

Use and Understanding of Therapeutic Hypothermia in Developing Countries

Joseph Varon, Guillermina Cruz, Pilar Acosta, Ana Laura Huerta-Alardin, Robert E. Fromm

Abstract

Purpose: The use of therapeutic hypothermia (TH) has increased in the treatment of comatose victims of cardiac arrest, traumatic brain injury, refractory dysrhythmias, neonatal encephalopathy and asphyxia, near-drowning and hemorrhagic shock. The purpose of this study was to ascertain the level of understanding of TH use for comatose victims of cardiac arrest among healthcare providers in two developing countries.

Methods: A 22-question survey was administered to physicians, nurses, and other health professionals who attended two large emergency medicine and critical care meetings in Indonesia and Mexico. The questionnaire included socio-demographic characteristics of the respondents. Specific questions regarding TH awareness and its use were included, as well as questions examining familiarity with the current recommendations from International Liaison Committee on Resuscitation (ILCOR)

Results: Two hundred and sixty-six surveys were collected from the two countries. Of all respondents, 15.54% had used TH: 37.8% were nurses and

31.58% physicians ($p = 0.012$). TH was used most frequently administered in the coronary care unit and the emergency department (55% and 45%, $p = 0.005$). Eight percent of all respondents had TH protocols established at their institutions, mostly by nursing personnel (80% $p = 0.009$). Practitioners reported they were not familiar with the ILCOR guidelines (97% of the respondents from Mexico and 87% of the respondents from Indonesia ($p = 0.009$)). Among those using TH, active rewarming was used by 71% of respondents queried in Indonesia as compared with 38% of respondents surveyed in Mexico ($p = 0.001$).

Conclusions: TH appears underutilized in our sample of practitioners from two developing countries. Clinicians in these countries are not familiar with ILCOR TH guidelines. Therapeutic hypothermia is certainly practical in most clinical settings and programs aimed at educating practitioners about TH are needed in developing countries to improve neurological outcome in comatose victims of cardiac arrest.

Key words: Hypothermia, ILCOR guidelines, cardiac arrest, dysrhythmias, Advanced Cardiac Life Support.

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Introduction

Therapeutic hypothermia after cardiac arrest has been studied for the last 5 decades. This intervention has been shown to have beneficial effects in clinical conditions such as brain injury, cardiac arrest, perinatal asphyxia, and in some cardiac and intracranial surgical procedures [1]. In 2005, the Advanced Cardiovascular Life Support (ACLS) and the International Liaison Committee on Resuscitation (ILCOR) guidelines recommended optimizing cardiopulmonary function, systemic perfusion and most importantly maintaining brain perfusion to improve the neurological outcome

of victims of cardiac arrest [2]. These guidelines also recommended induced hypothermia for comatose victims of cardiac arrest based on recent clinical trials demonstrative improved outcomes. The recommendations included inducing TH at 32-34°C for 12-24 hours when the initial presenting rhythm was ventricular fibrillation (class IIa recommendation), or non-ventricular fibrillation (class IIb recommendation) [3]. These recommendations were also applicable to other rhythms and for in hospital cardiac arrest [4].

Although considerable education regarding TH has occurred within the United States, it is less clear how prevalent the use of hypothermia is in developing countries and how cognizant of international guidelines practitioners from these areas are. The purpose of this study was therefore, to ascertain the level of understanding of TH use for comatose victims of cardiac arrest among health care providers in developing countries.

Methods

A 22-question survey was administered to physicians, nurses, and other health care professionals who attended two large Emergency Medicine and Critical Care meetings in Indonesia (12th International Symposium on Shock and Critical Care in Bali, Indonesia) and in México (Tercer Congreso de Urgencias Médicas in Monterrey, México).

The questionnaire included socio-demographic characteristics such as age, gender, years of clinical practice and years of education (See Appendix). Questions regarding patient population, whether or not the health care provider had used TH, and their familiarity with the ILCOR guidelines were also included. Participants were also asked to indicate if the institution where they worked had established protocols for TH, types of cooling methods utilized, the target cooling temperature, and how they monitor the patient's temperature. Rewarming methods and goals were also sought. The data were confidential and no specific identifiers were used. There was no follow up of initial non-respondents.

