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Mechanical devices to compress the patient's chest in a state of sudden cardiac arrest - future or everyday life of emergency medicine

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ABSTRACT

Providing high-quality chest compressions to patient in sudden cardiac arrest is a key action that should be taken by medical professionals as soon as possible after its recognition. Long-term keeping resuscitation, particularly chest compressions, can lead to fatigue rescuers which in turn may result in a decrease of the efficiency and quality of these treatments. Accordingly, it may be helpful to use commercially available medical devices for mechanical compression of the victim's chest.

The aim of this study is to present selected devices for mechanical chest compressions of patient in cardiac arrest.

Examples of such devices are: Lund University Cardiac Arrest System-LUCAS, AutoPulse Resuscitation System, Corpuls CPR, Life-stat CPR, Thumper CPR. Different between them are: mechanics of operation, construction, power source, size or also weight. Effectiveness and efficiency of all described devices have been confirmed by many scientific studies. Nevertheless, there are still no clear projects, which could become the basis for international organizations such as the European Resuscitation Council or American Heart Association to introduce these devices as a standard of patient care in the state of sudden cardiac arrest.

Using of mechanical chest compression devices influence for providing the permanent quality of treatments, enables patient transport in cardiac arrest as well as relieves rescue team. It is necessary to conduct more studies which could confirm their effectiveness and also which could improve them.

Keywords: resuscitation, chest compressions, emergency medicine

INTRODUCTION

Global organizations such as European Resuscitation Council (ERC), American Heart Association (AHA) and Australian Resuscitation Council (ARC), in their recent guidelines from the patient in sudden cardiac arrest (SCA) highlight the significance of uninterrupted chest compressions [1-4]. Scientific research confirms that largely patient's chances of surviving cardiac arrest depend on chest compressions, and in particular the speed of action, quality and proper massage techniques [5-7]. As recommended by the normal technique of cardiopulmonary resuscitation adult should be linked to: deep compression of the chest (5-6 cm antero-posterior dimension) appropriate frequency (100-120 compressions/minute), normal chest relaxation after each iteration and minimizing interruptions without carrying out chest compressions. The fulfillment of all of the above required from a professional rescuer relevant physical conditions and specialized training especially on high quality phantoms. Unfortunately, many research confirms that with time running cardiopulmonary resuscitation gradually decreases the quality of these procedures [8,9]. Therefore, the guidelines emphasize the need for changes in people conducting cardiopulmonary resuscitation (CPR) after each 2-minute cycle [1].

With reference to the above constructing a device which would replace the rescuer in chest compression was perfect idea. A lot of companies have constructed their medical device, which also successfully introduced to the real medical use. The vast majority of mechanical chest compression devices over the conventional manual method is that the machine does not fatigue and maintain a constantly compression of the chest with a normal depth. Additionally, there is a chance for a shock without having to interrupt chest compressions [10]. Such advantages affect both the minimization of time without chest massage as well as to conduct high quality CPR. An additional benefit of using such devices is the ability to focus on the other aspects of rescue advanced life support activities like: counting doses of medicines, collecting a detailed history of witnesses, clearing the respiratory tract [11]. Due to the many advantages of mechanical devices to compress the victim's chest should summarize the available devices by their mode of operation, construction elements, advantages, disadvantages and limitations.

AIM OF THE RESERCH

The purpose of this article is to present some mechanical devices to compress the patient's chest in a state of sudden cardiac arrest, with a particular focus on: LUCAS, AutoPulse Resuscitation System, Corpuls CPR, Life-Stat CPR, Thumper CPR. In addition, current world organizations recommendations about this alternative method of ensuring high-quality chest compressions were presented.

DESCRIPTION OF KNOWLEDGE

Lund University Cardiac Arrest System - LUCAS

LUCAS 1

LUCAS compression system was created for the first time by Physio-Control in 2003 (Pic.1). The first generation of this device (LUCAS 1) was consistent in its action with the ERC 2005 guidelines. The ready-to-use set consists of: supporting board affixed to the back of the patient, the upper part of the piston and oppressive suction and pressurized gas source (cylinder of compressed air or oxygen). This last element, that is the way of powering were just a feature this system out of the other available on the market. Analyzing the product specifications, the manufacturer determines that the average gas consumption is about 70 liters/minute and a maximum of 130 liters/minute. Depending on the ambient temperature LUCAS 1 system performs compression at frequency of 95-120 compressions per minute with a depth of 4-5 cm simultaneous antero-posterior dimension, corresponding to the pressure force 530-600N [12]. An additional advantage is the ability to protect the patient's upper limb by pinning them to the device using the special ties. Unfortunately, the described system is not without flaws. The first and the most important disadvantage seems to be that it needs an extra cylinder of compressed gas to work. In terms of emergency medicine, particularly ambulance services, additional cylinder is extra weight and another equipment necessary to take by rescuers to the scene. In addition, it should be emphasized, that in conditions of the pre-hospital care oxygen is most often applied tensed gas. Machine which is powered by oxygen especially in a limited space of medical range of ambulance is creating a huge risk during defibrillation for the patient and rescuer.

