Outcomes Associated with Mechanical CPR Devices

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Background

In the U.S. 350,000 out of hospital cardiac arrests(OHCA) occur annually with 90% resulting in mortality. Delivering timely, high-quality CPR is paramount in promoting favorable patient outcomes. Inherent difficulties in providing out of hospital CPR in addition to first responder shortages have increased mechanical CPR(mCPR) device utilization in out of hospital settings. Previous trials were conducted in urban areas and have shown no significant difference in efficacy, but smaller studies identified a greater risk of resuscitation related injuries with mCPR. We hypothesized that in a rural setting, mechanical would be non-inferior to manual CPR for patient survival but would produce more resuscitation related injuries.

Methods

This IRB approved retrospective chart review considered all OHCA with attempted resuscitation by Parkview EMS from 1/1/2022–12/31/2023. Pediatric, pregnant, and Do-Not-Resuscitate patient charts were excluded. Traumatic and hypothermic cardiac arrests were also excluded. Data collection was completed via EMR reports. We collaborated with county coroners to obtain autopsy reports with information regarding resuscitation related injuries. Survivability was the primary outcome with cerebral performance category(CPC) scores and resuscitation related injuries as secondary endpoints. A t-test was used for continuous data. Chi-square, odds ratios, and confidence intervals were used for binary data ($p<0.05$ for significance).

Results

There were 160 manual and 21 mCPR patients. Injury data was obtained for 117 manual and 11 mCPR patients. 32/160 (20%) manual CPR patients survived and 1/21 (4%) mCPR patients survived ($p=0.089$). 22/160 (14%) manual CPR patients had favorable CPC scores compared to 1/21 (4%) mCPR patients ($p=0.245$). While not statistically significant, survival rates and CPC scores may be clinically significant. mCPR patients experienced splenic maceration, liver laceration, lacerated inferior vena cava, and lacerated pericardium significantly more than manual CPR ($p=0.001$).

Conclusion

The outcomes in this rural cohort demonstrated noninferiority of mCPR in comparison to manual CPR.