Data was analyzed using STATA version 6.0 (StataCorp LP, College Station, TX, USA). A p value of

less than 0.05 was accepted as significant. Ratio scales were analyzed using Student's t -test and contingency tables were constructed for categorical data.

Results

Three hundred surveys were given to health care providers during these two meetings by the investigators. Two hundred and sixty-six completed surveys (88.6 %) were received. Among all respondents only 15.54% of them had used TH (**Figure 1**). Of those practitioners that had used TH, 37.8% were nurses and 31.58% physicians ($p = 0.012$). (**Figure 2**). TH was used most frequently in the coronary care unit and the emergency departments (55% versus 45%, $p = 0.005$) (**Figure 3**). Eight percent of all respondents had TH protocols established in their institutions, mostly by nursing personnel (80% $p = 0.009$).

When asked about existing guidelines, the vast majority of practitioners were not familiar with the ILCOR TH guidelines (97% of respondents from Mexico versus 87% of respondents from Indonesia ($p = 0.009$)). Among those using TH, active rewarming was utilized by 71% of respondents from Indonesia as compared to 38% of respondents from Mexico ($p = 0.001$).

Discussion

Sudden cardiac arrest is a leading cause of death in the United States and Canada with an annual estimate of 330,000 deaths per year [5]. Cardiac arrest also remains a common cause of death in developing countries with survivals that range from 0-35% [6]. Several large, randomized, controlled trials have shown clear improvement in neurologic outcome in comatose survivors of cardiac arrest treated with TH [7]. The Hypothermia After Cardiac Arrest (HACA) study enrolled 275 patients favorable neurologic outcome was found in 55% of the hypothermia vs 39% of the normothermia patient [8]. Despite its scientific basis and guidelines recommending its use, many clinicians have not adopted it.

A survey conducted in the United States in 2003 queried physicians about their utilization and

attitudes about cooling after cardiac arrest. This study revealed that 87% of respondents had not used TH [9]. In a telephone survey in the United Kingdom regarding the use TH as part of the management of cardiac arrest, 73% of respondents had never used TH; 26% had hypothermia induction resource issues and 23% considered the current evidence inadequate to support its use [10].

Our survey revealed that many health care providers in the two developing countries studied have not yet incorporated TH for comatose victims of cardiac arrest into practice, despite the existing information and international guidelines recommending its use. The prevalences were similar to those found in industrialized countries. We hypothesize that the reason why TH is not widely implemented is a lack of awareness of the ILCOR guidelines or the most recent revisions of the American Heart Association's ACLS guidelines. An alternative to this theory is the concern that many clinicians have expressed regarding TH being "experimental", perhaps pointing

to a lack of familiarity with the published literature. TH is one of the few treatment modalities that have shown a survival advantage in comatose victims of cardiac arrest. Programs and education for health care providers of all sorts are likely to be necessary for TH to become widely accepted.

