



LUCAS™ 2

Chest Compression System

Orientation Guide



Refer to the Instructions for Use for complete directions for use, indications, contraindications, warnings, precautions and potential adverse events.

This presentation should be viewed in its entirety by rescuers being trained for the first time on LUCAS™2.

LUCAS™2, also referred to as LUCAS, is an electrically driven chest compression system.





LUCAS™2 should only be used by persons with basic medical skills, such as:

- first responders, ambulance personnel, nurses, physicians, or medical staff who have
 - undertaken a CPR* course according to the resuscitation Guidelines, e.g. American Heart Association or equivalent
 - AND received training in how to use LUCAS

*CPR=cardiopulmonary resuscitation

Objectives



- Explain the emphasis on effective CPR
- Understand the importance of Coronary Perfusion Pressure (CPP)
- Define the characteristics of effective CPR according to Guidelines
- Describe the effects of rescuer fatigue on chest compressions



Objectives



Review the use of LUCAS including:

- Unpacking
- Assembly
- Adjustment
- Operation
- Stabilization Strap
- Defibrillation
- Ventilation
- Transporting the patient
- Changing the Battery
- Removing from patient
- Cleaning
- Removing and installing the Suction Cup

Sudden Cardiac Arrest (SCA)



Treatment Options

- CPR
- Defibrillation
- Oxygenation with ventilation



**CPR Guidelines have been changed to
make CPR more effective**

Why is CPR so important?

Coronary Perfusion Pressure (CPP)



- Measure of pressure driving blood flow to the heart muscle
- Typically 60 mmHg
- CPP drops dramatically in cardiac arrest



CPR



- Provides blood and oxygen to the brain and heart
- Generates CPP
- $CPP \geq 15$ mmHg associated with return of spontaneous circulation (ROSC)



Paradis NA, Gerard B, Rivers EP. et al. Coronary perfusion pressure and the return of spontaneous circulation in human cardiopulmonary resuscitation. *JAMA*. 1990;263:1106-1113.

Three Phases of Cardiac Arrest



1. Electrical:

- 0-3 minutes
- Immediate defibrillation

3. Metabolic:

- > 10 minutes
- ROSC highly unlikely

2. Circulatory:

- 4-10 minutes
- CPR: Ability to generate adequate CPP linked to ROSC

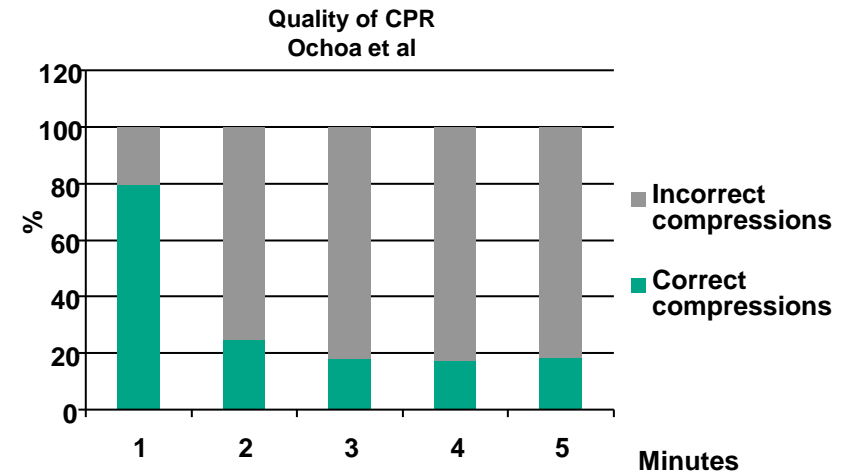
Weisfeldt ML, Becker LB. Resuscitation After Cardiac Arrest. A 3-phase time-sensitive model. *JAMA*. 2002;288(23):3035-3038.



Rescuer Fatigue



- May lead to inadequate compression rates and depths
- Significant fatigue and shallow compressions are seen after 1 minute of CPR¹
- Rescuers may deny that fatigue is present for ≥ 5 minutes²



¹ Ochoa FJ, Ramalle-Gómara E, Lisa V, Saralegui I. The effect of rescuer fatigue on the quality of chest compressions. *Resuscitation*. 1998;37:149-52.

