

# EUROPEAN COUNCIL OF LEGAL MEDICINE

## Harmonisation of Medico-Legal Autopsy Rules

### ECLM update of the principles and rules relating to medico-legal autopsy procedures

#### Scope of the recommendation

1. In cases where death may be due to unnatural causes, the competent authority, accompanied by one or more medico-legal experts, should where appropriate investigate the scene, examine the body and decide whether an autopsy should be carried out.
2. Autopsies should be carried out in all obvious or suspected unnatural death, even where there is a delay between causative events and death, in particular:
  - a. homicide or suspected homicide;
  - b. sudden, unexpected death, including sudden infant death;
  - c. violation of human rights such as suspicion of torture or any other form of ill treatment;
  - d. suicide or suspected suicide;
  - e. suspected medical malpractice;
  - f. accidents, whether transportational, occupational or domestic;
  - g. occupational disease and hazards;
  - h. technological or environmental disasters;
  - i. death in custody or death associated with police or military activities;
  - j. unidentified or skeletalised bodies.
3. Medico-legal experts must exercise their functions with total independence and impartiality. They should not be subject to any form of pressure and they should be objective in the exercise of their functions, in particular in the presentation of their results and conclusions.

#### Principle I – Scene investigation

##### a. General principles

1. In case of obvious or suspected unnatural death, the physician who first attended the dead body should report to the competent authorities, the latter deciding whether an examination should be carried out by a qualified doctor in legal and forensic medicine.
2. Particularly in cases of homicide or suspicious death, a doctor in legal and forensic medicine should be informed without delay and, where appropriate, go immediately to the place where the body is found and have immediate access there. In this respect, there should be an adequate structure of co-ordination among all persons involved and, in particular, among judicial bodies, medico-legal experts and police.

##### b. Examination of the body

###### 1. Role of the police

The following tasks, among others, should be carried out by police officers:

- a. record the identities of all persons at the scene;
- b. photograph the body as it is found;
- c. make sure that all relevant artifacts are noted, and that all exhibits, such as weapons and projectiles, are seized for further examination;
- d. in agreement with the medico-legal expert, obtain identification of the body and other pertinent information from scene witnesses, including those who last saw the decedent alive, where available;
- e. protect the deceased's hands and head with paper bags, under the control of the medico-legal expert;

f. preserve the integrity of the scene and surroundings;

## 2. Role of the medico-legal expert

The medico-legal expert should without delay:

- a. be informed of all relevant circumstances relating to the death;
- b. ensure that all necessary photographs of the body are properly taken including general view as well as detailed photographs with scale;
- c. record the body position and its relation to the state of the clothing and to the distribution pattern of rigor mortis and hypostasis, as well as the state of postmortem decomposition;
- d. examine and record the distribution and pattern of any blood stains on the body and at the scene, as well as other biological evidence;
- e. proceed to a preliminary examination of the body;
- f. except where the body is decomposed or skeletal, note the ambient temperature and deep-rectal temperature of the body, and estimate the time of death by recording the degree, location and fixation of rigor mortis and hypostasis, as well as other findings;
- g. make sure that the body is transported and stored in a secure and refrigerated location in an undisturbed state
- h. secure trace evidence if appropriate (sexual crimes, manual strangulation,...).

## Principle II – Autopsy physicians

Medico-legal autopsies should be performed, as soon as possible, by two physicians, of whom at least one should be a qualified in legal and forensic medicine.

## Principle III – Identification

In order to ensure that proper identification of the body is carried out in accordance with the disaster victim identification guide adopted by the General Assembly of Interpol in 1997 and updated in 2009, the following principles must be observed. Each body must be properly identified. For unidentified bodies, the identification should be carried out according to standardized methods, which must be scientifically sound, reliable, and capable of being implemented within a reasonable time. The primary and most reliable means of identification are finger print analyses, comparative dental analyses and DNA analyses. Secondary means of identification include personal description, medical findings as well as evidence and clothing found on the body. These means of identification serve to support identification by other means and are ordinarily not sufficient as a sole means of identification. All possible methods should be employed. Identification based solely on photographs is notoriously unreliable and should be avoided. Visual identification by a witness may provide an indication of identity but is not sufficient for positive identification of victims of large-scale disaster.

