IATSS Research 38 (2014) 71–76

Contents lists available at ScienceDirect

IATSS Research

Fatal traffic accidents and forensic medicine

Kazuhiko Kibayashi *, Ryo Shimada, Ken-ichiro Nakao

Department of Legal Medicine, School of Medicine, Tokyo Women's Medical University, 8-1 Kawada-cho, Shinjuku-ku, Tokyo 162-8666, Japan

ARTICLE INFO

Available online 1 August 2014

Keywords:
Autopsy
Injury
Sudden death
Alcohol
Drug
DNA

ABSTRACT

In the event of a traffic accident fatality, the death is reported as an "unusual death," an inquest is conducted, and, if necessary, a forensic autopsy is performed to prove any causal relationship between the accident and the death, identify the vehicle at fault, and determine the cause of the accident. A forensic autopsy of a traffic accident fatality needs to both determine the cause of death and identify the mechanism of injury, an analytical task that requires observation of three major traffic accident factors: the body, the vehicles involved, and the scene of the accident. Also crucial to determining the cause of death is the process of looking into whether the people involved in the accident had any diseases that might affect their driving performance or were under the influence of alcohol or drugs. In order to reduce the number of people killed in traffic accidents, it will be important to promote joint research uniting forensic medicine, clinical medicine, automotive engineering, and road engineering, take measures to limit the impact of inebriated pedestrians and pedestrians suffering from dementia, and ensure proper screening of alcohol and illegal drug consumption in drivers.

Contents

1. Introduction

Forensic medicine represents one of the medical sciences and plays a prominent role in the investigation of human deaths. Traffic accidents account for the majority of accidental deaths worldwide. The determination of the causes and manners of deaths is an important issue in the investigation of traffic victims. Forensic autopsies of the victims, alcohol and drug analyses of the drivers, and DNA analyses of the specimens help identify causes of death and identify causes of traffic accidents. In this review, we first survey the medico-legal management of traffic accident victims in Japan and then propose ideas for reducing the number of traffic accident fatalities from the perspective of forensic medicine.

2. The relationship between traffic accidents and forensic medicine

Professionals in the field of forensic medicine strive to make fair, scientific medical judgments, advocate for the individuals involved, and help make society a safer and more secure environment when working on legal cases that require medical explanation. Traffic accident fatalities fall into this category, making them an important focal point in the discipline of forensic medicine.

* Corresponding author. Tel./fax: + 81 3 5269 7300.
E-mail address: kibayash@research.twumu.ac.jp (K. Kibayashi).
Peer review under responsibility of International Association of Traffic and Safety Sciences.

Production and hosting by Elsevier

http://dx.doi.org/10.1016/j.iatssr.2014.07.002

Table 1
Unusual deaths (reportable deaths).

1. No known natural cause of death
2. External cause of death
   1. Unintentional deaths
      1. Transportation accidents
      2. Exposure to smoke, fire, and/or flames
      3. Falls
      4. Threats to breathing
      5. Drowning and submersion
      6. Poisoning and exposure to noxious substances
      7. Abnormal environment (high or low environmental temperatures, abnormal atmospheric pressure, etc.)
      8. Electrocution and lightning
      9. Natural hazards
      10. Others
   2. Intentional deaths
      1. Suicide
      2. Homicide
3. Medical malpractice

Not all reported cases fall into the above categories.
Reportable deaths are unrelated to the presence and duration of medical care.
Reportable deaths include deaths caused by complications or disabilities with external causes.
The "24 h rule," or deaths that occur within 24 h after hospitalization, does not apply.

Deaths fall into two main groups: "usual deaths" and "unusual deaths". The most common example of a death in the former category would be a person who has an illness (an endogenous disease) and dies in a hospital from the effects of his or her condition—in other words, an "endogenous death" that occurs during the course of medical treatment. In the event of a death that falls into the "unusual" category, meanwhile, Article 21 of the Medical Practitioners Act requires the physician to report the death to the police department with jurisdiction. Although the Medical Practitioners Act does not stipulate exactly what an "unusual death" is, the category covers traffic accident fatalities and all other exogenous deaths (Table 1). A traffic accident is an accident that involves any mode of transportation, be it a car, bicycle, ship, or airplane [15].

