Republic of San Marino

National Bioethics Committee of Republic of San Marino

Law no. 34, January 29, 2010

THE ASSESSMENT OF HUMAN DEATH

Approved in the plenary session of January 21, 2013

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INTRODUCTION

The *National Bioethics Committee of the Republic of San Marino* (CSB) during its first meeting decided to focus on several important issues for the nation. A scientific and bioethical discussion was necessary in order to have a proper legal adjustment.

Therefore, the CSB accepted the request of Renzo Ghiotti, President of *The Volunteer Association of blood and organs of the Republic of San Marino*, also a member of the CSB, to compose a document which defines the process of death and the criteria for its assessment considering that San Marino was legislatively lacking in this matter.

The CSB committed the management of the group to Dr. Nicolino Monachese with the assistance of Raffaele Giorgetti and the Deputy President. The group was also joined by Judge Emiliani, Father Gabriele Mangiarotti and Dr. Nicola Romeo.

The draft of the document, created by the group over the course of a year, was delivered to all of the members of the CSB before the discussion which took place in the plenary session on January 21, 2013. During the meeting, all present members of the Committee approved the document: Luisa Borgia, Verter Casali, Paolo Di Nardo, Lamberto Emiliani, Silvia Gabotti, Renzo Ghiotti, Raffaele Giorgetti, Father Gabriele Mangiarotti, Nicolino Monachese, and Nicola Romeo. Valentina Chantal Francia attended the meeting via videoconference and agreed with the approval of the document.

This document sets itself in the international debate on death in a concise, compressive and exhaustive way, taking into account the bioethical assumption of safeguarding human life until the very last moment.

In order to pursue this, the document proposes to document every clinical and instrumental exam, using IT tools including video and audio recording, necessary to certify death.

The CSB, as the publisher of this document, offers the San Marino community the basis to stimulate a public debate useful for the Authority in creating an internal legal system on this important matter.

CSB's Deputy President
and President of the same committee during the
02/15/2016 session.

Luisa Maria Borgia

FOREWORD

The *National Bioethics Committee of the Republic of San Marino* (CSB) considered the importance of a profound reflection on the assessment of human death as a result of the following considerations:

- Throughout human history, mankind had to face the evaluation of death through criteria that evolved simultaneously with knowledge and with biomedical and technological instrumentation.

  In the traditional criteria - considered here as that created before the use of Cardiopulmonary Resuscitation (CPR)- the certification of death was made when the cardiovascular system stopped working permanently which is defined as the "the cardiac death" criteria. Today death is certified as the moment the brain and brain stem stop working permanently and thus defined as the "brain death" criteria.

  The criteria of the assessment of death are considered today to be the center of a debate actively discussed by the scientific and bioethical community.

- Although the international legislation on the subject is wide, varied and often divergent, in the Republic of San Marino there are two normative documents that regulate it: the legal regulation of the Mortuary Police of March 15, 1910 and Law n. 35 of February 4, 2010, which modify the previous legal regulation. There is still no regulation regarding organ transplants.

- There is an absence of a correct and unanimous definition of death and the lack of an international agreement on the criteria of its assessment.

Also reported is a confused public opinion regarding the subject due to ancestral fears on the assessment of death and on its irrevocability. This phenomenon often brings preconceptions and skepticism on related subjects such as organ donation.

Due to the legal mandate given by the Law n.34 of January 29, 2010, the CBS may take into account all of the previous points in order to formulate a clear definition of death and its assessment criteria.

Setting its work on a scientific reflection and on the comparison of different international legislation on this subject, the CSB was able to develop its own contribution to the discussion, considering the ethical principal of respect and protection of human life during each stage, and in particular during the most vulnerable ones such as during agony and during the transition from life to death.

The CSB chose to identify the criteria based on scientific rigor and a definite prognosis, in order to provide, on the one hand, to the public opinion a guarantee on the assessment of death procedure, and on the other hand, ethical and scientific support to the San Marino legislator in the case of future updates of the current legislation.

The CSB deemed it necessary to deliberate only on the assessment of death, and distinguishing it from organ transplantation and donation. Regarding these subjects the CSB will write a specific document.

Even though organ donation is not possible if the donor is not declared dead, the CSB considers that the procedure of assessing death cannot be influenced by any other aim such as the request of organ removal or the allocation of poor resources – such as economical, human, or structural- to patients with higher chances of survival.

THE INTERNATIONAL LEGISLATIVE FRAMEWORK

The concept of death began to evolve in the 1960s and deeply changed with the development of diagnosis and treatment.

The evolution of medical science created the possibility of compensating for many organ functions, such as respiratory, cardiac and renal, thus giving the opportunity to observe new clinical scenarios unknown until that moment. Therefore, an artificial homeostasis of various functions such as respiratory, cardiovascular, and renal, was possible even in patients where cerebral damage caused death or parenchimal colliquation.

