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Medico-Legal Death Investigation Systems – The Nordic Countries

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ABSTRACT

The systems for medico-legal death investigation in the Nordic countries are similar, but there are some variations in the theme. In three countries, when the physician who establishes the death of a person calls the police, the police will themselves decide whether to proceed with a post mortem examination (PME), while Denmark has an institution staffed by physicians who will attend a medico-legal inquest in all cases, where the police is in doubt. The forensic pathologists who perform PMEs work for national authorities in Finland and Sweden and university institutes in Denmark. In Norway, PMEs are mostly performed by full-time forensic pathologists and by part-time forensic pathologists working as hospital pathologists. The PME includes histology, toxicology and genetics, except in Denmark where toxicology and genetics are to be ordered by the police. PMCT is the standard in all forensic autopsies in Denmark. However, in the other countries it is the standard in the major centres, but optional and rarely done in others. The four countries differ in detail but are very similar at basic level. This has been proven for example in Disaster Victim Identification operations such as the Thai Tsunami, where the Danish, Finnish, Norwegian and Swedish teams functioned as the "Nordic Team."

Keywords: Crime scene investigation; death investigation; forensic autopsy; medico-legal inquest

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INTRODUCTION

Medico-legal death investigations start before the case reaches the medico-legal community. In order to perform medico-legal death investigations relevant cases need to be identified from the total deaths, of which most are deaths from natural causes of which only a few warrant the attention of the forensic pathologist.

We report the death investigation systems in the four Nordic countries – Denmark including the Faroe Island and Greenland, Finland including the Åland Islands, Norway and Sweden. The medico-legal systems of the four countries differ to some extent but have a common background based in history since two countries gained full independence 120 years ago or less – Norway in 1905 and Finland in 1917. On the other hand, there has for centuries been a strong interaction between these countries. For example during the Thai Tsunami the four countries were grouped as "The Nordic Countries" being able to exchange personnel at short notice, knowing each other well and working to more or less identical standards. In this paper we will present the Danish system and how the other four countries differ.

THE CONFIRMATION OF DEATH AND THE TRIAGE OF DEAD PERSONS

The handling of deaths in Denmark is governed by the Health Law[1], up to and including both the clinical and the medico-legal autopsies. When a person is assumed dead, a physician, or in some cases a nurse, will confirm it according to the two types of death, "heart death", which is the routine method and involves establishing cardiac and respiratory arrest or "brain death", which requires a carotid angiography to show lack of cerebral circulation. It is then up to a physician to decide whether the death falls within article 179 of the Health Law and must therefore be reported to the police. Deaths must be reported if they are due to – or there is suspicion of – homicide, suicide or accident, if the person was found dead, if the death was not expected from a medical point of view, if there is suspicion of

medical malpractice, if the person died in a prison or other form of detention or if there is suspicion of an occupational disease. The latter is purely administrative since the administration of those deaths is handled by the Labour Market Insurance (LMI). If the death does not warrant reporting to the police, which occurs in about 80% of cases, or if the police decline a medico-legal inquest, the physician must then conduct the inquest (Ligsyn), which is distinct from the medico-legal inquest. It is includes observing certain signs of death(at least one), confirming the identity of the diseased and stating the cause and manner of death. This information is entered into the death certificate. The physician, be it a General Practitioner (GP) or a hospital physician can then with the permission of the relatives, request a clinical autopsy. However, currently they are rarely done.

Handling of deaths in Finland is governed by the Act on the Investigation of the Cause of Death[2]. External examination must be performed by the physician to confirm identity of the diseased and to document death. Permanent changes in the body due to death must be registered, and manner and cause of death must be resolved. External examination and completion of death certificate should be by a physician who knows the deceased person's medical history. The police has to be informed when a physician suspects/witnesses that (1) death is due to a crime, suicide, accident, (2) death is sudden without medical reasons, (3) the cause of death is possibly an occupational disease, (4) the cause of death is possibly due to medical treatment (5) a person dies under special circumstances such as in custody, in prison, during involuntary treatment or during military service, (6) there is suspicion that the cause of death could be poisoning or if (7) the deceased person has not been under medical treatment for his or her last illness. Police investigation and external forensic examination are to be performed in all above-mentioned deaths.