Picture 1. LUCAS 1 system (Physio Control)
Source: http://www.lucascpr.com/web_training_center/index_it.php?top=lucas1&sub=

LUCAS 2

Compression System LUCAS 2 has been designed in 2009 (Pic.2). Basic and main change compared to the previous version of the device is source of the power. This generation is powered through the battery system. Moreover, used batteries are very efficient because they provide uninterruptible operation for about 45 minutes and require only approximately 4 hours to fully charge. This version is especially dedicated to pre-hospital care through use of secure supply power, reduced weight of ready-to-use kit (all weigh about 7,8kg) and release of two work modes (30:2 and uninterrupted chest compressions in accordance with the guidelines of the AHA and ERC 2010) [13]. In terms of the structure of the device substantial changes weren't implemented. LUCAS 2 still consists of supporting board, affixed to the back of the victim and upper part which contains the constricting piston finished with the disposable vacuum cup. Another novelty is an electronic panel built in a peak which is used for a device support, choice of the mode and inspections of battery charge level. By using battery power supply producers have provided the ability to safely defibrillate the patient during the uninterrupted patient's chest compression. It must be borne in mind, however, that there is needs of use self-adhesive electrodes and sticking them in a correct distance from the device suction cup.

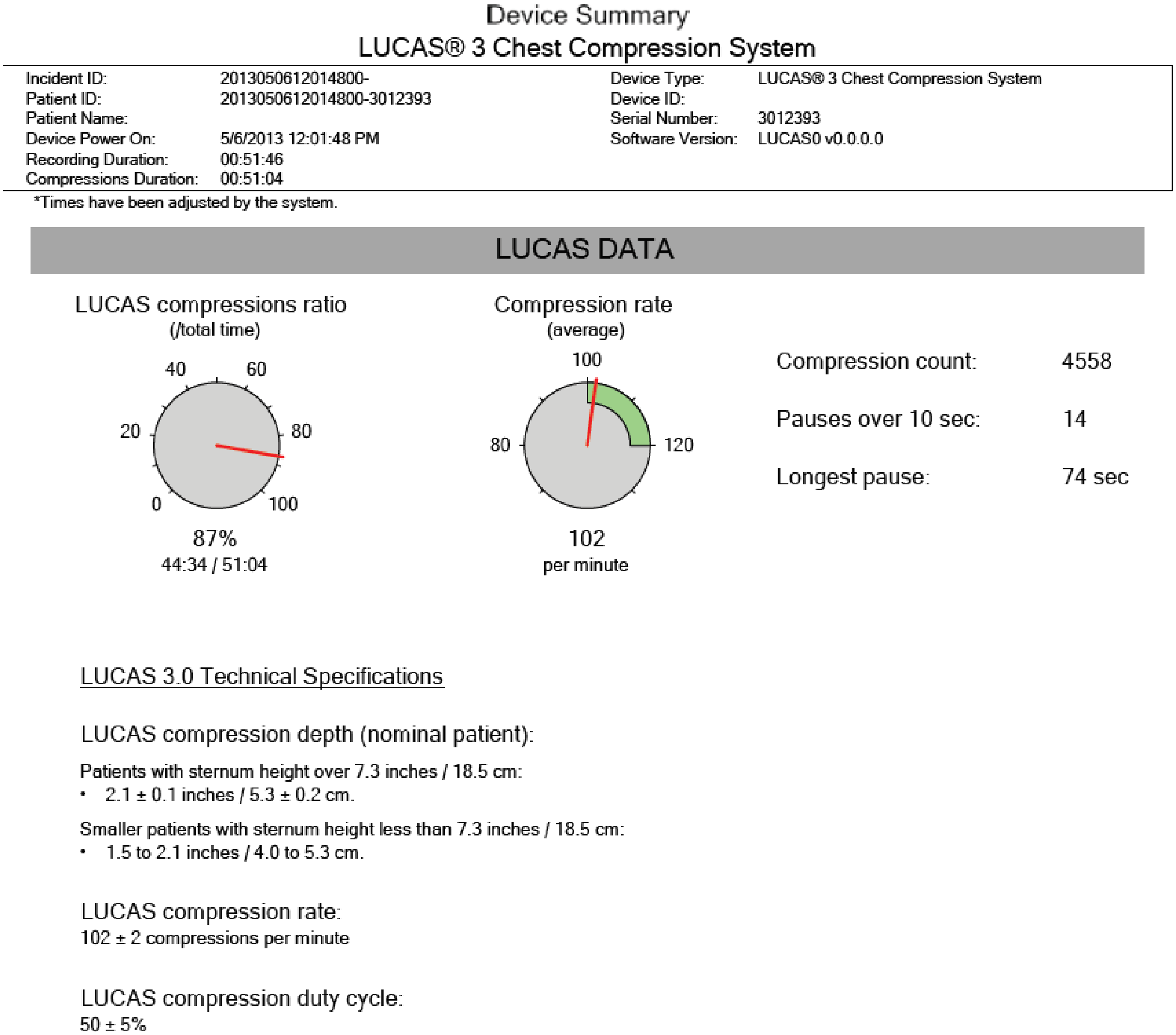
Picture 2. LUCAS 2 system (Physio Control)
Source: http://www.amb.se/en/portfolio-item/physio-control-lucas/

