ResQCPR™ System

What is the **ResQCPR System?**

The performance of ResQCPR relies on the use of two devices: the **ResQPOD® ITD 16**, an impedance threshold device (ITD), in combination with active compression-decompression cardiopulmonary resuscitation (ACD-CPR), performed with the **CardioPump® ACD-CPR Device**. No other device on the market delivers true ACD-CPR with 10 kilograms (kg) of lift, which increases the chances of survival after cardiac arrest.

Even though high-quality manual or automated CPR has been shown to increase survival, it provides only about 25%–40% of normal blood flow to the heart and brain.[1]

The ResQCPR devices work synergistically to deliver improved blood flow during cardiac arrest. By increasing the amount of blood returned to the heart (preload), and lowering intracranial pressure (ICP) during CPR, the ResQCPR System has been shown in human trials to deliver near-normal blood pressure.[2,3]

More importantly, a large clinical trial comparing conventional manual CPR to ResQCPR showed a **53% increase in neurologically intact survival** to hospital discharge, and a survival benefit that persisted out to one year.[4]

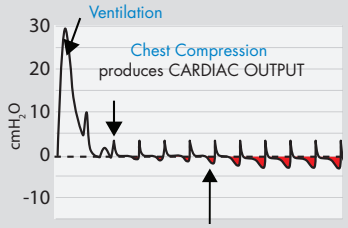
Conventional CPR Limited Blood Flow

Chest compression forces air out of the lungs and blood out of the heart. During chest wall recoil, air is drawn in and eliminates the vacuum (negative pressure) that is needed to fill the heart. Intracranial pressure (ICP) is also slightly lowered during this phase.

Blood flow may be limited due to:

1. Air rushing back into the lungs during chest wall recoil, minimizing the critical vacuum and resulting in suboptimal preload and cardiac output.
2. Incomplete chest wall recoil, which compromises preload.
3. CPR quality issues (e.g., ventilating and compressing too fast or too slow).

Airway Pressures



Hemodynamics

Blood Pressure[5]

ResQCPR Improved Perfusion and Near-Normal Circulation

The ResQCPR devices work together to optimize perfusion:

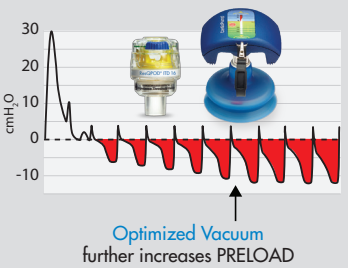
ResQPOD ITD 16

1. Regulates airflow into the lungs during chest wall recoil (except when intended during ventilation), enhancing the vacuum that generates preload and further lowering ICP.
2. Timing lights promote proper ventilation rate.

CardioPump ACD-CPR Device

1. Allows the user to perform ACTIVE decompression, which further enhances the vacuum.
2. Gauge displays compression and lift forces.
3. Metronome promotes proper compression rate.

Airway Pressure Impact



Hemodynamic Impact

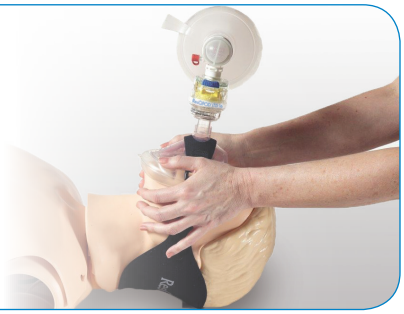
Blood Pressure[3]

ResQPOD® ITD 16

The ResQPOD regulates ariflow during the chest wall recoil phase of CPR to enhance the vacuum in the patient's chest. This increases preload and lowers intracranial pressure (ICP).

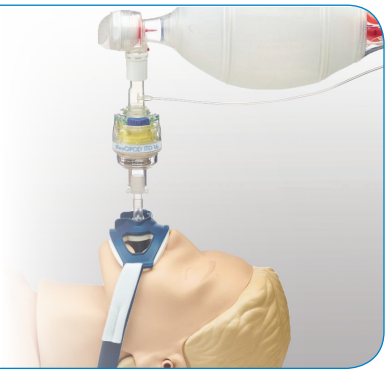
Using the ResQPOD on a Facemask

1. Connect the ResQPOD to a facemask.
2. Open the airway, lifting the jaw to facemask. Establish and maintain tight face seal with mask throughout chest compressions; a head strap and two-handed technique are recommended.
3. Connect the ventilation source to the top of the ResQPOD.



Using the ResQPOD on an Endotracheal (ET) Tube

1. Confirm ET tube placement and secure with a commercial tube restraint.
2. Connect ResQPOD to ET tube.
3. Place $EtCO_2$ detector between ResQPOD and ventilation source (preferred).
4. Connect ventilation source to top of $EtCO_2$ detector.
5. Turn on timing assist lights. Ventilate during active decompression phase (preferred) at timing light flash rate of 10/min.