The Norwegian system of handling a death is very similar to the Danish, but with some minor differences[3-4]. The physician is required to decide if death can be considered non-natural, and thereby warrants reporting to the police. The police would then decide whether medico-legal autopsy should be performed or not. If not, the body is referred to the reporting GP or physician who can refer the body to the funeral company. The physician must write a death certificate in all such cases. If the police decide that further examination is not needed, the family, and the deceased's physician can request a hospital or clinical autopsy. There are no LMI requested autopsies in Norway.

In Sweden, the handling of deceased is constituted through a number of laws and regulations of which the Autopsy Act[5] is the most important. In general, Swedish law is in accordance with other Nordic countries with regard to cases that must be reported to the judicial system. However, there are a few exemptions, mainly due to the more generally held regulatory language with fewer given settings under which the death has occurred.

Cases according to the Autopsy Act where the physician (often in general practice) is obliged to report to the police are, when there is;

- suspicion of crime
- suspicion of a possible wrongdoing or malpractice within health care.
- an obvious external factor – or there *may* have been such a factor – causing the death, and further investigation is called for to gain knowledge of environmental, occupational or traffic safety elements, *or* of some similar interest.
- need to establish the identity of the individual (eg., severe decomposition).

Hence, it is not formally regulated that deaths of individuals in custody nor deaths that occur during military service must be handled by governmental agencies. Moreover, if a death is suspected to have been caused by an occupationally contracted disease, the law permits the case to be investigated by the judicial system (and not by the LMI as in Denmark).

Other laws and regulations exist that further breaks down and exemplifies what is constituted by the Autopsy Act. Among the cases exemplified are deaths when there is knowledge or obvious signs of substance and/or alcohol abuse, sudden unexpected death in infancy or when the manner of death appears to be other than natural (i.e. obvious suicide, homicide or accident – or when it cannot be determined).

THE MEDICO-LEGAL INQUEST

If death is reported to the police, they will decide whether it is necessary to perform a medicolegal inquest. Some cases are closed over the telephone, if the police after consultation with the Danish Patient Safety Authority (DPSA) finds that death is not suspicious. Approximately one third of reported cases belong to this group and are returned to the GP or hospital physician for death certification. When there is suspicion of homicide or suicide there must be a medico-legal inquest. But in all the other cases mentioned above the police may decline. Such cases are for example where persons are known to have a well-known severe illness and when the death is expected by the physician, or if death is due to an accident that has happened long ago and where there is no one that can be held legally responsible for the death, such as falls of elderly persons at home, resulting in a fracture of the

femoral neck complicated by pneumonia at a later date, all on the condition that the police has closed the case. The medico-legal inquest is as the name implies performed by a physician from the DPSA, previously the District Medical officer and a representative of the police. The latter are working full-time handling deaths, not only attending the medico-legal inquests but collecting police records, talking to relatives, the GP, and other relevant parties, such as the dentist in identification cases and ambulance or pre-hospital medics. They are thus experienced in the legal and practical aspects of the handling of the deceased. The physician from the DPSA is a specialist in community medicine but some also have a background as pathologists or even forensic pathologist. The decision whether to proceed with a medico-legal autopsy/PM lies exclusively with the police, but in the vast majority of cases the parties are in agreement.

When the death is reported to the police after the Finnish law[2], external forensic examination is to be performed by the police, and they can ask for help from a physician (or forensic pathologist). The police must request forensic autopsy in cases where after the police investigation and external investigation of the body, the cause of death is still unknown, in unnatural deaths, if there is a suspicion of a crime, and in all the other sudden and unexpected deaths. Besides the police, are court or a National Institute for Health and Welfare (THL) able to decide whether a forensic autopsy is to be performed. Permission from the next-of-kin is not required to perform a forensic autopsy in Finland.

When a non-natural death is reported to the police in Norway, the police will either request a medico-legal autopsy or decline it, and just return the case to the GP or physician[6]. In some cases a clinical autopsy will be performed. There is no institution like the DPSA to consult in Norway, and there is no system with a medico-legal inquest before an autopsy. The police decide mostly without any consultation of medical expertise. Only in a few cases they will contact the forensic institution and discuss the case before they decide to request a medico-legal autopsy or not. Thus, most cases reported to the police will lead to a forensic autopsy. However, there are also financial considerations, as the transportation costs are very high, due to the long driving distances in Norway. Six hours of driving is not uncommon in western Norway to transport a body from the scene to the forensic institution.