Before this new treatment death was established when the heartbeat ceased. Presently the concept of death has changed. It is now considered to occur at the moment in which an individual stops being a person due to the death of the tissues that compose the brain regardless of the heartbeat.

During the same period in which this new scenario was taking place, the surgical techniques of organ transplant were arising and developing. Therefore, brain death and the consequent possibilities of harvesting organs while the heart is still beating, created the grounds for a debate on important ethics and deontological issues, that resulted in a world wide normative framework on the concept of "brain death".

The CSB believes that a presupposition is necessary: today it is globally accepted, with little differences between the Anglo-Saxon and European cultures, that the death of an individual is connected with the death of the brain stem and of the cerebral cortex. This can be primitive or secondary to cardiac arrest and therefore there are two scenarios for the assessment of death: brain death caused by a cardiovascular arrest and brain death while the heart continues beating.

The first scenario, namely brain death caused by cardiovascular arrest, which can be considered the successor of the common concept of death, is the common scenario whereby, at the end of a human life due to underlying disease, the cardiac activity stops and the death process begins and ends with the loss of all brain activities.

The evaluation of death is made using instrumental criteria, that is the execution of an electrocardiogram proving the absence of electric cardiac activities for a few minutes.

The second scenario, namely brain death with heartbeat, is typical in patients with serious primitive or secondary cerebrovascular insult, who have undergone CPR treatment with positive response with regard to cardiovascular, respiratory and renal functions, but in which the brain suffered irreversible and serious damage, causing the death of nerve tissues of the brain stem and of the cerebral cortex. This damage can be analyzed through clinical exams in order to begin the procedure of the assessment of death.

THE INSTRUMENTAL ASSESSMENT OF HUMAN DEATH THROUGH THE CARDIO-RESPIRATORY STANDARD
THE INTERNATIONAL FRAMEWORK

The assessment is realized through electrocardiogram monitoring that must remain isoelectric.

- NETHERLANDS: the observation period is 10 minutes;
- SWITZERLAND: the observation period is 10 minutes;
- SPAIN: the observation period is a minimum of 5 minutes after appropriate basic life support procedures;
- FRANCE: the observation period is a minimum of 5 minutes;
- UNITED KINGDOM: the observation period is a minimum of 5 minutes;
- ITALY: the Presidential Decree 285 of 09/10/1990 modifies the Mortuary Police regulation regarding anatomical, clinical, biological and cardiac criteria where it was established that death occurred in the moment the heart stops beating (so called **cardiac death**).

The absence of a heartbeat and vascular pulsation and the presence of a flat electrocardiogram lasting for at least 20 minutes are signs which allow, also from a legal standpoint (article 8 of the Mortuary Police's regulation), the assessment of death.

This condition establishes the suspension, strictly irreversible, of any chance of recovery of brain function and the function of all other organs and apparatus.

Two new legal provisions were later introduced in Italy:

- Law n°578 of December 29, 1993 "*Norme sull'accertamento e certificazione della morte*" (Standards in the assessment and certification of death)

The main innovation of this law is the definition of the moment of the person's death and the necessity of establishing it through clinical-instrumental criteria:

  - Art. 1: Death is identified by the irreversible cessation of all brain functions.
  - Art. 2 (1): Death by cardiac arrest is considered when breathing and circulation stop for enough time to determine the irreversible loss of all brain functions. It can be verified through clinical-instrumental procedures as defined by a Ministry of Health decree.

- Decree April 11, 2008, update of decree August 22, 1994 n°592/1994: "Regolamento recante le modalità per l'accertamento e la certificazione della morte" (Regulation for the procedures in the assessment and certification of death).

THE ASSESSMENT OF HUMAN DEATH IN THE INTERNATIONAL FRAMEWORK

In the present legislative framework, the vitality of an individual is based exclusively on the vitality of the brain stem and of the cerebral cortex. Therefore, whenever there is a brain death diagnosis, the law establishes the necessity of beginning the procedure for death assessment.

Worldwide criteria, instruments and timing of this procedure are treated and seen almost univocally, with few exceptions, mainly linked to two different biological criteria used to establish brain death. As a matter of fact, at the present time, different variants are used to analyze cerebral blood flow, due to technological progress that, each day, makes it possible to evaluate new procedures, such as instruments to highlight the presence or the absence of blood flow within the encephalon.

