CPR: Chest Compression to Ventilation Ratio In-Hospital- Adult

Citation

Olasgavengen T, Mancini MB, Berg, RA, Brooks S, Castren M, Chung SP, Considine J, Escalante R, Gazmuri R, Hatanaka T, Koster R, Kudenchuk P, Lim SH, Lofgren B, Nation, K, Nishiyma C, Perkins GD, Ristagno G, Sakamoto T, Sayre M, Sierra A, Smyth M, Stanton D, Travers A, Valliancourt C, Morley JP, Nolan, J. CPR : Chest Compression to Ventilation Ratio-In-Hospital-Adult Consensus on Science and Treatment Recommendation [Internet]. Brussels, Belgium: International Liaison Committee on Resuscitation (ILCOR), Basic Life Support Task Force, 2017 July 30. Available from: http://www.ilcor.org

CPR: Compression to Ventilation PICOST

The PICOST (Population, Intervention, Comparator, Outcome, Study Designs and Timeframe)
Population: Patients of all ages (i.e., neonates, children, adults) with cardiac arrest from any cause and across all settings (in-hospital and outof-hospital). Studies that included animals were not eligible. Intervention: All manual CPR methods including Compression-only CPR (CO-CPR), Continuous Compression CPR (CC-CPR), and CPR with different compression-to-ventilation ratios. CO-CPR included compression with no ventilations, while CC-CPR included compression with asynchronous ventilations or minimally-interrupted cardiac resuscitation (MICR) Studies that mentioned the use of a mechanical device during CPR were only considered if the same device was used across all relevant intervention arms and would therefore not confound the observed effect.
Comparators: Studies had to compare at least two different CPR methods from the eligible interventions; studies without a comparator were excluded.
Outcomes: The primary outcome was favorable neurological outcomes, measured by cerebral performance or a modified Rankin Score. Secondary outcomes were survival, ROSC, and quality of life.
Study designs: Randomised controlled trials (RCTs) and non-randomised studies (non-randomised controlled trials, interrupted time series, controlled before-and-after studies, cohort studies) were eligible for inclusion. Study designs without a comparator group (e.g., case series, cross-sectional studies), reviews, and pooled analyses were excluded.
Timeframe: Published studies in English searched on January 15, 2016

For the critical outcome of favorable neurological function, we identified very low quality evidence from one cohort study (Lee 2013 158). In unadjusted analysis of crude data from this study, patients admitted to an emergency department after out-of-hospital cardiac arrest who then received mechanical chest compressions (Thumper device) and tracheal intubation with positive pressure ventilations without pausing chest compressions had no demonstrable benefit for favorable neurological function (RR 1.18 (0.32, 4.35); RD 0.29 (-2.05, 2.64)) when compared to those who received mechanical chest compressions interrupted for ventilations at a ratio of 5 compressions to 1 ventilation. The quality of evidence was downgraded for very serious imprecision.

For the critical outcome of survival, we identified low quality evidence from one cohort study (Lee 2013 158). In unadjusted analysis of crude data from this study patients who received mechanical chest compressions and tracheal intubation with positive pressure ventilations without pausing chest compressions had increased survival to hospital discharge (RR 2.38 (1.22, 4.65); RD 5.86 (1.19, 10.53)) when compared to those who received mechanical chest compressions interrupted for ventilations at a ratio of 5 compressions to 1 ventilation.

For the critical outcome of return of spontaneous circulation , we identified low quality evidence from one cohort study (Lee 2013 158). In unadjusted analysis of crude data from this study, patients who received mechanical chest compressions and tracheal intubation with positive pressure ventilations without pausing chest compressions had increased return of spontaneous circulation (RR 1.5 (1.14, 1.97); RD 11.64 (3.61, 19.68)) when compared to those who received mechanical chest compressions interrupted for ventilations at a ratio of 5 compressions to 1 ventilation.

Treatment recommendations

Whenever tracheal intubation or a supraglottic device is achieved during in-hospital CPR, we suggest providers perform continuous compressions with positive pressure ventilations delivered without pausing chest compressions (weak recommendation, very low quality evidence).

Values and Preferences

In developing this treatment recommendation the BLS task force noted that delivering continuous compressions is common practice in many settings where tracheal intubation or placement of supraglottic devices is performed. There is limited evidence evaluating continuous chest compressions in the in-hospital setting, and while the single study included in this review compared out-of-hospital patients brought to the emergency room and treated with mechanical chest compressions, it does support the treatment recommendation.

Knowledge gaps

Current knowledge gaps include but are not limited to:

. There is no prospective study that compares delivery of ventilations during continuous manual chest compressions with ventilations delivered during pauses in manual chest compressions

- The effect of delayed ventilation versus 30:2 high-quality CPR.
- The duration of maximum delay in positive-pressure ventilation.
- The ability of in-hospital providers to perform effective bag-mask ventilations during CPR.
- The effect of hyperventilation on circulation during chest compressions.
- The effect of hyperventilation on outcomes for cardiac arrest patients.
- Effects of ventilation attempts during an obstructed airway, effects of gastric inflation.
- What is the optimal method for ensuring a patent airway?
- Is there a critical volume of air movement required to maintain effectiveness?
- How effective is passive insufflation?