



ELSEVIER

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitationEUROPEAN
RESUSCITATION
COUNCIL

Letter to the Editor

Prone CPR: A novel and cost-free solution to ensuring adequate chest compressions

To the Editor,

Caring for patients in the prone position is not uncommon in operating theatres and intensive care units (ICUs). However, because of the SARS-Cov-2 pandemic, the prone position is being increasingly used for both critically ill sedated patients and less-sick spontaneously breathing patients.¹ All of this will likely result in more prone cardiac arrests, posing a new challenge for healthcare workers. While conducting a scoping review of prone resuscitation, we discovered variation in how compressions were performed. We have highlighted four cases because they offer clinical insights, and because they helped us develop a solution: offered below and without cost.

Sun et al. described two neurosurgical cardiac arrests that received a reversed precordial compression manoeuvre, whereby a fist was placed under the inferior sternum while the other hand compressed the midthoracic spine.² This was associated with sustained systolic pressures in the 120mmHg range. Mazer et al. performed prone compressions on six ICU patients using two-hands compressing the T7-10 vertebrae, atop a 4.5kg sandbag on a rigid board.³ Burki et al.'s case report described two prone compression methods using cushions for sternal counter-pressure: the first using one-hand on the midthoracic spine, the second using bilateral open

palms between the scapula and thoracic spine.⁴ Finally, in a mannequin simulation, Atkinson used a gel pad beneath the patient's breastbone to offer sternal support during reverse compressions.⁵ The gel pad was produced after preliminary studies suggested that without sternal support it would be difficult to obtain successful compression depth, thereby resulting in poor quality prone compressions. The take home from these studies is that sternal counter-pressure and a hard surface are required.

In response, we have developed a prone cardiac arrest board with a sternal counter-pressure elevation. During development, our team performed and tracked the quality of 6600 compressions on a prone Laerdal Resusci Anne QCPR manikin. Adding the sternal counter-pressure increased the sternal depth of compressions from 2889 (44%) in the target range to 5541 (84%) (target range 4–5cm). Participant feedback also suggested that adequate compressions (i.e. those that achieved target depth) were less fatiguing with the rigid board and sternal ridge. This letter is to inform clinicians and provide free instructions on how to make your own prone CPR board, including 3D printing and computer numerical control instructions at: <http://rescuescience.org/2020/05/08/prone-cpr-board-with-sternal-elevation/> (Fig. 1).

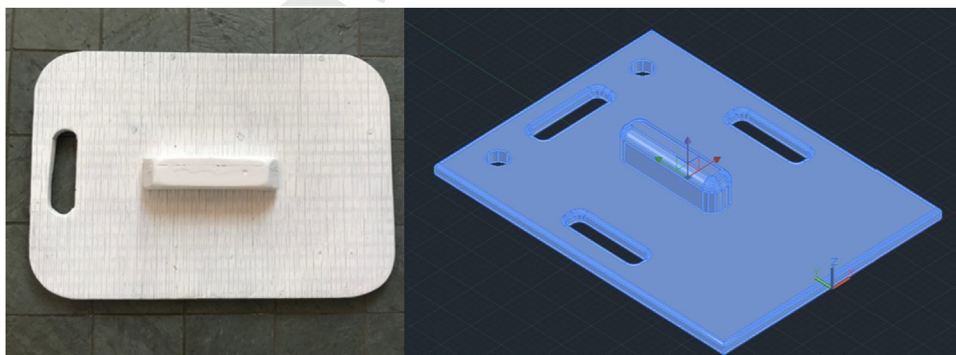


Fig. 1 – The left image is our earliest wood prototype and the second is a digital rendering of our refined prototype, free for download and manufacture.

Conflicts of interest

None declared.

Acknowledgements

We acknowledge and are grateful for the assistance of Rudy Douma and Vladimir Tchirkov of Ledcor Technical Services [Vancouver, British Columbia, Canada] in the design and digitization of our prototype.

REFERENCES

1. Ding L, Wang L, Ma W, He H. Efficacy and safety of early prone positioning combined with HFNC or NIV in moderate to severe ARDS: a multi-center prospective cohort study. *Crit Care* 2020;24:28, doi:<http://dx.doi.org/10.1186/s13054-020-2738-5>.
2. Sun W-Z, Huang F-Y, Kung K-L, Fan S-Z, Chen T-L. Successful cardiopulmonary resuscitation of two patients in the prone position using reversed precordial compression. *Anesthesiology* 1992;77:202–4.

3. Mazer SP, Weisfeldt M, Bai D, et al. Reverse CPR: a pilot study of CPR in the prone position. *Resuscitation* 2003;57:279–85, doi:[http://dx.doi.org/10.1016/S0300-9572\(03\)00037-6](http://dx.doi.org/10.1016/S0300-9572(03)00037-6).
4. Burki AM, Mahboob S, Fatima T. CPR in prone position during neurosurgery. *Intensive Care* 2017;21:4.
5. Atkinson MC. The efficacy of cardiopulmonary resuscitation in the prone position. *Crit Care Resusc* 2000;2:188–90.

Matthew J. Douma MN, RN*

Ella Mackenzie

Peter G. Brindley MD, FRCPC, FRCP, Edin

Department of Critical Care Medicine, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada

* Corresponding author.

E-mail address: E.douma@ualberta.ca (M. Douma).

Received 9 May 2020

Available online xxx

<http://dx.doi.org/10.1016/j.resuscitation.2020.05.018>

© 2020 Elsevier B.V. All rights reserved.

UNCORRECTED PROOF