LUCAS 3

A device which is a novelty on the market is LUCAS 3 (Pic.3). This is the latest generation of this unit. In terms of construction machine is equipped with an easy to clean safety straps, a new, lighter board supporting the patient’s back, and a new colour range of the device. Additionally a transport backpack was also changed. So far material backpack was replaced by stiff, made of plastics which additionally will be protecting this device from damage. This solution is particularly useful in pre-hospital conditions. The innovation in this device is the fact that manufacturers have built in special module, whose task is to collect all the information about the use of the equipment. With this function is the ability to generate a report after the end of all medical action. It includes information such as:

• time of begin/finishing using the device
• duration of chest compressions
• sum of breaks at chest compression more than 10 seconds
• duration of the longest interruption
• frequency of compression

• compression depth
• graphical presentation of all actions of the device
Example of the report was placed by the producer in the sales literature (Figs.1, 2, 3).


Device Summary

LUCAS® 3 Chest Compression System

Incident ID:	2013050612014800-	Device Type:	LUCAS® 3 Chest Compression System
Patient ID:	2013050612014800-3012393	Device ID:	
Patient Name:		Serial Number:	3012393
Device Power On:	5/6/2013 12:01:48 PM	Software Version:	LUCAS0 v0.0.0.0
Recording Duration:	00:51:46		
Compressions Duration:	00:51:04		

*Times have been adjusted by the system.

LUCAS DATA

Compression count: 4558

Pauses over 10 sec: 14

Longest pause: 74 sec

LUCAS 3.0 Technical Specifications

LUCAS compression depth (nominal patient):

Patients with sternum height over 7.3 inches / 18.5 cm:
- 2.1 ± 0.1 inches / 5.3 ± 0.2 cm.

Smaller patients with sternum height less than 7.3 inches / 18.5 cm:
- 1.5 to 2.1 inches / 4.0 to 5.3 cm.

LUCAS compression rate:
102 ± 2 compressions per minute

LUCAS compression duty cycle:
50 ± 5%

Figure 1. LUCAS 3 report 1.
Source: https://www.physio-control.com/uploadedFiles/Physio85/Contents/Workplace_and_Community/Products/Meet%20LUCAS%203%20Brochure%203328331_A_LR.pdf

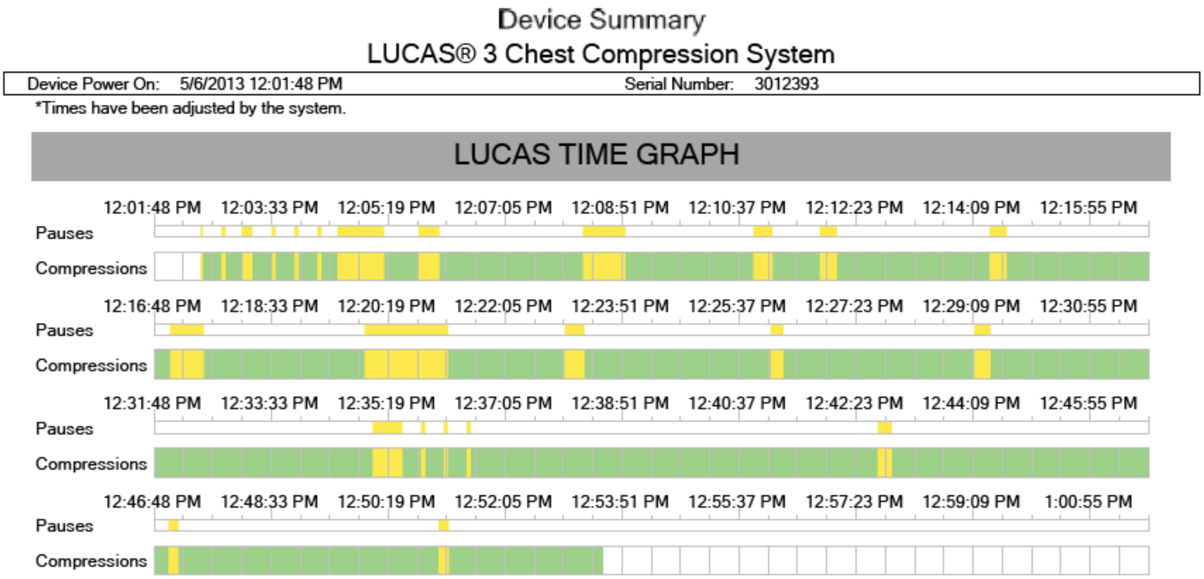


Figure 2. LUCAS 3 report 2.
Source: https://www.physio-control.com/uploadedFiles/Physio85/Contents/Workplace_and _Community / Products / Meet 20LUCAS% 203%%% 20Brochure 203328331_A_LR.pdf

*Times have been adjusted by the system.

