Clinical paper

Survey on current practices for neurological prognostication after cardiac arrest[☆]

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A R T I C L E I N F O

A B S T R A C T

Purpose: To investigate current practices and timing of neurological prognostication in comatose cardiac arrest patients.

Methods: An anonymous questionnaire was distributed to the 8000 members of the European Society of Intensive Care Medicine during September and October 2012. The survey had 27 questions divided into three categories: background data, clinical data, decision-making and consequences.

Results: A total of 1025 respondents (13%) answered the survey with complete forms in more than 90%. Twenty per cent of respondents practiced outside of Europe. Overall, 22% answered that they had national recommendations, with the highest percentage in the Netherlands (>80%). Eighty-nine per cent used induced hypothermia (32–34 °C) for comatose cardiac arrest patients, while 11% did not. Twenty per cent had separate prognostication protocols for hypothermia patients. Seventy-nine per cent recognized that neurological examination alone is not enough to predict outcome and a similar number (76%) used additional methods. Intermittent electroencephalography (EEG), brain computed tomography (CT) scan and evoked potentials (EP) were considered most useful. Poor prognosis was defined as cerebral performance category (CPC) 3–5 (58%) or CPC 4–5 (39%) or other (3%). When prognosis was considered poor, 73% would actively withdraw intensive care while 20% would not and 7% were uncertain.

Conclusion: National recommendations for neurological prognostication after cardiac arrest are uncommon and only one physician out of five uses a separate protocol for hypothermia treated patients. A neurological examination alone was considered insufficient to predict outcome in comatose patients and most respondents advocated a multimodal approach: EEG, brain CT and EP were considered most useful. Uncertainty regarding neurological prognostication and decisions on level of care was substantial.

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1. Introduction

Cardiac arrest is common and, in spite of improvements in care in recent years, only one of ten patients survives.[1,2] Most patients with return of spontaneous circulation (ROSC) who are admitted to a hospital are in coma and less than 50% eventually wake up.[3,4]

Early clinical signs of a poor neurological prognosis, such as the absence of ocular reflexes on admission, cannot in general inform the clinician about survival chances for the individual patient.[5,6] The best prognostic sign after cardiac arrest is that of awakening but due to modern intensive care, including temperature management and coronary intervention of comatose survivors, most patients are pharmacologically affected and cannot be adequately assessed during the first days.[7]

Current American recommendations regarding neurological prognostication after cardiac arrest have been widely adopted but are not optimal since they are based on studies performed prior to the era of temperature management and coronary intervention.[8]
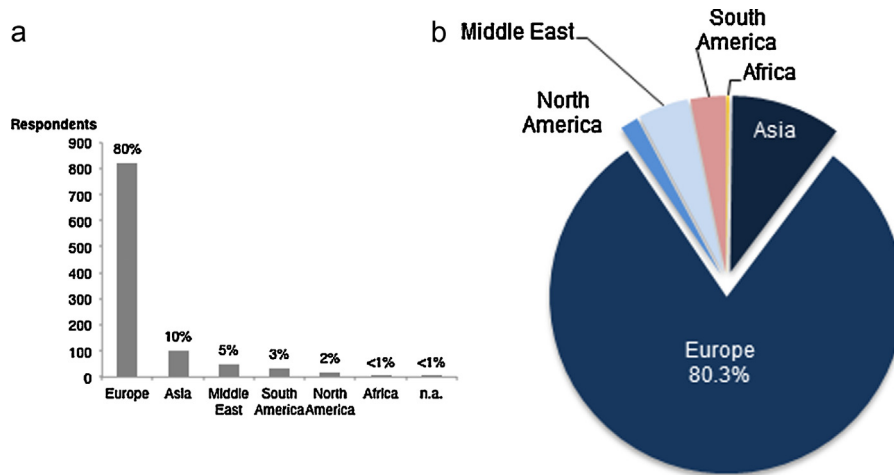
Fig. 1. All 1025 respondents of the survey divided per continent; 80% were from Europe (*n* = 822) with notably high participation from the United Kingdom (*n* = 171), France (*n* = 71) and Switzerland (*n* = 70). Of the remaining 203 respondents, 10% practiced in Asia, 5% in the Middle East, 3% in South America and 2% in North America.

