Actually doing chest compressions: the CPREzy's™ contribution to BLS

G.J. Noordergraaf, MD. Dept of Anesthesiology & Resuscitation, St. Elisabeth Hospital, Tilburg (NL)
H.P. Rutten, MD. Dept of Emergency Medicine, Waterland Hospital, Purmerend (NL)
A. Venema, RN[1]. P. van Berkom, RN[2]. H. Schoonen, RN[2]. H. van Hemert, RN[1]. CPRLab, Dept of Anesthesiology & Resuscitation & [1]Dept of Intensive Care or [2]Dept of Emergency Medicine, St Elisabeth Hospital, Tilburg (NL)
A. Noordergraaf, PhD. University of Pennsylvania, Philadelphia PA (USA)

Introduction:

While little has changed in the purpose and directives for chest compressions as a part of Basic Life Support (BLS), recognition of the importance of sufficiently and suitably forceful compressions has resurfaced. Correlations have been suggested between well-performed chest compressions, both in terms of rates, and in depth as a measure for positive outcome.[1] Interest has also refocused on ways of avoiding 'hands-off' time.

The ability of a caregiver to perform adequate chest compressions decreases rapidly after training.[2] This occurs in caregivers at all levels of training, including nurses, physicians and laymen. It is well known that this loss is not compensated by being involved in resuscitation(s) if no feedback or non participant observation is available.

In our hospital, a resuscitation may run ± 45 minutes. Maintaining chest compressions has been noted as a weak point: even for two (or three) alternating caregivers. Decreasing $ETCO_2$ which recuperate with a new caregiver, suggest that chest compressions are regularly insufficient.[3,4]

Figure 1: The CPREzy™

The CPREzy (5.5 x 18cm) is placed on the lower 1/3 of the sternum. When compressed lights indicate the force transmitted to the chest wall. These lights correlate to weight and depth : 1 light ≈ child up to 40 kg; 2 lights ≈ small (±55kg) adult;, 3 lights ≈ average (±75kg) adult; 4 lights ≈ large (± 90kg) adult; 5 lights ≈ extra large adult. A metronome with a flashing light and a beep indicated the frequency of compressions (100 min-1)

Results & discussion:

Case 1: Male, 70 years old, ±60kg. Witnessed VF in Emergency Department. Immediate Basic life support. The airway was secured and $ETCO_2$ instituted. The $ETCO_2$ was 14 mmHg while compressions were judged as adequate. Addition of the CPREzy (2-3 lights) increased the $ETCO_2$ to 29 mmHg. (Fig 2) This was repeated two shock blocks later, in inverse order. ROSC was achieved at 25 min. (Fig 3)

Case 2: Male, 59 years old, ±85kg. Found with pulseless electrical activity on the ward. Basic and advanced life support was initiated, the airway secured. Initial $ETCO_2$ was 10 mmHg (after epinephrine) increasing to 29 with the CPREzy (4 lights). With a second caregiver performing seemingly adequate compressions, 20 minutes after arrival of the team, the $ETCO_2$ was 8 and 12 mmHg, respectively. ROSC was not achieved. Post mortem investigation was inconclusive.

These anecdotal, case oriented, data suggest that concerns about manual compressions are justified. It supports suggestions that insufficient depth is difficult to judge and that loss of depth is occult.[2,5]

Focus: This poster presentation focuses on the potential benefit of a feedback device on compression force (depth).

Relating compression force to compression depth may resolve part of this issue.[2] We have evaluated the ability of trained caregivers to understand this concept and its effect on quality of compressions using the CPREzy in a manikin model (Fig 1).

The Problem:

There is little or no data available describing the use of the CPREzy clinically. The force-depth relationship for an individual patient as well as the caregiver workload may be confounding effects.

The Procedure(s):

After training, the CPREzy was added to the CPR equipment available to our in-hospital resuscitation team. In at random cases, the effect of the feedback was evaluated by removing and later replacing the CPREzy. The data are from early and later phases of the attempts.

Figure 2: Results

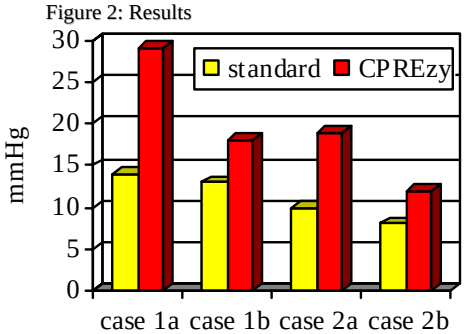

Figure 3: CPREzy after ROSC

It also supports the premise that adequate force (depth) are essential for output during CPR.[4] The differences seem clinically relevant.

In both cases the caregiver performing chest compressions was relieved after each cycle of one (case 1) or three (case 2) minute CPR. They had no difficulty in reaching and maintaining the desired number of lights. The data presents the best $ETCO_2$ which may have been influenced by other factors. Validation in a larger group and with simultaneous blood gas analysis may further reliability.

Conclusions:

- The CPREzy[tm] can be used during clinical resuscitation.
- Case oriented data, in terms of $ETCO_2$ values during CPR, show that using the CPREzy consistently increases this measure of pulmonary circulation.

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