All traffic fatalities are reported as unusual deaths and subjected to police inquests. If necessary, a judiciary process called a "forensic autopsy" is then performed to prove whether the victim died of injuries sustained in the accident, identify the vehicle at fault, and determine the cause of the accident. Forensic autopsies come in two types: judicial autopsies, which are performed for criminal deaths in forensic medicine departments at university faculties of medicine and medical schools across the country, and administrative autopsies, which are performed for non-criminal deaths in medical examiner's offices in the 23 wards of Tokyo, Yokohama City, Nagoya City, Osaka City, and Kobe City; in all other areas, autopsies of this second type are performed as administrative autopsy-compliant "autopsies with the consent of the family" in forensic medicine departments. Under the "Act on Investigations, etc., regarding Cause of Death and Identity of Dead Bodies Handled by the Police, etc.," enacted in April 2013, autopsies designed to investigate non-criminal deaths are now performed in forensic medicine departments nationwide (death investigation autopsies). Police and medical examiners select the applicable autopsy type based on the circumstances of the death in question (Fig. 1, Table 2).

3. Physical damage caused by traffic accidents

The main classifications of traffic accident victims—pedestrians, drivers, and passengers (and the less prominent group of victims of accidents involving bicycles or other two-wheeled vehicles)—normally sustain distinctive types of injuries (Table 3). Pedestrian injuries are generally categorized into injuries suffered when the pedestrian makes direct initial contact with a vehicle (primary injuries), injuries suffered when the pedestrian is thrown into direct contact with a vehicle (secondary injuries), and injuries suffered when the pedestrian is thrown to the ground (tertiary injuries). The nature of a pedestrian injury depends on the configuration of the vehicle involved and the speed at which the collision occurs. Whereas a collision between the front bumper of a regular car and a pedestrian tends to result in a bumper primary injury on the pedestrian's legs at roughly the same height as the bumper on the vehicle, for example, a collision with a hoodless, flat-faced "cab-over" vehicle usually creates a primary injury on the person's chest. When working on a hit-and-run case, investigators thus try to identify the vehicle at fault by finding a match between the location of the primary injury and the location of impact on the vehicle. The speed of the collision also affects the nature of the accident: a person will generally end up in front or to the side of the vehicle in a low-speed collision (with the vehicle moving around 20 km/h), tossed

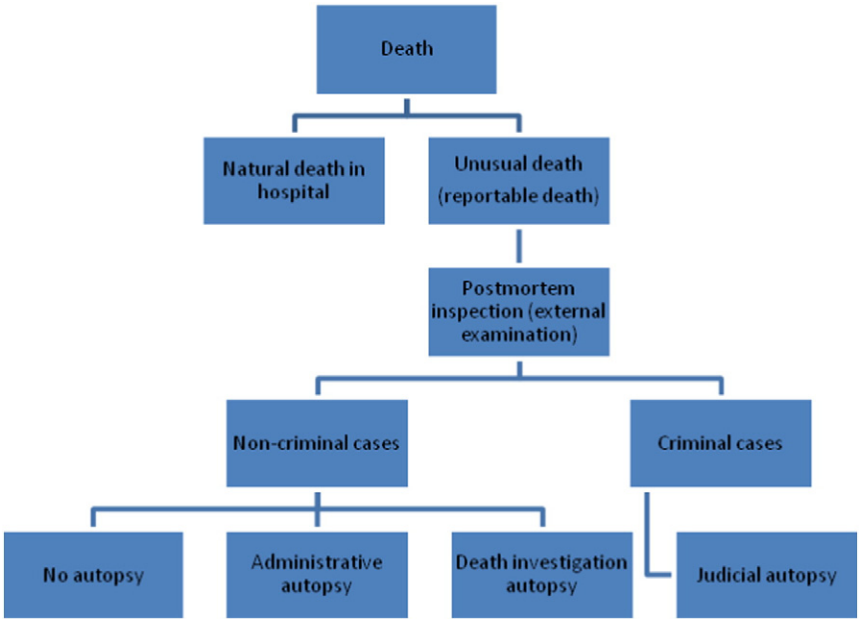

Fig. 1. Medico-legal management of death.