Patient characteristics of persons dead on arrival received in a Danish emergency department

A retrospective review of health records

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ABSTRACT

Problem: In addition to treating living patients, emergency nurses are also responsible for receiving and caring for persons dead on arrival (DOA) and their relatives. DOA persons are not systematically registered, there is limited knowledge about the population as well as care practice for the dead and their relatives. The first step in improving care for DOA persons is to know the size and characteristics of the population. Therefore, the aim of this study was to describe the size and characteristics of the DOA population in a Danish ED.

Methods: A retrospective review of medical records was undertaken for all consecutive DOA persons received in one Danish emergency department between January 2018 and December 2019.

Results: A total of seven hundred and nineteen DOA persons were included, 350 in 2018 and 369 in 2019. Males accounted for 64%. The mean age was 71 year with a range from 18 to 102 years. The place of death was for 80% at home, and more than half (54%) were found either dead or dying by a spouse, cohabitant or son/daughter. In most cases, the cause of death was described as unknown (92%), while suicide and accidents accounted for 8%.

Conclusion: The population of DOA persons in a Danish emergency department were mainly men, found dying or dead by relatives and brought in from home. The amount of 360 DOA persons per year calls on developing of a care practice for the dead and their relatives and further research is needed.

Keywords: Emergency nurse; brought in dead; dead on arrival; bereavement; ED; grief.

Contribution to Emergency Nursing Practice

- It is known that emergency nurses have the responsibility to care for persons dead on arrival and their relatives in Denmark, however characteristics and size of the population is unknown. The first step in improving care is to know the size and characteristics of the population.
- The main finding of this paper is that care of persons dead on arrival are a daily event in the emergency department and a daily task for emergency nurses. The population of persons dead on arrival are characterized by a mean age of a 71 years, the majority being male and found dead or dying by near family.
- The size and characteristics of the populations and subsequent impact on emergency nurses daily practice calls on further research of how to develop a care practice for person dead on arrival and their bereaved.
BACKGROUND
Emergency departments (ED) are gateways to hospitals treating patients with all kind of conditions and states of acute illness. Alongside treating living patients, patients who are dead are also received and cared for in ED.

Dead on arrival (DOA) or Brought in dead (BID) are terms used when a person is found unexpected dead outside a hospital. Persons can also be defined as DOA or BID after unsuccessful resuscitation in the ambulance or in the trauma room. There exists no definition or described difference between the terms “dead on arrival” and “brought in dead”. We use the term DOA to cover dead persons brought into an emergency department with or without resuscitation attempt.

In Denmark, it is a criminal offense not to initiate resuscitation or call for help if there is any doubt as to whether a person is dying or dead. Basically, only a physician can declare a person dead, unless the onset of death is obvious or expected e.g. in a terminally ill patient. Obvious death can involve decay, injury, or trauma inconsistent with life.

We are aware that an unknown subgroup is declared “dead in the field” and brought directly to a morgue or a forensic institute. The police are always involved and conduct a forensic inquest when death hypothetically could be caused by criminal offenses, suicide or accidents or if the person is found dead, or death occurred suddenly and without obvious medical reasons. According to Danish law, the police decide whether or not to transfer the dead person to a forensic institute.

Pursuant to the Danish Health Care Act, a person is dead by irreversible cessation of breathing and cardiac activity (the cardiac death criterion) or by irreversible cessation of all brain function (the brain death criterion). Inquest is performed by a physician at arrival at the ED or in the field to secure ascertain signs of death and if possible, manner and cause of death. Ascertain signs of death are either stiffness of death (rigor mortis), corpses (livores) or decay (cadaverositas). When ascertain signs of death are present a death certificate can be made by a physician. The death certificate is a legal document that is the first and foremost proof that a person is dead.

To our knowledge, DOA is not systematically registered in Denmark nor elsewhere, and there is a knowledge gap about the characteristics of the adult DOA population and how to care for their relatives and support the process of grieving.

