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Autopsy rate in suicide is low among elderly in Denmark compared with Finland

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ABSTRACT

National differences in the legislation on cause and manner of death investigation are reflected in a high autopsy rate in suicides in Finland and a low corresponding rate in Denmark. The consequences for mortality statistics of these different investigation practices on deaths classified as suicides in Denmark and Finland, respectively, are not known in detail.

The aim of this article was to analyse autopsy rates in deaths classified as suicides, and to identify any differences in investigation practices in deaths with a comparable cause of death, but classified as unnatural deaths other than suicide.

Data from the mortality registries were summarised for the years 2000, 2005 and 2010. Autopsy rates (total, forensic and medical) were analysed with regard to deaths classified as suicide, and they were compared for three age groups (1–50 years, 51–70 years and ≥71 years) and for causes of death. Deaths classified as suicide were compared with other unnatural classifications, and comparable causes of death were coded into six subgroups: poisonings, suffocations/strangulations, firearm discharges, drowning/submersions, explosions/flames and other/unspecified causes.

The total autopsy rate for suicides was 99.8% in Finland and 13.2% in Denmark. Almost all of these autopsies were conducted as forensic autopsies. In the age group ≥71 years, Danish suicides outnumbered Finnish suicides (410 versus 283). The total autopsy rate was lower in the more senior age group in Denmark (19.5%, 9.9%, 5.6%), whereas it was consistently high in Finland (99.8%, 99.9%, 99.6%). Among Danish deaths due to poisonings, the autopsy rate was 89.5% when these were classified as accidents, but only 20.7% for cases classified as suicides. The number of deaths in the two Danish subgroups was comparable (550 versus 553).

In Denmark, the decision regarding the need, if any, for a forensic autopsy is made during the external forensic examination of the body. Our study showed that the limited use of forensic autopsy to confirm the cause of death in deaths classified as suicides raises doubts about the accuracy of the Danish suicide mortality statistics. Our finding is emphasised by those cases in which the cause of death was registered as intentional self-poisoning. The high number of suicides among the elderly in Denmark is striking and begs further investigation and research. Overall, our data from Finland and Denmark reveal striking differences between the two countries and warrant further comparative studies on the subject in other countries.

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1. Introduction

National legislation and practices governing cause of death (CoD) and manner of death (MoD) investigation in Finland (FI) [1] differ from those employed in Denmark (DK) [2]. This is reflected in a high rate of autopsies in suicides in FI [3–5] and a low rate in DK [6–8], although – by tradition – suicide is at the core of forensic autopsy work as suicide typically involves a sudden, unnatural and often violent death [9–11].

The Finnish legislation on CoD investigation has been in force since 1973 [1]. The police investigate all unnatural deaths and all deaths with an unclear CoD. In deaths due to suicide, investigation always includes a forensic autopsy because suicide is an unnatural MoD and the CoD has to be confirmed. This practice is part of the investigation of circumstances, which includes any use of alcohol and drugs that may have contributed to the death. The Finnish legislation governing CoD investigation does not make use of medical autopsies in suspected suicides, but, in practice, the above provisions mean that a forensic autopsy will be performed even in cases where person dies at the hospital after a long treatment period due to attempted suicide, for instance.

The Danish act on external forensic examination came into force in 1871. The original purpose of the act was to establish that the subject was indeed dead, thereby avoiding live burial [12]. Today's legislation acts as a tool allowing the police to single out suspicious deaths for further investigation [2]. Medical doctors are obliged to inform the police of any deaths suspected of being unnatural, including suicides. The main difference compared with the Finnish CoD investigation practices is that in DK a preliminary external forensic examination of the body is performed by the police and a medical officer of health or a forensic pathologist. External forensic examination is neither followed by a CT scan nor is blood samples for toxicological analysis carried out during examination. Investigation only proceeds with a forensic autopsy if the MoD is uncertain, if a crime is suspected, or if the case is of interest to the police. Thus, if the external examination concludes that the MoD is suicide, a forensic autopsy will most likely not be performed. This practice is followed even in cases in which the CoD is undetermined. The decision made during the external forensic examination of the body is final, and next-of-kin have no option to appeal. A medical autopsy can be performed in these cases in DK, but medical autopsy is usually restricted to confirming the CoD in subjects who have died a natural death. For this reason, medical autopsy is most frequently used for in-hospital deaths. Permission from the relatives of the deceased is required for a medical autopsy to be performed [2].

