AutoPulse®

ZOLL®

# Mechanical CPR in the Hospital


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MONITOR


# When Do You Need Mechanical CPR?

Justifying the use of mechanical CPR in the pre-hospital setting where the number of rescuers is limited and patients must be moved out of buildings and transported in an ambulance is not difficult. But in the hospital, where if anything, too many caregivers respond to most codes, the role of mechanical CPR may not be so obvious. However, there is a definitive need, time, and place for mechanical CPR with in-hospital arrest.


***LifeBand® Load-distributing Band (LDB)***

*Because the AutoPulse uses a load-distributing band that squeezes the entire chest, patients receive consistent, high-quality compressions that drive good blood flow.*

## When Staff is Limited

The evidence is clear. Outcomes are worse on nights and weekends when qualified staff might be limited or otherwise engaged.[1] Not only may there be a shortage of personnel, but taking staff from their assigned duties upsets flow and can begin to disrupt patient care in other areas. The small hospital ED can be completely upset by a single code in the hospital, even if it's not in the ED.


## When Codes Run Long

Long codes strain resources, and the quality of CPR among the many providers can vary considerably. Moreover, a recent review in *The Lancet* reported that many hospitals are terminating CPR too early in asystolic patients: A longer period of CPR can increase survival more than 20%.[2] In addition, patients who are comatose due to hypothermia must be warm before the outcome can be certain. The AutoPulse® Non-invasive Cardiac Support Pump can run that code for as long as necessary while you get the patient warm. And, as a recent case in London showed, cold and comatose need not mean warm and dead—even after three hours if there is sufficient perfusion to maintain major organ viability.[3]

## When Manual CPR is Dangerous

Thankfully, codes in the cardiac cath lab are infrequent, but when they happen, in order to protect staff from excess radiation, the procedure must be stopped and the table returned to home position—at the very time when reperfusion of the myocardium is paramount. AutoPulse maintains perfusion, allows vascular access, and supports end organ perfusion.


***AutoPulse User Control Panel***

*Easy to use, studies show that trained staff can deploy the AutoPulse in less than 30 seconds.*

## When You Need Time to Think

There are many reversible causes of cardiac arrest, ranging from tamponade in a trauma to a post-surgical thromboembolism or an inadvertent narcotic overdose in a medical patient. The chaos of a code does not provide the optimal atmosphere for thinking, but when automated CPR takes over the perfusion task, calming the entire atmosphere, there is time and opportunity to think and react appropriately.

## Who Should Be Responsible for Mechanical Support?

After nearly 10 years of experience with mechanical CPR, it has become evident that just like a dedicated code team, deploying mechanical CPR quickly, appropriately, and effectively benefits from a dedicated team as well. Codes are infrequent enough that maintaining skills across multiple departments is difficult at best. Among the groups usually trained to manage the AutoPulse are respiratory therapy, rapid response team members, and resuscitation officers. The keys to an effective, rapid deployment are training, regular practice, and mock codes. Studies show that trained staff can deploy the AutoPulse in under 30 seconds, minimizing interruptions to perfusion and supporting a high CPR fraction.[4]

## AutoPulse Should Be Your Mechanical CPR Device of Choice

All other mechanical CPR devices replicate the motion of the hands on the sternum by using a piston to compress the heart, and then allow it to fill. AutoPulse, by contrast, delivers a complete thoracic compression, wrapping a band around the chest. This allows the compression force to squeeze the entire chest cavity rather than a point on the sternum, driving perfusion to near-normal levels while maintaining a safe compression.[5]

## AutoPulse is Smart

Each patient who requires CPR is unique. That's why AutoPulse delivers a custom compression to each individual; it compresses 20% of the patient's thoracic cavity. AutoPulse measures the chest circumference upon start-up and uses the first six to eight compressions to determine the chest compliance. The force required to achieve adequate compression depth varies from patient to patient, and AutoPulse automatically compensates to deliver the correct compression.

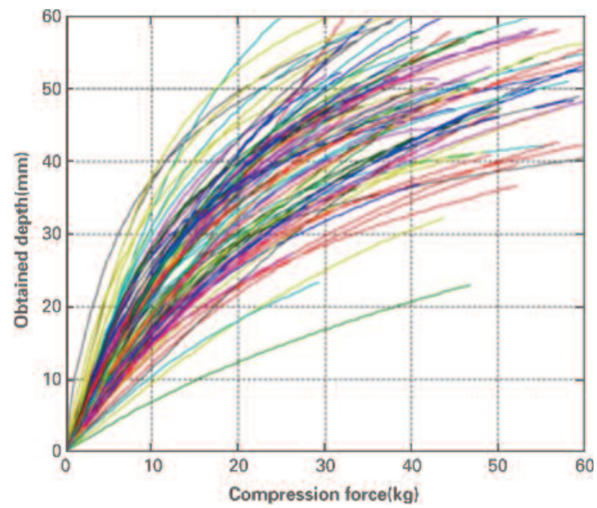
## AutoPulse is Sure

AutoPulse is the only mechanical CPR system to show significant clinical benefits in comparative human trials. Multiple comparative studies have demonstrated that vital signs improve in humans because the AutoPulse drives superior blood flow. And AutoPulse consistently shows improved ROSC (return of spontaneous circulation) rates compared to sternal compressions.

