CARDIOVASCULAR AND METABOLIC SCIENCE www.ancam.org.mx

POSITIONING

Vol. 35 No. 1
January-March 2024

doi: 10.35366/115003

Suggested protocol for certification as a cardio-protected area in Mexico. Positioning of a group of experts

Protocolo sugerido para la certificación de espacios cardioprotegidos en México. Posicionamiento de un grupo de expertos

Agustín Urzúa-González,* Jorge Álvarez de la Cadena-Sillas,‡ David Martínez-Dunker,§ Manuel Celaya-Cota,¶ Luisa F Aguilera-Mora,‖ José Lainez-Zelaya,** Fernando Ortiz-Galván,‡‡ Enrique Asensio-Lafuente,§§ Ricardo Allende-Carrera,¶¶ Luis Lojero-Weathley,*** Erik H González-Cruz,‡‡‡ Elisa Delgado‡‡‡

Keywords:
protocol, cardio-protected area, sudden cardiac death, automatic external defibrillator, cardiopulmonary resuscitation.

Palabras clave:
protocolo, espacios cardioprotegidos, muerte súbita cardiaca, desfibrilador automático externo, reanimación cardiopulmonar.

* Cardiólogo, Servicio Cardiología UMAE T1 IMSS, León, Guanajuato, México.
‡ Cardiólogo, Práctica privada San Miguel Allende, y Cardiólogo del Instituto de Corazón de Querétaro Querétaro, México.
§ Cardiólogo de Facultad de Medicina, Universidad Autónoma de Morelos, Morelos, México.
¶ Electrofisiólogo del Servicio de Cardiología Hospital CIMA, Hermosillo, Sonora, México.

ABSTRACT

Sudden Cardiac Death (SCD) and Out-of-Hospital Cardiac Arrest (OHCA) are global public health problems suffered by ≈3.8 million people annually; they represent a challenge in public health, which leads us to work on regulations, legislation, and consensus to implement the formation of protected Cardio areas in Mexico. The increase in cardio-protected spaces and the use of Automatic External Defibrillators (AED) in the world have contributed to improving the survival of OHCA. The use of AEDs and early public access defibrillation requires training for non-medical personnel, who are generally the first to assist and start the chain of survival, with basic and efficient Cardiopulmonary Resuscitation (CPR) until emergency services arrive at the scene of the incident. In this article, we present a structured guide to the steps that must be followed to accredit a cardio-protected space in Mexico and distinguish between public access defibrillation and a cardio-protected area.

RESUMEN

La muerte súbita cardiaca (SCD, por sus siglas en inglés) y el paro cardiaco extrahospitalario (OHCA, por sus siglas en inglés) es un problema de salud pública mundial que padecen ≈3.8 millones de personas al año. Representa un reto en salud pública, por lo que nos lleva a trabajar en reglamentos, legislaciones y consensos para lograr implementar la formación de espacios cardioprotegidos en México. El aumento en los espacios cardioprotegidos y uso de desfibrilador automático externo (DAE) en el mundo, han contribuido a mejorar la supervivencia del OHCA. El uso de DAE y la desfibrilación temprana de acceso público, requiere de entrenamiento al personal no médico, quienes generalmente son los primeros en asistir e iniciar la cadena de la supervivencia, con una reanimación cardiopulmonar básica (RCP) y eficiente hasta que lleguen al lugar del incidente los servicios de emergencias. En este escrito se mencionan los problemas actuales en México y alternativas de solución para los mismos. En el presente artículo mencionamos una guía estructurada de los pasos que se deben seguir para poder acreditar un espacio cardioprotegido en México y hacer la diferencia entre desfibrilación de acceso público y espacio cardioprotegido.