In Sweden, the police decide whether to continue a forensic investigation of a reported death or not. The police is obliged to consult with a forensic pathologist before they decide not to investigate further, but still has the final say regardless of what advice they might receive. In practice, very few of elderly who pass away in the aftermath of a minor trauma, for example due to acute pneumonia following a hip fracture from a fall, undergo a forensic autopsy although there is an underlying external factor. This has been studied several times[7-8], but it is still quite unknown if this phenomenon is due to underreporting of those cases to the police, if it is the police that decide not to investigate further, or just an unspoken social consensus of what to use tax funds for.

A forensic investigation might consist of only an external examination of the dead body (comparable to the Danish "ligsyn") or a full forensic autopsy, including external and internal examination with possibility of toxicological analyses of body fluids, histological samples and – in some cases – genetic analyses.

THE MEDICO-LEGAL POST-MORTEM EXAMINATION

The total number of medico-legal autopsies in Denmark was 1330 in 2021 in a population of 5,800,000 and 57,000 deaths. Autopsy is not obligatory in suicides or accidents where the history is clear and there are no legal consequences, such as traffic accidents involving only the deceased or falls at home, when there is no suspicion of foul play. If it is decided to conduct an autopsy, the relatives of the deceased must be informed of the decision and the rules governing procedure, including the possibility of referral to court. This happens rarely and the police will only go to court in cases where they are convinced that the court will decide in their favour. The timescale for court proceedings is extremely short, for obvious reasons, and there is always the possibility for the police to proceed with the autopsy if there is a risk of *periculum in mora* (danger in delay).

After making the decision to conduct an autopsy the body is transported to one of the three Institutes of Forensic Medicine in Denmark. Copenhagen serving Zeeland and the islands to the south, Aarhus serving Northern Jutland and Odense serving Southern Jutland and Funen. Health Law states that the legal autopsy must be performed by a qualified pathologist i.e. the Chief Forensic pathologist or her/his deputy, or if a junior forensic pathologist takes over the autopsy, it must be supervised by the Chief Forensic Pathologist or her/his deputy. The report must be signed by two pathologists of which one of them is the supervising senior pathologist. The report is then sent to the police/LMI and can only be released to the relatives of the deceased at the discretion of the police.

The legal autopsy in Denmark is performed according to a circular from the Ministry of Justice issued in 1995 and written by the three Chief Forensic Pathologists and Professors of Forensic Medicine[9]. Therefore the

procedure is the same no matter which institute is conducting the autopsy. Additionally the quality assurance programmes of the three institutes are very similar and ensure a high and consistent standard of work. The methods used are described in international textbooks[10]. Before the autopsy a whole-body Post-mortem CT-scan (PMCT) is performed.

The institutes of pathology are university institutes of the universities of Copenhagen, Aarhus and Southern Denmark. They are obliged by law to maintain such institutes and guarantee the quality of autopsies and independence of the police, who request and pay for the autopsies.

Finland has about 55,000 annual deaths. The forensic autopsy rate in Finland is now about 16%[11]. In 2009, a political decision was made to abolish the provincial governments, and the medico-legal administration had to be reorganized. It was decided to establish a national organization that was located at the *Terveyden ja hyvinvoinnin laitos* (THL, which means National Institute for Health and Welfare in Finnish). The act on cause of investigation was changed in 2009 making the THL the authority responsible for performing forensic autopsies[2]. THL is centralized in five regional forensic centers which are localized in five university hospital districts. Each center has a THL Forensic Medicine Unit and a University Department of Forensic Medicine. Forensic pathologists working at THL perform most of the forensic autopsies (~80%). The forensic pathologists at the THL guide medical doctors and the police in the death investigation and control the death certificates which are completed by the medical doctors in their respective districts.

In Finland, the government finances forensic autopsies, and these do not compete with other costs. The police are responsible for paying for cadaver transport, but this cost is refunded to the police by the government's central administration[2].

