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*Corresponding author

Aizman RI, Federal State Budgetary Educational Institution of Higher Education, Novosibirsk State Pedagogical University, Novosibirsk, Russia

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Short Communication

A New Method of Non-Ventilatory Cardiopulmonary Resuscitation in First Aid

Bubnov VG¹ and Aizman RI^{2*}

¹ANO DPO, National Center for First Aid Training, Bubnov School, Moscow, Russia

²Federal State Budgetary Educational Institution of Higher Education, Novosibirsk State Pedagogical University, Novosibirsk, Russia

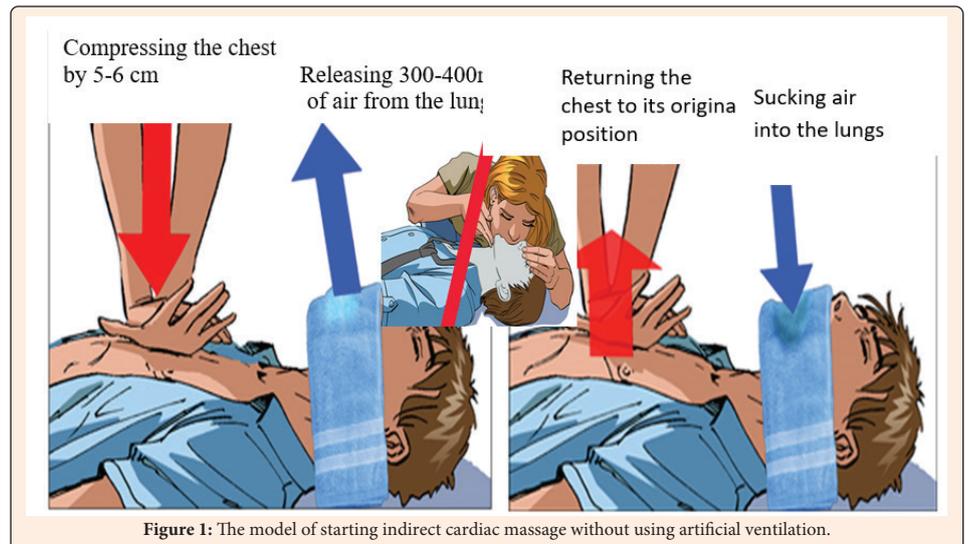
Abstract

The importance of first aid stems from the fact that all emergency situations, whether traffic accidents, accidental injuries, exposure to high or low temperatures, and so on, arise suddenly and develop quite rapidly. Given the time constraints, even before medical personnel arrive on the scene, it is crucial to immediately take all necessary measures to save the life and health of the victim [1]. Today, every person, regardless of professional expertise, gender, or age, must master the necessary knowledge and effectively apply it in practice [2]. Everyone must learn how to properly remove a foreign body from the upper respiratory tract, stop external bleeding, provide first aid for frostbite or overheating, and perform Cardiopulmonary Resuscitation (CPR) [3]. It is no coincidence that on April 12, 2023, an amendment was made to Article 31 of Federal Law No. 323 of November 21, 2011, "On the Fundamentals of Health Protection of Citizens in the Russian Federation" on first aid and the procedure for its provision, which entered into force on September 1, 2024. According to the law, "first aid is a set of measures provided to victims of accidents, injuries, wounds, poisonings, and other conditions and diseases that threaten the life and health of victims before medical assistance is provided." One such acute condition is the absence of vital signs (breathing, circulation) in the victim, which requires cardiopulmonary resuscitation. Persons required to provide first aid, in accordance with federal laws, include three categories: 1) those in their official capacity (firefighters, military personnel, rescuers, police officers, customs officers, etc.); 2) the victims themselves (self-aid) or persons nearby (mutual aid), in particular, teachers; 3) other persons, with the appropriate training and/or skills, on a voluntary basis [4].

Therefore, first aid training has become a pressing issue for pedagogical universities and specialized organizations [1,5]. To facilitate the acquisition of first aid skills, various methods and tools are being developed that not only do not reduce the effectiveness of first aid (and often even enhance it), but are also simpler and more reliable [3]. This article presents a new technique for performing cardiopulmonary resuscitation using artificial ventilation without Mouth-Device-Mouth and other artificial respiration devices, but using a terry towel [6]. This method is especially useful for use by individuals without medical training [7].

Rationale

The widespread belief that artificial ventilation is mandatory to save the victim's life is the main reason for the widespread refusal of CPR (Figure 1). The vast majority of witnesses to an accident find it very difficult to overcome their basic instinct for self-preservation-disgust. To overcome this psychological barrier and not miss the chance to save many lives, the authors suggest starting indirect cardiac massage without using artificial ventilation [7-9].



When the chest is compressed 5-6 cm, up to 300-500 ml of air is expelled from the lungs. This is called “active exhalation.” During the pause between compressions, the chest returns to its original position, and “passive inhalation” occurs.

Reasons for Switching to The Use of a Terry Towel

- a. Risk of infection.
- b. Risk of gas poisoning, especially during fire rescues and rescues from wells and basements.
- c. Risk of rescuer unconsciousness due to hyperventilation.
- d. Mass refusal to provide any assistance due to fear, even to approach the victim.
- e. Disgust is an irresistible instinct for self-preservation.

Anyone understands perfectly well that breathing into the mouth of a dying person while on a ventilator means putting not only yourself, but also your family and loved ones at risk of infecting them with incurable diseases [9].

