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Letter to the Editor:

Compression Rate during Cardiopulmonary Resuscitation

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Out-of-hospital cardiac arrest (OHCA) is a global health concern, accounting for over 350,000 unexpected deaths in North America (1). High quality chest compression is a critical factor in OHCA survival (2-4). The recommended rate of chest compression has been revised upwards several times in the past few decades; current international guidelines recommend 100-120/min (5,6). These recommendations were based on observational studies showing associations of improved outcomes with around 100-120/min and worse outcomes at rates outside of this range (7,8).

In the *Journal of Korean Medical Science*, Hwang et al. (9) reported findings from the COMPRATE trial. This was a multicenter trial which recruited OHCA patients from 12 Emergency Departments (ED). Non-traumatic OHCA patients were randomized to either 100/min or 120/min manual chest compressions, with 136 and 156 patients analyzed in each respective arm. The primary outcome measure was sustained return of spontaneous circulation (ROSC; defined as 20 min without relapse of cardiac arrest). The trial found a trend towards higher ROSC in the 100/min arm (50.7% vs. 42.9%, $P = 0.183$).

The authors should be commended for implementing the first randomized real-world, human trial on this important question of ideal chest compression rate. Trials on human subjects with patient-oriented outcomes such as survival provide crucial data for the formation of credible practice guidelines.

The main problem with the design of this trial is the ED setting. Patients with better prognostic features would be expected to have received bystander or emergency medical services (EMS) chest compressions (average likely much closer to 100/min than 120/min), and attained ROSC en route. These patients would therefore have been excluded from this trial as they arrived at the ED with a pulse. Survey data from the Pan-Asian Resuscitation Outcomes Study found EMS CPR rate to be 91%-98% (10) in Korean cities. This suggests that most of the subjects in the 120/min arm received a significant amount of 100/min chest compression by EMS before arriving at hospital. The trial may not have allowed a fair comparison of the two compression rates.

In view of the above limitations, further trials examining this question would more suitably be performed in the prehospital setting, possibly with mechanical chest compression devices (to reduce the influence of compression depth, as it is known that manual compression depth decreases with increasing rate in a dose-dependent manner) (7). As the authors pointed out, a much larger sample size would be required as the effect size is expected to be low — the 10% effect size assumed in the sample size calculation seems to have been overly optimistic.

DISCLOSURE

Andrew Fu Wah Ho, Pin Pin Pek, and Susan Yap do not have any conflicts of interest to disclose. Marcus Eng Hock Ong is the principal investigator of an industry-funded study involving a mechanical CPR device; has received grants from Laerdal Medical, grants and personal fees from Zoll Medical Corporation, and non-financial support from Bard Medical and Zoll Medical Corporation; and has a patent method of predicting patient survival licensed to Zoll Medical Corporation, and a patent system and method of determining a risk score for triage pending.

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