² Hightower D, Thomas S, Stone C, Dunn K, March J. Decay in quality of closed-chest compressions over time. *Annals of Emergency Medicine*. 1995;26:300-303.

CPR Recommendations



- Ratio: 30 compressions to 2 ventilations
- Rate: at least 100 compression/minute
- Depth: at least 2 inches / 5 cm
- Duty cycle: 50%
- Allow chest wall to recoil completely
- Minimize interruptions
- Change rescuer who provides compressions every second minute

2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardio-vascular Care, Circulation 2010; 122: S639-946

Quality of CPR matters



- The guidelines are based on a large number of studies of what CPR technique is optimal to achieve a high coronary perfusion pressure and a successful defibrillation result
- One study demonstrated it took about 90 seconds after a pause of compressions to re-establish the previous CPP levels
- Mechanical chest compressions may eliminate unnecessary interruptions to compressions

Steen S, Liao Q, Pierre L, Paskevicius A, Sjöberg T. The critical importance of minimal delay between chest compressions and subsequent defibrillation: a haemodynamic explanation. *Resuscitation*. 2003;58:249-258.

Bottom Line



- Heart and brain perfusion is critical
- The Guidelines changed to make CPR more effective
- Most rescuers have difficulty meeting and maintaining CPR according to the Guidelines
- Looking for new solutions to improve CPR



LUCAS™ 2



- LUCAS is a portable device used to provide external cardiac compressions
- LUCAS meets all of the recommended Guidelines for effective CPR and won't get tired!
- LUCAS can be used during transport
- LUCAS is easy to use and a great asset to the team



LUCAS™2 Chest Compression System



Uses



- Adult patients in acute circulatory arrest
 - loss of consciousness
 - absence of spontaneous breathing and pulse
- LUCAS must only be used in cases where chest compressions are likely to help the patient



Contraindications



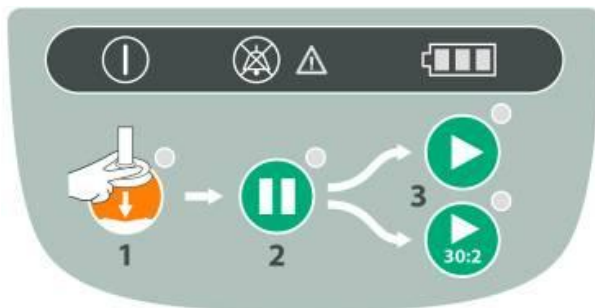
- If it is not possible to position LUCAS safely or correctly on the patient's chest.
- Too small adult patient
- Too large patient









Always follow local and/or international Guidelines for CPR when using LUCAS.

LUCAS™2 Chest Compression System



User Control Panel:



-  - ON/OFF
-  - ADJUST
-  - PAUSE (locked)
-  - ACTIVE (continuous) – LUCAS performs continuous chest compressions. The green LED signal will blink 8 times per minute to alert for ventilation
-  - ACTIVE (30:2) – LUCAS performs 30 chest compressions and then temporarily stops for 3 seconds. During the stop, the operator can perform 2 ventilations. After the stop the cycle starts again. An intermittent LED in combination with an alarm signal sequence will alert the operator before each ventilation pause
-  - MUTE
-  - Battery indicator
-  - Alarm indicator

Basic Steps for Use



- Arrival at the patient
- Unpacking
- Assembly
- Adjustment
- Operation
- Stabilization Strap
- Defibrillation
- Ventilation
- Transporting the patient
- Changing the Battery
- Removing from the patient
- Cleaning
- Removing and installing the Suction Cup

Arrival at the patient



- Confirm cardiac arrest

- Begin manual CPR until LUCAS is ready



Unpacking of LUCAS™ 2



- Position the bag with its top nearest to you
- Put your left hand on the black strap on the left side and pull the red handle so that the bag unfolds



Activate LUCAS™ 2



- Push ON/OFF on the User Control Panel for 1 second to power up LUCAS in the bag and start the self test. The green LED adjacent to the ADJUST key illuminates when LUCAS is ready for use



Note: LUCAS powers down automatically after 5 minutes if you let it stay in the ADJUST mode.

Assembly



- Remove the Back Plate from the Carrying Bag.
- Stop manual CPR
- Make sure that you support the patient's head
- Carefully put the Back Plate under the patient, immediately below the arm pits
- Start manual CPR again

Note: An accurate position of the Back Plate makes it easier and faster to position the Suction Cup correctly.



