total)							
	2016[a]	2017	2018	2019	2020	2021	2022	2023
Level of urgency								
A – Acute	61,351 (44.6)	124,589 (43.7)	154,937 (51.7)	146,196 (50.1)	143,429 (50.6)	155,782 (49.2)	158,182 (46.8)	143,892 (43.7)
B – Urgent	57,949 (42.1)	98,012 (34.4)	126,012 (42.1)	124,290 (42.6)	120,643 (42.6)	140,605 (44.4)	147,426 (43.6)	140,642 (42.7)
C – Scheduled	1,173 (0.9)	2,568 (0.9)	2,798 (0.9)	3,128 (1.1)	3,200 (1.1)	4,726 (1.5)	5,897 (1.7)	5,851 (1.8)
D – Transport	25 (0.0)	147 (0.1)	163 (0.1)	169 (0.1)	188 (0.1)	363 (0.1)	1,088 (0.3)	1,259 (0.4)
E – Other	540 (0.4)	1,406 (0.5)	2,450 (0.8)	2,749 (0.9)	2,544 (0.9)	3,379 (1.1)	5,000 (1.5)	5,591 (1.7)
Missing level of urgency	16,596 (12.1)	58,473 (20.5)	13,153 (4.4)	15,326 (5.3)	13,475 (4.8)	11,966 (3.8)	20,659 (6.1)	31,873 (9.7)
Total count of patient records	137,634 (100)	285,195 (100)	299,513 (100)	291,863 (100)	283,479 (100)	316,821 (100)	338,252 (100)	329,108 (100)

Notes: Levels of urgency are categorized in the Danish Index for Emergency Care as: A – Acute, potentially life-threatening, emergency response with lights and sirens; B – Urgent, not life-threatening, response following general traffic regulations; C – Scheduled, non-acute with possible need for prehospital treatment; D – Non-acute supine transport without need for treatment; and E – Other, services such as taxi transport, advice, or referral (usually no ambulance would be dispatched). [a]Registration of whether a dispatch was related to an emergency medical call started during 2016, explaining the lower count in absolute numbers for that year.

Figure 2 presents an overview of the vital signs recorded per patient contact triggered by 1-1-2 emergency medical calls during 2016–2023. The annual proportion of patients with no recorded vital signs varied between 8.2% and 12.1%. Supporting numerical data, including the proportion of patients with a valid CPR number (ranging from 90.7% to 95.1%), are available in Table S2.

Data Quality and Data Resource Use

Two studies have examined data quality in the DPMR, focusing on the completeness of vital signs documentation. A study from the North Denmark Region observed an initial decrease in missing vital signs recordings in the earlier local DPMR version, ie, from 18% in 2007 to 5% in 2014. The corresponding decrease in the new DPMR was from 11% in 2016 to 9% in 2017.[21] A study from the Region of Southern Denmark found a steady decrease in the proportion of missing vital signs recordings from 6% in 2016 to 2% in 2020.[22] The studies found higher rates of missing data due to challenges in measuring vital signs in children, possibly due to preferences for clinical assessment over measurement in this patient group. Vital signs were especially incomplete in pediatric patients, mostly in patients aged ≤2 years.[23] Mandatory educational initiatives for EMS providers were associated with increased vital sign documentation in

