TOPIC # 15: LUCAS 3.1 Chest Compression System

Description:

The LUCAS device is designed as a portable tool to assist rescuers be delivering effective, consistent, and continuous chest compressions as recommended by AHA guidelines. LUCAS device may also be useful during transport situations or extended CPR due to loss of efficacy from provider fatigue or manpower becomes exhausted. CFD personnel must be specifically trained on use and deployment of this device in order for it to be successful in its designed functions and ensure serviceability. Training can be conducted by ALS Supervisors and the EMS Bureau as requested/required.

Contraindications:

Do NOT use LUCAS in the following 3 cases:

- Device cannot be placed safely & correctly on patient
- A patient too small (3 fast signal alerts will notify responders in such cases)
- A patient is too large (backing plate cannot be locked to piston device without compressing patient's chest

Device Components:

- Back Plate
  - Positioned underneath patient as support for compressions
- Upper Part
  - Contains battery, compression system w/ control module, and disposable suction cup device
- Stabilization Strap
  - Secures position of device in relation to patient
- Carrying Case

Notes:

- It is not uncommon that during deployment of the LUCAS that a patient will develop rib fractures, contusions, abrasions, or soreness. These are acceptable consequences during the course of CPR given the alternative of death from cardiac arrest.
- Do not immerse the machine or components in ANY solution to attempt to decontaminate. This will cause permanent damage to LUCAS and/or cause component failure.
- Do not attempt repair or opening of housing of the LUCAS for any reason. This may void warranty and permanently damage device.
- Patient's chest must be dry and free of gels in order for suction pad to remain in position

Features & Device Controls:

ON/OFF:
The LUCAS device will power up/ power down when you push this key for 1 second. When the device powers up, you will hear an audible signal sequence and the device automatically does a self-test of the functions and the protective system. When the self-test is complete the audible signal stops and a green LED (Light Emitting Diode) beside the ADJUST key illuminates. This procedure takes approximately 3 seconds.

ADJUST:
This mode is used when you want to adjust the position of the Suction Cup. When you push this key, you can manually move the Suction Cup up or down.

To set the Start Position of the Suction Cup, manually push down the Suction Cup onto the chest of the patient.

To lift up the Suction Cup from the chest, manually pull up the Suction Cup

PAUSE:
When you push the PAUSE key after adjusting the Suction Cup to the patient's chest, the height position of the Suction Cup is fine-tuned and locked into the Start Position.

When you push this key during device compressions, the LUCAS device will stop compressions and lock the Suction Cup in its Start Position.

ACTIVE (continuous):
When you push this key, the LUCAS device performs continuous chest compressions. The green LED signal will blink 10 times per minute to alert for ventilation during ongoing compressions.

ACTIVE (30:2):
When you push this key, the LUCAS device performs 30 chest compressions and then temporarily stops. During the stop, the operator can perform 2 ventilations. After the stop the cycle starts again. An intermittent LED in combination with an audible signal sequence will alert the operator before each ventilation pause.

Common Indicators & Battery Information:

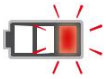
Battery indicator levels are based on 3 LED lighting patterns:

- Three green LEDs: Fully charged

- Two green LEDs: 2/3 charged

- One green LED: 1/3 charged

- One intermittent yellow LED and alarm during operation: low battery, approximately **10 minutes** of operating capacity remaining.



- One intermittent red LED and an alarm signal means battery is empty and MUST be recharged or battery is too hot for operation.

Note: When the LED to the far right is yellow and not green, the Battery has reached the end of its service life. Jolife recommends that this battery be replaced with a new one.

MUTE:
If you push this key when the LUCAS device operates, you mute the alarm for 60 seconds. If you push this key when LUCAS is powered off, the battery indicator will show the charge status of the battery.

