



Research Paper

Factors associated with autopsy rates in a 6-year sample of Danish suicides in the Capital area of Copenhagen



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ABSTRACT

On average, two suicides occur in Denmark every day. In order to prevent suicides, it is important to understand their nature. The forensic autopsy plays an important role by providing detailed knowledge of the cause and manner of death. Unfortunately, the autopsy rate for suicides in Denmark is very low.

The aim of this study was to elucidate the factors that may affect the decision to perform a forensic autopsy and thereby affect the autopsy rate of suicidal deaths in the Capital area of Copenhagen.

Data from 6211 death certificates from the Capital area of Copenhagen, Denmark, over a study period of six years, were investigated. For deaths classified as suicide, the presence of the following factors were registered: gender, age, date of birth, date of death, marital status, nationality, place of death, cause of death, psychiatric condition, former admissions at a psychiatric ward, former attempts of suicide, presence of suicide note, history of substance abuse (alcohol, narcotics or both), and presence of self-inflicted scars. These factors were cross-tabulated with whether a referral to a forensic autopsy was made. Significant association was calculated by using Chi² and Fisher's exact test.

We found a total of 381 cases of suicide. The forensic autopsy rate was 21.3%. The following factors were associated with a significantly lower forensic autopsy rate: age above 50, history of psychiatric illness, the presence of a suicide letter, and cause of death registered as hanging/strangulation/suffocation, drowning/submersion, self-harm with sharp object, and jumping from height. Only the presence of a suicide letter remained significant after the Bonferroni correction for multiple testing. History of substance abuse and cause of death registered as intentional exposure to smoke, fire and flames were associated with a significantly higher forensic autopsy rate.

A forensic autopsy can give more precise information on suicide methods, the impact of fatal lesions and comorbidity. Our study results showed that violent methods of suicidal death and psychiatric comorbidity led to a lower forensic autopsy rate. A higher autopsy rate would enable more thorough study and investigation of suicides, which would benefit the next-of-kin, general preventive procedures, and treatment of patients at risk of suicide.

1. Introduction

The concept of suicide is a paradox of life. To most people, the desire to commit suicide is incomprehensible. The World Health Organization explains that in many cases, committing suicide is the ultimate consequence of an inability to cope with a given life situation.¹ Most people associate suicide with psychiatric illness to some extent,² but the term “rational suicide”, meaning suicide as a carefully planned action, is not uncommon.³ The phenomenon is by no means rare: two people commit suicide every day in Denmark, on average.⁴

Suicide is a global problem and constitutes a major health burden.^{1,4} It leaves society, the health care system and especially the relatives of the deceased with unanswered questions, which might be answered by a forensic autopsy.

In Denmark all suspected suicides do not undergo a forensic autopsy. It is by Danish legislation the police, who single-handedly decide whether or not a forensic autopsy is performed. When a death occurs in Denmark, a physician must declare the person dead. In cases of deaths suspected to be of unnatural causes – accident, suicide or homicide – the physician must report the death to the police. The police can then

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either dismiss the death as being of no investigative interest, or they can decide to conduct an external forensic examination. By law, this examination must be conducted together with a medical officer of health or a forensic pathologist. The main purpose of the external forensic examination is to determine the manner and cause of death and to rule out any suspicion of criminal activity. After the examination, the police representative alone decides whether an autopsy will be performed. The medical officer of health or forensic pathologist has a purely advisory role.⁵

In order to prevent suicides, it is important to obtain detailed knowledge of their nature. A forensic autopsy can often establish a precise cause and manner of death, differentiating between accidents, suicides, and deaths classified as undetermined and possible homicides to a greater degree than external examination of the body alone, thus achieving more complete information on the circumstances of suicidal deaths.⁶ In addition, due to Danish legislation, it is not possible to carry out forensic radiological and/or toxicological investigations without conducting a forensic autopsy.

Unfortunately, at only 2.8%, the forensic autopsy rate in Denmark is the lowest of the Nordic countries and the Western world. This low forensic autopsy rate weakens the accuracy of the national mortality statistics.⁷ Because the police are only interested in whether a crime may be connected to the death, this could lead to variability in the autopsy rate among different types of suicides.