INTRODUCTION

Out-of-hospital cardiac arrest (OHCA) is a world health problem.[1] It is calculated that sudden cardiac death (SCD) represents 30% of the mortality of cardiovascular origin and 20% of the total causes of death in adults.[2-4] The actual incidence is hard to determine and may vary in each country. However, in countries like the United States

How to cite: Urzúa-González A, Álvarez de la Cadena-Sillas J, Martínez-Dunker D, Celaya-Cota M, Aguilera-Mora LF, Lainez-Zelaya J et al. Suggested protocol for certification as a cardio-protected area in Mexico. Positioning of a group of experts. Cardiovasc Metab Sci. 2024; 35 (1): 31-36. https://dx.doi.org/10.35366/115003

‖ Cardióloga, Dirección. Clínica Insuficiencia Cardiaca ICMI. Guadalajara, Jalisco, México.
** Electrofisiólogo del Servicio de Cardiología Hospital Alta Especialidad ISSSTE, Zapata Morelos. México.
‡‡ Cardiólogo, Práctica privada, Ciudad Guzmán, Jalisco, México.
§§ Cardiólogo, Hospital de Especialidades La Salud, San Luis Potosí, México.
¶¶ Médico Internista de Práctica privada, Monterrey Nuevo León, México.
*** Técnico en Urgencias Médicas. Dirección Instituto del Deporte Medicina del Deporte. Morelos, México.
‡‡‡ Técnico en Urgencias Médicas, Cuernavaca Morelos, México.

Received: 12/04/2023
Accepted: 02/13/2024

of America or European Countries, it is calculated that it is between 41-155 cases for every 100,000 habitants yearly in populations older than 45 years;[5-7] this incidence is ten times less frequent in younger patients.[8] The survival rate is meager depending on the population studied. It is of vital importance to have a survival chain. This implies a simple and valuable conceptual method that requires coordination in each of the actions to employ. The successful performance of cardiopulmonary resuscitation (CPR) during an OHCA requires the intervention of the community trained in basic CPR. They can initially detect and notify the emergency system of the CPR in process and use an automated external defibrillator (AED)[9,10] if necessary. Basic CPR (BLS) knowledge is relevant to the general population since, usually, the first responder of an OHCA is not a health-related professional.[11,12]

Recommendations for public access defibrillation (PAD) were first published by the American Heart Association in 1992 and later by the European Resuscitation Council in 1998.[13,14]

Since then, several efforts have been made worldwide to increase the use of AEDs in areas with high incidence of OHCA, prepare community members to use them, and create protected areas. These measures, immediate CPR bystander and early AED use could increase the chance of survival by up to 50-74%.[15-17]

THE PROTOCOL

This article presents a structured guide to accredited areas as cardio-protected in México, defining them as any space or building that can ensure an adequate response to an event of sudden cardiac death within its facilities.[18] Therefore, it must be differentiated from public access defibrillation, where an AED may be available for the general population's use without necessarily being considered a cardio-protected space.

The protocol is designed so that in the vast majority of SCD cases, victims can be defibrillated in no more than 5 minutes, with initiation of high-quality CPR within the first minutes, activation of Emergency Medical Services (EMS) in the first 2 minutes of the SCD event, and transferred, in the shortest possible time, to a health institution with installed capacity for subsequent care, with the ultimate goal of rescuing the highest percentage of SCD victims from death, but also ensuring that they have a good neurological recovery and are functional in society.[19]

This protocol is not intended to be an error-free and infallible tool for recovering SCD victims in the country. It is based on the certification protocol for cardio-protected spaces of the Spanish Society of Medicine and Safety at Work. Since it is a protocol with precise and easy-to-apply recommendations, it is expected to provide the best results for possible victims of SCD within the facilities of a cardio-protected space in most cases.

The first step is to have enough AED to cover a temporal radius of 2.5 minutes between the victim and the AED. Therefore, the location and number of AED needed must be strategically planned so that any SCD victim within the cardio-protected space facilities can be detected and have fast access to high-quality CPR and an AED.[20]

Therefore, the following recommendations regarding AED equipment must be considered:

DEFIBRILLATOR AND DISTRIBUTOR

1. Defibrillator
   a. COFEPRIS must authorize the defibrillator equipment used in the facilities (Federal Commission for the Protection against Health Risks) to be used as AED in our country.
   b. The AED must have the following characteristics: a biphasic wave, patches for adults and pediatrics, and batteries in good condition.
2. Distributor
   a. The distributor must be registered as a company authorized (COFEPRIS) to sell medical-sanitary material.
   b. The company must have specific civil liability insurance for defibrillators, sales management information, expiration dates, and an equipment maintenance program.