The diagnosis of brain death is based on neurological clinical and instrumental examinations that depend from one of the two concepts used today:

- *Brain Stem Death* (BSD) is the criteria used in United Kingdom and in Anglo-Saxon countries to diagnose the death of an individual. It is based on the concept that the consciousness process is located in the reticular formation of the brain stem and that the activity of the cerebral cortex is secondary to the work of this nervous structure which coordinates and supports the consciousness process. According to the laws of the countries who have assimilated this concept, when there is the death of the nervous tissue of the brain stem, the death of the cerebral cortex is an unavoidable and sudden process and the individual can be declared dead.
- The *Whole Brain Death* extends the concept of brain death by including instrumental evaluation of the electrical activity of the cerebral cortex and adding the execution of the electroencephalogram to the diagnostic procedures linked to the evaluation of the brain stem functions. This concept, used in the European countries including Italy, is developed with the idea of providing a more ensuring vision in this delicate process of the assessment of death, because, for obvious reasons, it was never possible to exclude with certainty that, during the clinical course, the minimum electrical activity is observed with the intra-cortical electroencephalographic measurement particularly in cases with localized insults that cause the death of the brain stem. Excluding the electroencephalographic investigation, the remaining process of procedures follows that of the death of the brain stem.

IN UNITED KINGDOM

Definition of death (Academy Royale Colleges 2008):

The irreversible cessation of the brain stem activity.

IN DENMARK

Determination of death:

The death of a person occurs in the case in which:

1. The cardiac and respiratory functions are irreversibly stopped;
2. Every cerebral activity is irreversibly stopped.

IN ITALY

Determination of death:

In Italy article 2 of law n°578 December 29, 1993 establishes that death in individuals with encephalic injuries and who have undergone CPR treatment occurs when there is the irreversible interruption of all the encephalic functions and when it is verified through clinical and instrumental procedures as defined by a Ministry of Health Decree (the latest decree is that of April 11, 2008).

THE SAN MARINO LEGISLATIVE FRAMEWORK

The only documents presently in force in the Republic of San Marino date back to the Regulation of the Mortuary Police of March 15, 1910, where, in the general disposition, title 2, paragraph 1, article 5, it states :

- **Determination of death** is done under the responsibility of the treating physician.

- **Evaluation of death** is done under the responsibility of the physician operating in the district where death occurs.

Later this regulation was modified with law n°35 of February 4, 2010, but in this context it gives only indications about burial plots and their concessions, and dispositions regarding cremation.

THE POSITION OF CSB

The CSB states the concept of the uniqueness of death defined as the total and irreversible loss of the body's ability to autonomously maintain its functional unit.

The process of death is presented as a "continuum" of events leading to "biological" death, the interruption of the vital functions of every cell in the body and the subsequent establishment of the process of putrefaction.

This process, however, is preceded by a well-defined "point of no return", beyond which the capacity of the human body to behave as a single functional unit is categorically lost.

This must be looked for in the cessation of the vitality of the brain, with the resulting inability of the body to support and coordinate vital functions. At this point, inevitably and within a short period, the total cessation of each vital function follows.

Brain death coincides with the death of the individual, but there are different roads that can lead to it and the contexts in which the death of an individual may emerge are extremely different. If the assessment of death is an easy objective evidence in cases of "devastation", as in cases of physical disintegration of the person (a condition which is realized for example in airplane disasters, in natural and military disasters), it is much less obvious and certain in the typical daily diagnosis of death.

The discussion of clinical, biological, cardiac and brain deaths may generate considerable confusion and disorientation: it is as if there are many deaths and different ways of dying.

For this reason, the CSB considers that a regulation in this regard should be implemented with caution and clear definition of the actors and roles in both the medical and legal process that medical recognition of death implies.

In reference to the evaluation of death with cardiopulmonary criteria, the CSB believes **that the absence of the heartbeat and peripheral pulses, and the presence of a flat electrocardiogram for no less than 12 minutes**[1] are the criteria that allow one to refine the diagnosis of death.

In cases of cardiac death, in healthcare and non-healthcare facilities, the CSB believes that the assessment of death, after the ascertainment and the death certificate produced by the attending physician, must be delegated to the figure of a medical pathologist, to be identified in the following figures:

- a medical doctor with a specialization in pathology;

- a medical doctor with a specialization in forensic medicine;

- a medical doctor of the Public Health Department.

[1] The time limit conservatively identified by doubling the minimum observation period provided in Europe (5 minutes) and with a further coefficient (2 minutes) for the possible interindividual variability.

