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SHORT COMMUNICATION

CPR and AED Use Training: Strengthening Emergency Response in High School Students

Capacitación en RCP y Uso de DEA: Fortaleciendo la Respuesta ante Emergencias en Estudiantes Secundarios

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ABSTRACT

An educational project focused on training high school students in basic cardiopulmonary resuscitation (CPR) maneuvers and the use of the automated external defibrillator (AED). The main objective of this initiative was to improve students' knowledge and skills to respond effectively to cardiorespiratory emergencies, especially in out-of-hospital settings. The intervention was carried out in an educational institution in Venado Tuerto, where fifth year students participated. The training included a combination of theory and practice in a four-hour day, which covered topics such as the recognition of cardiorespiratory arrest, the sequence of CPR maneuvers and the correct use of the AED. The students worked in groups with mannequins to simulate emergency scenarios, which allowed them to apply the knowledge acquired. The results showed a significant increase in the level of knowledge after the intervention, from an initial 41% to more than 60% in the final evaluation. In addition, the students showed greater confidence and willingness to act in critical situations. This project highlighted the importance of integrating CPR training into school curricula and fostering a culture of prevention and response in the community.

Keywords: CPR; AED; education; emergency; students.

RESUMEN

Se desarrolló un proyecto educativo centrado en la capacitación de estudiantes de nivel secundario en maniobras de reanimación cardiopulmonar básica (RCP) y el uso del desfibrilador externo automático (DEA). El objetivo principal de esta iniciativa fue mejorar los conocimientos y habilidades de los

alumnos para responder eficazmente ante emergencias cardiorrespiratorias, especialmente en entornos extrahospitalarios.

La intervención se realizó en una institución educativa de Venado Tuerto, donde participaron alumnos de quinto año. La capacitación incluyó una combinación de teoría y práctica en una jornada de cuatro horas, en la que se abordaron temas como el reconocimiento de una parada cardiorrespiratoria, la secuencia de maniobras de RCP y el uso correcto del DEA. Los estudiantes trabajaron en grupos con maniqués para simular escenarios de emergencia, lo que les permitió aplicar los conocimientos adquiridos.

Los resultados evidenciaron un aumento significativo en el nivel de conocimientos tras la intervención, pasando de un 41% inicial a más del 60% en la evaluación final. Además, los alumnos manifestaron mayor confianza y disposición para actuar en situaciones críticas. Este proyecto resaltó la importancia de integrar la formación en RCP en los currículos escolares y fomentar una cultura de prevención y respuesta en la comunidad.

Palabras clave: RCP; DEA; educación; emergencia; estudiantes.

Cardiopulmonary arrest (CPA) is a pathology with a high incidence worldwide. It has the characteristic of being a time-dependent process whose initial treatment is Basic Life Support (BLS), which, if started early by witnesses, can double and even triple survival rates. Despite this, these maneuvers are initiated in a very low percentage of cases, and the mortality rates are still very high.

In more than 70% of the cases in which an out-of-hospital cardiac arrest (OHCA) event occurs, it is witnessed by family members, friends, or bystanders not related to the healthcare field, and this is why Scientific Societies such as the American Heart Association (AHA), since 1992, recommend including BLS training in school curricula to bring essential knowledge to the general population and thus try to increase the rates of initiation of Cardio Pulmonary Resuscitation (CPR) by witnesses and long-term survival data. (López, 2021, pp,11)

It is common knowledge that sudden cardiac death is a problem in our society; it is the most demanding scenario in medical intervention, with the highest mortality rate in the world population, and most of the time, it occurs in an environment unrelated to the healthcare setting. That is why today, globally recognized institutions such as the AHA maintain that essential life support (BLS) is the most effective and important tool available to people facing an event of this nature. If it is carried out correctly, providing quality CPR significantly increases the victim's survival rate and reduces the event's consequences. (Antonetti, 2018, p3)

According to the AHA (American Heart Association), CPR is defined as a life-saving emergency procedure performed when the heart stops beating to restore efficient oxygenation and circulation in an individual in cardiopulmonary arrest, to achieve an adequate recovery of higher nervous function, its ultimate goal. It is applied in the event of cardiac arrest, regardless of its cause, and, if performed immediately, can double a person's chances of survival after suffering cardiac arrest. It is important because it keeps the blood flow active, even partially, and extends the opportunity for successful resuscitation once trained personnel arrive at the scene. (Garcia-Beltran, 2019)

Before starting, it is important to review some important concepts:

According to the Ministry of Health of the Presidency of the Nation (2016)

First aid is the immediate measures taken for an injured, unconscious, or suddenly ill person at the site of the incident (scene) and until the arrival of healthcare (emergency services). These measures, taken in the first moments, are decisive for the victim's evolution (recovery). Before assisting (rescue, aid), the helper must always ensure self-care (not expose themselves to danger while ensuring their integrity). Only when their health is not at risk can they assist the victim?

The objectives of applying first aid area. To preserve life.

- b. To avoid physical and psychological complications.
- c. To aid recovery and reduce after-effects.
- d. To ensure the affected person is well while transferring to a nearby healthcare center.

Every minute the person does not receive adequate care, their chance of successful recovery decreases by 10%. Through different investigations, professionals have defined that after 3 to 5 minutes of cardiorespiratory arrest, brain death begins, which causes irreversible damage to the affected person. Romergryko G. Geocadin (2019) states:

The cause of most deaths is brain injury, although only 10 percent of these patients present with a clinical picture of brain death. Most patients die because life support measures are withdrawn on the basis that their brain activity is severely impaired, and the prediction that their recovery would be pretty unlikely. During cardiac arrest, brain damage occurs in two stages: the first corresponds to the interruption of the supply of oxygen to the brain, and the second corresponds, paradoxically, to the spontaneous resumption of circulation (p.7).

