LUCAS™
Chest Compression System

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PHYSIO CONTROL
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.
LUCAS should only be used by persons with basic medical skills such as:

• First responders, ambulance personnel, nurses, physicians, or medical staff who have completed a CPR course according to the American Heart Association or equivalent, AND

• Receive training in how to use LUCAS
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 and connecting the air source
• Assembly
• Adjustment
• Operation
• Stabilization strap
• Removing from patient

• Defibrillation
• Ventilation
• Transporting the patient
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 $\geq 15$ mm Hg associated with return of spontaneous circulation (ROSC)

Three Phases of Cardiac Arrest

• Electrical:
  – 0-3 minutes
  – Immediate defibrillation

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

• Metabolic:
  – > 10 minutes
  – ROSC highly unlikely

Rescuer Fatigue

- May lead to inadequate compression rates and depths
- Significant fatigue and shallow compressions are seen after 1 minute of CPR
- Rescuers may deny that fatigue is present for $\geq 5$ minutes


CPR Recommendations

Ratio: 30 compressions to 2 ventilations
Rate: 100 compressions/minute minimum
Depth: 1 ½ - 2 inches (4-5 cm)
Duty cycle: 50%
Allow chest wall to recoil completely
Minimize interruptions

Guiding Principle

- The Guidelines and several studies have stressed the importance of minimizing interruptions in chest compressions
- Guidelines recommend switching rescuers performing compressions every 2 minutes
- One study demonstrated it took about 90 seconds after a pause in compressions to re-establish previous CPP levels
- Mechanical chest compressors eliminate unnecessary interruptions to compressions

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

- 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
Uses

- Adult patients in acute circulatory arrest
  - loss of consciousness
  - absence of spontaneous breathing and pulse

- LUCAS should only be used in cases where manual chest compression would be used

- Intended only for temporary use
Contraindications

• Too small adult patient
• Too large patient
• Children
• Traumatic injury
• Advanced pregnancy
LUCAS Cardiac Compression System

Knob positions:

- ADJUST (1)
- LOCK (2)
- ACTIVE (3)
Basic Steps for Use

- Arrive at patient and check responsiveness
- Provide manual compressions, if needed, until LUCAS attached
- Open LUCAS bag and connect the air
- Assembly
- Adjustment
- Operation
- Stabilization strap
- Removing from patient
- Changing air source
Considerations for LUCAS Use

- Defibrillation
- Ventilation
- Transporting the patient
Arrival at the patient

- Confirm cardiac arrest
- Begin manual CPR until LUCAS is ready
Unpacking LUCAS

- Place bag on ground with the top of LUCAS closest to you
- Open cover so that entire bag unfolds
Connecting the Air

• Confirm knob is in the **ADJUST** position
• Attach air hose connector to regulator of air cylinder or to wall outlet
• Open air valve, if using a pressure regulator
• Always follow proper sequence of air connection and assembly so the device doesn’t start compressing by mistake and potentially cause injury
Assembly

- Remove back plate from bag
- Stop manual CPR
- Lift up patient’s upper body
- Lay back plate under body below armpits
- Resume manual CPR
Assembly

- Lift upper part out of bag
- Open support legs
- Pull release rings to ensure claw locks are opened
Assembly

- Stop manual compressions
- Place upper part over patient’s chest so claw locks engage with back plate
- Lock support legs to back plate
- Pull up to ensure legs are locked to back plate
Adjustment-Position

For effective compressions and to avoid serious patient injury it's important to make sure to start with the suction cup in the correct position:

• Lower edge of suction cup should be immediately above the end of the sternum
• Suction cup should be centered over the sternum
Adjustment Procedure

- If the suction cup is too low on the sternum, reposition LUCAS by pulling it up higher on the chest

- Compress in the right spot to avoid serious patient injury and get effective compressions
Adjustment Procedure

- Ensure the knob is in the ADJUST position
- Lower suction cup until pressure pad inside suction cup touches patient’s 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