As a result, current practices for assessment of coma after cardiac arrest may differ between and within countries. National recommendations have been published in the Netherlands and in Sweden.[9] Updated and evidence-based guidelines are requested and work is ongoing by several societies. Recently, an advisory statement from the European Resuscitation Council (ERC) and the European Society of Emergency Medicine (ESICM) was published.[10] Most authors in the field recommend a multimodal approach using several independent methods in addition to a clinical neurological investigation, which remains the foundation.[11,12] Additional methods advocated include computed tomography (CT) scan of the brain, magnetic resonance imaging (MRI), electroencephalography (EEG), evoked potentials (EP) and biomarkers for brain damage.[13–15]

The aim of the present survey was to investigate current practices for neurological prognostication after cardiac arrest among members of the ESICM. In addition, data on the use of induced hypothermia were collected.

2. Methods

An anonymous questionnaire was generated by the authors and endorsed by the European Research Committee of the ESICM. A link to the electronic survey was distributed by e-mail through the ESICM membership database, consisting of approximately 8000 members, during September and October 2012. All replies were collected in a central database and saved. The survey consisted of 27 questions, 10 on background data, 11 on clinical data and 6 on decision-making and consequences (ESICM survey, Electronic Supplementary Material (ESM)). All survey responses were used for data analysis. Descriptive data is presented per question including missing data. No statistical analysis was performed. No approval from an ethical review board was sought in any country.

3. Results

A total of 1025 replies (13%) were collected and analyzed. Background data was complete in all surveys, clinical data was complete in 984 (96%) and decision-making and consequences was complete in 951 (93%).

3.1. Background data (Q 1–10)

Eighty per cent of respondents were from Europe (*n* = 822) with high participation from the United Kingdom (*n* = 156), France (*n* = 71) and Switzerland (*n* = 70) while 20% practiced in countries outside of Europe (*n* = 203) (Fig. 1). Respondents were mainly attending physicians or consultants (73%), 11% were fellows and 16% were residents. Their main specialty was intensive care (74%), anaesthesiology (19%) or internal medicine (3%); remaining specialties had absolute numbers below ten. Most respondents represented university or university-affiliated hospitals (67%) with up to 20 ICU beds (Fig. 2a). The number of admitted cardiac arrest patients per year differed but 10–30 patients was most common (Fig. 2b). Induced hypothermia (32–34 °C) for comatose cardiac arrest patients was used by 89%, 61% used hypothermia for a majority of patients independently of initial rhythm or location of arrest, 15% only for patients with shockable rhythm, 13% only for patients with OHCA and shockable rhythm while 11% did not use induced hypothermia (ESM Fig. 3). There were no differences
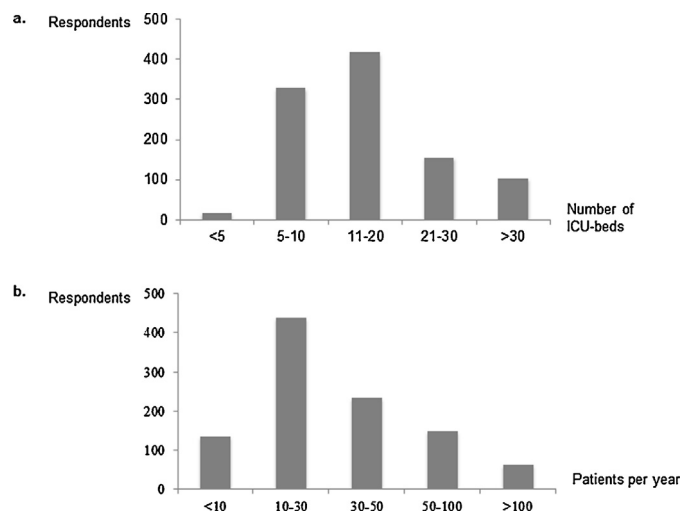

Fig. 2. All 1025 respondents were asked about (a) the number of beds in their intensive care unit (ICU) and (b) the approximate number of treated cardiac arrest patients per year in their ICU, with or without hypothermia.