High priority alarms:

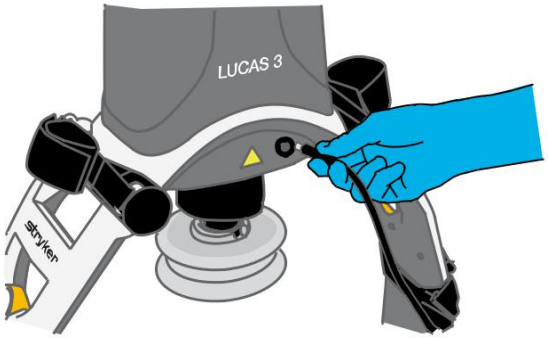
One intermittent red LED and an alarm signal sequence indicate malfunction. A high priority alarm will take precedence over lower priority or information related alarms. Refer to ALS Supervisor on remedy and clearing the alarm. ANY malfunction alarm during a cardiac arrest requires that manual compressions be started on a patient.

TRANSMIT data:
Push this key to send device data and receive new setup options. The device has to be in Power OFF mode to send and receive data.

Equipment & Operation

Every CFD Medic Units will have the following items:

- A LUCAS device (Upper Part and Back Plate)
- 2 disposable LUCAS Suction Cups
- A LUCAS Carrying Case
- Instructions for Use
- A rechargeable LUCAS Battery (x2?)
- A LUCAS Stabilization Strap
- LUCAS Patient Straps
- Disposable LUCAS Suction Cups
- External LUCAS Battery Charger
- LUCAS Power Supply & Cord



Battery Charging:

You can charge the LUCAS Battery in two ways:

In the LUCAS Battery Charger:

-- put the Battery in the slot of the Battery Charger,

-- connect the Battery Charger power cord to the mains wall outlet.

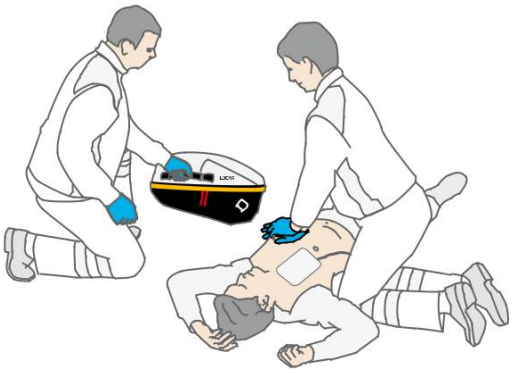
Installed in the LUCAS device:

-- put the Battery in the slot of the hood of the LUCAS device,

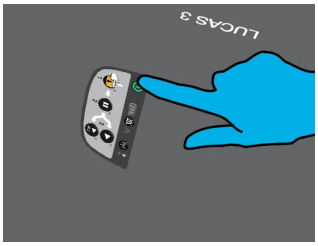
-- connect the Power Supply to the DC input on the side of the LUCAS device,

-- connect the Power Supply to the mains wall outlet (available on CFD Medic Units)

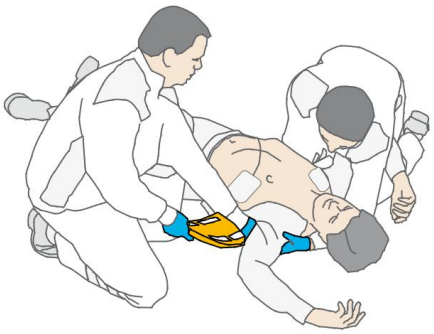
Using the LUCAS Device:



When you have confirmed a cardiac arrest, immediately start manual cardiopulmonary resuscitation (CPR). Minimize interruptions to manual chest compressions during the preparation and application of the LUCAS Chest Compression System.



Open carrying case and remove device. Push ON/OFF on the User Control Panel for 1 second to power on and start self-test.