North Zealand Hospital is a university hospital located in the Capital Region of Denmark. When a DOA person is received in the ED, and if the police permits, the ED-nurses take on the task to prepare the deceased for the viewing of their relatives and are present while the relatives are with the DOA person. Preparing a DOA person can involve grooming and positioning so the DOA person appears dignified and as presentable as possible. The condition of DOA persons can vary greatly depending on how death occurred, and death can be more or less expected or traumatic depending on the circumstances surrounding the death. The incidence of DOA persons may vary across time and contexts and pandemics like covid-19 or catastrophic situations can be expected to increase the number of DOA persons significantly.

Several systematic literature searches did not identify any relevant studies describing the adult population of DOA. The few identified studies focused on how to predict or prevent patients from dying on the way to the ED, dead on arrival in low income countries or perinatal loss or loss of
children \(^8,9\) or patients \(< 45 \) years \(^10\). No identified studies described the characteristics of an adult DOA population received and cared for in ED in high-income countries.

Studies have described that some ED-nurses and physicians find it difficult and unsatisfying to provide end-of-life care in an ED. This is due to both lack of knowledge and resources as well as how this is associated with increased level of work-related stress and low job satisfaction \(^11-17\).

The grieving process can be painful and stressful, though most individuals have sufficient internal resources and external support to adequately cope with their grief and slowly adjust to a life without the deceased. Situational factors such as place of death, lack of preparation for death, violent or traumatic death is associated with increased risk of prolonged grief disorder (PGD) \(^18-21\). Factors associated with a favorable bereavement response is when death is perceived peaceful and non-distressing and the ability of giving the loss a sense of meaning \(^3,18,19\).

The DOA population does not connect with a specific medical field. In a way it is an unnoticed and overlooked population despite a link to many medical fields. It seems urgent to know more about the DOA population to take proper care of both DOA persons, their relatives and health care professionals’ work environment. Therefore, the aim of this study was to describe the size and characteristics of the DOA population in a Danish ED.

**METHODS**

This study was a retrospective review of medical records of all DOA persons received in the ED at North Zealand Hospital within a two-year period. North Zealand Hospital is a university hospital located in the capital region of Denmark, which serves a population of 310 000 urban and rural residents. The ED employ about 120 nurses and receive more than hundred thousand patients each year corresponding to three-hundred patients each day. DOA persons are among the patients, seeking help for acute illness, trauma or injuries in the ED.

This study is reported according to the RECORD statement a checklist extended from the STROBE statement \(^22\).

**Participants**

All adult persons (+18 years) classified as DOA persons and received in the ED at North Zealand Hospital between January 1, 2018 and December 31, 2019 were identified and included.

Children and young people < 18 years classified as DOA are not received in the ED. They are received and cared for in the pediatric ward by pediatric nurses and physicians, and therefore not included in this study.

**Data collection and data management**

Based on a pilot-test of 10 randomly selected cases from 2019, a standardized audit scheme was designed. All variables that could be extracted from the medical records and was related to death were registered. The medical record is electronic and covers the persons’ past and present contact with hospitals. If the DOA persons have had no such contacts, the medical journal will be empty, except for recent data related to death. Data on resuscitation is sparse and only recorded as attempted CPR yes or no. By whom and why CPR is or is not initiated is not systematically registrated in the medical journal. Patients who received CPR on their way to the ED or in the
trauma-room on the ED are also classified as DOA because they die before being labeled “hospitalized” and therefore perceived as unexpected dead outside a hospital.

The first and second author reviewed the DOA persons’ medical records, and all data were entered into a REDCap database. Data were anonymized for analysis. All variables were analysed in a descriptive manner and presented as means with standard deviations (SD) and ranges (parametric continuous data) or frequencies with percentages (categorical and binary data). SPSS Statistics, version 22.0; IBM Corp. was used for the statistical analysis.

Ethics
As the study design was retrospective, informed consent was not relevant and according to the Danish Committee Act not required for registry-based studies. The project was approved by the hospital executive board and the chief nurse and physician of the ED. All data were handled and stored in accordance with the Danish Data Protection Agency, and the Regional Data Protection Agency approved the project (VD-20019-03).

RESULTS
A total of 719 DOA persons were included. The results are presented in Table 1. When the number do not equal 719 data are missing at random due to lack of chart registration (Table 2).