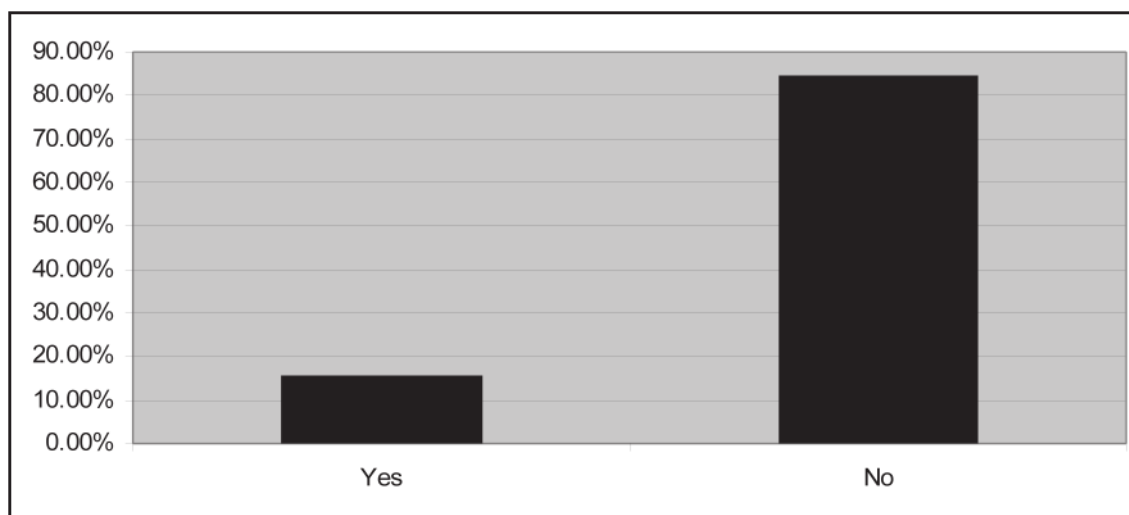
Conclusions

TH appears to be underutilized in our sample of clinicians from two developing nations. In addition, clinicians in these countries are not familiar with the ILCOR TH guidelines. Programs aimed at educating practitioners regarding TH in developing countries are needed in an attempt to improve neurological outcome in victims of cardiac arrest.

Conflict of interest

The authors report no conflicts of interest in the preparation of this manuscript.

Figure 1. OVERALL USE OF TH AMONG RESPONDENTS



TH = Therapeutic hypothermia

Figure 2. USE OF TH BY DIFFERENT HEALTH CARE PROVIDERS

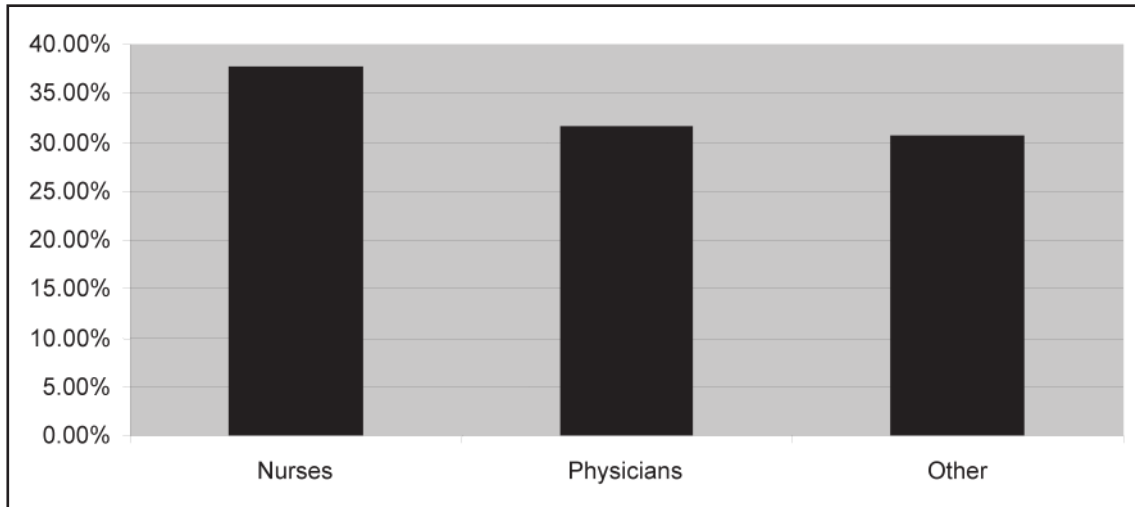
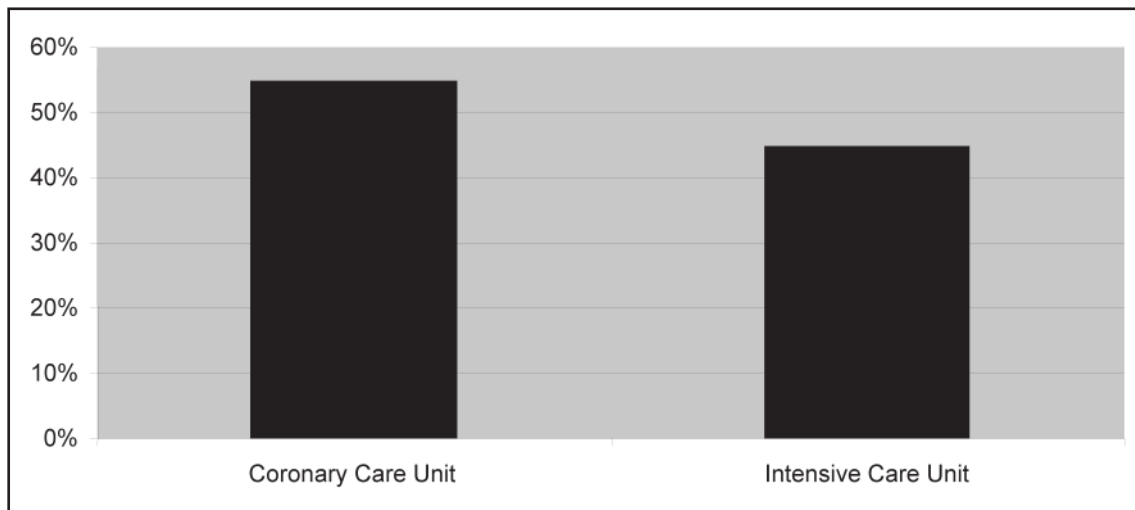