The discrepancies between external forensic examination and forensic autopsy are well documented in both natural and unnatural deaths. Error rate in determining CoD can be as high as 28% in natural deaths [13]. About 33% of unnatural deaths have been previously proven with minor to severe missed injuries, discovered at autopsy [14]. Misdiagnoses are inevitable in determining CoD since majority of deaths are certified without an autopsy, although it is known that an autopsy is still the golden standard for determining CoD and MoD [15]. The purpose of external examination of the body is not just to establish CoD and MoD, but also to provide facts in the service of the judicial process and the public health. If CoD and MoD cannot be determined by an external examination, investigation should proceed with an autopsy [16].

External forensic examination of the body is the most common method used to investigate medico-legal deaths also in other countries than Denmark. Recommendations and detailed documents for the harmonization of the CoD investigation have been done in Europe and in USA [17,18]. Denmark as well Netherlands and Germany, were the countries reserving the right of their governments to comply or not with the recommendation stating, that autopsies should be carried out in all suspected unnatural deaths, e.g. suicides or suspected suicides.

To the best of our knowledge, no studies have previously been undertaken to analyse the effects of national differences in the legislation governing CoD investigation on mortality statistics in deaths classified as suicides. In addition, we are unaware of any cross-national studies of CoD investigation in which the CoD classification is the same, but the MoD is classified differently, e.g. deaths with the same CoD classified as suicide, accidental, undetermined or homicide.

2. Materials and methods

The study material was received from the Finnish and Danish national mortality registers (Statistics Finland and the Division of Health Surveillance and Research at Statens Serum Institut, Denmark, respectively). The study design was cross-sectional covering the years 2000, 2005 and 2010. In the final analysis, data from these samples were summarised.

Both countries use the International Classification of Diseases, 10th revision (ICD-10), in death certificates and for mortality statistics [19]. Finnish and Danish deaths due to suicide were identified from the ICD-10 codes on intentional self-harm (X60–X84).

National mortality registers were used to extract data on CoD, MoD, age at death and information about the method used to investigate the CoD. The Danish death certificate data also contained information describing if the relatives of the deceased had refused to grant permission to perform the autopsy, or if the relatives were not asked for such permission.

Data from FI covered 90% of all deceased persons in whom death had occurred later than at 4 weeks of age. The missing 10% are due to random exclusion required under Finnish law [1,20,21]; the use of all FI deaths from any time period for research purposes is prohibited. Simple randomisation was performed by Statistics Finland using the SAS (Statistical Analysis Software) procedure "Proc SurveySelect samprate = .90 Method = srs" to ensure that every observation had the same probability of being selected. Data from DK included all deaths occurring in the studied years. To ensure valid comparison, we excluded all deaths occurring before one year of age in both countries. Also, one Finnish death due to suicide and 24 Danish deaths were excluded from the final analysis due to missing data of the method used to investigate the CoD. All statistical analyses were conducted using IBM SPSS Statistics software (Statistical Package for the Social Sciences, version 20).

The summarised data for the three study years in both countries were analysed for CoD and autopsy rates (total, forensic and medical) in deaths classified as suicides. Cases that were not investigated by autopsy were labelled as clinical examinations, including the rate of external medical examinations of the body in FI and external forensic examinations of the body in DK. The cases were divided into three age groups based on the age of the deceased person (1–50 years, 51–70 years and $\geq$71 years at the time of death). Odds ratios (ORs) with 95% confidence intervals (95% CI) and Fisher's exact test for two-sided p values (p) were calculated.

To explore any differences in CoD investigation practices for deaths classified as suicides versus other unnatural deaths, the following classification was introduced: accidental deaths (W00–X59), deaths by undetermined intent (Y10–Y34) and homicides (X85–Y09); the cases were identified on the basis of ICD-10 codes. A total of six subgroups were formed to enable comparison between groups of comparable CoD, which were classified with different unnatural MoDs. This was done using