### 1. Visual identification

Visual identification of a body should be carried out by relatives or persons who knew and have recently seen the decedent.

### 2. Personal effects

A description of clothing, jewellery and pocket contents should be recorded. These may assist correct identification.

### 3. Physical characteristics

Physical characteristics should be recorded through an external and an internal examination.

### 4. Dental examination

Where appropriate, the examination of teeth and jaws should be carried out by a dentist with medico-legal experience.

### 5. Anthropological identification

Whenever human material is skeletised or in an advanced stage of decomposition, an anthropological identification should be carried out, if necessary.

## 6. Fingerprints

Where appropriate, fingerprints should be taken by police officers. A close collaboration should exist between all experts involved.

## 7. Genetic identification

Where appropriate, genetic identification should be carried out by an expert in forensic genetics.

It is appropriate to take biological samples from the deceased in order to assist genetic identification. Measures should be taken in order to avoid contamination and guarantee appropriate storage of biological samples. The identification methods mentioned under 1, 2 and 6 are under the responsibility of the police.

## Principle IV – General considerations

1. The medico-legal autopsy has to be performed in appropriate facilities (mortuary). Basic principles of hygiene have to be respected along with national health and safety procedures. Medico-legal autopsies and all related measures must

be carried out in a manner consistent with medical ethics and respecting the dignity of the deceased.

2. Where appropriate, the closest relatives should be given an opportunity to see the corpse.

3. Before beginning the autopsy, the following minimum rules should be applied:

a. record the date, time and place of autopsy;

b. record the name(s) of the medico-legal expert(s), assistant(s) and all other persons present at the autopsy with indication as to the position and role of each one in the autopsy;

c. take all the necessary colour photographs or video, where appropriate, of all relevant findings and of the dressed and undressed body including general view and details with scale;

d. undress the body, examine and record clothing and jewellery, verify the correspondence between injuries on the body and clothing;

e. where appropriate, radiological imaging techniques should be used, particularly in cases of suspected child abuse, and for identification and location of foreign objects.

4. Where appropriate, before beginning the autopsy, body orifices should be appropriately swabbed for the recovery and identification of biological trace evidence.

5. If the decedent was hospitalised prior to death, admission blood specimens and any imaging documents / data should be obtained as well as hospital records.

## Principle V – Autopsy procedures

### *1. External examination*

1. The examination of the clothing is an essential part of the external examination and all findings therein are to be clearly described. This is especially important in those cases where the clothing has been damaged or soiled: each area of recent damage must be described fully and relevant findings are to be related to the site of injuries on the corpse. Discrepancies in such findings are also to be described.

2. The description of the body following an external examination must include:

a. age, sex, build, height, and weight, nutritional state, skin colour and special characteristics (such as scars, tattoos or amputations);

- b. post-mortem changes, including details relating to rigor and post mortem hypostasis – distribution, intensity, colour and reversibility – and putrefaction and environmentally induced changes;
- c. findings on a primary external inspection and description which, if required, include sampling of stains and other trace evidence on the body surface and a reinspection after removal and cleaning of the body;
- d. inspection of the skin of the posterior surfaces of the corpse;
- e. description and careful investigation of the head and the facial orifices includes: colour, length, density and distribution of hair (and beard); nasal skeleton; oral mucosa, dentition and tongue; ears, retro-auricular areas and external meati; eyes: colour of irises and sclerae, regularity and appearance of pupils, sclerae, conjunctivae; skin and mucosa (presence/absence, quantity of petechiae to be described); if fluids have been evacuated from facial orifices, their colour and odour;
- f. neck: checking for excessive mobility, presence and absence of abrasions, other marks and bruising (including petechiae) over the entire circumference of the neck;
- g. thorax: shape and stability; breasts; aspect, nipples and pigmentation;
- h. abdomen: external bulging, pigmentation, scars, abnormalities and bruising;
- i. anus and genitals;
- j. extremities: shape and abnormal mobility, abnormalities; injection marks and scars; palmar surfaces, finger and toe nails;
- k. material findings under fingernails.

3. All injuries, including abrasions, bruises, lacerations and other marks have to be described by shape, exact measurement, direction, edges, angles and location relative to anatomical landmarks. Photographs including general view and details with scale should be taken. Bite marks shall be swabbed, and casts made where necessary.

