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The ResQPOD has been evaluated in more than 50 pre-clinical and clinical studies using both conventional CPR and active compression-decompression CPR (ACD-CPR). Research has shown that use of the ResQPOD increased survival by 25% or more over CPR without an ITD. The following is a summary of some of these studies, highlighting improved survival and demonstrated cost effectiveness. Additional studies can be found in our bibliography, available at zoll.com/ResQPODBibliography.

**Clinical Summary**

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**Key Studies**

**A Systems-Based Approach**


In this prospective, observational study involving more than 350 pre-hospital cardiac arrest patients, overall survival to hospital discharge more than doubled following adoption of a systems-based approach and implementation of the most highly recommended American Heart Association (AHA) CPR Guidelines, which included the use of an ITD.

Despite the costs of implementing a systems-based approach, the receiving hospital had an average direct margin* of more than $20,000 if the patient survived to hospital discharge, and more than $3,000 if the patient later died in the hospital.

*Margin after direct costs subtracted
The ROC PRIMED Study
The Resuscitation Outcomes Consortium (ROC) PRIMED study was a large pre-hospital, randomized, placebo-controlled trial that compared a sham impedance threshold device (ITD) to an active ITD. Results published in The New England Journal of Medicine in September 2011 and initially concluded that survival in patients who received the active and sham ITD were equivalent. However, subsequent analyses of the ROC data have shown that CPR quality parameters (e.g., compression rate, depth, and fraction) had a significant impact on survival and on the analysis of the ITD's effectiveness.

A recent subanalysis of the ROC PRIMED Study was published in Resuscitation by independent investigators showing that:
- Only 1675 patients in the ROC study received high-quality CPR, defined as a compression depth of 4-6 cm (2 inches), a rate of 80-120/min, and a CPR fraction of ≥50%.
- As CPR quality improved, so did survival impact of the ITD (Figure 2).
- When acceptable CPR was performed, patients who received the active ITD had a significantly higher chance of survival to hospital discharge with functional favorable neurological function (7.2%), compared to those who received the sham ITD (4.1%); p<0.001. This represents a relative 76% increase in functional survival (Figure 2).
- This post hoc analysis demonstrates that CPR quality has a dose-related impact on the ITD's effectiveness. The better the CPR quality, the more impact the ITD has on survival. Therefore, it is important to use the ITD with high-quality CPR. If the ITD is not used with high-quality CPR, it may not deliver its full therapeutic benefit.

Figure 1
Cubic Spline of Survival vs Chest Compression Rate
95% confidence intervals as dashed lines

Figure 2
Relative Increase in Survival with Active ITD

Multisystem Impact

This prospective, observational study of more than 3,000 pre-hospital cardiac arrest patients from five U.S. communities (Winn., Tex., Neb., Fl., N.C.) found that survival to hospital discharge improved nearly 30% following implementation of the AHA CPR guidelines, which included use of an ITD. The effect of the new interventions was most pronounced in patients initially presenting with Vf or Vtach, with increase in survival to hospital discharge.

Survival to hospital discharge with favorable neurologic function improved more than 75% at three sites that tracked these outcomes (p<0.038).

In-Hospital Cardiac Arrest

In a prospective, observational study involving more than 500 in-hospital cardiac arrest patients, survival to hospital discharge increased by 60% following adoption of the AHA CPR guidelines, including ResQPOD use.

The greatest benefit of the intervention was in patients presenting with pulseless electrical activity (PEA), the most common initial arrest rhythm during in hospital arrests. In these patients, survival improved 106%.