Assembly



- Hold the handles on the support legs to remove the LUCAS Upper Part from the bag
- Pull the release rings once to make sure that the claw locks are open
- Let go of the release rings



Assembly



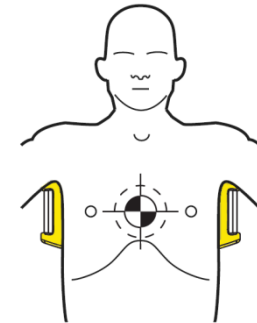
- Attach the support leg that is nearest to you to the Back Plate
- Stop manual CPR
- Attach the other support leg to the Back Plate, so that the two support legs lock against the Back Plate. Listen for click
- Pull up once to make sure that the parts are correctly attached



Positioning of the Suction Cup



For the compression to be effective and to avoid serious patient injuries, it is very important that the Suction Cup is properly positioned and centered over the sternum of the patient:



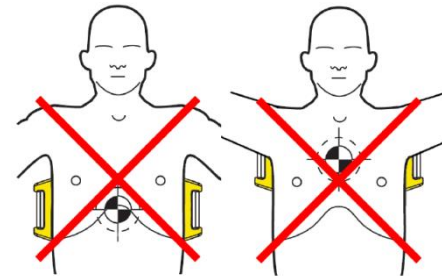
- The compression point should be the at the same spot as for manual CPR and according to guidelines
- When the pressure pad in the Suction Cup is in the correct positing, **the lower edge of the Suction Cup is immediately above the end of the sternum**



Adjustment procedure





- If necessary, move the device by pulling the support legs to adjust the position
- Compress in the right spot to avoid serious patient injury and get effective compressions
- Start manual CPR again if it is not possible to position LUCAS safely and correctly on the patient's chest



Adjustment procedure



- Make sure that LUCAS is in the ADJUST mode 
- Push the Suction Cup down with two fingers until the pressure pad touches the patient's chest without compressing the chest
- Push PAUSE to lock the Start Position - then remove your fingers from the Suction Cup* 
- If you cannot enter the PAUSE mode or ACTIVE mode when the pressure pad touches the patient's chest and LUCAS alarms with 3 fast signals, then the patient is too small. Start manual compressions again

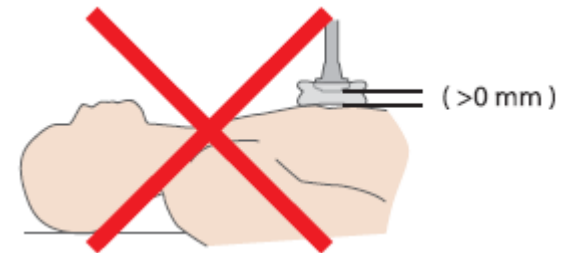
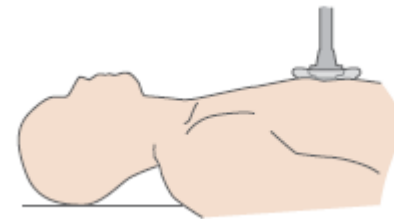


*for software version 2.1. LUCAS will adjust the pressure pad to the correct Start Position (within a range of 30 mm / 1.2 inches) if the pressure pad is pushed down too hard, or too loose to the chest

Adjustment procedure



- Do not use LUCAS if:
 - pressure pad doesn't touch chest
 - Upper Part won't fit around patient or claw locks won't fasten to Back Plate
- Continue with manual compressions



Adjustment procedure



- Critical to make necessary adjustments rapidly to minimize “no flow” time or time without compressions
- After the Back Plate is placed under the patient, it should take less than 20 seconds to stop manual compressions, connect the Upper Part of LUCAS, and start mechanical compressions
- *“Practice makes perfect”*



Operation



- Check for proper position. If not:
 - Push ADJUST, pull up the Suction Cup to readjust the central and/or height position for a new Start Position. Push PAUSE
- Push ACTIVE (continuous) OR ACTIVE (30:2) to start the compressions.