4. Signs of vital reaction around wounds, foreign particles inside wounds and in their surroundings and secondary reactions, such as discolouration, healing and infections must also be described.

5. The investigation of cutaneous and sub-cutaneous bruising may require local skin incision.

6. Where appropriate, specimens from wounds must be removed for further investigations, such as histology and immunohistochemistry.

7. All signs of recent or old medical and surgical intervention and resuscitation must be described. Medical devices must not be removed from the body before the intervention of the medico-legal expert.

8. A decision has to be taken at this stage as to the strategies of investigation and the necessity of documentation by radiological and other imaging procedures.

## *II. Internal examination*

### *A. General*

1. All relevant artifacts produced by the dissection and from sampling procedures, must be documented.

2. All three body cavities head, thorax and abdomen must be opened layer by layer. Where appropriate, the vertebral canal and joint cavities should be examined.

3. Examination and description of body cavities include: an examination for the presence of gas (pneumothorax), measurement of volume of fluids and blood, appearance of internal surfaces, intactness of anatomical boundaries, external appearance of organs and their location; adhesion and cavity obliterations, injuries and haemorrhage.

4. The demonstration and in situ layered dissection of the soft tissues and musculature of the neck have to be components of all medico-legal autopsies (see the paragraph concerning special procedures).

5. All organs must be examined and sliced following established guidelines of pathological anatomy. This includes opening of all relevant vessels, for example, intracranial arteries, sinuses, carotid arteries, coronary arteries, pulmonary arteries and veins, aorta and vessels of the abdominal organs, femoral arteries and lower limb veins. Relevant ducts have to be dissected, for example, central and peripheral airways, biliary ducts and ureters.

All hollow organs have to be opened and their content described by colour, viscosity, volume (samples should be retained, where appropriate). All organs have to be sliced and the appearance of the cut surface described. If injuries are present, the dissection procedure may have to vary from the normal one: this should be appropriately described and documented.

6. All internal lesions and injuries must be precisely described by size and location. Injury tracks must be described in order to include their direction as regards the organ anatomy. Injuries are to be documented with colour photographs (general view and details with scale).

7. The weight of all major organs must be recorded.

## B. Detailed

### 1. Head

a. Before opening the skull, the periosteum must be scraped off in order to display or exclude any fractures.

b. The head examination procedure must allow the inspection and description of the scalp, external and internal surfaces of the skull and of the temporal muscles.

c. The thickness and appearances of the skull and sutures, the appearances of the meninges, the cerebrospinal fluid (CSF), the wall structure and contents of cerebral arteries and sinuses must be described. The description of the bones must also include an examination of their intactness, including the connection between the skull and the first two vertebrae.

d. In obvious or suspected head injury (for example, if a detailed examination is required or if autolysis or putrefaction is present) fixation of the whole brain is recommended before its dissection.

e. Middle ears must be always opened and nasal sinuses where indicated.

f. The soft tissue and skeleton of the face is dissected only in relevant cases, using a cosmetically acceptable technique.

### 2. Thorax and neck

The opening of the thorax must be performed using a technique which allows the demonstration of the presence of pneumothorax and the inspection of the thorax walls, including the postero-lateral regions. In situ dissection of the neck must display the details of its anatomy. If there is any suspicion of neck trauma, the brain and thoracic organs are to be removed prior to the dissection of the neck, to enable detailed dissection to take place in a bloodless field.

### 3. Abdomen

The opening procedure of the abdomen must allow an accurate examination of all layers of the walls, including the postero-lateral regions. In situ dissection is necessary in certain cases, particularly for the demonstration of injury tracks and evacuation of fluids. Dissection of organs should observe anatomical continuity of systems, where possible. The whole intestine must be dissected and its contents described.

### 4. Skeleton

a. The examination of the thoracic cage, the spine and the pelvis must be part of the autopsy procedure.

b. Where appropriate traumatic deaths need a precise dissection of the extremities, possibly complemented by radiological examination.