Thus, the aim of this study was to elucidate the factors that may influence the decision to conduct a forensic autopsy and thereby influence the autopsy rate of suicidal deaths in the Capital area of Copenhagen.

2. Materials and methods

We developed a database by examining 6211 death certificates issued by the Department of Forensic Pathology at the Department of Forensic Medicine, University of Copenhagen, during the period 2007–2012. Death certificates were issued by medical doctors working at the Department of Forensic Medicine. The doctors had various degrees of experience and education; they ranged from residents to senior forensic pathologists. The department covers the area of greater Copenhagen, which has a population of approximately one million inhabitants, or one fifth of the Danish population. In rare cases, other police jurisdictions may request that an external examination be performed by our department.

The certificates were either based on external forensic examination followed by a forensic autopsy or based on the external examination alone. Our study end-point was registered as whether a forensic autopsy was requested or not. All certificates pertaining to suicide cases were included, and the covariate types listed in Table 1 were registered. A case was defined as a suicide if the manner of death was registered as suicide and/or the underlying cause of death was registered by ICD-10¹ codes for intentional self-harm (X60 to X84, appendix). Regarding the code X70 (hanging/strangulation/suffocation), we are aware that most textbooks on forensic pathology define suffocation as death due to lack of oxygen in the broadest possible sense, thus also including drowning (which has its own ICD-10 code). Due to our data being available in ICD-10 coded format, we have chosen to retain the original terminology, thus, in the current work, suffocation does not include cases of drowning.

During our study period, 6211 death certificates were issued. In 381 of these (6.1%), the manner of death was registered as suicide. Additionally, 184/6211 (3%) of the certificates were incomplete due to missing parts of the certificate and had to be omitted. Assuming a similar prevalence of suicide cases among these omitted death certificates, approximately 9 cases of suicide will have been erroneously

Table 1
Covariates included.

Category	Covariate types included
Demographic information	Gender Date of birth Date of death Age at time of death Nationality Marital status
Perimortem circumstances	Cause of death (ICD10 code) Place of death If the relatives had prohibited an autopsy
Medical history	Psychiatric history mentioned on certificate Former admissions to a psychiatric ward History of suicidal ideation Former attempt(s) of suicide Reported presence of a suicide note History of abuse of alcohol, narcotics or both

excluded. In one case, the manner of death was not explicitly registered as suicide; however, as suicide was explicitly mentioned in the additional information of circumstances surrounding the death in the death certificate, this case was also included.

The age variable was divided into 3 cut off points – below and above 50, 60 and 70 years old at the time of death – making dichotomous comparison between age groups possible.

Fig. 1 shows a flowchart of the inclusion process.

2.1. Statistical methods

We used cross tabulation to compare the dichotomous groups for each variable with the presence or absence of a performed autopsy after the external forensic examination, assuming independence between the groups. We used a significance value of $p < 0.05$. If the observed and expected frequencies were low, defined as fewer than five in 20% or more of the cells of the given table, we used Fisher's exact test with the two-sided value instead. Furthermore, we applied the Bonferroni correction to our significance value in order to correct for multiple testing. We made 29 different cross-tabulations, giving a corrected significance value of $0.05/29 = 0.0017$.

3. Results

We found a total of 381 cases of suicide, of which 81 (21.3%) were subjected to forensic autopsy. The nine factors significantly associated with a higher or lower rate of forensic autopsy are shown in Table 2. In the following, the term 'higher' signifies that the rate of forensic autopsy was significantly higher (before correction) in a group where a given factor was present compared with the group where it was not, and 'lower' vice-versa.

3.1. Demographics

Age above 50 was the only demographic variable significantly associated with a lower autopsy rate. The majority of the 381 cases were males: 252 (66%) compared to 129 (34%) females. The age at death ranged from 16 years to 101, with a mean age of 52 years (SD 16.9 years). A total of 121 (31.8%) of the suicides occurred during the months of March–May. A total of 364 (95.5%) of the decedents were of Danish nationality. Regarding marital status, 245 (64.3%) individuals were listed as being single, while 82 (21.5%) were listed as married or cohabiting.

3.2. Psychiatric condition

Mention of a possible psychiatric history was significantly

¹ International Classification of Diseases, 10th Revision (2016), ©WHO.

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