WHERE TO PLACE THE AED

1. The installation of defibrillators will depend on the physical space available, so an AED must be within a temporal radius of 2.5 minutes for timely defibrillation of an SCD victim in less than 5 minutes.
    a. This may include ample physical space, as remote delivery systems, such as drones, can ensure the timely delivery of the AED anywhere on the property.
2. They must be installed in visible and easily accessible places, within reach of everyone, and used approved displays for easy identification.
3. They must be identified in the property's evacuation plans.
4. There must be a sign identifying the existence of the AED and its signage.

Once the first steps of the protocol have been covered, it is necessary to have an action plan to have sufficient personnel trained in basic CPR and the use of AEDs in the cardio-protected space facilities. It must ensure adequate personnel for all the pre-established locations of the AEDs and for the time that people remain within the cardio-protected space. If the building is open 24 hours a day, it must have trained personnel on all shifts.

It is essential to emphasize the timed drills of the action protocol for an SCD victim within the cardio-protected area facilities, with a desirable timing of at least four training exercises per year, to maintain adequate knowledge of the protocol by the staff and ensure attention to a victim in less than 5 minutes.

Also, the EMS must be immediately activated, with a previously established agreement between the cardio-protected areas, the EMS provider, and the reference hospital where the victims will be transferred for subsequent specialized treatment. All of this must be supported in writing in a physical and virtual manual, accessible and known by all staff.

TRAINING FOR THE USE OF THE AED

1. Companies that opt for the cardio-protected area certification must have sufficient workers trained in basic CPR and using AEDs to cover all areas where the AEDs were installed, for as long as the people remain inside the property.
2. They must have a certificate of completing a course on the importance of public access to defibrillation and a current course (no older than two years) in basic CPR and use of AEDs, given by an officially established training center and endorsed.[21]
3. In addition, there must be a program of quarterly timed drills to ensure personnel's correct action in the event of an SCD event, with an adequate response and timely defibrillation.
    a. Recognition of the SCD victim and activation of the EMS in less than 2 min.
    b. Start high-quality CPR immediately after EMS activation, ideally within the first 2 minutes of SCD.
    c. Timely defibrillation before the first 5 minutes of SCD.
    d. The EMS (high-tech ambulance) should arrive within the first 15 minutes and, if necessary, within 30 minutes of the property's EMS activation.
4. Write a response in case of SCD on the property and provide evidence on how it is disseminated to its workers, especially to the personnel directly responsible for an AED on the property.
5. The protocol must include the full names of the people responsible for each DEA and the substitute in case of absence from work due to any situation.
6. There must be a control center or response center within the property in charge of:
    a. Activate the EMS with the health institution with which you have the agreement.
    b. Ensure timely delivery of the AED if remote delivery systems (drones) are used.
    c. Maintain direct communication with the EMS and those responsible for access to the property to avoid delays in your arrival and departure.
7. The property considered for the certification of a cardio-protected area must have a log of the care of all SCD that is treated in its

facilities, with the specific attention times: With the general data of the SCD victim, activation time of the EMS, initiation of high-quality CPR, timely defibrillation, arrival time of the EMS, and time of transfer and arrival of the victim to the receiving health institution.
8. Each SCD event must be registered in the RENAPACE (National Registry of Out-of-Hospital Cardiac Arrests)[22] to have an adequate incidence of cases at the national level and subsequent protocol standardization.
9. A company or institution legally certified and endorsed in advice and evaluation of the cardio-protected area program may be contracted to implement the response protocol for an SCD on the property.

It is worth commenting on the importance of maintaining the AEDs that are established within the cardio-protected area, which is why the following is recommended:

MAINTENANCE

1. The correct condition of the equipment and its accessories must be guaranteed. In addition, the necessary accessories for the proper operation of the equipment and spare parts must be available, making rapid replacement possible or, where appropriate, ensuring that the supplier can provide the spare part within the next 24 hours.
2. The necessary spare parts are adult and pediatric patches and batteries. Likewise, these are within their validity dates with their corresponding logs by the property or the authorized provider of said services.
3. The biomedical department of the same institution or the authorized supplier must have a maintenance program or contract.

As mentioned in step number 3, it is crucial to have a service provision agreement with a certified hospital with specialized care capacity for SCD victims and with the EMS provider for safe and quick transfer of the victim.