### 5. Special procedures

a. If there is a suspicion of air embolism, pre-autopsy radiological imaging of the thorax must be performed and the dissection technique must allow collection and quantification of intravascular gas. The first stage of the autopsy in such a case must be a careful partial opening of the thorax and dislocation of the lower three-quarters of the sternum with the subsequent opening of the heart under water, allowing the measurement and sampling of escaping air or gas.

b. For the demonstration of particular injury patterns, deviation from the normal procedure of dissection has to be accepted, provided that such procedures are specifically described in the autopsy report.

c. The dissection in traumatic deaths must include a full exposure of the soft tissues and musculature on the back of the body. The same procedure must be applied to the extremities (so called "peel-off" procedure).

d. In suspected or overt sexual assaults, „en bloc” removal of the sexual organs together with the external genitalia, rectum and anus should be considered before they are dissected. Relevant swabs of orifices and cavities must be taken prior to this procedure.

## 6. Sampling

The scope of the sampling procedure is to be case-dependent. However, the following minimum rules should be applied:

- a. in all autopsies, the basic sampling scheme includes specimens from the main organs for histology and peripheral blood sampling (such as for alcohol and drug analyses and genetic identification), urine and gastric contents. All blood samples must be peripheral blood and not heart or thoracic;
- b. if the cause of death cannot be established with the necessary degree of certainty, sampling includes additional specimens and fluids for postmortem chemistry, thorough toxicology, genetic analyses. This includes blood, vitreous humour, CSF, bile, hair samples and further relevant tissues;
- c. if death is related to physical violence, sampling includes the injuries, for example to determine vitality/wound age and any foreign materials in the wounds;
- d. if reconstructions are desirable, the removal of bones and osseous compartments may become necessary;
- e. if identification is the predominant aim, the removal of jaws and other bones may be necessary;
- f. if strangulation or the application of physical force to the neck is suspected or diagnosed, the entire neck structures, musculature and neurovascular bundles must be preserved for histology. The hyoid bone and the laryngeal cartilages must be dissected very carefully;
- g. biological samples must be collected in tightly closed jars, properly preserved and placed under seal and transported to the laboratory in perfect safety;
- h. certain specimens and fluids need to be sampled in a special way and analysed without delay.

## 7. Release of the body

After a medico-legal autopsy has been carried out, medico-legal experts should ensure that the body is returned in a dignified condition.

## Principle VI – Autopsy report

1. The autopsy report is as important as the autopsy itself, as the latter is of little value if the findings, epicrisis and evaluation of the medico-legal expert are not communicated in a clear, accurate and permanent document. The autopsy report should be an integral part of the autopsy procedure and be drafted carefully.

2. The report should therefore be:

- a. full, detailed, comprehensive and objective;
- b. clear and comprehensible not only to other doctors, but also to non-medical readers;
- c. written in a logical sequence, well-structured and easy to refer to in various sections of the report;
- d. be in a legible and permanent form, with hard paper copy even if it is retained in electronic storage;
- e. be written in a discursive “essay” style;

3. When drafting an autopsy report, the following minimum content should be included:

- a. legal preface to fulfil statutory requirements, if needed;
- b. serial number, computer retrieval coding and International Classification of Disease Code (ICD) code;
- c. full personal details of deceased (including name, age, sex, address and occupation) unless unidentified;
- d. date, place and time of death, where known;
- e. date, place and time of autopsy;
- f. name, qualifications and status of medico-legal expert(s);
- g. persons present at the autopsy and their function;
- h. name of the authority commissioning the autopsy;
- i. person(s) identifying the body to the medico-legal expert;
- j. name and address of the medical attendant of the deceased;
- k. a synopsis of the history and circumstances of the death, as given to the medico-legal expert by the police, judges, relatives or other persons, as well as information contained in the file, where available;

