Impact of prehospital epinephrine administration and quality of cardiopulmonary resuscitation on neurologically intact survival in out-of-hospital cardiac arrest patients with non-shockable rhythm

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Background: The effects of prehospital epinephrine administration in combination with the quality of cardiopulmonary resuscitation (CPR) on neurological outcomes in out-of-hospital cardiac arrest (OHCA) patients with non-shockable rhythm remains unclear.

Purpose: This study aimed to elucidate the effects of prehospital epinephrine administration in combination with the quality of CPR on neurologically intact survival in OHCA patients with non-shockable rhythm.

Methods: We analysed 118,732 adult OHCA patients with non-shockable rhythm from the All-Japan OHCA registry between 2011 and 2016 (29,989 emergency medical service [EMS]-witnessed arrests with EMS-initiated CPR [high-quality CPR] and 88,743 bystander-witnessed arrests with bystander-initiated CPR continued by EMS providers [low-quality CPR]). Patients who achieved prehospital return of spontaneous circulation without prehospital epinephrine administration were excluded. The primary outcome measure was 1-month neurologically intact survival (cerebral performance category 1 or 2; CPC 1–2). Time from collapse to prehospital epinephrine administration for patients with prehospital epinephrine administration, or to hospital arrival for patients without prehospital epinephrine administration was calculated and adjusted collectively in multivariate logistic regression analysis for 1-month CPC 1–2.

Results: Multivariate logistic regression analysis revealed that the time from collapse to prehospital epinephrine administration or to hospital arrival was negatively associated with 1-month CPC 1–2 (adjusted odds ratio [OR] 0.95 per 1-minute increment, 95% confidence interval [CI] 0.94–0.96). Compared with bystander-witnessed arrests without prehospital epinephrine administration, EMS-witnessed arrests with or without prehospital epinephrine administration were significantly associated with increased chances of 1-month CPC 1–2 (adjusted OR 2.04, 95% CI 1.50–2.75 and adjusted OR 1.97, 95% CI 1.57–2.48, respectively). Prehospital epinephrine administration was significantly associated with an increased chance of 1-month CPC 1–2 among bystander-witnessed arrests (adjusted OR 1.57, 95% CI 1.24–1.98), but not among EMS-witnessed arrests. EMS-witnessed arrests without prehospital epinephrine administration were significantly associated with an increased chance of 1-month CPC 1–2 compared with bystander-witnessed arrests with prehospital epinephrine administration (adjusted OR 1.26, 95% CI 1.01–1.56).

Conclusions: High-quality CPR is crucial for increasing neurologically intact survival in OHCA patients with non-shockable rhythm. The additional beneficial effects of prehospital epinephrine administration were observed only among OHCA patients with low-quality CPR.