That said, it is vitally important that people present at the scene of this type of emergency are aware of basic resuscitation techniques. That being the case, if they are applied, no time is lost, and the person's chances of survival increase until trained personnel arrive at the scene. Often, bystanders are frightened and afraid to act simply because they do not know how to do it. However, if they could understand the help they would bring to the situation, it would be comforting when all that is needed is a helping hand and empathy for the other person.

There are two levels of support: essential life support and advanced cardiac life support. The first only requires opening the airway, mouth-to-mouth resuscitation, chest compressions, and using a defibrillator, if available and indicated, which can be performed by non-medical personnel. Advanced life support should continue the previous one, requiring special equipment and knowledge of specific techniques. In this intervention, we will focus on essential life support for adults.

According to the AHA *(American Heart Association 2020)

The chain of survival consists of a series of actions that, when properly executed in an emergency, allow us, in a short period, to increase the victim's chances of survival and reduce the sequelae that may be caused.

The six links in the AHA Chain of Survival

- Recognition and early prevention
- Activation of the emergency response
- Rapid defibrillation is available on-site.
- Starting with quality CPR
- Defibrillation
- Post-cardiac arrest care
- Recovery. (See Appendix 3)

Although not all public spaces have an automatic defibrillation system, it is important to give a brief description. The AED device checks a person's heart and applies an electric shock if the heart has stopped beating normally. If a person suddenly collapses, they may be suffering from sudden cardiac arrest (SCA), which is severe. This means the person's heart has stopped pumping blood and needs help quickly. (Koninklijke Philips N.V., 2004)

The new law 27159 says that defibrillators should be installed in places that are easily accessible for use in an emergency, and their location should be marked. Moreover, it provides for heavy sanctions for those who fail to comply. (Law 27,159, Government of the Nation, 2017, April)

Any lay rescuer can use this device, as it provides audio instructions on the steps to follow.

According to the 2015 AHA Guidelines (American Heart Association 2020), a guide to cardiopulmonary resuscitation recommendations for lay personnel.

The technique for chest compressions for adults is as follows:

- 1 - Stand to one side of the victim.
- 2 - Make sure the victim is lying face up on a firm, flat surface. If you suspect a cervical or head injury, keep the head, neck, and torso aligned when turning the victim.
- 3 - Position your hands and body to perform chest compressions by placing the heel of one hand on the center of the chest, on the lower half of the sternum. Then, place the heel of the other hand on top of the first. Straighten your arms and place your shoulders directly over your hands.
- 4 - Perform chest compressions at a rate of 120 compressions per minute
- 5 - Push down at least 5 cm with each compression. With each chest compression, make sure you push straight down onto the victim's breastbone.
- 6 - Make sure the chest returns to its normal position between each compression.
- 7 - Keep interruptions to chest compressions to a minimum.
- 8 - After 30 compressions, give two rescue breaths lasting 1 second each. Combine chest compressions with rescue breaths (30:2) for five cycles.

(American Heart Association, 2020). Algorithm Display (See Appendix 4).

García Beltrán argues that adolescence, the stage of the most incredible neuronal plasticity in people's lives, makes learning fast and establishes it with continuous reinforcement and recycling. They are characterized as a motivational group, so teaching them simple basic CPR maneuvers could lead to a large number of resuscitators in the long term, thus increasing the number of cardiopulmonary resuscitations performed by witnesses and, consequently, the likelihood of survival and improvement of the neurological prognosis. In addition, other reasons could make it enjoyable to train this type of group, such as raising awareness of healthy lifestyle habits, helping to deal with urgent situations in general, addressing death in the educational environment, and improving the overall self-esteem of the student. Carolina García Beltrán, 2019, p.17)

It is known that professionally trained health personnel have the tools to reverse a cardiac emergency. However, any trained person with basic knowledge can perform CPR maneuvers, even if it is unrelated to health. Engaging the community and getting involved is an initiative that should be discussed in educational establishments. Being in the school environment amid cognitive development, young people find it easier to acquire new knowledge, so they are in charge of transmitting it to their environment. In addition, educational communities trained in CPR could be present in a place other than school.

In this regard, Carolina García Beltrán (2019) states,

However, although the risk of a cardiac arrest occurring in a school is relatively low, the emotional and psychological costs associated with the sudden death of a child are enormous. Increasing the percentage of students, staff, and teachers trained in CPR increases the likelihood that someone will quickly begin resuscitation. Furthermore, a child trained in CPR could be present at the scene of a medical emergency requiring CPR outside of school.

Data collection

A 10-question questionnaire based on AHA literature was administered to determine the student's initial knowledge of basic adult CPR.

Each question had four options, only one of which was correct, and each correct answer was given a value of 1 point and 0 for an incorrect answer.

Out of 360 possible points, the questionnaire yielded 148 points, which indicates a knowledge level of 41%.

The scale used to classify the degree of knowledge was differentiated into three levels according to the percentage obtained, which indicates the level of knowledge in the pre-intervention.

Scale of measurement.

Scale	Level of knowledge
Low level	from 0 to 40 %
Moderate level	from 40 to 60 %
High level	from 60 to 100%

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FINANCING

None.

CONFLICT OF INTEREST

None.