- l. description of the scene of death, if attended by the medico-legal expert; reference should be made to the provisions contained in Principle I above;
  - m. external examination; reference should be made to the provisions of Principle V above;
  - n. internal examination by anatomic systems, together with a comment on every organ. Reference should be made to the provisions of Principle V above;
  - o. a list of all samples retained for toxicology, post mortem chemistry, genetic identification, histology, microbiology and other investigations should be included; all such specimens should be identified and attested by the medico-legal expert according to the legal system of the state concerned, for continuity of evidence;
  - p. results of ancillary investigations, such as radiology, odontology, entomology and anthropology should be included, when such results are available;
  - q. one of the most important parts of the autopsy report is the evaluation of the significance of the accumulated results by the medico-legal expert. After termination of the autopsy, evaluation is usually provisional because later findings and later knowledge of other circumstantial facts can necessitate alteration and modification. Medico-legal experts must interpret the overall findings so that the maximum information and opinion can be offered. Also questions that have not been raised by the competent authority must be addressed if they could be of significance;
  - r. based on the final interpretation, the cause of death (in the International Classification of Disease should be given. Where several alternatives for the cause of death exist and the facts do not allow a differentiation between them, the medico-legal expert should describe the alternatives and, if possible, rank them in order of probability. If this is not possible, then the cause of death should be certified as “Unascertained”;
  - s. if appropriate, a medico-legal evaluation of the manner of death should be given. The report should be finally checked, dated and signed by the medico-legal expert(s).
4. The date of the autopsy and the date of the provisional report should never be more than a day or two apart. The date of the autopsy and the date of the final report should be as close together as possible.

### **Appendix to Recommendation No. R (99) 3**

#### Specific procedures (selected examples)

##### 1. Constriction of neck (hanging, manual and ligature strangulation)

The examination of the scene where the body was found is extremely important: for example the presence of a chair or similar platform; fastening of the strangulation device; technique of tying of the knot; adhesive taping of hands and objects for trace evidence:

- Strangulation marks: depth, width, intermediate rings, direction, suspension point, raised ridges of skin, zones of hyperaemia, presence of duplicate strangulation marks; further specific neck injuries: dried excoriations due to slippage of the implement, marks due to textile weave pattern and structure, distribution of petechiae in the skin, bruising, scratch marks, blisters in the strangulation mark.
- Bleeding from facial orifices. Differences in widths of the pupils, localization of hypostasis, presence and distribution of congestion.
- Injuries due to convulsions, defensive injuries, injuries due to being held forcibly. Dissection of the soft tissues, of the musculature and of the organs of the neck in a bloodless field is essential. Swabs from strangulation marks should be taken if manual strangulation is suspected.

##### 2. Drowning / Immersion

Note carefully the following findings: foam at the mouth, cutis anserina, maceration, mud and algae, lesions due to water animals, injuries due to surroundings (for example rocks and ships), loss of nails, skin, localization of livor mortis.

Technique: sampling of gastric contents, precise description of the lungs (weight, measurement, extent of emphysema), sampling, lung fluid, liver and other tissues, for the possible demonstration of diatoms and other contaminants.

If required, sampling of drowning medium (for example river, bath water) should be carried out.

##### 3. Sexually motivated murder

The inspection and documentation of the scene of crime, e.g. relative to the injury pattern, is especially important. All injuries must be photographed together with a scale. If required, the body surfaces must be

investigated under UV light and taped. Search for and sampling of foreign biological material must include pubic hairs and secretions on the body surface as for instance originating from bites. Such material must be preserved carefully for DNA investigation and protected against contamination. "En bloc" dissection of the genital organs is strongly recommended. It is also necessary to proceed to the careful removal and sampling of material under the fingernails and control hairs.

#### 4. Death from child abuse and neglect

State of nutrition and general care, thorough description and documentation of external injuries and scars, thorough examination for bone fractures radiological documentation must be evaluated.

Consider the removal of a variety of tissues: for example all injuries, regional lymph nodes in malnutrition, endocrine organs, immuno-competent tissues, specimens from different parts of the intestine.

#### 5. Infanticide / still-birth

Special techniques of dissection are necessary to expose the falx cerebri and the tentorium cerebelli; describe the site of caput succedaneum; remove all fractures "en bloc"; investigate all bone centres of ossification (size and presence). Special care is to be applied to the thoracic organs: degree of inflation of the lungs, flotation test "en bloc" and "en detail". However, the limitations of the flotation test must be appreciated. All malformations must be described. As regards abdominal organs, gas content of the intestine must be investigated. The umbilical cord and the placenta must be subject to morphological and histological examination.

