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Survival in children with out-of-hospital cardiac arrest after standard or chest compression-only bystander cardiopulmonary resuscitation before emergency medical services arrival

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Background: For out-of-hospital cardiac arrest (OHCA), current cardiopulmonary resuscitation (CPR) guidelines recommend chest compression-only bystander CPR (C-BCPR) for both untrained and trained bystanders unwilling to perform rescue breaths before emergency medical services personnel arrival. However, during 3 consecutive guideline periods, changes in type of BCPR and neurologically intact survival rate are unclear in paediatric OHCA cases.

Purpose: We aimed to determine the change in the rate and type of BCPR in correlation to the 1-month neurologically intact survival and causes of OHCA.

Methods: We reviewed 5461 children with bystander witnessed OHCA included in the All-Japan Utstein-style registry from 2005 to 2017. Patients were divided into 3 groups according to the type of BCPR: no BCPR (NO-BCPR), standard BCPR with rescue breaths (S-BCPR), and C-BCPR. Guideline periods 2005 to 2010 (pre-G2010), 2011 to 2015 (G2010), and 2016 to 2017 (G2015) were used for comparison over time. The study endpoint was 1-month neurologically intact survival (Cerebral Performance Category [CPC] scale 1 or 2; CPC 1–2).

Results: The rates of patients receiving any BCPR and 1-month CPC 1–2 by year significantly increased from 46.2% and 9.4% in 2005 to 61.3% and 15.7% in 2017 (all P for trend <0.0001), respectively. The rates of patients receiving C-BCPR in the pre-G2010 period significantly increased from 21.6% to 35.5% in the G2010 period, and to 40.4% in the G2015 period (P for trend <0.0001); the overall proportion of cases with 1-month CPC 1–2 increased from 9.1% to 10.8% and 14.7%, respectively (P for trend <0.0001). Particularly, in patients receiving C-BCPR, CPC 1–2 rate significantly increased from 9.5% in the pre-G2010 period to 19.0% in the G2015 period (P for trend <0.0001). For all time periods, 1-month CPC 1–2 rate in the S-BCPR (17.2%) cohort was significantly higher than those in the C-BCPR (12.5%) and NO-BCPR (6.4%) cohorts (adjusted odds ratio [aOR] of S-BCPR compared with C-BCPR, 1.59; 95% confidence interval [CI], 1.25–2.01; $P < 0.0001$; compared with NO-BCPR, aOR 2.31; 95% CI, 1.82–2.94; $P < 0.0001$). No significant difference between S-BCPR and C-BCPR was found in 1-month CPC 1–2 rate for patients with non-traumatic origin (17.7% vs. 16.3%; aOR, 1.23, 95% CI, 0.95–1.59, all $P > 0.05$). However, in patients with traumatic origin, S-BCPR was superior to C-BCPR (15.1% vs. 3.4%; aOR, 4.53, 95% CI, 2.39–8.61, all $P < 0.0001$). During the 3 guidelines periods, the CPC 1–2 rate in patients with non-traumatic origin significantly increased from 11.8% to 19.7% (P for trend < 0.0001), but not in patients with traumatic origin (from 4.9% to 4.1%, P for trend = 0.29).

Conclusions: During the 3 guidelines periods, the rate of C-BCPR and 1-month CPC 1–2 increased by approximately 2-fold each over time. C-BCPR was associated with increased odds of 1-month CPC 1–2 similar to S-BCPR for children with non-traumatic origin but not in those with traumatic origin.