



Polish Guidelines on Diagnosing Brain Death in Adults vs the International Perspective: Are We in Need of an Update?

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ABSTRACT

Introduction. The Polish definition of brain death originated from the original Harvard criteria and has been revised several times. Practitioners worldwide are required to regularly update their national guidelines on the definition of brain death to fit the latest international research concerning this topic.

Aims. (1) Compare current Polish guidelines on diagnosing brain death in adults with the American, British, Australian, and New Zealand recommendations; and (2) evaluate existing differences for the purposes of updating the Polish guidelines.

Materials. Current guidelines on diagnosing brain death published by The American Academy of Neurology (USA, 2010), the Academy of Medical Royal Colleges (United Kingdom, 2008), the Australian and New Zealand Intensive Care Society (AU/NZ, 2013), and the Polish Ministry of Health (Poland, 2007).

Results. All guidelines outline similar recommendations regarding the need for a suitable observation period before clinical examination and for basic medical conditions and exclusions to be evaluated before testing, the obligatory role of clinical examination including brain stem reflexes and apnea testing, and the nonobligatory role of ancillary tests. There is no consensus regarding: the recommended time period of pretesting observation, the number, seniority, and specialty of clinicians performing the testing, the role of additional exclusion criteria, the repeatability of clinical tests, the methodology of apnea testing, and recommended confirmatory tests.

Conclusions. Current Polish guidelines on diagnosing brain death in adults remain up-to-date in comparison to the guidelines analyzed, though additional recommendations concerning apnea testing, drug and toxin clearance, and medical exclusion criteria for potential brain dead patients might be considered an important point of interest in the future.

THE POLISH definition of brain death, introduced in 1984, originated from the original Harvard criteria (1968) and has been modified several times since its implementation (1990—conversion to brainstem criteria, twice revised in 1994 and 1996) [1–4]. The latest update took place in 2007 with the introduction of the Polish Ministry of Health Commission's new brain death criteria featuring additional classifications (including primary and secondary brain injuries, supratentorial and infratentorial processes), and several modifications concerning apnea

and instrumental testing, re-establishing whole-brain death criteria for a brain death diagnosis [3,5]. With the growing

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medical consensus for unifying the concept of human death, practitioners worldwide are required to regularly update their national guidelines concerning the diagnosis of brain death to fit the latest international research concerning this topic [6]. Although brain death remains a widely accepted form of human death, there is still no global consensus concerning its diagnostic process [7,8].

AIMS

(1) Compare the current Polish guidelines on diagnosing brain death in adults with the American, British, Australian, and New Zealand recommendations and (2) evaluate existing differences for the purposes of updating the Polish guidelines.

MATERIALS AND METHODS

This survey analyzed the guidelines published in *The ANZICS statement on death and organ donation* [9]; *Evidence-based guideline update: Determining brain death in adults. Report of the Quality Standards Subcommittee of the American Academy of Neurology* [10]; *A code of practice for the diagnosis and confirmation of death*—Academy of Medical Royal Colleges (UK, 2008) [11]; and *The [Polish] Minister of Health's announcement concerning the criteria and methods of diagnosing irreversible cessation of brain functions announced on July 17th 2007* [5]. Criteria submitted for evaluation included: the status and duration of pre-testing observation period; main and additional inclusion and exclusion criteria for potential donors; guidelines concerning the number, seniority and specialty of clinicians confirming brain death; the status and repeatability of clinical tests; the variety of brainstem reflexes tested; main characteristics of the apnea test; and the status and variety of presently recommended and future ancillary tests.

This survey focused on adults and did not include guidelines for pediatric patients.

RESULTS

Guidelines submitted for evaluation were presented in Table 1.

All guidelines outline similar recommendations concerning: the need of a suitable observation period before clinical examination, basic medical conditions (irreversible coma and brain injury of established etiology, mechanical ventilation) and exclusions (hypothermia, metabolic and endocrine disturbances, use of drugs or narcotic agents) to be evaluated before testing, the obligatory role of clinical examination, including brainstem reflexes and apnea testing, the non-obligatory role of confirmatory investigation using ancillary tests, highlighting 4-vessel angiography, and HMPAO SPECT as the only instrumental tests recommended in all 5 countries.

There is no consensus concerning: the recommended time period of pre-testing observation (no specific time period in most guidelines), the number, seniority, and specialty of clinicians performing the testing, the role of additional exclusion criteria (such as hypotension, cervical spine or craniofacial injuries), the repeatability of clinical testing (1 vs 2 series of tests, no specific time intervals highlighted in most cases), the methodology of apnea testing (including duration, use of CPAP, and measurement of arterial pH

values), recommended confirmatory tests (no MEPs, EEG, or TCD among some guidelines, still not enough data concerning CTA and MRA, more research required concerning the use of PET, Xenon-enhanced computed tomography, or bispectral index).

Compared with the guidelines analyzed, Polish criteria for diagnosing brain death do not address the issues of several additional exclusion criteria (electrolyte and circulatory disturbances, the level of alcohol intoxication, and analgesic use), use of CPAP, and the final arterial pH value for apnea testing. However, Polish guidelines proved more detailed regarding the duration of the pretesting observation period and the time intervals between series of clinical tests, setting very specific and therefore more practical timelines, as well as including classifications absent in other guidelines covering the dynamics of primary/secondary and supratentorial/infratentorial injuries. Polish guidelines also included the biggest variety of confirmatory tests and brain stem reflexes tested during clinical examination, establishing a specific multitasked medical team confirming brain death based on its members' specialties rather than their professional experience, unlike the other guidelines.

DISCUSSION

Diagnosing brain death requires great care and alertness. Any national guidelines concerning this matter should leave no room for errors or misinterpretations, being both complex (by including a great variety of clinical situations) and specific—thus allowing the physicians to find practical answers for the most likely to arise and clinically valid questions. Despite the international common ground featuring core diagnostic steps in stating brain death, pitfalls in brain death determination may vary from country to country, depending on the experience of the physicians involved, confounding factors not highlighted in the national guidelines, or a dangerous over-reliance on ancillary tests [12].

The evaluation of confounders is often considered the most important step prior to any clinical examination. And although most national guidelines analyzed in this article highlight some of the most commonly found atypical symptoms and reflexes present among patients with brain death, none of them succeeded in delivering a detailed assessment of confounding drug clearance or intoxication. Several surveys have discussed drug monitoring in the past, establishing clinically relevant serum concentrations of midazolam, diazepam, thiopentone, pentobarbitone, phenobarbitone, methohexital, or propofol that ought to be measured before further diagnostics [13,14]. It is therefore very surprising that no guidelines have incorporated specific drug and/or toxin levels in their recommendations, leaving their interpretation entirely to the medical teams.

The availability of ancillary tests continues to remain one of the greatest concerns among smaller medical facilities unable to perform the widely-recommended 4-vessel angiography or HMPAO SPECT [15]. Ongoing research concerning the implementation of more accessible tests, especially CTA, may bring a long-awaited solution to this problem [16,17].

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