- Turn knob to **ACTIVE** to begin compressions
- Check for proper position
- Turn knob to **ADJUST** to reposition, if needed, and back to **ACTIVE** to resume compressions
- Turn knob to **LOCK** to stop compressions for any reasons
- Do not leave patient or device unattended while LUCAS is active.
Stabilization Strap

- Start compressions
- Place support cushion under patient’s neck
- Fasten cushion straps to device straps
- Tighten the straps
- Delay, or don’t use stabilization strap when it might impair treatment
Removing LUCAS from Patient

- Remove patient arms from support straps
- Disconnect and remove stabilization strap
- Turn knob to **ADJUST**
- Raise suction cup to uppermost position
- Disconnect upper part of LUCAS from back plate and replace in bag
- Remove back plate
- Close air valve on regulator
- Turn knob to **ACTIVE** to purge air from system
- Return knob to **ADJUST**
- Disconnect air hose from air source
Changing Air Source During Use

- Set knob to **ADJUST**
- Close valve on used air cylinder
- Disconnect air hose from air source
- Attach air hose to new air source
- Open valve on new air cylinder
- Adjust the height of suction cup, if needed
- Turn knob to **LOCK**
- Turn knob to **ACTIVE** to continue compressions
Break for practice applying/removing LUCAS on a manikin
Defibrillation

- Defibrillation pads may be applied before or after LUCAS is placed
- Make sure pads or wires are not under suction cup
Defibrillation

- Stop LUCAS during ECG rhythm check or analysis — compressions can interfere with ECG analysis
- Perform defibrillation as usual according to the manufacturer’s instructions following AED prompts and agency protocols
- Check for correct position of LUCAS on patient’s chest after defibrillation shock and adjust if needed
Ventilation

- Unprotected airway: stop LUCAS while delivering breaths according to the Guidelines

- Protected airway: deliver breaths independently of LUCAS operation according to the Guidelines
Transporting the Patient

• Secure the patient’s arms
  – Apply straps on LUCAS to patient arms

• Do not over-tighten

• Do not lift LUCAS by the arm straps
Transporting the Patient

• 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
Transporting the Patient

- Turn knob to **LOCK** to pause compressions during lift

- Check position of suction cup

- Turn knob to **ACTIVE** to resume compressions
Transporting the Patient

Once the patient is placed on the stretcher or other surface, LUCAS may be in active state during all horizontal lifts and movements.
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

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

• Practicing LUCAS application will be benefit both rescuer and patient
Practice Scenarios
A 65 year old man was found unresponsive down in the basement of his house by his wife. She called 9-1-1. Your response time is 8 minutes. Upon arrival you find the patient unconscious, pulseless and not breathing. No CPR in progress.
48 year old was playing basketball at a local community center. He started to complain of shortness of breath and chest tightness. His friends called 9-1-1. Upon arrival you find the patient is pale and sweaty. He rates his chest pain as 8 (1-10 scale). You are about to take his blood pressure when he suddenly collapses and is unresponsive.
Hospital-Witnessed Arrest

76 year old man walked in to the ED 30 minutes ago with c/o fever, malaise and dizziness for the last 3-4 days. Triage nurse comes out to the waiting room and begins to assess the situation when the patient suddenly slumps over on the couch and is unresponsive. You respond to her call for help.
Hospital-Witnessed

44 year old woman admitted with c/o abdominal pain and distention. She is scheduled for a CAT scan. The transporter goes into her room and you hear a call for help. You arrive and find the patient unresponsive, pulseless, and not breathing.
Special Situation

33 year old woman c/o fatigue, increasing shortness of breath, tingling in fingers and chest discomfort. The symptoms started this morning and she was told to come to the ED. She suddenly collapses and is unresponsive. She is 8 months pregnant.
A distraught family member has called for help after finding her 78 year old grandmother unconscious in a chair. He just stopped by for a visit. The grandmother has a history of congestive heart failure, diabetes, and gout. She is unresponsive, cold and has signs of lividity.
USA Rx

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For more information, please contact Physio-Control at 1.800.442.1142 or visit our Web site at www.physio-control.com.

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