AGREEMENT WITH THE INSTITUTION PROVIDING ADVANCED HOSPITAL SERVICES

To be sure the chain of survival will be complete in an SCD victim, the building's facilities,[23,24] must have:

1. An agreement or contract with a health services institution that has the possibility of continuing to provide adequate medical care to a victim of SCD, so it must have at least one Intensive Care Unit or Cardiovascular Intensive Care Unit, as well as access available to a hemodynamics room 24/7, 365 days a year.
2. Preferably, the agreement should be made with a health institution certified under the standards of the General Health Council, which has high-tech ambulance and medical personnel specialized in high-risk transfers.
3. In the written protocol for response to an MSC in the property, as well as in the physical locations of the AEDs, the emergency telephone number must be specified to which they should call when there is a suspicion of an MSC or in default is the number 911 for the EMS in the region.
4. The person responsible for the property must disseminate this emergency number, as well as infographics of the response protocol for an MSC, not only to its workers but to all the public who have access to its facilities daily. With the aim that everyone knows the protocol and, if necessary, can use it promptly.
5. Virtual tools available for mobile devices or equipment with Bluetooth technology or WiFi access may be used to keep people aware of the protocol's existence and activate it in case of an MSC within its facilities.

Finally, this process must not be considered finite, so it must be carried out bi-annually to ensure that the cardio-protected areas protocols are current and renewed.

RENEWAL

1. The renewal of the certificate must be biennial. To obtain this, the requirements mentioned above must be met.

2. The corresponding renewal process must be requested in advance, and all the necessary documentation for verification will be required.

This protocol covers the most important aspects to take into account to carry it out in a cardio-protected area to save the lives of SCD victims. We are sure they will give us pleasant surprises in applying it directly in their spaces, such as using new technologies for timely access to the AED, such as through drones, remotely controlled or autonomous vehicles, virtual CPR training, and AED use, etcetera.

These practices must be carried out in México to achieve cardio-protection areas and, finally, SCD, an important health problem in our country.

ACKNOWLEDGEMENT

Acknowledgment to Lillian Hernández García M.D. at her assistance translating the text.