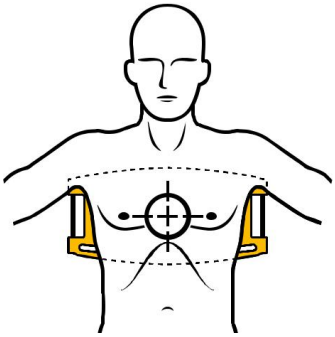


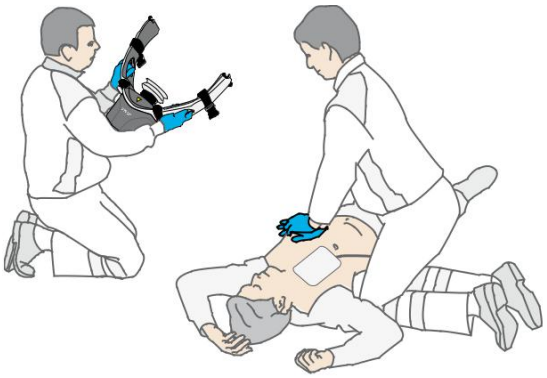
****Keep compression interruptions to a minimum.**

Remove back plate from carrying case and pause manual CPR briefly before placing back plate under patient.

This will require coordinated effort to roll or lift patient by members.

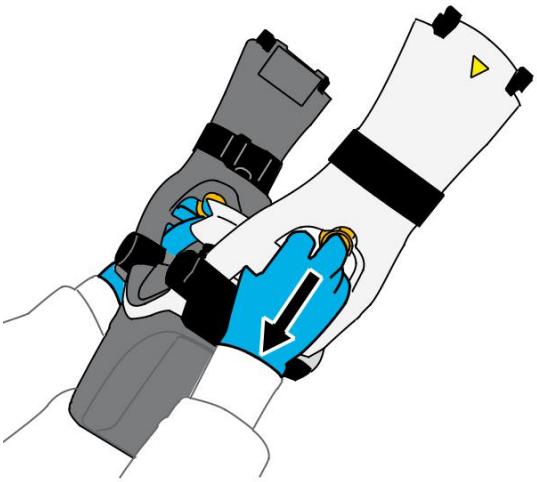
Ensure plate is directly below armpits as shown here. Resume CPR immediately after plate is positioned



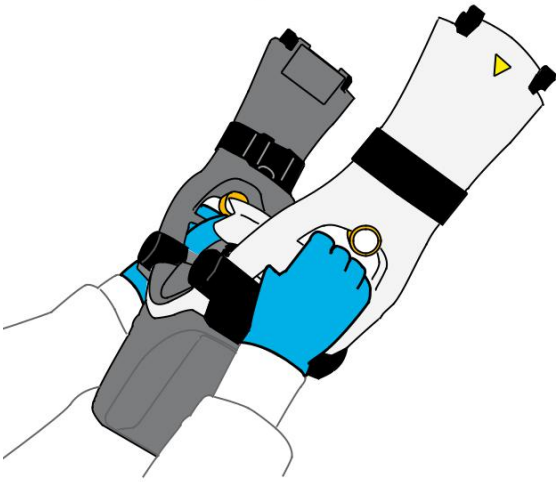


1. Hold the handles on the support legs to remove LUCAS upper part from case.
2. Pull release rings once to make sure claw locks are open
3. Release rings.

4. Minimize CPR interruption using coordinated effort and secure upper part to back plate.
5. Listen and ensure "CLICK" is heard to make sure parts are secured together.



If a patient is too large for device this will be apparent by device not locking into place. Abandon attempts to force device onto patient and resume manual CPR per protocol.



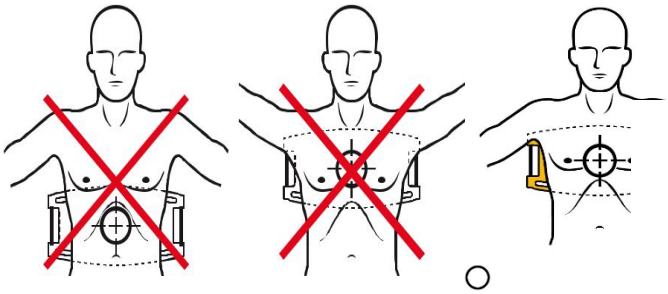
Once in place, adjust the suction cup to the correct position on the patient's chest. The compression point should be at the same spot for manual CPR. When the pressure pad on the suction cup is in the correct position, **the lower edge of the suction cup is immediately above the end of the patient's sternum.**

