

## Response to Letter Regarding, “Resumption of Chest Compressions After Successful Defibrillation and Risk for Recurrence of Ventricular Fibrillation in Out-of-Hospital Cardiac Arrest”

We appreciate the thoughtful letter to the editor by Drs Shiyovich, Gerovich, and Katz. We examined whether an association exists between when chest compressions (CC) are resumed after a shock that defibrillates ventricular fibrillation (VF) and when VF may recur after that shock, in a cohort of witnessed cardiac arrest victims in Arizona. We used 2 main statistical analyses. We first used regression analysis to see whether there was a relationship between CC resumption and VF recurrence. This test considered all VF refibrillations (n=166), and no relationship to CC resumption was found, and furthermore, the randomness is visually apparent in the scatter diagrams of Figure 3. Second, we looked at the risk of VF recurrence in the first 30 s post shock using a Kaplan–Meier analysis and categorized shocks according to 4 prespecified CC resumption groups. The Kaplan–Meier analysis specifically uses not only the information from cases where VF recurs but also the information from cases where VF does not recur, affording this test its statistical power. Also, we like to correct a misstatement in the letter by Shiyovich et al: the CC groups (1–5, 6–10, 11–30, and >30 s) were not the result of any CPR (cardiopulmonary) prompt to delay CC because all the monitor/defibrillators functioned according to the manufacturer’s specifications.

There are other factors, such as CC quality, that affect resuscitation outcome, but are beyond the scope of this investigation. However, in response to the interesting points raised by Shiyovich et al, we examined CC rate and depth and found no relationship with time to VF recurrence. We also used the well-accepted definition for defibrillation in the literature, which is based on the rhythm assessment at 5 s post shock; therefore, we cannot comment on the shocks where VF may recur before 5 s, yet are classified by this definition as shocks that fail to defibrillate. Nonetheless, in response to this letter, we looked at the distribution in CC resumption times for shocks classified as failed to defibrillate, and we found a similar distribution with a median of 7 s (compared with a median of 8 s for shocks that did defibrillate VF, which is reported in Table 1).

It may be interesting in an additional analysis to compare VF recurrence with respect to CC resumption before or after 30 s (ie, CC groups 1–3 compared with CC4) because the CC4 group showed a nonsignificant lower early refibrillation rate. However, in this late CC group, there could be potentially unknown but important clinical confounding variables, and furthermore, the value of such an analysis is questionable given that no ACLS guideline in the past 20 years has advocated delaying CC resumption for >30 s after shocks.

We welcome the interesting questions that Shiyovich et al have raised, and in particular, that this discussion highlights the important need to identify factors that may increase the risk of VF recurrence in cardiac arrest.

### Disclosures

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