REFERENCES

1. Gallagher EJ, Lombardi G, Gennis P. Effectiveness of bystander cardiopulmonary resuscitation and survival following out-of-hospital cardiac arrest. JAMA. 1995; 274 (24): 1922-1925.
2. Nichol G, Laupacis A, Stiell IG, O'Rourke K, Anis A, Bolley H et al. Cost-effectiveness analysis of potential improvements to emergency medical services for victims of out-of-hospital cardiac arrest. Ann Emerg Med. 1996; 27 (6): 711-720.
3. Dami F, Carron PN, Praz L, Fuchs V, Yersin B. Why bystanders decline telephone cardiac resuscitation advice. Acad Emerg Med. 2010; 17 (9): 1012-1015.
4. Rea TD, Eisenberg MS, Culley LL, Becker L. Dispatcher-assisted cardiopulmonary resuscitation and survival in cardiac arrest. Circulation. 2001; 104 (21): 2513-2516.
5. Kim F, Nichol G, Maynard C, Hallstrom A, Kudenchuk PJ, Rea T et al. Effect of prehospital induction of mild hypothermia on survival and neurological status among adults with cardiac arrest: a randomized clinical trial. JAMA. 2014; 311 (1): 45-52.
6. Vaillancourt C, Verma A, Trickett J, Crete D, Beaudoin T, Nesbitt L et al. Evaluating the effectiveness of dispatch-assisted cardiopulmonary resuscitation instructions. Acad Emerg Med. 2007; 14 (10): 877-883.
7. Berg RA, Hemphill R, Abella BS, Aufderheide TP, Cave DM, Hazinski MF et al. Part 5: adult basic life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2010; 122 (18 Suppl 3): S685-705.
8. Hallstrom A, Cobb L, Johnson E, Copass M. Cardiopulmonary resuscitation by chest compression alone or with mouth-to-mouth ventilation. N Eng J Med. 2000; 342 (21): 1546-1553.
9. Nichol G, Thomas E, Callaway CW, Hedges J, Powell JL, Aufderheide TP et al. Regional variation in out-of-hospital cardiac arrest incidence and outcome. JAMA. 2008; 300 (12): 1423-1431.
10. Ong ME, Shin SD, De Souza NN, Tanaka H, Nishiuchi T, Song KJ et al. Outcomes for out-of-hospital cardiac arrests across 7 countries in Asia: the pan asian resuscitation outcomes study (PAROS). Resuscitation. 2015; 96: 100-108.
11. Cummins RO, Ornato JP, Thies WH, Pepe PE. Improving survival from sudden cardiac arrest: the "chain of survival" concept. A statement for health professionals from the Advanced Cardiac Life Support Subcommittee and the Emergency Cardiac Care Committee, American Heart Association. Circulation. 1991; 83 (5): 1832-1847.
12. INEGI Comunicado de prensa NÚM. 24/22 24 Enero 2022, páginas 1-40. Disponible en: https://www.inegi.org.mx/contenidos/saladeprensa/boletines/2022/dr/dr2021.pdf
13. Guidelines for cardiopulmonary resuscitation and emergency cardiac care. Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Part II. Adult basic life support. JAMA. 1992; 268: 2184-2198.
14. Bossaert L, Handley A, Marsden A, Arntz R, Chamberlain D, Ekstrom L et al. European Resuscitation Council guidelines for the use of automated external defibrillators by EMS providers and first responders: a statement from the Early Defibrillation Task Force, with contributions from the Working Groups on Basic and Advanced Life Support, and approved by the Executive Committee. Resuscitation 1998; 37: 91-94.
15. Álvarez de la Cadena-Sillas J, Asensio LE, Martinez DD, Urzúa GA et al. Out of hospital Cardiac Arrest (OHCA), first steps to know and follow in Mexico to have cardioprotected territories. A point of view of a group of experts. Arch Cardiol Mex. In press.
16. Valenzuela TD, Roe DJ, Nichol G, Clark LL, Spaite DW, Hardman RG. Valenzuela TD, Roe DJ, Nichol G et al. Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos. N Engl J Med. 2000; 343: 1206-1209.
17. Baekgaard JS, Viereck S, Moller TP, Ersboll AK, Lippert F, Folke F. The effects of public access defibrillation on survival after out-of-hospital cardiac arrest: a systematic review of observational studies. Circulation 2017; 136: 954-965.
18. Gantzel NC, Andelius LC, Hansen CM, Blomberg SNF, Christensen HC, Kjolbye JS et al. Bystander interventions and survival following out-of-hospital cardiac arrest at Copenhagen International Airport. Resuscitation 2021; 162: 381-387.
19. Urzúa-González AR, Rivera-Chávez MJ, Zapién-Villegas R, Huaracha-López PA. Cardio protected areas in Mexico. Arch Cardiol Mex. 2020; 90 (2): 207-215.
20. Marijon E, Narayanan K, Smith K, Barra S, Basso C et al. The lancet commission to reduce the global burden of sudden cardiac death: a call for multidisciplinary

action. Lancet. 2023; 402 (10405): 883-936. doi: 10.1016/S0140-6736(23)00875-9.
21. Al Haliq SA, Khraisat OM, Kandil MA, Al Jumaan MA, Alotaibi FM et al. Assessment on CPR knowledge and AED availability in Saudi malls by security personnel: public safety perspective. J Environ Public Health. 2020; 2020: 7453027.
22. Wyckoff MH, Greif R, Morley PT, Ng KC, Olasveengen TM et al. Collaborators. 2022 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Circulation. 2022; 146 (25): e483-e557.
23. Martínez-Duncker RD, Urzúa-González AR, Aguilera-Mora LF, Laínez-Zelaya JS, Álvarez de la Cadena-Sillas J et al. Espacios cardioprotegidos en México: acciones para prevenir la muerte súbita cardiaca. Una postura de profesionales de la salud. Salud Pública Mex [Internet]. 2023; 65 (4): 407-415.
24. Cánovas MC, Salas RJM, Sánchez-Arévalo MS, Pardo Ríos M. Should the CRA chain of survival be the survival cycle? Rev Esp Cardiol (Engl Ed). 2018; 71 (5): 412-413.

Funding: no funding was received for this text.
Declaration of interests: the authors declare no conflict of interest.

Correspondence:
Jorge Álvarez de la Cadena Sillas
E-mail: jalvarezdelacadena@gmail.com