Men accounted for nearly two third of DOA persons (64%, n = 461). The mean age of DOA was 71 years (SD 15) and the median 73 years with a range from 18 to 102 years. The majority (80 %) were found dead or died in their home. In 54 % of the cases relatives had been present when the person died or called the Danish emergency number 112 equal to 911, as the person was found dead or dying. Home care service was involved in 17 % of the events and friends and neighbours in 10 %. In 14 %, the DOA person was found by random bystanders with no relation to the DOA person.

In total, 274 DOA persons received unsuccessfully cardiopulmonary resuscitation (CPR) corresponding to 43 %. Among these were 183 patients ≥ 70 years, and of these were 22 patients ≥ 90 years. In total CPR was initiated on patients ≥ 70 years in 67 % of the cases.

The cause of death was divided into three broad categories as recorded in the medical record. The cause of death was not the conclusion of an autopsy or medical examination but estimated by the ED physician who filled out the death certificate. In cases of accidents and suicide, the cause of death was certainly established. The remaining cases were categorized as unknown cause of death e.g. where the cause of death cannot be determined for certain. In some cases, based on the patient’s medical history, the ED physician estimated a cause of death e.g. COPD, cancer, etc. However, the systematics of these estimates were so weak and flawed with such uncertainty that it would be impossible to create additional valid categories.
DISCUSSION

This study described the characteristics of persons brought in dead in a Danish ED during a two years period. There was no significant difference in any of the variables between the years 2018 and 2019. The ED received on average one DOA person every day. The DOA population was characterized by a median age of 73 years and nearly two thirds were males. However, the range from 18 to 102 years and the different causes of death illustrates a very heterogenic population. As expected, the elderly constituted the largest proportion of the DOA population. Why males constituted the majority of DOA persons is unknown. The same pattern is seen in autopsy studies finding that sudden death is more frequent in men compared to women.²⁴

Our data show that 67% (n=183) of those receiving unsuccessfully CPR were older than 70 years and out of these were 22 patients older than 90 years. It is debatable whether the death of a 90 years old person is unexpected and if it is always commendable to start resuscitation. However if the person has not discussed CPR with a physician and opted out of CPR marked by a noted in his medical record, then the person who find the patient dead or dying will be will be obliged to start resuscitation regardless of the persons’ age and general state of health. We have not identified any

<table>
<thead>
<tr>
<th>Table 1. Characteristics of the DOA persons and circumstances related to their death (n = 719).</th>
</tr>
</thead>
<tbody>
<tr>
<td>All data are presented as numbers and percent except for age.</td>
</tr>
<tr>
<td><strong>Characteristics:</strong></td>
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<tr>
<td><strong>Gender and age</strong></td>
</tr>
<tr>
<td>Male</td>
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<tr>
<td>Female</td>
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<tr>
<td><strong>Age, years.</strong></td>
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<tr>
<td>Mean (SD) / Median (range)</td>
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<tr>
<td><strong>Resuscitation</strong></td>
</tr>
<tr>
<td>Initiated CPR*</td>
</tr>
<tr>
<td>No CPR*</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>Place of death</strong></td>
</tr>
<tr>
<td>Home</td>
</tr>
<tr>
<td>Outside home</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>The DOA person was found by</strong></td>
</tr>
<tr>
<td>Spouse, cohabitants or children</td>
</tr>
<tr>
<td>Neighbors or friends</td>
</tr>
<tr>
<td>Home Care Service</td>
</tr>
<tr>
<td>Police</td>
</tr>
<tr>
<td>Others, often random bystanders</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td><strong>Forensic inquest</strong></td>
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<tr>
<td>Forensic inquest, yes</td>
</tr>
<tr>
<td>Forensic inquest, no</td>
</tr>
<tr>
<td>Missing</td>
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<tr>
<td><strong>Cause of death</strong></td>
</tr>
<tr>
<td>Suicide</td>
</tr>
<tr>
<td>Traffic or other accidents</td>
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<tr>
<td>Unknown cause of death</td>
</tr>
</tbody>
</table>

*CPR, cardiopulmonary resuscitation; #cause of death estimated by time of death by a physician.
studies that investigated the perspectives of the bereaved relatives, but seek answers to questions like; do you, on behalf of your e.g. husband regret him being subjected to resuscitation? If our husband has had the opportunity, would he have opted out of CPR? Would your grieving process have been different if you and your husband had taken a stand in advance and discussed with a physician? In summary, we need knowledge and insight from the relatives to DOA persons and recommend further research about this topic.