Figure 3. HOSPITAL UNITS THAT MORE FREQUENTLY USED TH



TH = Therapeutic hypothermia

Appendix

1. - What is your level of graduate education?

- a. Attending physician
- b. Resident/Fellow
- c. Physician assistant
- d. Nurse

Other: _____

2. - Which is your primary clinical area where you practice?

- a. Critical care
- b. Emergency Medicine
- c. Cardiology
- d. Neurology
- e. Anesthesia
- f. Other

3. - How many years have you been working in this clinical area?

- a. 0-5 years
- b. 6-10 years
- c. 11- 15 years
- d. 16-25 years
- e. More than 25 years

4. - What kind of patient populations do you treat and care for?

- a. Adults
- b. Children
- c. Both

5. - In which country do you practice? _____

6. - What is the capacity of the hospital where you practice?

- a. 0-250 beds
- b. 251-500 beds
- c. 501-750 beds
- d. 751-1000 beds
- e. greater than 1000 beds

7. - The hospital where you practice is:

- a. University/academic institution
- b. Private institution
- c. Government institution with academic affiliation
- d. Other _____

8. - How many patients that have suffered a cardiac arrest and had return of spontaneous circulation do you see a year?

- a. None
- b. 1-5 patients
- c. 6-10 patients
- d. 11-25 patients
- e. More than 25 patients

9. - Have you ever used hypothermia as a therapy?

- a. Yes
- b. No

10. - What would you consider a range for therapeutic hypothermia?

- a. 30-32 °C
- b. 33-34 °C
- c. 35-36 °C
- d. >36 °C

11. - Are you familiar with the therapeutic hypothermia guidelines recommended by International Liaison Committee of Resuscitation (ILCOR)?

- a. Yes
- b. No

12. - Does the institutions you work established protocols for therapeutic hypothermia?

- a. Yes
- b. No

13. - In which of the following clinical scenarios would you consider therapeutic hypothermia? (mark all that apply):

- a. VF arrest
- b. PEA arrest
- c. Asystolic arrest
- d. Other: _____

14. - Which cooling method do you use the most?
- Ice packs
 - Cooling blankets
 - Cooling helmet
 - Lavage: gastric, peritoneal, rectal
 - Cold IV fluids
 - Endovascular cooling catheter
 - Other: _____
15. - How do you monitor the patient's core temperature? (mark all that apply):
- Rectal probe
 - Tympanic
 - Esophageal probe
 - Bladder probe
 - Central access
 - Other _____
16. - What would you consider the patient's target temperature during therapeutic hypothermia?
- 30 °C
 - 31 °C
 - 32 °C
 - 33 °C
 - 34 °C
17. - What is the ideal duration for the patient to be maintained under therapeutic hypothermia?
- 6-12 hours
 - 12-24 hours
 - 24-48 hours
 - 48-72 hours
18. - Do you routinely sedate patients that undergo therapeutic hypothermia?
- Yes
 - No
19. - What type of adjunctive therapies do you use when treating a patient with therapeutic hypothermia? (mark all that apply)
- None
 - Steroids
 - Magnesium
 - Coenzyme Q10
 - Antioxidants
 - Others _____
20. - For the patients who remain comatose after therapeutic hypothermia, when would you discuss palliative care?
- 24 hours after rewarming
 - 48 hours after rewarming
 - 72 hours after rewarming
 - Other _____
21. - Further questions or feedback:

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