Event log

LUCAS 3 Chest Compression System

Incident ID:		Device Type:	Unknown
Patient ID:		Device ID:	iLUCAS
Patient Name:		Serial Number:	29140001
Device Power On:	5/30/2016 4:17:14 AM	Software Version:	LUCAS3 v3.0.1.3
Recording Duration:	01:14:17		
Compressions Duration:	01:11:25		

Elapsed Time	Real Time	Description
Monday, May 30, 2016		
00:00:00	4:17:12 AM	Power On
00:00:00	4:17:12 AM	Adjust Mode
00:00:19	4:17:31 AM	Continuous Mode
00:00:19	4:17:31 AM	First Compression
00:00:29	4:17:41 AM	Pause Mode
00:00:32	4:17:44 AM	30:2 Mode
00:00:46	4:17:58 AM	Continuous Mode
00:00:52	4:18:04 AM	30:2 Mode
00:01:11	4:18:23 AM	Pause Mode
00:01:27	4:18:39 AM	Adjust Mode
00:02:47	4:19:59 AM	Continuous Mode
00:04:52	4:22:04 AM	30:2 Mode
00:04:59	4:22:11 AM	Continuous Mode
00:15:10	4:32:22 AM	Pause Mode
00:21:43	4:38:55 AM	Continuous Mode
00:29:16	4:46:28 AM	Pause Mode
00:38:34	4:55:46 AM	Continuous Mode
00:41:02	4:58:14 AM	Battery Low Charge (S/N 31150118851)
00:43:18	5:00:30 AM	Pause Mode
00:46:48	5:04:00 AM	Continuous Mode
00:57:02	5:14:14 AM	Pause Mode
01:03:19	5:20:31 AM	Continuous Mode
01:11:44	5:28:56 AM	Last Compression
01:11:45	5:28:57 AM	Battery Depleted (S/N 31150118851)
01:14:17	5:31:28 AM	Power Off

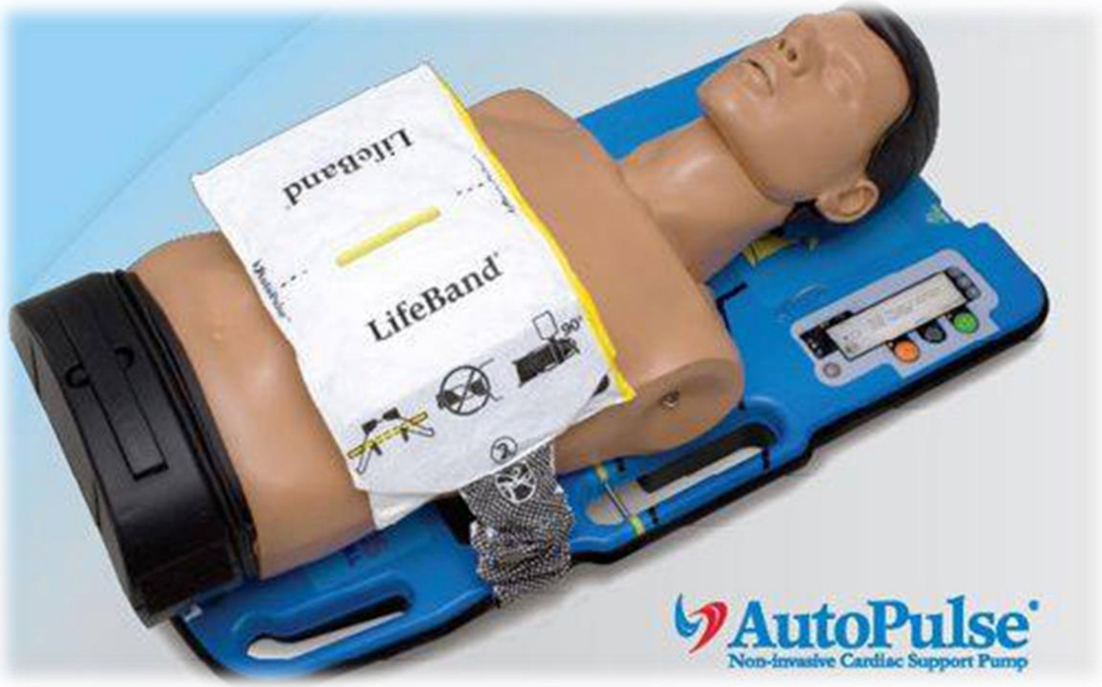
Figure 3. LUCAS 3 report 3.
Source: https://www.physio-control.com/uploadedFiles/Physio85/Contents/Workplace_and_Community/Products/Meet %20LUCAS%203%20Brochure%203328331_A_LR.pdf

Picture 3. LUCAS 3 system (Physio Control)
Source: https://plus.google.com/+MeetbDe