In Norway, approximately 2200 medico-legal autopsies are performed yearly, in a population of 5,400,000. With a death rate of 40,500 per year, the medico-legal autopsies are performed on about 5% of the total number of deaths. In some cases, a medico-legal autopsy is mandatory. This is in case of traffic accidents and all suspected non-natural deaths in children. In addition, in all cases of homicide, and in most cases of suicides and accidents, the police will request a medico-legal autopsy. The relatives of the deceased must be informed of the decision to have an autopsy. The relatives can oppose this. However the police make the decision and no cases goes to court for decision.

There are five forensic centres in Norway: in Stavanger, Bergen, Oslo, Trondheim and Tromsø. In some places, autopsies are performed by university professors in forensic medicine, and in other places by well-trained hospital pathologists.

There is no formal training to qualify as a forensic pathologist in Norway. There is also no need for formal qualifications in the health law. The performing forensic examiners are, however, mostly specialists in histopathology, with long experience in forensic cases. In most cases a single pathologist performs the autopsy. However, all cases of homicides or cases that are bound to end up in court, are autopsied by two pathologists who will write a single report to the police. The report from the autopsy is similar in all forensic centres, and the autopsy is performed in the same way. In Oslo, the largest centre, all bodies are CT scanned before autopsy. The possibility of having a full body scan is available also in the other centres in Norway but it must be performed in a hospital radiology department. CT scans are performed in increasing number in many different cases of non-natural deaths.

In Sweden, about 6,000 forensic autopsies are performed each year- out of a national death toll of around 90,000-95,000 cases annually. The number of clinical autopsies performed within the health care system is much lower.

The organization of forensic pathology in Sweden differs from the other Nordic countries. The National Board of Forensic Medicine (Rättsmedicinalverket, RMV) is a tax funded state agency that underlies the Ministry of Justice. It is spread out on six units nationally, corresponding to the nearest regional police districts. There are affiliations to universities through, for example, adjunct professors, but all practicing forensic pathologists, residents, attendings and senior attendings are first and foremost government officials within RMV.

All correspondence is between the police and RMV, and the conclusions of the autopsy report can only be released to the next of kin or others at the discretion of the police and after a confidentiality check. It is the police that request and pay for the autopsies, as well as facilitate the transport of the deceased to and from the nearest RMV unit.

Within the RMV, there are also forensic odontologists and geneticists who collaborate closely with forensic pathologists in disaster victim identification missions (DVI) as well as in everyday case work that involve identification or (if determined helpful) mapping of genetic heart diseases. In recent years, RMV has enhanced its competence within forensic anthropology and has also, through the regulation letter from the Ministry of Justice, received the outspoken mission to perform scientific research.

CRIME SCENE INVESTIGATION

If the police require a forensic pathologist to attend a crime scene investigation (CSI) the pathologist on call in the district in question will attend. The CSI is done as teamwork comprising of investigators from the local police, forensic scientists from the National Forensic Science Centre and a senior pathologist or a junior pathologist under supervision. The forensic pathologist will write the death certificate as well on behalf of the Danish Patient Safety Authority. At the subsequent autopsy the forensic technicians from the National Forensic Science Centre will assist in taking photos, samples, fingerprints and giving expert advice in cases involving fire, firearms etc.

In earlier times in Finland a forensic pathologist routinely used to participate in crime scene investigations, at least in Southern Finland. The police are allowed to perform external forensic examination in connection with CSI, but they can request help from a physician (or forensic pathologist).

In Norway, there is no formal full time (24/7) on call service for the forensic pathologist to be called to a crime scene investigation. However, during ordinary working hours, the police will call a forensic pathologist who performs autopsies during daytime, and request assistance. This will usually solve the police's problem, as many forensic pathologists are willing to go to the scene. At the scene a forensic pathologist will assist the police in sampling for DNA, measure body temperature, remove vitreous for time of death determination and in addition will assist the police in different matters and discussions. Since there are only very few forensic pathologists, it is difficult to have a formal night and day on call service. In some cases, therefore, the police's request may be turned down. If that is the case, the pathologist will discuss the case and instruct the police to take extra photos from the scene. Long distances in Norway, perhaps including ferry transportation, may also be a problem, as it will sometimes take many hours to get the pathologist to the scene. The number of homicides yearly in Norway is about 30 (approx. 0.5 homicides per 100,000 inhabitants per year). Stabbing is the most common method of homicide in Norway, while the number of gunshot wound homicides is below 10 per cent.

