HTW GUIDANCE

Technoleg Iechyd Cymru
Health Technology Wales

Mechanical chest compression for use by the ambulance service to treat adults with out-of-hospital non-traumatic cardiac arrest

Guidance Number:	FIELD: Cardiology
001 (February 2018)	TYPE: Medical device

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HEALTH TECHNOLOGY WALES (HTW) GUIDANCE 001 (February 2018)

Mechanical chest compression for use by the ambulance service to treat adults with out-of-hospital non-traumatic cardiac arrest

Are there special populations for which mechanical chest compression devices are clinically and cost effective compared with manual cardiopulmonary resuscitation?

Figure 1. LUCAS 3® chest compression system
(Reproduced with permission from Stryker.)

Figure 2. AutoPulse® Resuscitation System
(Reproduced with permission from ZOLL Medical Corporation.)

Why did Health Technology Wales (HTW) appraise this topic?

This topic was proposed by the Welsh Ambulance Services NHS Trust to support evidence-informed decision making over whether to routinely adopt mechanical chest compression devices across the ambulance service in Wales.

HTW advises that routine adoption of mechanical chest compression devices across the ambulance service is not currently supported by available evidence.

Evidence:

- Several high quality randomised controlled trials and meta-analyses do not show any benefit for cardiopulmonary resuscitation (CPR) with two different forms of mechanical chest compression device when compared with manual CPR.
- Mechanical chest compression devices are not cost effective when used across the ambulance service.
- Expert opinion suggests that mechanical chest compression devices might be useful for patients where transportation to lifesaving in-hospital treatment can be achieved in a short timeframe. The clinical and cost effectiveness of this is unknown and so careful audit of such a service is needed.

The status of HTW guidance is that NHS Wales should adopt this guidance or justify why it has not been followed. HTW will evaluate the impact of its guidance.

SUMMARY OF EVIDENCE APPRAISAL REPORT[1]

Context

Last year, the Welsh Ambulance Services NHS Trust (WAST) was called to 5,800 cardiac arrests and cardiopulmonary resuscitation (CPR) was attempted in 2,832 patients. Approximately 8% of such patients in the UK survive to be discharged from hospital. As the Out-Of-Hospital Cardiac Arrest (OHCA) Plan for Wales states, this is a major issue for Wales and strategies are being developed to improve survival rates.

One suggested approach to improving survival is the use of mechanical chest compression devices to undertake CPR in a consistent manner even when the patient is being transported on a stretcher or in an ambulance. Two different forms of mechanical chest compression devices have been on the UK market for over a decade and have been tested in randomized controlled trials (RCTs) to treat OHCA. The LUCAS is a piston device with a suction cup that delivers active compression and decompression. The AutoPulse uses a load-distributing band that fits around the patient's chest and then compresses and includes a backboard for transporting patients.

The LUCAS is currently used by the Emergency Medical Retrieval and Transfer Service Cymru in three air ambulances and five rapid response cars. It has been used by WAST in a clinical trial but is not currently deployed. AutoPulse has been trialled for a limited time in Cardiff.

Evidence on clinical effectiveness, safety, economic analysis and patient issues

Several high quality meta-analyses of three recent, large, good quality RCTs and two smaller, older RCTs have been performed of mechanical chest compression vs manual CPR. The trials had strict exclusion criteria including elements such as those medically appropriate to attempt resuscitation, the ambulance should have arrived within a certain timeframe (e.g. 12 minutes) and cardiac arrest was witnessed. These trials in 12,206 patients show consistent evidence that for treatment of these people with OHCA, mechanical chest compression with either device is no better than manual CPR given by trained ambulance services. This was apparent for a range of outcomes including return of spontaneous circulation and survival.

Some of the RCTs reported a small number of adverse events, mainly related to flail chest injuries, which are in accordance with those identified on the Instructions for Use of the device.

The list cost of AutoPulse and its components is £9,060, with additional costs for training. The list cost for LUCAS 3 is £9,760, with additional costs for components and training. Given the lack of benefit in terms of quality of life and survival, a cost utility analysis of LUCAS 2 shows it is dominated by manual CPR (more costly, less effective). No economic evaluations have been undertaken for the AutoPulse.

Quality of Life was studied in the large UK trial and no difference was found between those who received LUCAS and those who received manual CPR. No other patient experiences' evidence was identified.

[1]Summary of Evidence Appraisal Report intended for use by decision-makers in NHS Wales.

Organisational issues

Experts make a range of suggestions about sub-populations in which mechanical chest compression devices might be useful. These can be summarized as relating to situations where transportation to definitive in-hospital treatment is required in a short timeframe. The number of cases in which this would be necessary is small and clearly a cost-effective distribution of the devices could not be achieved amongst the entire ambulance service in Wales. Use of mechanical chest compression devices in rapid response vehicles or helicopters, with at least one especially trained team member per team could be feasible. However, the clinical and cost effectiveness of this is unknown.

Further research

Where mechanical chest compression devices are deployed in emergency response vehicles in Wales to treat of out-of-hospital non-traumatic cardiac arrest, audit is required linking to the UK OCHA registry.

Responsibilities for consideration of this Guidance

Health Technology Wales (HTW) was established by Ministerial recommendation[1,2] to support a strategic, national approach to the identification, appraisal and adoption of non-medicine health technologies into health and care settings. The HTW Appraisal Panel comprises senior representation from all Welsh boards with delegated authority to produce guidance 'from NHS Wales, for NHS Wales'. The status of HTW guidance is 'adopt or justify'. There is an expectation from Welsh Government that HTW guidance is implemented with adoption regularly audited by HTW.[3]

The guidance in this document is intended to assist Welsh care system decision makers to make evidence-informed decisions when determining the place of health technologies and thereby improve the quality of care services.

The content of this HTW guidance was based upon the evidence and factors available at the time of publication. An international evidence base was reviewed and external topic experts and HTW committee members consulted to contextualise available evidence to Wales. Readers are asked to consider the generalisability of the evidence reviewed to NHS Wales and that new trials and technologies may have emerged since first publication and the evidence presented may no longer be current. It is acknowledged that evidence constitutes only one of the sources needed for decision making and planning.

This guidance does not override the individual responsibility of health professionals to make decisions in the exercise of their clinical judgment in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

No part of this guidance may be used without the whole of the guidance being quoted in full. This guidance represents the view of HTW at the date noted. HTW guidance is not routinely updated. It may, however, be considered for review if requested by stakeholders, based upon the availability of new published evidence which is likely to materially change the guidance given.

Standard operating procedures outlining HTWs evidence review methods and framework for producing its guidance are available from the HTW website.

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Declarations of interest were sought from all reviewers. All contributions from reviewers were considered by HTWs Assessment Group. However, reviewers had no role in authorship or editorial control and the views expressed are those of Health Technology Wales.

Chair, Health Technology Wales Appraisal Panel

1. National Assembly for Wales, Health and Social Care Committee. Access to medical technologies in Wales. December 2014.
2. Response to Recommendations from the Health & Social Care Committee: Inquiry into Access to Medical Technologies in Wales. February 2015.
3. Gethin, V. Letter to all Health Board Chairs re Funding for Sacral Nerve Stimulation in Wales. VG_01655_17. September 2017.