AutoPulse Resuscitation System

AutoPulse Resuscitation System was designed and is produced by Zoll Circulation, Chelmsford, Massachusetts USA (Pic.4). In comparing to LUCAS system in this one engineers used a different mechanism of action. By using of chest belt (LifeBand), which is attached to the special platform, chest is encompressive almost entire circumference and then compressed. Acting compressive force is not focused only on sternum and anterior wall of chest, how it’s take place in LUCAS system, but it is also fold-out on her entire skeleton. AutoPulse can be used in a wide range of patients. It is suitable for adults with a maximum body weight of 136 kg and the circumference of the chest from 76 to 130 cm [14]. Important is a fact that device automatically adjust recommended size of chest belt and selects correct power of pressure. According to the technical specifications this device on fully charged batteries provides up to 30 minutes of continuous work. Zoll company during the design process also secured the paramedics providing medical assistance in the pre-hospital setting. AutoPulse can additionally be equipped with a fold-out stretcher connected with platform. This create good conditions for patient transport in compliance with the constant chest compression. Significant weight is a considerable lack of AutoPulse system - about 13 kg what is in ambulance service conditions a significant load for staff. In this unit there are three modes of operation: chest compressions in the sequence with an interval of 30 compressions to 2 rescue breaths, with an interval of 15 compressions to 2 breaths and compressions continuously without interruption for patient ventilation [15]. An important highlight is the fact that the AutoPulse system generates chest compressions only at a frequency of about 80/minute, which is unfortunately associated with technical limitations of equipment. However, in spite of non-execution recommended frequency according to European

Resuscitation Council guidelines (frequency 100-120/minute) in a number of scientific studies the authors described the compression efficiency and increase coronary perfusion pressure by up to 33% [16]. Other studies show that use of AutoPulse Resuscitation System significantly improves the effectiveness of resuscitation (20.2% without the device vs 34.5% with the device), is increasing survivability the patient for admitting to hospital (from the 11.1% up to the 20.9%) and most importantly is increasing the survivability to the certified excerpt from the hospital (from the 2.9% up to the 9.7%) [16.17].



Picture 4. AutoPulse Resuscitation System (Zoll)
Source: http://medipmentdata.blob.core.windows.net/product/35807/product-35807-29769.jpg

CORPULS CPR

One of the newest device for mechanical chest compression is Corpuls CPR which is manufactured by the German company GS Elektromedizinische Geräte G. Stempel. Described equipment is innovative in many aspects. Mechanics of action rely on trunk piston left vertically on the patient chest, which exerts a point pressure with appropriate frequency. The whole mechanism is based on a specially profiled panel, which will ultimately be placed under the patient. Described boards are available in two shapes: "X" (RecBoard) and the square (QuadBoard) (Pic. 5 and Pic. 6). The first one is much lighter and designed for pre-hospital actions while the second is larger and is intended to use in hospital. Both types of board are completely translucent to radiation. At the top of the device is an electronic module with a display that indicates all of equipment operating parameters [18]. It contains information such as: work module (one of three available: 30:2, 15:2 or continuous asynchronous), compression depth (from 2 to 6 cm), frequency (from 80 to 120/minute), total time from starting work and time remaining on the battery (Pic. 7). In addition, in connection with a wide range of useful opportunities to Corpuls CPR included are two, reusable pads - regular pediatric and adult. Corpuls CPR in its innovation does not provide for restrictions due to patient weight. Only parameters that may exclude the patient from the use of this equipment is chest dimensions: height from 14 to 34 cm and a width of 48 cm [18]. Corpuls

CPR is powered by battery energy, which is very efficient and allows device to operate for up to 90 minutes. The time required to fully charge it is about 135 minutes, however, it takes 105 minutes to reach approximately 80% of the charge [18]. A big plus of the device is also adaptation of equipment for severe weather conditions. The temperature range in which Corpuls CPR works is: from -20°C to + 45°C. Additionally, this device meets IP 56 standards, which means it's water and dustproof. Corpuls CPR is relatively light compared to the competition because compression device with the battery weighs about 5.5 kg, but weight of the supporting board should be added: Recboard approximately 2.2 kg and Quadboard 1.7 kg [18].

Picture 5. RecBoard Corpuls CPR device
Source: http://corpuls.world/products/corpuls-cpr?lang=en#1480541205547-602963ba-4938