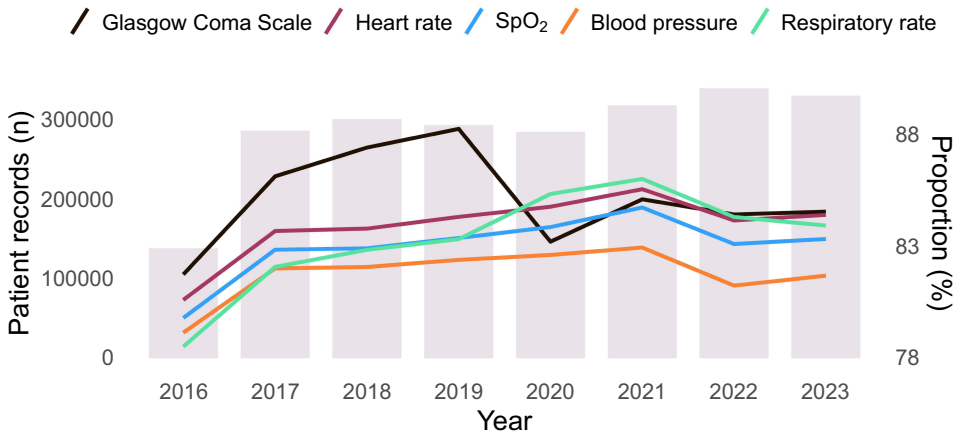

Figure 2 Recording rate of vital signs in Danish Prehospital Medical Record patient pathway data by year for dispatches triggered by a 1-1-2 emergency medical calls, 2016–2023.

Notes: Registration of whether a dispatch was related to a 1-1-2 emergency medical call started during 2016, explaining the lower count in absolute numbers that year. To supplement Figure 2, supporting numerical data are provided in Table S2.

Abbreviation: SpO_2, arterial oxygen saturation (pulse oximetry).

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patients ≤ 7 years.[24] Other suggested reasons for missing data were software changes, technical challenges, and lack of formal introduction to the system.

Record Linkage to Other Health Registries

The unique civil registration number assigned to all residents of Denmark enables accurate record linkage with other Danish health registries.[12] Examples of registries relevant to record linkage with prehospital data include the Danish Civil Registration System,[12] the Danish National Patient Registry,[25] the Danish National Prescription Registry,[26] and Danish clinical quality registries such as the Danish Stroke Registry.[27] In addition to being linkable with other registries, patient pathway data from the DPMR are forwarded directly to the Danish Quality Database for Prehospital Emergency Medical Services and the Danish Cardiac Arrest Registry.[28] This direct data transfer distinguishes DPMR as a data source compared with data sources for many Danish clinical quality registries, which often rely on manual data entry.

The DPMR data may be used to construct patient pathways from the arrival of EMS units until hospital admission and discharge, with follow-up on vital status on a nationwide level, which is unique.

Overview of Studies Using DPMR Data

We conducted a literature search to ascertain the scope of research applications of DPMR data following the system's full nationwide implementation in 2016 (Figure S1). The aim was not to synthesize evidence but to provide an overview of studies using the DPMR as a data source, excluding those using DPMR data obtained solely via the Danish clinical quality registries. We identified more than fifty papers published after 2016. A summary bibliography is provided in Table S3.

Research using DPMR data linked to hospital diagnoses and time of death has expanded our understanding of the prehospital patient population, identifying patient groups requiring more attention in research studies. These groups include patients with dyspnoea[29,30] and unclear complaints.[31] Both groups have a higher risk of poor outcomes than patients with chest pain, who still account for a majority of ambulance runs.[32,33] Non-specific diagnoses account for 20–30% of hospital discharge diagnoses among patients admitted after 1-1-2 emergency medical calls[34–36] and is a diagnostic group with a high number of deaths within 30 days after admission to hospital after a 1-1-2 emergency medical call.[34]

Prehospital vital signs have been examined as prognostic factors and used to describe the severity of a condition before treatment is initiated.[23,24,37] Standardized fields in the DPMR capturing medication have allowed for detailed descriptions of pharmacological interventions.[38–41] Also, the DPMR system's "incident report card" which provides an overview of patient conditions and triage levels upon arrival at the scene, has been used during major incidents.[42,43] Free text fields have been used for string searches, permitting research on specific events or occurrences initially not registered elsewhere in Danish health registries. Examples include electric scooter accidents,[44] validation of traumatic and exercise-related cardiac arrest cases,[45,46] drowning incidents,[47] alcohol-related ambulance calls,[48] and characterization of patients found dead upon ambulance arrival.[49] Further, manual reviews of medical records have been used to extract information about subpopulations or circumstances related to out-of-hospital cardiac arrest, such as pediatric patients,[50] potential organ donors,[51] or patients with chest-compression-induced injuries.[52] Further, interventional studies have leveraged the DPMR system for data collection for trial databases.[53–55]

