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Letter to the editor

Reply to: Over time, differences in survival and favorable neurologic outcomes between conventional and compression-only cardiopulmonary resuscitation have been gradually reduced in pediatric out-of-hospital cardiac arrest

We thank Dr. Fukuda for his comments regarding our recent publication [1]. Recently, the difference in 30 day neurologically intact survival rate between bystander conventional cardiopulmonary resuscitation (CPR) and bystander chest-compression-only CPR (CC-CPR) has been decreasing [1]. In matched patients aged 1–17 years (n = 2682, 67.6% of patients before propensity score matching) in our study [1], the 30 day neurological intact survival rates in overall patients receiving conventional CPR were equivalent to those in patients receiving CC-CPR in 2011–2012 (9.8% vs. 6.5%, *P* = .15) and 2013–2014 (11.2% vs. 8.8%, *P* = .38). Table 1 shows the results of the secondary analyses of 30 day outcomes after out-of-hospital cardiac arrest (OHCA) in the matched patients aged 1–17 years from 2011 to 2014 (n = 1148), when we use same matched dataset in the manuscript [1]. Risk difference, risk ratio, and odds ratio of overall patients receiving conventional CPR for 30 day neurologically intact survival was 0.03 (95% confidence interval [CI], -0.003–0.062), 1.40 (95% CI, 0.96–2.03), and 1.44 (95% CI, 0.96–1.04), respectively, compared to overall patients receiving CC-CPR. In subgroup analyses, only the cohort of patients aged 1–7 years had a significant difference in 30 day neurologically intact survival between two bystander CPR cohorts (*P* = .04) with risk difference of 0.04 (95% CI, 0.002–0.075), risk ratio of 2.03 (95% CI, 1.01–4.09), and odds ratio of 2.11 (95% CI, 1.01–4.42). Moreover, the difference in 30 day survival rate between two bystander CPR cohorts is crucial in overall patients and in the three subgroups. These results show that conventional CPR is superior to CC-CPR in 30 day survival even in the recent years.

However, we must pay attention in interpreting these results. The number of matched patients for analyses is considered inappropriate for secondary analyses. The number of matched patients who received CC-CPR (n = 574) accounted for only 39.7% of overall patients who received CC-CPR during the study period (n = 1447, 2011–2014), eliminating 873 patients (60.3% of overall patients), while the number of patients who received conventional CPR (n = 574) accounted for 98.1% of overall patients who received conventional CPR (n = 585, 2011–2014). To focus on patients who were treated in recent years (from 2011 onward), we must analyse another matched patient cohort using not only propensity score matching method but also stratified analysis, inverse probability weighting methods, or doubly robust estimator method [2]. Accordingly, in our manuscript [1], we did not include any further

Table 1
Comparison of 30 day Outcomes in Matched Patients Aged 1–17 Years (N = 1148).

		Conventional CPR		Compression-only CPR		P-value
		N	% (95% CI)	N	% (95% CI)	
30-day survival						
Overall (n = 1148)		109/574	19.0 (16.0–22.4)	81/574	14.1 (11.5–17.2)	**.03**
Subgroup						
Aetiology	Cardiac, n = 405 (35.3%)	48/200	24.0 (18.6–30.4)	42/205	20.5 (15.5–26.5)	.40
	Non-cardiac, n = 743 (64.7%)	61/374	16.3 (12.9–20.4)	39/369	10.6 (7.8–14.1)	**.02**
Initial rhythm	Shockable, n = 116 (10.1%)	29/57	50.9 (38.3–63.4)	25/59	42.4 (30.6–55.1)	.36
	Non-shockable, n = 1032 (89.9%)	80/517	15.5 (12.6–18.8)	56/515	10.9 (8.5–13.9)	**.03**
Witnessed status	Witnessed, n = 415 (36.1%)	64/210	30.5 (24.6–37.0)	46/205	22.4 (17.3–28.6)	.06
	Unwitnessed, n = 733 (63.9%)	45/364	12.4 (9.4–16.1)	35/369	9.5 (6.9–12.9)	.21
Age	**1–7 years, n = 599 (52.2%)**	54/304	17.8 (13.9–22.5)	30/295	10.2 (7.2–14.1)	**.008**
	8–17 years, n = 549 (47.8%)	55/270	20.4 (16.0–25.6)	51/279	18.3 (14.2–23.2)	.53
30-day CPC 1–2						
Overall (n = 1148)		60/574	10.5 (8.2–13.2)	43/574	7.5 (5.6–9.9)	.08
Subgroup						
Aetiology	Cardiac, n = 405 (35.3%)	34/200	17.0 (12.4–22.8)	28/205	13.7 (9.6–19.0)	.35
	Non-cardiac, n = 743 (64.7%)	26/374	6.9 (4.8–10.0)	15/369	4.1 (2.5–6.6)	.08
Initial rhythm	Shockable, n = 116 (10.1%)	26/57	45.6 (33.4–58.4)	20/59	33.9 (23.1–46.6)	.20
	Non-shockable, n = 1032 (89.9%)	34/517	6.6 (4.7–9.0)	23/515	4.5 (3.0–6.6)	.14
Witnessed status	Witnessed, n = 415 (36.1%)	44/210	20.9 (16.0–27.0)	29/205	14.2 (10.0–19.6)	.07
	Unwitnessed, n = 733 (63.9%)	16/364	4.4 (2.7–7.0)	14/369	3.8 (2.3–6.3)	.68
Age	**1–7 years, n = 599 (52.2%)**	23/304	7.6 (5.1–11.1)	11/295	3.7 (2.1–6.6)	**.04**
	8–17 years, n = 549 (47.8%)	37/270	13.7 (10.1–18.3)	32/279	11.5 (8.2–15.7)	.43

CI, confidence interval; CPC, cerebral performance category; CPR, cardiopulmonary resuscitation.

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data analyses for patients treated in recent years. The glass half-empty analysis may have introduced significant bias to the results [3].

Considering the aforementioned circumstances, our study [1] strongly supports the 2017 International Liaison Committee on Resuscitation summary statement [4] and the European Resuscitation Council 2017 guidelines update [5]: we suggest that bystanders provide CPR with ventilation for infants and children <18 years of age with OHCA; if bystanders cannot provide rescue breaths as part of CPR, they should at least provide chest compressions.

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Conflicts of interest

None.

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