In Sweden, when forensic detectives in charge of an obvious or suspected crime scene call, a forensic pathologist from their closest RMV unit will attend on site. Subsequently, in the autopsy suite, the forensic pathologist and technicians will assist the police with practical matters such as collecting trace evidence and reference materials.

SUPPLEMENTARY INVESTIGATIONS

In addition to the macroscopic examination of the body, microscopic examination is performed on selected organs by the forensic pathologist, and samples for toxicology and forensic and clinical genetics are secured during autopsy. Toxicologic and forensic genetics investigations are ordered in relevant cases. The procedure varies, and in some cases it is ordered after consultation with the police while in other cases it is ordered by the pathologist. However, the police can then cancel it within three days. In addition, there is a possibility of calling forensic odontologists and anthropologists if identification is an issue or if the body is partly or wholly skeletonised.

The procedures for performing a forensic autopsy are standardized in Finland after international standards[12]. In many departments, it is possible to perform computed tomography prior to the forensic autopsy. Supplementary investigations to confirm the cause of death are performed using forensic toxicology analyses for specific drugs and other chemicals, histopathological investigations including a neuropathological examination of the central nervous system when necessary; microbiological analyses; biochemical and metabolic analyses and DNA-analyses for diagnostic or identification purposes.

There exist small differences between the forensic centres in Norway in the amount of tissue samples taken to be prepared for histology. In some places, all internal organs are examined histologically, in other places only selected tissue specimens are examined. In contrast to Denmark, a full toxicological screening is performed, usually in both blood and urine, in all medico-legally examined cases. Forensic genetics are performed in selected cases, for instance in suspected genetic heart disease, and in criminal cases. Forensic genetics and forensic odontology services are readily available and are performed in cases of unknown identity.

The forensic pathologists in Sweden work independently when it comes to deciding on what supplementary investigations should be performed in a case, such as a CT scan, or what and if any toxicological and/or genetic analyses should be undertaken. The Autopsy Act only allows for the supplementary investigations that are necessary to determine the cause of death. Therefore this demands restraint from the forensic pathologist, for example when it comes to the extent of histological tissue sampling or genetic mapping.

In all RMV units, it is possible to perform a CT-scan prior to autopsy. As of today (2022), only one unit (Stockholm) owns a scanner. In the other five units

examination is conducted at a cost by the nearest department of radiology, usually within a university hospital. Thus, it is impossible to scan every forensic case prior to autopsy due to logistical and financial limitations. Plans for the future include purchase of own scanners by each unit to complement to all forensic autopsies.

CONCLUSION

The system for medico-legal death investigation in the Nordic countries is favoured by a generally homogenous population, and the institutes or departments have made provision for relatives of all faiths to bid farewell to their loved ones, irrespectively of their creed and assist in whatever special requirements are needed. On the other hand, it is not possible to deviate from the legal regulations of medico-legal death investigation due to demands on a religious background, which has also been accepted.

The systems are similar, and the training and tradition makes assistance between nations easy. In three of the countries, when the physician who establishes the death of a person calls the police, they will themselves decide how to proceed with a PME. Only Denmark has an institution staffed by physicians who will attend a medico-legal inquest in all cases, where the police is in doubt. The forensic pathologists who perform the PMEs work for national authorities in Finland and Sweden, university institutes in Denmark while in Norway, due to its geographical challenges PMEs are performed by full-time forensic pathologists in the capital Oslo and by part-time forensic pathologists working for the health authorities in their region as hospital pathologists. In most nations the PME includes histology, toxicology and genetics. However, in Denmark the latter two are to be ordered by the police after consultation. PMCT is standard in all forensic autopsies in Denmark while in the other nations this is standard in the major centres but optional and rarely done in others.

Even though the four nations differ in detail, they are very similar in the way they work, which is exemplified in the DVI operations such as the Thai Tsunami, where we were not Danish, Finnish, Norwegian nor Swedish, but the Nordic Team.

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