Note: *LUCAS in PAUSE mode stops the compressions but remembers the patient settings*



Stabilization Strap



- The LUCAS Stabilization Strap helps secure the correct position during operation
- Apply it while LUCAS is active to keep interruptions to a minimum
- Carefully lift the patient's head and put the cushion behind the patient's neck
- Connect the buckles on the support leg straps with the buckles on the cushion strap
- Hold the LUCAS support legs stable and tighten the cushion strap tightly

Note: Delay the application of the LUCAS Stabilization Strap if this prevents or delays any medical treatment of the patient



Defibrillation



- Defibrillation can be performed while LUCAS operates
- You can apply the defibrillation electrodes before or after LUCAS has been put in position

Note: Make sure pads or wires are not under the Suction Cup



Defibrillation



- Perform the defibrillation according to the instructions from the manufacturer of the defibrillator
- After defibrillation, make sure that the position of the Suction Cup is correct. If necessary, adjust the position
- LUCAS needs only to be stopped for ECG analysis – chest compressions interfere with ECG analysis



Ventilation



- Unprotected airway
 - Operate LUCAS in ACTIVE (30:2) mode
 - Deliver breaths during pause according to the Guidelines
- Protected airway
 - Operate LUCAS in ACTIVE (continuous) mode
 - Deliver breaths independently of LUCAS operation according to the Guidelines
- Always follow local and/or international guidelines for ventilation



Transporting the patient



- Secure the patient's arms
 - Apply Patient Straps on LUCAS to patient arms
- Make sure that IV access is not obstructed when using Patient Straps
- Do not lift LUCAS by the Patient Straps



Lifting the patient



- One person on each side and one person supporting the patient's head, even with Stabilization Strap in place
- Those at patient's side lift with one hand beneath claw locks of back plate keeping fingers clear of claw locks
- Other hand lifts patient's leg



Lifting the patient



- Push PAUSE to temporarily stop the compressions during the lift
- Make sure that the Suction Cup is in the correct position on the patient's chest
- Push ACTIVE (continuous) or ACTIVE (30:2) to start the compressions again



or



Transporting the patient



LUCAS can be active while you move the patient if:

- LUCAS and the patient are safely positioned on the transportation device
- LUCAS stays in the correct position and angle on the patient's chest



Changing Battery during operation



- Have a spare, fully charged Battery ready
- Push PAUSE to temporarily stop the compressions
- Pull the empty Battery out and then upwards to remove it. Install the fully-charged LUCAS Battery.
- Wait until the green PAUSE mode LED illuminates
- Push ACTIVE to start the chest compressions again



Keep interruptions to a minimum while changing the Battery. To minimize interruptions, we recommend to always have a charged spare LUCAS Battery in the Carrying Bag.

The LUCAS Smart Restart feature remembers the settings and Start Position for 60 seconds.

Removing from the patient



- Push ON/OFF for 1 second to power off the device
- If a LUCAS Stabilization Strap is attached to LUCAS, remove the cushion strap, which is part of the Stabilization Strap, from the support leg straps
- Pull the release rings to remove the Upper Part from the Back Plate
- If the patient's condition allows it, remove the Back Plate



Cleaning LUCAS™2



- Remove the used and contaminated Suction Cup
- Clean all surfaces and straps with a soft cloth and warm water with a mild cleaning agent or disinfectant agent, e.g.
 - **70% isopropyl alcohol solution**
 - **quaternary ammonium compound**
 - **45% isopropyl alcohol with added detergent**
 - **10% bleach**
- Do not immerse LUCAS in liquid. The device can be damaged if liquid enters the hood



Changing the Suction Cup



- Remove the used and contaminated Suction Cup
- Mount a new Suction Cup according to the picture to the right



Side Effects



- Bruising and soreness of the chest is common during use of LUCAS
- The International Liaison Committee on Resuscitation (ILCOR) states the following side effects of CPR:
 - Rib fractures and other injuries are common but acceptable consequences of CPR given the alternative of death from cardiac arrest
 - After the resuscitation, all patients should be reassessed and reevaluated for resuscitation-related injuries

2005 International Consensus on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) Science with Treatment Recommendations. Circulation. 2005;112(suppl III):III-11.

Summary



- CPR is receiving renewed attention
- More emphasis on meeting Guideline recommendations for CPR
- LUCAS achieves effective and consistent compressions easily
- LUCAS helps minimize unnecessary interruptions to compressions
- LUCAS benefits both rescuer and patient



www.lucas-cpr.com | a product by JOLIFE