

HISTORICAL NOTES

A history of cardiopulmonary resuscitation from the Book of Kings to Peter Safar — and of a woman drowned in the Seine along the way

Historia de la reanimación cardiopulmonar: del Libro de los Reyes a Peter Safar, pasando por una mujer ahogada en el Sena

Enrique Chicote Álvarez¹, Natalia-Gloria Lizama-Gómez²

“Then the child sneezed seven times, and the child opened his eyes.”¹

In this biblical passage, dated around the 9th century BCE, we can find the first reference to cardiopulmonary resuscitation (CPR) and mouth-to-mouth ventilation performed by the prophet Elisha to try to bring a child back to life.

Attempts to restore life to the deceased have been a constant in the history of mankind, from the times when primitive societies tried to do so through rituals, prayers and sacrifices, or in ancient China, where the deceased were immersed in hot oil to try to bring them back to life,² to the present day.

In the Babylonian Talmud (3rd century CE.), a book that gathers mainly rabbinical discussions about Jewish laws, traditions, stories, one can read: “They went up and found Hillel covered with three cubits of snow. They took him down from there, washed him, rubbed him, and sat him by the fire” (TB-Yom35b). In addition, it describes how they saved a sheep that was suffocating by cutting into its windpipe and inserting a hollow stalk.

In these texts, both centuries old, this “Resuscitation” is described in relation to the airway and resuscitation, the letters A and B of the modern system of life support therapies developed in the 20th century. With regard to this airway management, Vesalius, the great 16th century anatomist, describes in his major work “De Humanis Corporis Fabrica” how, by inserting a reed tube into an incision in the trunk of the trachea and insufflating air, the lungs are inflated and the heart is strengthened. Later, in 1732, Tossach performed the first documented resuscitation of a miner suffocated by smoke, using the mouth-to-mouth method.³ The mouth-to-mouth method was not very popular due to hygienic reasons and the belief that the exhaled air might not be entirely beneficial to the victim’s lungs.⁴ Therefore, different types of bellows were used, already used years earlier by scientists, as in the case of Paracelsus in the 16th century. The use of the bellows was recommended over the mouth-mouth method by the Royal Humane Society in 1782.²

In this same 18th century, different methods were developed to try to resuscitate victims who had suffered drowning. In that century, various machines were developed to try to avoid the methods that had been used previously, such as stimulation by blows, hanging the patient upside down, rolling him over a barrel or riding him on a trotting horse (Figure 1), as these procedures were very aggressive and could cause irreparable injuries.⁴ For this type of patient, various methods were developed, such as fumigatory machines, which used tobacco smoke as a stimulant substance, introducing it through tubes and pipes into the patient’s intestine through the anus.

With the development of these machines, societies for the rescue of drowned persons were established, the pioneer being the one founded in Holland (Dutch Society for the rescue of drowning and asphyxiated persons). In our country, a Board for the aid and rescue of drowned persons was established in 1791 in Orihuela (Alicante), an organization that can be considered a forerunner of the emergency services.⁵

Returning to the maneuvers to establish respiration, already in the 19th century, Leroy d’Etiolles was the first to manipulate the position of the victim’s body to induce ventilation, avoiding the mouth-to-mouth maneuver.² During the second half of the 19th century the most widely used methods for postural resuscitation were the methods of Hall, Howard, Sylvester, Schaefer and Holger-Nielsen^{2,6,7} (Figure 2). These methods were the standard for resuscitation until 1958, when studies by Safar, Escarraga and Elam published in the New England Journal of Medicine demonstrated the superiority of mouth-to-mouth resuscitation over postural methods.⁸

Peter Safar, an Austrian physician specializing in anesthesiology in the USA in the second half of the 20th century, working as head of the Department of Anesthesiology at the Baltimore City Hospital, met James Elam, who, at the meeting of the American Society of Anesthesiologists in 1956, explained that exhaled air could maintain normal blood gasometry in patients. They performed studies (dubiously acceptable

Author Affiliations: ¹Hospital San Pedro, Logroño, La Rioja, Spain. ²Hospital Reina Sofía, Tudela, Navarra, Spain.

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Corresponding author: Enrique Chicote Álvarez. Hospital San Pedro. C/ Piqueras, 98. 26006 Logroño, La Rioja, Spain.