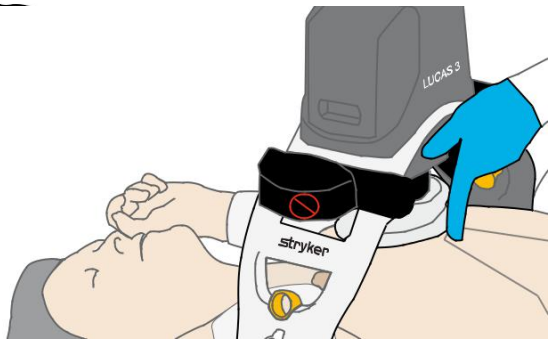
You can place your finger as shown to make sure that the lower edge is above the sternum. Periodic checks during event to ensure proper positioning may be needed especially if transporting patient.

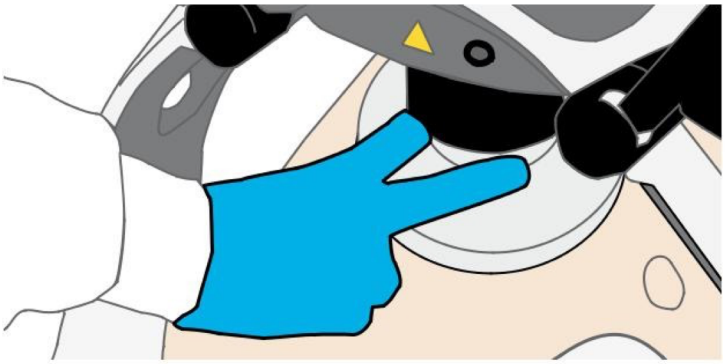
With the device in **adjust** mode, adjust the height of the suction cup to the chest to set start position. Suction cup touching the patient's chest is the start position.

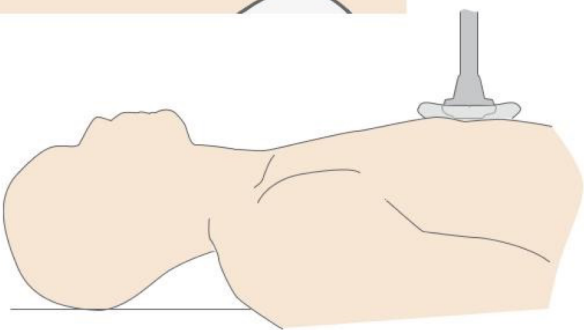
Pressing **pause** will lock the start position and press **active (continuous) or active (30:2)** to begin LUCAS compressions. If at any time device is not able to placed correctly or safely on patient, abandon attempts and being manual CPR

See images below for reference points





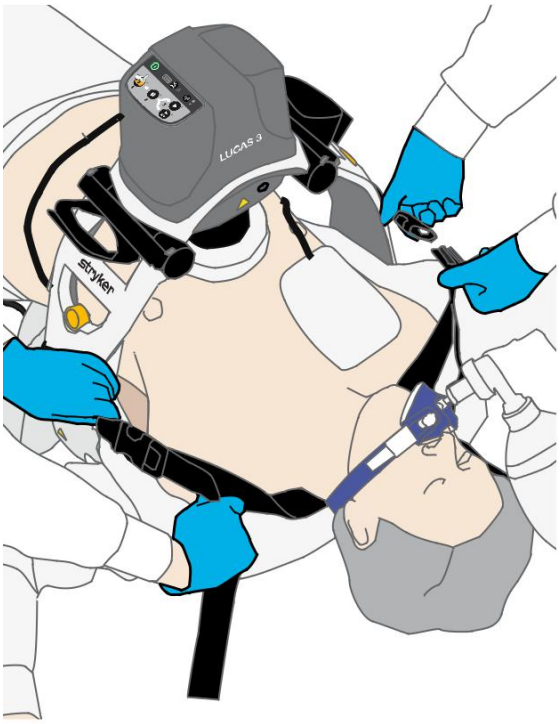




Once device is in place and operating as prescribed, apply stabilization strap to patient. Applying this strap while compression on underway minimizes interruptions. You may delay application of the strap if other interventions take precedence.