#### 6. Sudden death

A subdivision into three main categories relative to the further strategy after gross examination is useful:

- a. findings that obviously explain the sudden occurrence of death (for example haemopericardium, aortic rupture). Cases belonging to this category can usually be regarded as sufficiently solved;
- b. findings that could explain the death but allow other explanations. Cases belonging to this category necessitate the exclusion of, for example, poisoning and possibly histological proof of recent or chronic alterations relative to the cause of death;
- c. findings are either nil/minimal or do not explain the occurrence of death. Cases belonging to this category will usually require extensive further investigations (for example: molecular analyses, microbiology, biochemistry...). This is especially so with sudden infant death cases. In such cases a more comprehensive investigative scheme is essential.

#### 7. Shooting fatalities

The following should be carried out:

- extensive account on the scene of the incident, of weapons involved, of types of bullets, of sites of "environmental" damage, of cartridge cases and of relative positions of persons involved;
- thorough examination of the clothing and description of relevant damage and careful sampling;
- thorough investigation and documentation of any blood (splashes) on the body surfaces (including clothing and hands);
- precise description of bullet entry and exit wounds relative to anatomical landmarks and distances from the soles of the feet and bullet tracks within the body;
- description of any impression marks of the muzzle;
- excision of uncleaned skin specimens surrounding entry and exit wounds;
- radiological documentation before and/or during autopsy (where necessary);
- determination of bullet tracks and their direction(s);
- final determination of direction(s) of fire, of the succession of shots, of intra-vital occurrence, of the victim's position (s).

#### 8. Death caused by explosive devices

a. As well as evaluating the cause of death, autopsy is essential to assist in reconstructing the nature of the explosion and identifying the type and maker of the explosive device, especially in aircraft sabotage or other terrorist actions.

b. Full radiological documentation of the body must be made to detect and localise any metallic objects, such as detonator components, which may lead to the identification of the explosive device.

- c. The pattern of injury may indicate that the dead person was a perpetrator of the explosion, for example maximum injury in the lower abdominal region suggests that he or she carried the device on his or her lap during a premature explosion.
- d. At autopsy, all foreign objects in the tissues, identified on radiological images, must be carefully preserved for forensic examination.
- e. Samples of tissues, clothing, etc., must be retained for chemical analysis to identify the type of explosive.

## 9. Blunt and/or sharp force injuries

The following should be carried out:

- examination of the weapons or objects that are possibly involved (especially their dimensions);
- extensive examination and inspection of clothing (including damage, stains);
- careful dissection and description of all tracks (layer by layer) including their dimensions and weapon-related traces, signs of vitality.

## 10. Fire Deaths

The following should be carried out:

- examination of remains of clothing, – specific types and shapes of skin combustions;
- search for heat-related alterations and peculiarities;
- demonstration/exclusion of fire accelerants;
- search for signs of vitality: carbon monoxide, HCN, soot inhalation, skin lesions. Radiological examination will exclude bony injury, presence of foreign bodies, for example bullets.

## 11. Suspicion of intoxication (General Outlines)

11.1 Where anatomical findings do not reveal a cause of death and/or there is vague suspicion of poisoning, basic sampling should include peripheral blood, urine, stomach contents, bile, vitreous humor, liver, kidney, brain and keratinic matrices and any containers including syringes.

11.2 If specific suspicion arises, sampling should be group-related as follows:

- hypnotics, sedatives, psycho-active drugs, cardiac drugs and analgesics, pesticides: as aforementioned under (11.1);
- drugs of abuse: as aforementioned under (11.1) and additionally cerebrospinal fluid, injection marks;
- volatile fat-soluble substances such as fire accelerant and solvents: as aforementioned under (11.1) and in addition: blood from left ventricle, subcutaneous fat tissue, lung tissue, clothing;
- nutritional intoxication: as aforementioned under (11.1) and in addition: intestinal contents, if possible taken from 3 different sites;
- suspicion of chronic intoxication (heavy metals, drugs, pesticides etc.) as aforementioned under (11.1) and in addition: hairs (tufts), bones, fat tissue, intestinal contents.

## 12. Decomposed bodies

The presence of decomposition does not remove the need for a full autopsy.

Radiological examination will exclude bony injury, the presence of foreign bodies, for example bullets. Toxicological studies (particularly estimation of alcohol concentrations) should be carried out but interpreted with great caution.

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