Email: chicotelogro@hotmail.com

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Figure 1. Different methods used to attempt resuscitation of the deceased. Source: Rivera-Pineda J. Internal Medicine Association of Guatemala. 2015;19(3).

according to our current ethical parameters) with healthy volunteers who were previously anesthetized and demonstrated the superiority of the mouth-to-mouth technique.^{8,9}

After presenting his results and being aware of the importance of teaching CPR to the general population, he contacted the Norwegian toy manufacturer Asmund Laerdal, who developed the well-known Rescuci-Anne® manikin in 1960.⁹ Eighty years earlier, in Paris, a young woman about 20 years old was found drowned in the Seine River. Her serene face was admired by all, and molds and sculptures were made, and she was called “The Mona Lisa of the Seine”. Laerdal, when he thought of how to make a friendly mannequin for training and training in the mouth-to-mouth technique, used this woman’s face as a model for the fabrication of the mannequin.

The CPR algorithm that Safar established, and which has practically lasted until the present day, is the ABC, the letter C being blood circulation, trying to maintain organic perfusion, especially myocardial and cerebral perfusion.

Chest compressions are used to maintain this circulation, using the technique known as cardiac massage. The origin of this massage dates back to the 19th century. At the end of that century, Bohem used massage effectively to restore circulation in a cat.⁴ Later, in 1880, Niehaus tried to perform the maneuver on a deceased man but was unsuccessful. However, 5 years later, Koenig described eight successful cases of cardiac massage in humans.³ A few years later, between 1898 and 1901, Tuffier, Hallion and Igelsrud described cases of effective cardiac massage, but on an open chest.⁴

Cardiac massage was definitively adopted as a CPR maneuver in the 1960s, following the work of



Schaefer method



Sylvester method

Figure 2. Different methods for attempting to restore ventilation, prior to the generalization of mouth-to-mouth in the 1960s. Source: Bejarano J. (June 5, 2019) History of CPR. HealthIt. <http://www.hitformacion.es/rcp/blog/>.

Kouenhoven, Jude and Knickerbocker, who described a series of 20 patients who had undergone CPR by closed chest massage with a survival rate of 70%.²

The use of adrenaline in advanced CPR was described at the beginning of the 20th century by the surgeon George Washington Crile in 1906, who performed an experiment in animals combining closed cardiac massage, artificial respiration and the use of parenteral adrenaline in resuscitation.⁶ The subsequent use of adrenaline, maintained in life support therapies up to the present day in practically invariable doses of 1 mg bolus, was the result of various experimental studies throughout the 20th century, and is maintained in the latest life support guidelines in spite of different controversies regarding its use and doses.⁹

Peter Safar, together with his team, was the one who in the 1960s integrated all these advances, establishing the A (airway) B (breathing) C (circulation) model that has endured to the present day as a CPR system. In addition, he understood the importance of teaching and disseminating CPR to the general population,⁶ a decision that has proven to be completely correct and has been fundamental in saving hundreds of thousands of lives over the last 60 years.

In addition, Dr. Safar collaborated with Vladimir Negovsky, who, in the Soviet Union and parallel to Dr. Safar’s advances in resuscitation, contributed to the scientific development of CPR, allowing it to be as we know it today. Safar recognized his work and began a close collaboration in this field, founding together with Rudolf Frey the “World Association of Disaster and Emergency Medicine” and promoting (one from the USA and the other from the Soviet Union) the medical movement for the prevention of nuclear war. nuclear war.¹¹

Safar credited Negovsky with the introduction of concepts such as clinical death (period without poten-

tially reversible blood flow) and biological death (cardiac arrest with irreversible brain death) or experimentation in therapeutic hypothermia.¹¹

Finally, regarding the use of electrical therapy for defibrillation in the for defibrillation in CPR, the first experiments date back to the middle of the 18th century, with cases reported of provocation of cardiac arrest and subsequent resuscitation in dogs by means of electric shocks.³ In the 20th century, Claude Beck in 1947 performed the first successful internal defibrillation in humans in an operating room, while Zoll and colleagues performed it externally for the first time.²

CPR, as we understand it today, is undoubtedly a set of techniques that has prevented hundreds of thousands of deaths in recent decades. To arrive at the technique used in current resuscitation guides, there has been an evolution that has involved several centuries of our history. It is important to know where we come from and to whom we owe it, in order to move forward and improve the ultimate goal of CPR, which is none other than saving lives and improving the quality of people who come back to life.

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