Studies show that older people frequently attend the ED in their last year of life giving ED nurses and physicians a chance to address issues related to end of life care and dignified death. This is a new way of thinking ED care as ED nurses and physicians per tradition are focused on solving acute clinical problems and saving lives and not on advanced care planning (ACP). However, it may be the only chance we get to discuss ACP with some of the patients and we know that ACP is important for both the patients (in risk of becoming a DOA person), their relatives and for the way we use the resources in our health care system.

The DOA persons are received and cared for by the ED nurses but can neither be “treated” nor “saved”. On average, each dead person leaves four close relatives, corresponding to more than 1400 relatives per year. This implicates that DOA persons and their relatives nationally and globally constitute a substantial population in an ED, and a population that can be expected to increase significantly during pandemics like Covid-19. The DOA population has not previously been studied in western countries, despite its size and impact on daily nursing practice in ED.

Near family were in more than half of the cases the ones that either found the person dead or dying. In 8%, the cause of dead was an accident or suicide. Finding a loved one dead or dying and being the one who initiates CPR and/or being present during unsuccessful CPR seems likely to become a traumatic experience for the relatives. We know that the prevalence of PGD is higher when death is caused by traumatic events compared to non-traumatic events, 9,8 % vs. 13-78 %, however sparse knowledge of grief interventions aimed at bereaved to adults exists. We have not identified any intervention aimed at relatives to DOA, thus a systematic review investigated the effectiveness of interventions for people bereaved through suicide and found only scant and weak evidence – and a need for further research.

PGD is a painful condition and associated with elevated rates of suicidal ideation and attempts, cancer, immunological dysfunction, hypertension, cardiac events, functional impairments, depression, anxiety, hospitalizations, adverse health behaviors and reduced quality of life. No studies seem to have investigated the prevalence of PGD among DOA relatives nor their need for support. However, relatives of DOA persons can be considered a vulnerable population as the circumstances surrounding death often will be traumatic.

The relatives of DOA will often be in contact with ED-nurses in the first hours/day after the death as they arrive to the ED to see and say goodbye to the deceased. Care that potentially prevents or relieves symptoms of PDG among relatives, is described as an integrated part of palliative care but in an illness trajectory where patients, relatives and health care professionals already have an established relationship.

This study has some limitations. Firstly, it is a single center study. It would be interesting to include DOA persons from all Danish hospitals with an ED (n=14) in a future study. Secondly, the
retrospective design made it impossible for us to retrieve missing data by collecting supplementary information about prehospital care, CPR, cause of death etc. Thirdly, more characteristics of the DOA relatives would have been relevant but was impossible due to the retrospective design. Nonetheless, this study did provide new data describing the DOA population, knowledge that can lead to further research needed to improve care for DOA persons and their bereaved relatives.

This paper reports the finding from the first of three studies with the overall aim to improve care for the brought in dead and their relatives. The other studies are ongoing and described in detail in a qualitative study protocol 39.

IMPLICATIONS FOR EMERGENCY NURSES
Knowledge about palliative care is not in demand or trained in ED as focus is on life saving competences and skills, and it may not be fair to expect that all ED-nurses are able and dedicated to provide care for DOA persons and their relatives. Care for DOA persons and their relatives require other competences and interests than generally demanded and valued in emergency medicine. However, what competences care for DOA persons require and how care is best organized is unknown and warranted if we want to improve nursing care for this population. The size of the population and the complexity of care needs implicates that care for DOA persons and their relatives must affect the daily practice and the work environment of ED-nurses and physicians.

CONCLUSION
The population of DOA persons in a Danish emergency department were mainly men, found dying or dead by relatives and brought in from home. The amount of 360 DOA persons per year calls on developing of a care practice for the dead and their relatives and further research is needed.
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