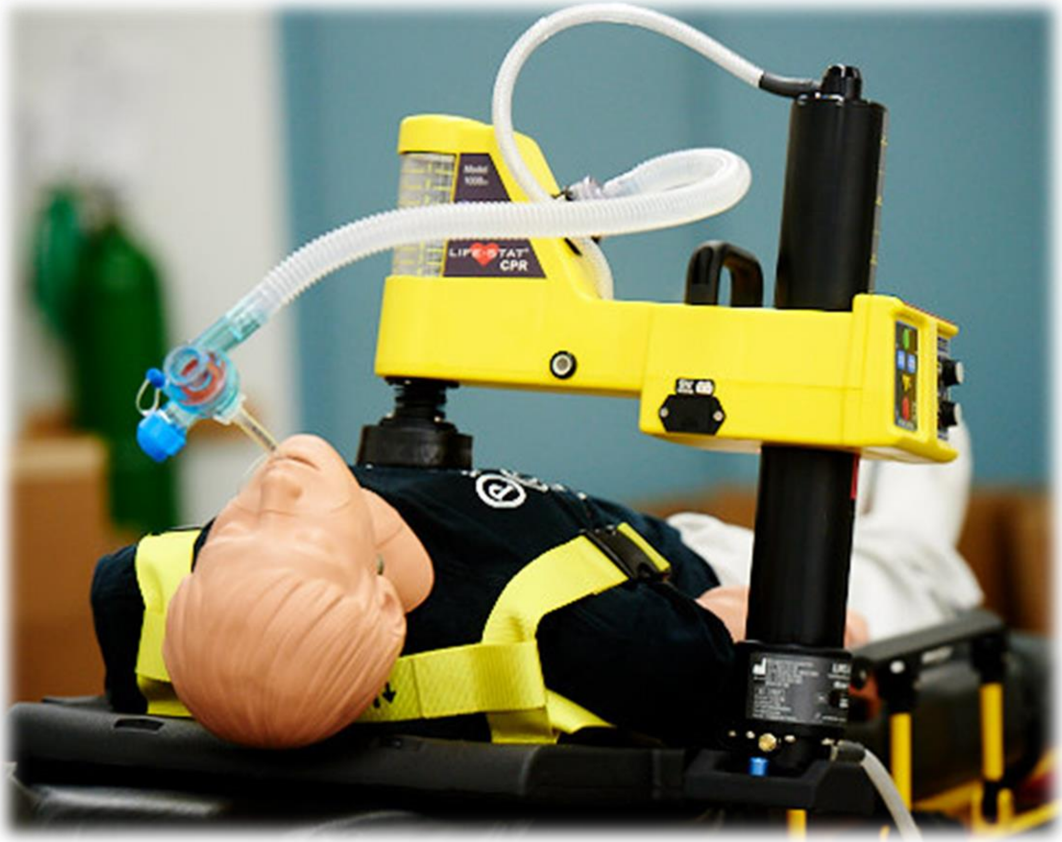
Picture 6. QuadBoard Corpuls CPR device
Source: http://corpuls.world/products/corpuls-cpr?lang=en#1480541205547-602963ba-4938

Picture 7. Display of Corpuls CPR device
Source: http://corpuls.world/products/corpuls-cpr?lang=en#specifications

Picture 8. Corpuls CPR system (GS Elektromedizinische)
Source: http://corpuls.world/wp-content/uploads/2016/12/corpuls-cpr-Showroom-1041px.jpg

LIFE-STAT CPR

Michigan Instruments Company (Grand Rapids, Michigan, USA) in 2008 produced a device called Life-stat CPR (Pic.9). This is one of the few devices available on market which combines two functions: a mechanical device to compress the patient's chest and transport respirator. In terms of construction, Life-stat CPR consists of standard support platform with patient fastening belts, and a height-adjustable arm on which is mounted on frame of compression module, respirator and control panel. Oxygen supply line and transport bag are added to the set. Manufacturer also offers the opportunity to buy a transport backpack for oxygen supply (backpack for one or two gas bottles) (Pic.10). The whole device weighs about 8.85 kg [19]. Device is powered with compressed gas most often with oxygen which is why a gas supply is required while using Life-stat CRP. The maximum oxygen consumption is about 45 liters per minute. Therefore, as in the case of the LUCAS 1 device, the question arises as to the safety of performing defibrillation in an environment with rich oxygen concentration, in which Life-stat CPR works. Additionally, this device requires connection of two 9V batteries to power the control panel [19]. Life-stat can be operated in the interval of 30 compressions with a break for 2 rescue breaths using a face mask and in the mode of continuous compressions with 9 asynchronous, automatic vents per minute through the endotracheal tube. In addition, it is worth noting that described equipment also has the function of adjusting the volume of oxygen supply from 0 - 1000ml. As for chest compression parameters Life-stat CPR system provides compression depth from 0 to 8 cm with a frequency of 100 ± 2 per minute. The temperature range in which it is working properly is from -20°C to +45°C [19].



Picture 9. Life-Stat CPR (Michigan Instruments)
Source: https://www.michiganinstruments.com/automatic-mechanical-cpr-machines/life-stat-mechanical-cpr/

Picture 10. Backpack oxygen supply (Mobile Oxygen Carrier - MOC)
Source: https://www.michiganinstruments.com/automatic-mechanical-cpr-machines/life-stat-mechanical-cpr/