Features of Conducting Resuscitation Without Artificial Ventilation

The chest compression rate should not exceed 60-80 compressions per minute. This is essential for filling the lungs with air. The common belief that the compression rate should be at least 100-120 compressions per minute is unfounded for the following reasons:

- a. A man of average physical fitness will not be able to maintain the jackhammer rhythm for more than 3-5 minutes, while waiting for rescue services can take significantly longer.
- b. The chest of many people, especially the elderly, will not have time to return to its original position and will remain in a constant exhalation position without the ability to inhale.

The Effect of a Terry Towel in Resuscitation Without Ventilatory Inspiration

- a. Creates the necessary passive exhalation resistance during chest compressions, ensuring a sufficient CO₂ concentration in the victim’s airways to stimulate their respiratory center.
- b. Significantly outperforms gauze face masks in protecting against infection.
- c. Reduces the distance hazardous gases escape from the respiratory tract of dying patients during chest compressions on victims rescued from fires and basements.
- d. Does not slide on the victim’s face (Figure 2).

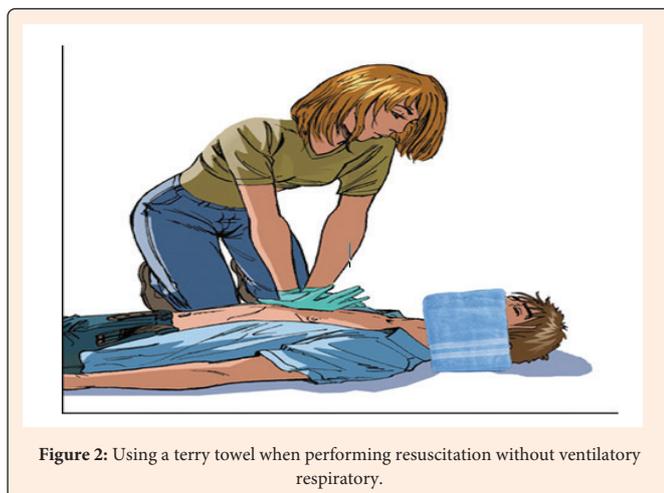


Figure 2: Using a terry towel when performing resuscitation without ventilatory respiratory.

Rules for Using a Terry Towel When Performing Resuscitation Without Ventilatory Respiratory

- a. Cover the victim’s mouth and nose with a towel.
- b. The ends of the towel should touch the floor or ground.
- c. After releasing pressure, pause to allow the chest to return to its original position to allow a passive inhalation to occur.

The method has found application in

Transaero, Aeroflot, and S7 Airlines; hazardous production and transport organizations, including Rosseti, RusHydro, Norilsk Nickel, Severstal, T+, Gazprom, Transneft, Lukoil, Sibneft, Tatneft, MTS, MGTS, Russian Railways, Moscow Metro, Vorkuta Coal, Kuzbass Coal Mine, and others. At power generation facilities alone, the number of fatalities decreased by 50%, with a total number of workers of approximately 800,000 people.

Methodological Equipment

To practice resuscitation skills without artificial ventilation, V.G. Bubnov created the GOSHA robotic simulator, which was awarded the Gold Medal at the XXVIII Geneva International Salon of Inventions and Innovations (Figure 3).

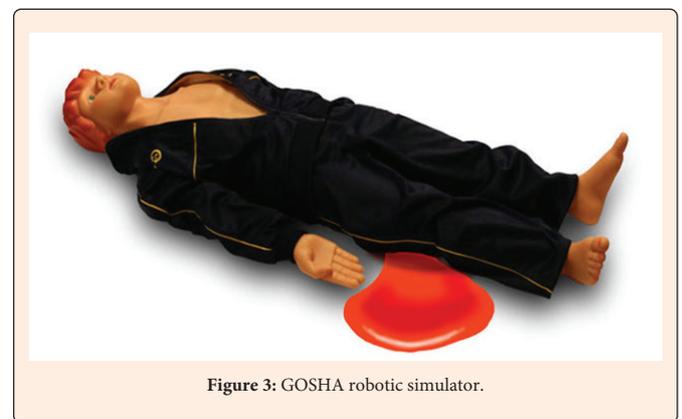


Figure 3: GOSHA robotic simulator.

The simulator has four operating modes

Clinical death: If resuscitation is successful, GOSHA will develop a carotid pulse and pupillary light reactivity. All successful and unsuccessful actions by the rescuers will be reflected by a light indicator on his chest. At any time, the robot can automatically switch to non-ventilator resuscitation mode, simply by not administering ventilator breaths, which is crucial for training resuscitation skills during a pandemic.

Damage to the bones of the lower leg (ankle joint): If the bandage, transport splint, or robot is not applied correctly, an audible signal (“robot groan”) will sound and the left shin will flash a red pain light.

Combination of clinical death and femoral artery injury: If the robot is successfully revived, it will develop a pulse in the carotid artery, a pupillary response to light, and a pulsating red wave of bleeding from the damaged femoral artery. At any time, the robot can automatically switch to non-ventilator resuscitation mode, simply by not administering ventilator breaths, which is crucial for training resuscitation skills during a pandemic.

Bleeding from the femoral artery: If the bleeding is not stopped within 2 minutes, the robot’s carotid pulse will disappear, and a pulsating scarlet wave of bleeding will appear.



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