Correspondence

Letter by Rai Regarding Article, “Bystander-Initiated Rescue Breathing for Out-of-Hospital Cardiac Arrests of Noncardiac Origin”

To the Editor:

I read with interest the study by Kitamura et al published in a recent issue of Circulation.1 This nationwide, population-based study found significantly higher rate of favorable neurological outcome in the conventional-cardiopulmonary resuscitation (CPR) group compared to the compression-only-CPR group for out-of-hospital cardiac arrest (OHCA) of noncardiac origin (NCO). However, 2 recent randomized controlled trials showed no benefit of rescue-breathing in for OHCA.2,3 Even for NCO-OHCA, Rea et al found no significant difference in survival to hospital discharge (P=0.29) or in neurological outcome (P=0.42) between compression-only-CPR and conventional-CPR groups.2

Although important, these findings are not new. However, they do add significant evidence and knowledge to our understanding about differential effects of CPR with and without rescue-breathing on outcomes of cause-specific OHCA. These results also highlight the importance of study size and power in evaluating such narrow differences in outcomes. Unlike preceding studies that failed because of a lack of statistical power, study by Kitumura et al was large enough to allow evaluation of the differences in outcomes between the each type of bystander-initiated CPR among NCO-OHCA.1 Rea et al noted a trend favoring compression-only-CPR in OHCA of cardiac origin (CO) (P=0.09), but similar to previous studies, found no significant difference or superiority of compression-only-CPR in CO-OHCA, likely because the studies were underpowered to rigorously evaluate the type of CPR in these subgroups.2 Larger, powerful studies would be required to plausibly demonstrate benefit of compression-only-CPR in CO-OHCA. Much larger studies would be required to demonstrate significant benefit of compression-only-CPR in all-cause-OHCA, if any, given the fact that majority of adult OHCA are cardiac in origin.

Cardiac arrest is a heterogeneous condition. The pathophysiology of each arrest is dynamic, and the relative importance of oxygenation may depend on the time-dependent phase of the arrest. Failure of bystanders to perform CPR because of aversion to or the complicated nature of mouth-to-mouth ventilations, delays chest compressions which are central to survival. Rescue-breathing not only results in reduced cardiomyocyte loss by inhibiting free-oxygen-radical generation,5 but also decreases coronary and cerebral blood flow by decreasing venous return to the chest. Additionally, arterial hyperoxia following resuscitation from cardiac arrest and in-hospital mortality has been associated.4 Initial reperfusion with hypoxic blood may also result in reduced cardiomyocyte loss by inhibiting free-oxygen-radical generation.6 In contrast, NCO-OHCA involves asphyxia resulting in hypoxemia and acidemia, and rescue-breathing is important under these conditions.

Taken together, the potential differential effects of CPR with and without rescue-breathing may support a more targeted application of type-specific CPR. Rea et al calculated that such a tailored approach, if correctly applied according to the cause of arrest, would theoretically result in 156 survivors with favorable neurological outcome per 1000 patients, compared with 144 per 1000 if compression-only-CPR was used for all patients or 115 per 1000 if conventional-CPR was used for all patients.3 Given these numbers, the small impact of rescue-breathing on survival after NCO-OHCA,3 and the fact that majority of adult OHCA are cardiac in origin, it would be best to continue following the current AHA recommended hands-only CPR, a much simpler technique that is easier to teach, learn, and perform.

Disclosures

None.

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References

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