In reference to the evaluation of death by means of cerebral criteria, the complex of clinical and instrumental reliefs, at the base of which there is a clinical neurological examination designed to assess the absence of answers related to the activity of the nervous centers contained in the brain stem, the CSB believes that this examination must take into account the following criteria:

1. Definite diagnosis of the etiology of brain damage (vascular, traumatic, post-anoxic, neoplasia)

2. Absence of vigilance and individual consciousness

3. Absence of the pupillary reflex

4. Absence of the corneal reflex

5. Absence of a response to a painful stimulation in the trigeminal area

6. Absence of a motor response in areas innervated by the facial nerve to a painful stimulation wherever applied

7. Absence of the vestibulo-ocular reflex

8. Absence of the gag reflex

9. Absence of the cough reflex

10. Absence of spontaneous respiratory activity after reaching a pCO_2> 60 mmHg with a

pH<7.4

11. Absence of electrical activity documented with the electroencephalogram carried on for 30 minutes at maximum amplification

The CSB believes that this clinical evaluation must take place in a well-defined context which excludes the presence of factors which make unreliable or impracticable any of the assessments described above (craniofacial trauma which makes unfeasible an electroencephalogram or an evaluation of one of the described reflexes, the presence of central nervous system depressant drugs or neuromuscular junction blockers).

The CSB believes, therefore, that the examination for the diagnosis of brain death must be carried out under the following conditions:

1. hemodynamic stability with adequate organ perfusion

2. Good peripheral oxygenation and proper respiratory homeostasis

3. Body temperature > 34 ° C

4. Absence of residual pharmacological activity due to the infusion of central nervous system depressant drugs

5. Absence of residual pharmacological activity due to the infusion of drugs with activity on the neuromuscular junction.

The CSB believes that the evaluation should take place in situations of biological balance, to avoid that a precise response to the clinical examination may be affected by other factors not related to the death of the nerve tissue.

Where this occurs, even for only one of the previously described criteria, the absence of cerebral vascular flow will be sought.

This method of investigation is based on the assumption that, following the death of the brain, due to edema of the nervous tissue and of its swelling, the increase of intracranial pressure completely stops the blood flow that irrigates the cerebral territory. Demonstrated this, for obvious reasons the absence of cerebral blood flow is an undeniable sign of death of the brain, and subsequently of the individual.

Although the techniques for the analysis of the cerebral blood flow are constantly changing, due to the development of new technologies and methodologies, techniques that have been shown with clear clinical evidence a specificity of 100% (with the absence of false positives) and good sensitivity (with a low number of false negatives) are the following:

1. Angiography

2. Transcranial Doppler Sonography

3. Positron Emission Tomography (PET) of the brain

Each of these techniques has advantages and disadvantages due to the ease in performing them and the need to infuse a contrast agent, to the necessity of trained operators (as for transcranial Doppler sonography) or specialized structures (as for PET brain).

The demonstration of an absent cerebral flow replaces the previous clinical trials and allows the physician to start the procedures for the assessment of death by brain death.

Then, a period of observation starts (in Italian lasting six hours) during which a board of physicians, each of one has a different specialization, meets together at the bed of the patient and proceeds with the assessment of brain death.

In Italy the board responsible for the assessment of brain death is composed of three physicians:

- an anesthesiologist-resuscitator;

- a medical examiner or, in his absence, a doctor of the Health Department;

- a neurophysiologist or, in his absence, a neurologist or neurosurgeon expert in electroencephalography.

The CSB believes that the assessment of death in a health facility should provide, alongside the mentioned clinical criteria for the diagnosis, also instrumental criteria that must

be analyzed and defined: EEG recording, flow tests in the assessment of brain death, consistent with the criteria currently adopted in the Italian Republic, **integrated with a video recording of the clinical/instrumental examination of the brain death assessment.**

The CSB believes that the video recording of the clinical and instrumental examination of brain death assessment can offer more guarantees and responds to the need to produce clinical and instrumental documentation of the assessment of death (Clinical examination video recording made by the College for not less than thirty minutes, with simultaneous videotaping of the electroencephalogram (EEG) and blood gas analysis, and many other procedures in the future were to be included in the assessment).

The CSB also believes that it is necessary to indicate, in the rules governing the composition of the deputy medical board of the assessment the diagnosis of brain death (composed of three doctors with qualifications of a neurologist, resuscitator and coroner), the presence of an anesthetist other than the one who is caring for the patient.

The CSB believes in sharing the practices in use in some countries, including Italy, according to which, at the beginning of the observation period, the College repeats the assessment of brain death diagnosis criteria, and possibly evaluates the report of the flow tests previously administered. This evaluation is repeated at the end of the observation period.

In brain death due to a post-anoxic etiology, at least twenty-four hours by the insult need to be spent before the ascertainment of diagnosis of brain death, except for cases in which a flow test demonstrates the absence of the cerebral circulation before this period.

If the board agrees about the outcome of the tests, the death is declared and, without delay, the body will be sent to the morgue or, if possible, the procedures for organ donation will commence.