Two ethnographic and qualitative studies have been conducted on the perceived impact of the DPMR system on prehospital care.[22,56]

Limitations

Prehospital clinical documentation, and thus DPMR data, face challenges both unique to the prehospital environment and shared with other acute settings.[57] Like data from other acute settings, prehospital data may be incomplete due to the setting's inherent challenges, where rapid response, limited resources, and acute patient management can take priority over detailed documentation.[58,59] Further, some operational barriers similar to electronic documentation in the in-hospital setting remain, such as increased documentation and staff training time and potential disruptions to clinical workflows.

The primary objective of the DPMR is to document clinically relevant parameters, not to collect data for research purposes. Because data documentation varies between patients, inconsistent documentation and a systematic lack of data may complicate comparisons between regions or patient groups. Additionally, there is a lack of clear definitions of terms such as "dead upon ambulance arrival" or "prehospital death." This is particularly challenging since ambulance personnel are not authorized to declare a person dead unless obvious and irreversible signs are present, complicating data accuracy and reporting.[49]

The DPMR does not contain information on patients in cases where no EMS units are dispatched, ie, those whose only interaction with the prehospital healthcare system is a telephone-based medical assessment. As such, follow-up is limited for these patients. While such data are available in regional dispatch systems, they are not standardized across regions. Prehospital medical assessments, including telephone-based assessments and pre-arrival instructions, should ideally be documented in the prehospital medical record rather than dispatch systems. Further, some patient records lack a valid civil registration number, which restricts the ability to link these records to other healthcare registries. Although the overall national coverage is high, this limitation should be considered when interpreting results that rely on data linkage.

The literature search may not have been exhaustive, as researchers did not always explicitly report their use of DPMR data or used different terminology across studies. There are a limited number of studies on the data quality of the system, which should be taken into account when using it for research.

Finally, a key limitation of the DPMR data source is that its data are not included in nationwide registries except those needed for the quality indicators in the Danish Quality Database for Prehospital Emergency Medical Services and the Danish Cardiac Arrest Registry. Under Danish legislation, medical record data are considered particularly sensitive personal information. Therefore, access to DPMR data is more restricted than access to most other Danish health registries and international registries such as the US NEMSIS. While access is more limited, DPMR data are highly granular compared with many registries, which often reduce granularity to accommodate variation across EMS reporting systems.

Data Sharing Statement

From a legal perspective, the content of the DPMR constitute medical record data equivalent to in-hospital medical records. Researchers are subject to the European Union General Data Protection Regulation (GDPR), supplemented by specific Danish regulations. In Denmark, access to medical records also requires patient consent.[60] When patient consent is not possible, researchers must obtain permission to retrieve or access data from patient medical records from the local Regional Council, which is the administrative legal entity responsible for overseeing access to patient medical records in Denmark.

DPMR data are available for research through three sources: (1) the Danish Healthcare Quality Institute, which maintains the Danish Quality Database for Prehospital Emergency Medical Services, and the Danish Cardiac Arrest Registry, which includes all out-of-hospital cardiac arrests (both registries containing only the DPMR variables needed for the current 10–15 quality indicators), (2) the regional prehospital organizations, and (3) the DPMR patient pathway data, provided on behalf of all regions administered by the North Denmark Region. Data access is limited to researchers working at or collaborating with a Danish institution since only Danish institutions can assume data responsibility for Danish health data.

Ethics Approval and Informed Consent

The study was registered in the North Denmark Region's data processing inventory (F2024-065). The North Denmark Region also approved the handover of prehospital medical record data (2024-013315). According to Danish law, no further approval was required for this registry-based study.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

Dr Oscar Rosenkrantz reports personal fees from the Department of Clinical Epidemiology at Aarhus University Hospital and Aarhus University, outside the submitted work. All authors state that they have no other conflicts of interest to declare for this work.

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