1. Remove neck strap from carrying case and fully extend at the buckles.
2. Carefully lift patient's head and put cushion behind patient's neck. Position the cushion as near the shoulders as possible
3. Connect buckles to support leg straps
4. Hold LUCAS support legs stable and tighten neck strap
5. Recheck position of suction cup to ensure no accidental movement, if not push **adjust** and release buckles as needed to reposition suction cup.
6. Press **active** to resume compressions

LUCAS® 3 [redacted]
CHEST COMPRESSION SYSTEM

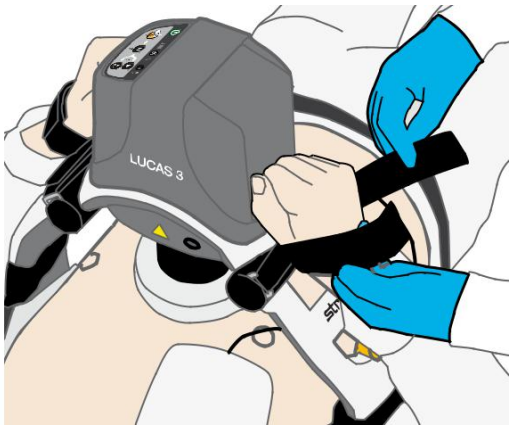


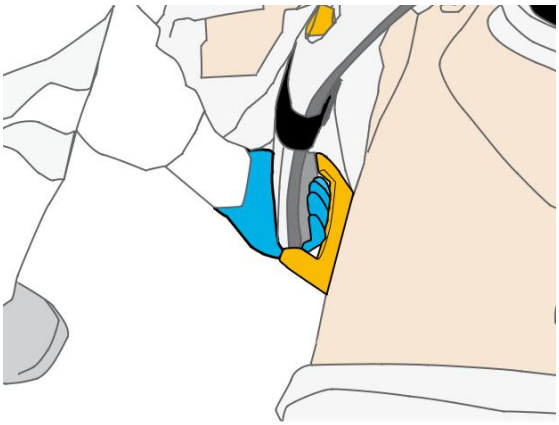
Securing and Moving a Patient:

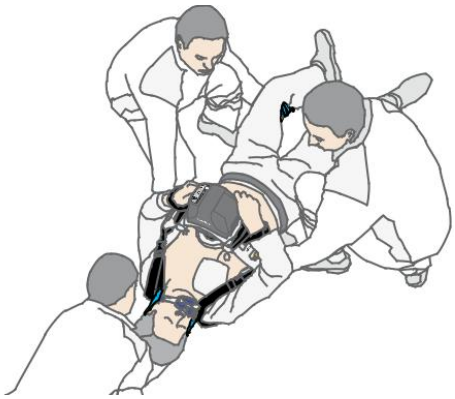
Secure patient's arms to LUCAS device with Velcro straps on upper part. Ensure during movement that **no straps of any type** are used to lift or move patient. This will cause movement of device and may injure patient or providers. Ensure that coordinated efforts are utilized and that adjuncts such as IV access, airways, bleeding control items, cables, and tubing are clear for lifting and movements.

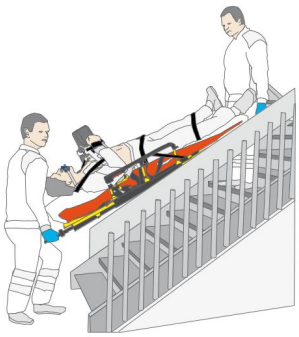
Providers at the patient's side should put one hand **below claw locks** as shown to support under device and use other hand under thigh or use belt, clothing, bedding, etc. to lift/move patient.