THE ASSESSMENT OF HUMAN DEATH DURING THE PEDIATRIC PERIOD

The CSB believes in the necessity of dealing with the assessment of the brain death in pediatric patients. The main issues in these cases are related not in the deontological or legal field, but in the difficulties of clinical and instrumental diagnosis.

It is known that in the child, the anatomical and functional substratum of the brain tissues is different from the adult, in particular in the first life stages, and it is characterized by a condition of immaturity and better resistance of the brain parenchyma to the ischemic insult.

The criteria used for the clinical diagnosis of the brain death in the child were described in 1987 in the paper "*Task Force for the determination of the brain death in children*" and adopted by the *Italian National Bioethics Committee* (NBC) in 1991.

Later the regulation about the procedure of establishment and certification of the death, expressed in the Ministerial Decree n° 582 of August 22, 1994, specified for the pediatric patients:

- The need to execute analysis in order to establish the absence of brain blood flow in children younger than 1-year-old (article 2, paragraph 2a);
- In the neonatal period, the evaluation of death can be done only if the child was born after the 38th gestational week and at least after one week of extra-uterine life (article 3, paragraph 3);
- The duration of the observation for the assessment of the brain death has to be for 12 hours for children from 1 to 5 years old, and 24 hours for children younger of 1 year (article 4, paragraphs 1b-1c);

The following mentioned Ministerial Decree of April 11, 2008, confirmed:

- The need of executing tests to exclude the existence of a brain blood flow in children younger than 1 year;
- The assessment of death, in the neonatal period, can be done only if the child was born after the 38th gestation week and at least after one week of extra-uterine life;

It established a period of observation of 6 hours also for children younger than 5 years, as requested for adults.

This is the present Italian legislative framework for the assessment of the death during the pediatric period, which provides more guarantees and rigorous rules on the respect of the person in such a critical phase as that of the assessment of the brain death.

The CSB considers adequate the adoption of instrumental caution as requested by the international regulations (study of the brain blood flow for children younger than 1 year), in addition to the video recording of the clinical and instrumental exam, as requested in the adult.

THE MORTUARY POLICE UPDATE

The CSB desires the update of the regulation of the Mortuary Police of the Republic of San Marino, with reference to the changed scientific knowledge and to the legal adjustments needed, and wishes for effects on bioethics and healthcare policies.

The quality and the timing of health care provided to a person in the moment of death, can be identified in three different scenarios:

a) The person that deceases without health care;
b) The patient that dies in his home where he is regularly assisted by the territorial health care system and by the family physician;
c) The patients that dies during hospitalization.

When the case c) occurs, the CSB believes that what described below can be applied regarding the different procedures of assessing of death in the case of stroke or primitive irreversible suspension of all brain functions (confirming and innovating what provided by the Italian law).

According to the CSB, the precautions taken by a board of physicians in this last case and in that with an electrocardiogram analysis of cardiac death by a medical examiner, ensure objectivity and certainty in terms of a technical point of view.

The case (a) and (b) are different.

According to the CBS, in case (b), when the patient dies at home, even in the presence of a known and reliable diagnosis of a spontaneous evolution of a disease and even in the presence of a continuous and adequate health care, often the physician cannot perform the technical examinations on site, like ECG. In this case, the certain verification of death can be postponed of the time required for the appearance and stabilization of the consecutive abiotic phenomena and their observation by the "territorial" or "traveling" pathologist (the old medical officer of district), that has to intervene at least 12 hours after the death was established by the physician (the declaration of death present in the current legislation in the Republic of San Marino).

In the case (a) (death in the absence of health care) the CSB believes that different procedures should be used in relation to two different cases that might occur:

1. **Violent death**, due to murder (in various forms regarding the psychological element of intention, negligence, fault), suicide, accident at work and accidental death. In these cases, the CSB considers essential, or highly recommended in accidental deaths, a legal autopsy conducted in accordance to the guidelines written by the scientific forum at the European level. Often the assessment of the death is not focused on the recognition of the cause of death (because it is already evident with the simple external inspection), but on the identification of the time of death or on the dynamics of the events. An autopsy will be performed only after the ascertainment of the death and always after the inspection of the medical pathologist (at least 12 hours after the death) or after performing an ECG examination for no less than 12 minutes. The CSB believes that this procedure can overcome the inconsistencies detected in the Italian Mortuary Police Regulations which do not allow performing the autopsy in the first 24 hours after death, despite the intervention of the medical pathologist already after 15 hours from the death.

2. **Sudden death**, considering mainly the cases of unexpected death. The real sudden deaths are due to natural causes, but often they hide violent deaths. This determines the need for accurate investigations. There are sudden deaths that are actually produced by electric shock (often accidents at work and, therefore, likely negligent homicide); acute poisoning by drugs and toxic agents (in this case there is a possibility of a therapeutic overdose or fraudulent administration of poisons and, therefore, manslaughter and/or intentional homicide); inappropriate or missed admissions or releases from the hospital (in this case the responsibility of health professionals is investigated).