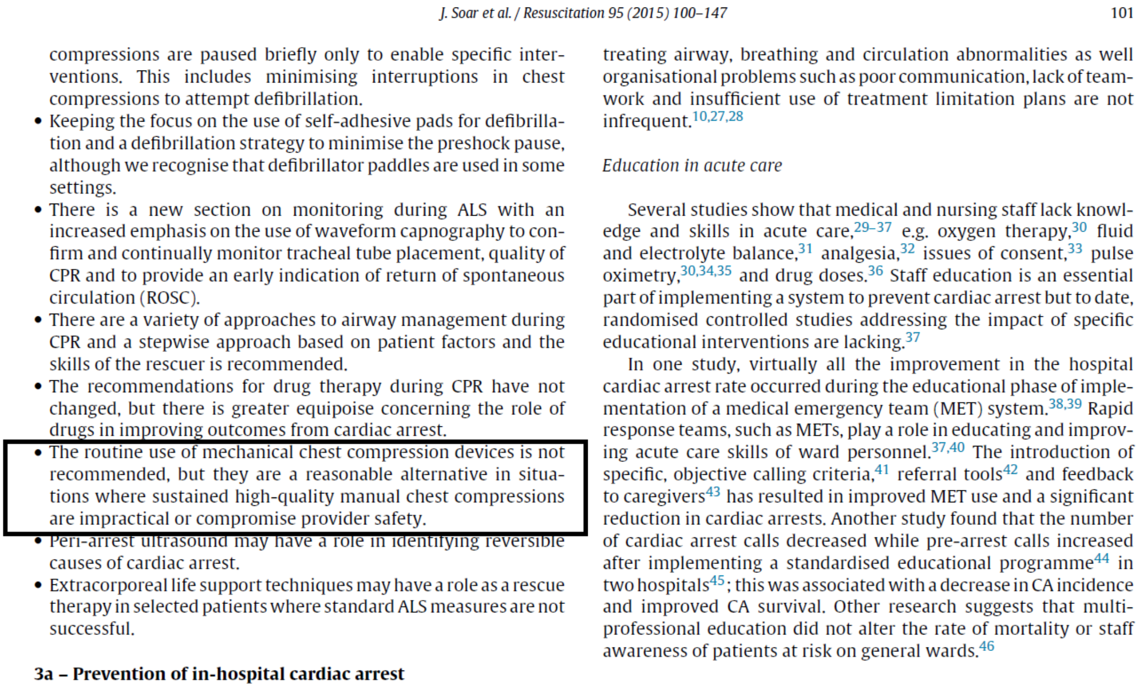
Thumper CPR

Thumper CPR is another device produced by Michigan Instruments, Grand Rapids, Michigan, USA (Pic.11). The principle of this device is virtually identical to Life-stat CPR device. The main difference of this equipment is the fact that it does not have a transport respirator module. It is merely a device for mechanical chest compression.

Picture 11. Thumper CPR (Michigan Instruments)
Source: https://www.michiganinstruments.com/automatic-mechanical-cpr-machines/life-stat-mechanical-cpr/

DEVICES FOR MECHANICAL CHEST COMPRESSION IN THE LIGHT OF CURRENT GUIDELINES

European Resuscitation Council, in its latest guidelines from 2015, clearly emphasizes that it does not recommend routine use of mechanical chest compressions devices (Fig.4). It only draws attention to the fact that these devices constitute a justified alternative in situations when it is impossible to maintain high-quality resuscitation, or there is a threat to the safety of rescuers [21].



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compressions are paused briefly only to enable specific interventions. This includes minimising interruptions in chest compressions to attempt defibrillation.

- Keeping the focus on the use of self-adhesive pads for defibrillation and a defibrillation strategy to minimise the preshock pause, although we recognise that defibrillator paddles are used in some settings.
- There is a new section on monitoring during ALS with an increased emphasis on the use of waveform capnography to confirm and continually monitor tracheal tube placement, quality of CPR and to provide an early indication of return of spontaneous circulation (ROSC).
- There are a variety of approaches to airway management during CPR and a stepwise approach based on patient factors and the skills of the rescuer is recommended.
- The recommendations for drug therapy during CPR have not changed, but there is greater equipoise concerning the role of drugs in improving outcomes from cardiac arrest.
- The routine use of mechanical chest compression devices is not recommended, but they are a reasonable alternative in situations where sustained high-quality manual chest compressions are impractical or compromise provider safety.
- Peri-arrest ultrasound may have a role in identifying reversible causes of cardiac arrest.
- Extracorporeal life support techniques may have a role as a rescue therapy in selected patients where standard ALS measures are not successful.

3a – Prevention of in-hospital cardiac arrest

treating airway, breathing and circulation abnormalities as well organisational problems such as poor communication, lack of teamwork and insufficient use of treatment limitation plans are not infrequent.[10,27,28]

Education in acute care

Several studies show that medical and nursing staff lack knowledge and skills in acute care,[29–37] e.g. oxygen therapy,[30] fluid and electrolyte balance,[31] analgesia,[32] issues of consent,[33] pulse oximetry,[30,34,35] and drug doses.[36] Staff education is an essential part of implementing a system to prevent cardiac arrest but to date, randomised controlled studies addressing the impact of specific educational interventions are lacking.[37]

In one study, virtually all the improvement in the hospital cardiac arrest rate occurred during the educational phase of implementation of a medical emergency team (MET) system.[38,39] Rapid response teams, such as METs, play a role in educating and improving acute care skills of ward personnel.[37,40] The introduction of specific, objective calling criteria,[41] referral tools[42] and feedback to caregivers[43] has resulted in improved MET use and a significant reduction in cardiac arrests. Another study found that the number of cardiac arrest calls decreased while pre-arrest calls increased after implementing a standardised educational programme[44] in two hospitals[45]; this was associated with a decrease in CA incidence and improved CA survival. Other research suggests that multiprofessional education did not alter the rate of mortality or staff awareness of patients at risk on general wards.[46]

Figure 4. Fragment of 2015 European Resuscitation Council Guidelines.
Source: Soar J, Nolan JP, Böttiger BW, et. al .: The European Resuscitation Council Guidelines for Resuscitation 2015: section 3. Adult advanced life support. Resuscitation. 2015; 95: 101.