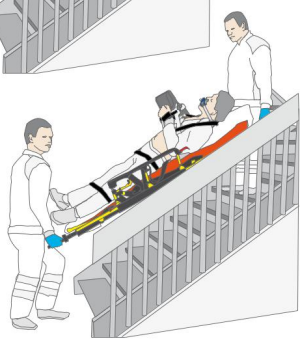
Patients can be moved down stairs as shown but once to destination such as building elevator, lobby, ambulance, etc. Recheck position of suction cup to ensure proper positioning. During prolonged movements/transport it may become necessary to remove a battery that is low and replace with new battery. This should only take a few seconds by pressing **pause** and replacing battery and then pressing **active** to resume CPR and should only result in minimal interruption to operation of device.





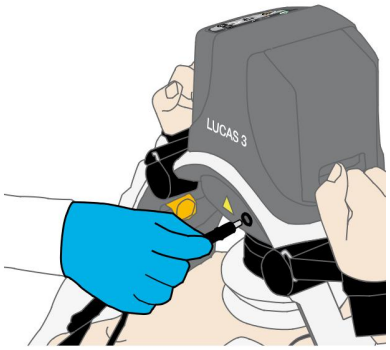






Connecting to External Power Supply:

LUCAS can be connected to external power supply using provided adapter. Connect power supply cable as shown and plug into wall outlet such as one found on CFD Medic Units. Battery must be kept in place at all times to allow for proper functioning of device even if being used on 100-240V power system.



Operating LUCAS in conjunction with LP-15, ventilation, and defibrillation:

Defib pads can be applied before or after application of the LUCAS device. There is no change is protocol for defibrillation when using LUCAS device.

Be sure to position pads and wires so that they are not under suction cup device. If pads have been applied and are now under suction cup they must be removed and new pads applied so as not to be under suction cup.

It may be necessary to recheck positioning after "spasm" of patient following initial and repeat defibrillations.

Ventilation:

- **ACTIVE (continuous)**
  - LUCAS performs continuous compressions and green LED signal will blink 10 times per minute to alert for ventilations during compressions
- **ACTIVE (30:2)**
  - LUCAS performs 30 compressions and stops to allow for 2 ventilations to be given by providers. Intermittent signal and LED alerts providers before each ventilation pause takes place.

Concluding Notes:

- LUCAS device is safe to remain on patient should it be necessary for ongoing resuscitation efforts in Emergency Department or Cath Labs
- To remove device simply follow reverse order of application and stow accordingly after decontamination procedures take place (see below)

Decontamination & Routine Checks:

- Clean surfaces and straps with mild cleaning solution of the following:
  - Sani-Wipes (CFD Issued as of this publication)
  - 10% bleach **use of stronger concentration may damage device and void warranty**
  - Hydrogen Peroxide wipes (commonly used at hospital destinations)
  - **Under no circumstances should unit be wetted down or submerged. This includes overspray from bleach solutions especially into hood area of device.**

Decontamination & Routine Checks (cont'd):

After each use or during monthly drug inventory checks LUCAS system should be checked for the following:

- Device is clean
- New suction cup is installed on device
- Make sure patient straps are attached, secure, and ready to use on device
- Ensure neck strap and buckle attachments are on device and strap is inside carrying case
- Pull release rings upwards to make sure claw locks are working and in open position
- Make sure battery is fully charged. When LUCAS is off push **mute** and battery indicator will show charge level
- Push **on/off** to make device do a self-test and make sure **adjust** LED illuminates and no alarms are present
- Power off device and stow accordingly
- Check cords and adapters for damage
- Any damage or faults with LUCAS should be reported to Company Officer and ALS Supervisor immediately and Form-40 filled out if required for repairs.