## Human Studies Show

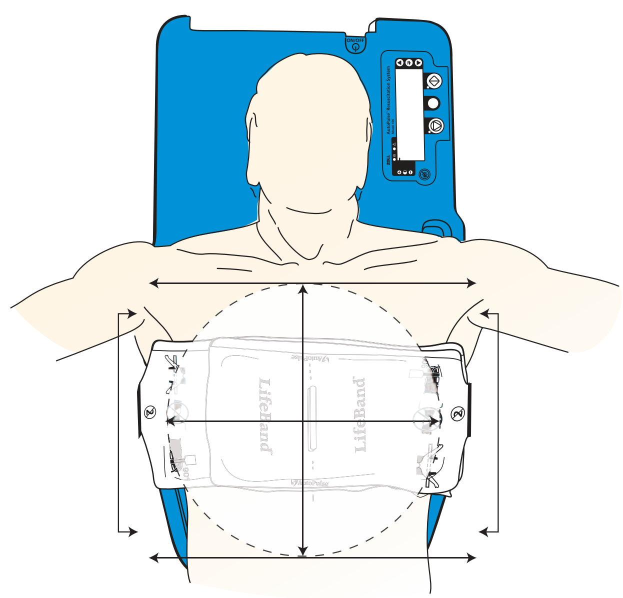
- Systolic BPs > 100 mmHg
- $SpO_2$ Values Consistently > 90%
- Increased end-tidal $CO_2$ levels

**Compression Force Versus Depth During CPR[6]**




***Range of Force Required for Target Compression***

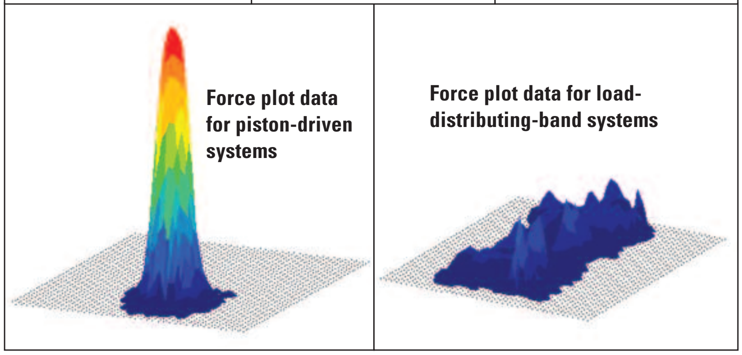
*As shown here, the force required to deliver an adequate chest compression can vary by 400%. The AutoPulse load sensor control system adjusts the force applied to ensure that all patients, regardless of size or chest stiffness, get the correct compression.*

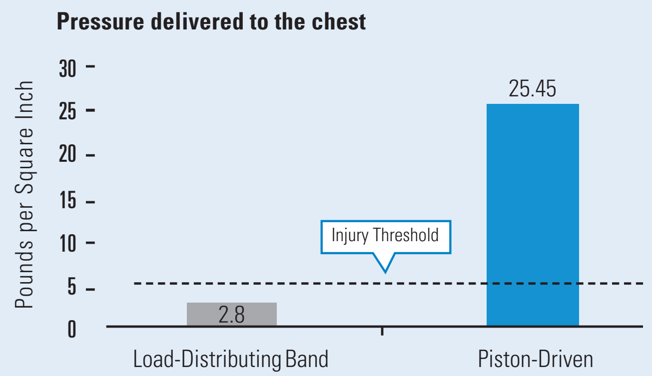



***AutoPulse Automatically Adjusts for Patient Variability***

*After measuring chest circumference and determining chest compliance, the AutoPulse adjusts to compress 20% of the patient's thoracic cavity so that each patient receives custom compressions.*

| Technology | Compression Force (lbs) | Contact Surface Units (in²) |
|---|---|---|
| Load-Distributing Band | 280.0 | 100.0 |
| Piston-Driven | 111.3 | 4.4 |




Knoell CK. Thoracic response to blunt frontal loading SH. Published by Society of Automotive Engineers, Inc. 1976.

*Data from the automotive industry have demonstrated that when pressure on the chest climbs above 6 pounds per square inch, the frequency and severity of compression-related injuries rises. The pressure applied by the AutoPulse is well below the injury threshold.*

## AutoPulse is Safe

By distributing the compression force over the thoracic cavity, the pressure at any one point on the chest is about one-tenth that experienced at the sternum with a manual compression. Studies show that distributing the force over a wide area drives perfusion to near-normal levels while maintaining safe compression forces well below the threshold for injury.

Although infrequent, there are times when mechanical CPR is needed during in-hospital cardiac arrest. When that need arises, the AutoPulse is sure, smart, and safe.

[1] Peberdy MA, et al. *JAMA*. 2008 Feb 20;299(7):785–92.
[2] Goldberger ZD, et al. *Lancet*. 2012 Sept. 4 (e-pub ahead of print).
[3] *Daily Mirror*, Jan. 14, 2011.
[4] Tomte O, et al. *Resuscitation*. 2009;(80):1152–57.
[5] Halperin HR, et al. *J Am Coll Cardiol*. 2004;44(11):2214–20.
[6] Tomlinson AE, et al. *Resuscitation*. 2007 Mar;72(3):364–70.

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