   When the deaths are truly sudden (not determined by violent cause), these situations affect the families and the public opinion, sometimes arise alarm and concern. Often sudden deaths are due to genetic causes, so the recognition becomes essential for the prevention of other sudden deaths in the same family. The CSB believes that in these

cases of sudden death which occur without health care, it is essential to execute the autopsy, and to monitor the consecutive abiotic phenomena that have to be performed by the territorial pathologist. Furthermore, when the diagnostic autopsy is performed before 24 hours from the declaration of death, the CSB believes that it is essential to perform an ECG examination attesting the arrest of cardiac function and that the diagnostic autopsy should be requested by the first doctor aware of the case (assistance in a public place, at home, dead body brought at the ER etc.). The CSB finally considers essential to complete the autopsy with routine toxicological tests on biological fluids (urine) and storage of blood and fragments of organs for future needs.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, after dealing with the autopsy diagnostic activities, the CSB emphasizes how the level of health culture of a country is also connected with the development and the wide application of ascertainment tools for clinical diagnostic (minimum requirement of the finding of significant discrepancies, mistakes and of the limitations of care interventions) that are based on anatomical dissection, pathological and forensic studies. Therefore, the CSB makes the following recommendations:

1. In cases of death of hospitalized patients, the verification and ascertainment of the death is requested by the medical board and by the pathologist, to ensure certainty and reliability of the findings and to ensure that the adoption of invasive health measures occurs in the absolute conviction of irreversibility of the condition of death.
2. In cases of sudden death, violent death and death at home, either when the dead person did or did not receive health care and their death occurred in mysterious or dangerous circumstances for the society or for individuals, the evaluation and the ascertainment of the death is delegated to the local pathologist (who may also be the hospital doctor with additional roles) in order to exclude any possibility of crimes and any causes of death potentially harmful for the community (family members of dead persons with genetic diseases; people environmentally or professionally exposed to external damaging agents).
3. The diagnostic autopsy (the diagnostic examination of the Italian legislation) should be requested by the physician (whoever he/she is) to the Health Authority who is in charge (hospital, nursing home or Territorial Structure). The task of the Health Department direction has the duty to assign the pathologist and the medical examiner available (employed or provided from National Health Service).
4. The diagnostic autopsy needs to answer to a specific request of the physician (that can be the cause of death).
5. In cases of violent death an autopsy is systematically performed (for all organs) by a medical examiner appointed by the Judicial Authority who received the notice, by the police force, the citizens, etc., but also by any health professional who learnt about a certain or suspected crime.

The CSB hopes that the conditions exposed in this document can be applied in the Republic of San Marino, in case of need, with equipment and necessary expertise.

BIBLIOGRAPHY

1. *Regolamento di Polizia Mortuaria.* RSM. 15 Marzo 1910

2. Law 4 Febbraio 2010 n° 35. *Modifica al regolamento di Polizia Mortuaria del 15 marzo 1910*, pag 1-10

3. Kline EL, Winters RW. *Disorders of ADH*. In: Winters RL, ed. *The body fluids in pediatrics.* Boston: Little, Brown 415-37, 1973.

4. Outwater KM, Rockoff MA. *Diabetes insipidus accompanying brain death in children.* Neurology. 1984 Sep;34(9):1243-6.

5. Tapper D. *Renal Transplantation. Pediatric Intensive Care.* Norwalk, CT: Appleton and Lange: 379-387, 1987.

6. Fiser DH, Jimenez JF, Wrape V et al. *Diabetes insipidus in children with brain death.* Crit Care Med. 1987 Jun;15(6):551-3.

7. *Guidelines for the determination of brain death in children.* Pediatrics 80:298-300, 1987.

8. Maxwell LG, Fivash BA, Mc Clean RH. *Renal failure*. Textbook of Pediatric Intensive Care. William and Wilkins. 2: 1042-1046, 1987

9. Italian National Bioethics Committee. *Definition and detection of human death*, 15 Febbraio 1991 (http://www.governo.it/bioetica/pareri_abstract/criteri_accertamento_morte20100624.pdf)

10. Mejia RE, Pollack MM. Variability in brain death determination practices in children. JAMA. 1995 Aug 16;274(7):550-3.

11. G. Kootstra et all. *Categories of non-heart-beating donars*, Transplant. Proc., 1995, 27, 5, pp 2893-2894

12. G. Kootstra et all. *Categories of non-heart-beating donars*, Transplant. Proc., 1995, 27, 5, pp 2893-2894

13. Magrane BP, Gilliland MG, King DE. *Certification of death by family physicians*. Am Fam Physician. 1997 Oct 1;56(5):1433-8.