Additional Information for Caregiver

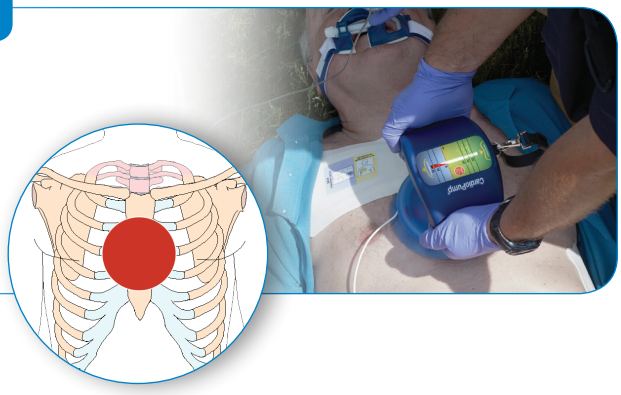
- Perform CPR at recommended compression-to-ventilation ratios.
- Ventilate over 1 second until chest rises.
- Do not hyperventilate!
- Clear secretions from the ResQPOD by blowing out using the ventilation source.

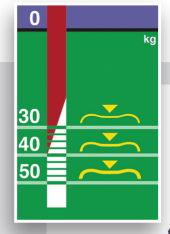
CardioPump® ACD-CPR Device

The CardioPump further enhances the effect of the ResQPOD by actively re-expanding the chest, rather than relying on it to passively recoil. It also promotes proper ResQCPR compression rates (80/minute), and helps guide compression and lifting forces.

Rescuer and CardioPump Positioning

Kneel close to the patient's side with shoulders directly over the patient's chest. Place the CardioPump in the middle of the chest, between the nipples but above the xiphoid process. Shaving may be needed to achieve good suction.





Compress

Compress to recommended depth (e.g., 2 inches or 5 centimeters). Observe the force required to achieve that depth, as it will vary according to how compliant the chest is. The tip of the red arrow indicates the force being applied.

The approximate amount of force required to compress the chest 2 inches/5 centimeters is:

- 30 kg: soft/supple chest
- 40 kg: chest of average compliance
- 50 kg: stiff/rigid chest

Once the amount of force required is known, use that target as a guide for continued compressions.

Arms should be straight with shoulders directly over the sternum. Bend at the waist and compress, using the entire upper body and large thigh muscles. Compress at a rate of 80/minute using the metronome (push button) as a guide. This rate allows for more filling time. Compress on one tone, lift on the other tone.

Lift

To fully achieve the benefits of ACD-CPR, attempt to actively pull up until the tip of the red arrow on the force gauge registers ≈10 kg. Lift using the upper body and large thigh muscles, and bending at the waist. If the suction cup dislodges, pull up slightly less. It is not necessary to lift with more than 10 kg of force. The CardioPump is the only device that allows rescuers to deliver true ACD-CPR.

Performing High-Quality ResQCPR

1. Confirm absence of pulse and send for an AED.
2. Begin chest compressions with the CardioPump.
3. Attach the ResQPOD to a facemask, using a two-handed technique to maintain a tight facemask seal and airway position. Move it to the advanced airway once intubated, and turn on lights to guide ventilations.
4. Begin using both devices as soon as possible so that the patient receives the benefit of ResQCPR at the earliest opportunity.
5. Perform chest compressions at the recommended compression-to-ventilation ratio. Use a 50% duty cycle, spending equal time compressing and lifting. Avoid interruptions.
6. Use the force gauge to monitor forces and rescuer fatigue. Rotate ACD-CPR duties every two minutes (or more often) to avoid fatigue.
7. If the patient has a return of spontaneous circulation (ROSC), use of both devices should be discontinued. If the patient re-arrests, resume ResQCPR immediately.
8. NOTE: Signs and symptoms of improved cerebral blood flow (e.g., eye opening, gagging, spontaneous breathing, limb or body movement) have been reported in patients without a pulse who are undergoing ResQCPR. If these occur, check quickly to see if a pulse has returned. If the patient remains in cardiac arrest, continue ResQCPR and contact your medical control authority for guidance on managing these signs and symptoms in an arrested patient. If ROSC occurs, discontinue ResQCPR and support ventilations as indicated.

For additional product training resources, go to www.zoll.com or www.AmericanCME.com.

PRODUCT		ORDER #
	ResQCPR Carrying Case	12-0935-000
	ResQCPR Demo Kit	12-0869-000
	ManiKIT™ with ResQPAD™	12-2116-000
	Suction Cup for ACD-CPR Device	12-0586-000
	ResQPAD (box of 2)	12-2394-000

See product inserts for additional instructions for use. The ResQCPR System should only be used by personnel who have been trained in its use. Pre-clinical studies may not be indicative of clinical outcomes.

[1]Andreka P, et al. *Curr Opin Crit Care*. 2006;12:198-203.
[2]Lurie KG, et al. *Cardiovasc Electrophysiol*. 1997;8:584-600.
[3]Plaisance P, et al. *Circulation*. 2000;101;989-994.
[4]Aufderheide TP, et al. *Lancet*. 2011;377(9762):301-311.
[5]Pirrallo RG, et al. *Resuscitation*. 2005;66:13-20.

Printed in U.S.A. MCN IP 1606 0132

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