Additionally European Resuscitation Council emphasized that recent studies has not shown benefits of delivering the defibrillation shock in the continuation of chest compressions strategy (no defibrillation break) (Fig.5) [22].

- The importance of early, uninterrupted chest compressions remains emphasised throughout these guidelines, together with minimising the duration of pre-shock and post-shock pauses.
- Continue chest compressions during defibrillator charging, deliver defibrillation with an interruption in chest compressions of no more than 5 s and immediately resume chest compressions following defibrillation.
- Self-adhesive defibrillation pads have a number of advantages over manual paddles and should always be used in preference when they are available.
- CPR should be continued while a defibrillator or automated external defibrillator (AED) is retrieved and applied but defibrillation should be undertaken rapidly but efficiently. The post shock pause is minimised by resuming chest compressions immediately after shock delivery (see below). The entire process of manual defibrillation should be achievable with less than a 5 s interruption to chest compressions.

Hands-on defibrillation

By allowing continuous chest compressions during the delivery of the defibrillation shock, hands-on defibrillation can minimise peri-shock pause and allow continuation of chest compressions during defibrillation. The benefits of this approach are not proven and further studies are required to assess the safety and efficacy of this technique. A recent study did not observe a benefit when

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shocks were delivered without pausing manual or mechanical chest compressions.[427] Standard clinical examination gloves (or bare hands) do not provide a safe level of electrical insulation for hands-on defibrillation.[428]

mid-axillary line, approximately level with the V6 ECG electrode. This position should be clear of any breast tissue.[437] It is important that this electrode is placed sufficiently laterally. Other acceptable pad positions include

Figure 5. Fragment of 2015 European Resuscitation Council Guidelines.
Source: Soar J, Nolan JP, Böttiger BW, et. al .: The European Resuscitation Council Guidelines for Resuscitation 2015: section 3. Adult advanced life support. Resuscitation. 2015; 95: 145.

Similar recommendations relating to mechanical chest compression devices have been issued by the American Heart Association (AHA) in their latest recommendations. American Heart Association recommends that the manual method of chest compressions remains standard care in the treatment of sudden cardiac arrest. At the same time, it extends examples of situations in which the use of such a device may not be justified: prolonged resuscitation, cardiac arrest connected with hypothermic, ambulance transport etc. (Fig.6) [23].

Mechanical Chest Compression Devices

2015 (Updated): The evidence does not demonstrate a benefit with the use of mechanical piston devices for chest compressions versus manual chest compressions in patients with cardiac arrest. Manual chest compressions remain the standard of care for the treatment of cardiac arrest. However, such a device may be a reasonable alternative to conventional CPR in specific settings where the delivery of high-quality manual compressions may be challenging or dangerous for the provider (eg, limited rescuers available, prolonged CPR, CPR during hypothermic cardiac arrest, CPR in a moving ambulance, CPR in the angiography suite, CPR during preparation for ECPR).

2010 (Old): Mechanical piston devices may be considered for use by properly trained personnel in specific settings for the treatment of adult cardiac arrest in circumstances (eg,

These inclusion criteria should be considered in a provider's selection of potential candidates for ECPR.

Adult Advanced Cardiovascular Life Support

Summary of Key Issues and Major Changes

Key issues and major changes in the 2015 Guidelines Update recommendations for advanced cardiac life support include the following:

- The combined use of vasopressin and epinephrine offers no advantage to using standard-dose epinephrine in cardiac arrest. Also, vasopressin does not offer an advantage over the use of epinephrine alone. Therefore, to simplify the algorithm, vasopressin has been removed from the Adult Cardiac Arrest Algorithm–2015 Update.

Highlights of the 2015 AHA Guidelines Update for CPR and ECC 13

Figure 6. Fragment of 2015 American Heart Association Guidelines
Source: https://eccguidelines.heart.org/wp-content/uploads/2015/10/2015-AHA-Guidelines-Highlights-Polish.pdf.

SUMMARY

Equipment for mechanical chest compressions to patient in cardiac arrest revolutionized modern approach to cardiopulmonary resuscitation in hospitals and ambulance services. Thanks to their use, it is possible to introduce advanced life support activities in a shorter time, because rescuers, who until now had to ensure high-quality patient's chest compressions now have hands free, for example to: intubate the patient, get the appropriate doses of drugs, etc. Additionally, using these devices it is possible to almost completely minimize interruptions of chest compressions without even in time of defibrillator charging and shock supplying. Certainly using described devices will have a positive effect on a curtailment of injuries to medical providers while manual resuscitation. In the literature, cases of spinal injuries have been reported many times during the CPR. These also included: pain of cervical spine, lumbar spine injuries and wrist injuries [24].

Despite the many advantages of described devices and promising results of several scientific studies, world organizations still maintain the position that the standard and classic method of chest compressions is the recommended one. This is due to the fact that there are not enough studies that would clearly demonstrate the benefits of routine use of automatic chest compressions. Therefore, it seems reasonable to continue work on utility equipment for mechanical chest compressions of patient in sudden cardiac arrest.

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