14. Rodotà S. *Questioni di Bioetica*, Biblioteca Universale Laterza, Roma, 1997

15. *Raccomandazioni per il trattamento del grave traumatizzato cranico adulto.* Gruppo di studio SIAARTI e gruppo di studio SINC. Minerva Anestesiologica, Giugno 1998

16. Cattorini P., *Bioetica. Metodo ed elementi di base per affrontare problemi clinici*, Masson, Milano, 2000 (seconda edizione)

17. Youngner SJ, Arnold RM. *Philosophical debates about the definition of death: who cares?* J Med Philos. 2001 Oct;26(5):527-37.

18. Dagi FT, Kaufman R. Clarifying the discussion on brain death. J Med Philos. 2001 Oct;26(5):503- 25.

19. Shewmon AD. The brain and somatic integration: insights into the standard biological rationale for equating "brain death" with death. J Med Philos. 2001 Oct;26(5):457-78.

20. Wijdicks EFM. The diagnosis of brain death. N Engl J Med. 2001 Apr 19;344(16):1215-21.

21. Umani Ronchi G., Bolino G., Traditi F. La diagnosi di epoca della morte. Moderni orientamenti e limiti razionali. Giuffrè Editore, 2002.

22. N. Valko, Ethical implication of non-heart-beating organ donation, Medicine and Morality, Michaelmas, 2002 Vol XVII, n° 3

23. Kerridge IH, Saul P, Lowe M, McPhee J, Williams D. Death, dying and donation: organ transplantation and the diagnosis of death. J Med Ethics. 2002 Apr;28(2):89-94.

24. Wijdicks E. The neurologist and Harvard criteria for brain death. Neurology. 2003 Oct 14;61(7):970-6.

25. Flores JC, Pérez M, Thambo S, Valdivieso A; Grupo de Estudios sobre Muerte Encefálica, de las Sociedades Chilenas de Nefrología y de Trasplante. Brain death, bioethics and organ transplantation. Rev Med Chil. 2004 Jan;132(1):109-18.

26. Dimond B. The law and the certification, verification and registration of death. Br J Nurs. 2004 Apr 22-May 12;13(8):480-1.

27. P. Geraci, G.Azzoni, Prelievo di organi da donatore a cuore non battente. Protocollo

Alba, 2005

28. Hill TE, Phillips C, Randolph JF. Death certification in long-term care. J Am Med Dir Assoc. 2005 Sep-Oct;6(5):351-2.

29. Shemei SD, Doig C, Dickens B, Byrne P, Wheelock B, Rocker G, Baker A, Seland TP, Guest C, Cass D, Jefferson R, Young K, Teitelbaum J; Pediatric Reference Group; Neonatal Reference Group. Severe brain injury to neurological determination of death: Canadian forum recommendations. CMAJ. 2006 Mar 14;174(6):S1-13.

30. Elio Sgreccia, Manuale di bioetica/Fondamenti ed etica biomedica, Vita e Pensiero, IV edizione, Milano 2007

31. Bellomo R, Stow PJ, Hart GK. Why is there such a difference in outcome between Australian intensive care units and others? Curr Opin Anaesthesiol. 2007 Apr;20(2):100-5.

32. Rimmelé T, Malhière S, Ben Cheikh A, Boselli E, Bret M, Ber CE, Petit P, Allaouchiche B. The electroencephalogram is not an adequate test to confirm the diagnosis of brain death. Can J Anaesth. 2007 Aug;54(8):652-6.

33. Machado C, Korein J, Ferrer Y, Portela L, García Mde L, Chinchilla M, Machado Y, Machado Y, Manero JM. The Declaration of Sydney on human death. J Med Ethics. 2007 Dec;33(12):699- 703.

34. E. Chaib Non heart-beating donars in England. Clinics (Sao Paulo). 2008 Feb;63(1):121-34.

35. Mathur M, Petersen L, tadtler M, Rose C, Ejike JC, Petersen F, Tinsley C, Ashwal S. Variability in pediatric brain death determination and documentation in southern California. Pediatrics. 2008 May;121(5):988-93.

36. Lu TH, Shaw KP, Hsu PY, Chen LH, Huang SM. Non-referral of unnatural deaths to coroners and non-reporting of unnatural deaths on death certificates in Taiwan: implications of using mortality data to monitor quality and safety in healthcare. Int J Qual Health Care. 2008 Jun;20(3):200-5.

