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Introduction

Each year, about 55 people per 100,000 suffers from sudden cardiac arrest (SCA) and is treated by Emergency Medical Services (EMS); where fewer than 10 percent survive. Out-of-hospital SCA / out-of-hospital cardiac arrest (OHCA) due to heart disease is a considerable public health burden in the US. Substantial resources are directed at treatment of SCA by maintaining and enhancing the "chain of survival" through prompt activation by emergency telephone 9-1-1, early bystander Cardiopulmonary Resuscitation (CPR), rapid defibrillation, and timely advanced cardiac life support.

One key determinant for the likelihood of successful resuscitation is the quality of the CPR administered. Chest compressions must be delivered at the proper rate, depth, and duty cycle, the chest must be allowed to fully recoil between compressions, and pauses in compressions must be kept to an absolute minimum. Several studies have demonstrated the need to perform CPR with high quality chest compressions, in order to increase the chance of restoring spontaneous circulation. Manual chest compressions, at best, result in a cardiac output of approximately 20–30% of normal, and their effectiveness is limited by the rescuers' endurance.

Piston-type mechanical chest compression is a mechanical chest compression device (manufactured by Jolife AB, Sweden) that provides both compression and active decompression. It consists of a silicone rubber suction cup that is applied to the chest and a pneumatic cylinder mounted on two legs which are connected to a stiff back plate. The original piston-type mechanical chest compression device was driven by oxygen or air, but this has been superseded by a battery-driven device.

Objective/Aim

The objective of the technology review was to review the efficacy and device performance of piston-type mechanical chest compression compared to manual cardiopulmonary resuscitation in patient with out-of-hospital cardiac arrest or atraumatic cardiac arrest in Emergency Department with primary care team.

Results and Conclusions

There were three systematic review, one randomised controlled trial, four cohort studies, three cross sectional and two case series included in this review. One of the systematic reviews is from Cochrane, which is an update from the previous published in 2011.

Based on the above review, evidence showed that the clinical benefits of piston-type mechanical chest compressions is as good as compared to good manual chest compression during CPR for OHCA or atraumatic cardiac arrest. In addition, there are several large randomised trials designed to answer the used and benefit of piston-type mechanical chest compressions in resuscitation field are currently under way, and these results are expected in the next two years.

The piston-type mechanical chest compressions system represents a reliable alternative to manual CPR in a moving vehicle during emergency evacuations and/or in catheterization laboratory or cath lab. Its needs less human resources and might be much safer for Emergency Medical Services (EMS) personnel. Piston-type mechanical chest compressions compared to manual chest compressions increased CPR quality and reduced hands-off time but prolonged the time interval to defibrillations.

Methods

Literatures were searched through electronic databases specifically PubMed, Medline, Embase, Cochrane, Ovid, other websites; US FDA, and from non scientific database - Google search engine. In addition, a cross-referencing of the articles retrieved was also carried out accordingly to the topic. Relevant articles were critically appraised and evidence graded using US/Canadian Preventive Services Task Force and NHS Centre for Reviews and Dissemination (CRD) University of York, Report Number 4 (2nd Edition).