37. Giusto Giusti (a cura di) Trattato di medicina legale e scienze affini (Vol. III: Patologia forense) Cedam, II Edizione, Padova 2009

38. Herff H, Loosen SJ, Paal P, Mitterlechner T, Rabl W, Wenzel V. False positive death certification. Does the Lazarus phenomenon partly explain false positive death certification by rescue services in Germany, Austria and Switzerland? Anaesthesist. 2010 Apr;59(4):342-6

39. Machado C. Diagnosis of brain death. Neurol Int. 2010 Jun 21;2(1):e2.

40. RSM, Decreto Delegato 22 Giugno 2010 n° 114. Modifiche e integrazioni alla Legge n° 35/2010 In materia di Polizia Mortuaria.

41. Comitato Nazionale per la Bioetica. I criteri di accertamento della morte. Presidenza del Consiglio dei Ministri, 24 giugno 2010 (http://www.governo.it/bioetica/pareri_abstract/criteri_accertamento_morte20100624.pdf)

42. Nakagawa TA, Ashwal S, Mathur M, Mysore M; Society of Critical Care Medicine, Section on Critical Care and Section on Neurology of American Academy of Pediatrics; Child Neurology Society. Clinical report—Guidelines for the determination of brain death in infants and children: an update of the 1987 task force recommendations. Pediatrics. 2011 Sep;128(3):e720-40.

43. Guignard NG, Gardner AI, Baker S, Van Heerden PV. Brain death determination in Australia and New Zealand: a survey of intensive care units. Crit Care Resusc. 2011 Dec;13(4):271-3.

44. Nau JY Electronic certification of death. Rev Med Suisse. 2012 Feb 8;8(327):340-1.

45. Lewis A. Improving accuracy in death certification, or, everybody dies of cardiopulmonary arrest. Tenn Med. 2012 Apr;105(4):37-8.

46. Nakagawa TA, Ashwal S, Mathur M, Mysore M. Guidelines for the determination of brain death in infants and children: an update of the 1987 task force recommendations-executive summary. Ann Neurol. 2012 Apr;71(4):573-85.

47. Wijdicks EF, Smith WS. Brain death in children: why does it have to be so complicated? Ann Neurol. 2012 Apr;71(4):442-3.

48. Webb A, Samuels O. Brain death dilemmas and the use of ancillary testing. Continuum (Minneap Minn) 2012 Jun;18(3):659-68.

49. Macleod RD, Wilson DM, Malpas P. Assisted or hastened death: the healthcare practitioner's dilemma. Glob J Health Sci. 2012 Aug 30;4(6):87-98.

50. Nau JY. A question of life and death. Rev Med Suisse. 2012 Sep 19;8(354):1794-5.

51. Padela AI, Basser TA. Brain death: the challenges of translating medical science into Islamic bioethical discourse. Med Law. 2012 Sep;31(3):433-50.

52. Quentin B. Dignity and the elderly: age makes no difference. Rev Infirm. 2012 Oct;(184):335.

53. Ettema EJ. Death: 'nothing' gives insight. Med Health Care Philos. 2012 Oct 9. [Epub ahead of print]

54. Burkle CM, Benson JJ. End-of-life care decisions: importance of reviewing systems and limitations after 2 recent North American cases. Mayo Clin Proc. 2012 Nov;87(11):1098-105.

55. Prosser R, Korman D, Feinstein RA. An orthodox perspective of the Jewish end-of-life experience. Home Healthc Nurse. 2012 Nov-Dec;30(10):579-85.

56. St Ledger U, Begley A, Reid J, Prior L, McAuley D, Blackwood B. Moral distress in end-of-life care in the intensive care unit. J Adv Nurs. 2012 Dec 4. doi: 10.1111/jan.12053. [Epub ahead of print]

57. Janssens U, Burchardi H, Duttge G, Erchinger R, Gretenkort P, Mohr M, Nauck F, Rothärmel S, Salomon F, Schmucker P, Simon A, Stopfkuchen H, Valentin A, Weiler N, Neitzke G. Change in therapy target and therapy limitations in intensive care medicine: Position paper of the Ethics Section of the German Interdisciplinary Association for Intensive Care and Emergency Medicine. Anaesthesist. 2013 Jan;62(1):47-52.

58. Baumann A, Audibert G, Guibet Lafaye C, Puybasset L, Mertes PM, Claudot F. Elective non- therapeutic intensive care and the four principles of medical ethics. J Med Ethics. 2013 Jan 30. [Epub ahead of print]

59. Bright JM. Ethics of physician-assisted death. Can Fam Physician. 2013 Jan;59(1):26

60. Joffe AR, Shemie SD, Farrell C, Hutchison J, McCarthy-Tamblyn L. Brain death in

Canadian PICUs: demographics, timing, and irreversibility. Pediatr Crit Care Med. 2013 Jan;14(1):1-9.