

Comparison of Bystander Fatigue and CPR Quality when Using Continuous Chest Compressions Versus 30:2 Compressions to Ventilations: A Randomized Cross-over Trial

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Background

- Out-of-hospital Cardiac Arrest (OOHCA) is the number one cause of death in Canada
- Cardiopulmonary Resuscitation (CPR) increases OOHCA survival 3 to 4 times
- Bystanders often hesitate to initiate CPR because of its mouth-to-mouth component
- Resuscitation Guidelines changed from 30:2 compressions to ventilations ratio (2005) to continuous chest compressions (CCC, 2010)
- Meant to increase bystander CPR rates and minimize compression interruptions
- Effect of CCC on CPR quality and bystander fatigue is unknown
- People 55 and older are the group most susceptible to perform CPR on a real victim

Objectives

- To compare bystander fatigue and CPR quality after 5 minutes of CPR using CCC versus 30:2 in a population aged ≥ 55



Methods

- Randomized cross-over trial with participants aged ≥ 55 , Clinical Frailty Score (CFS) ≤ 3 , and no physical limitation or disease limiting CPR
- Recruitment at 3 campuses of The Ottawa Hospital and the Kanata Seniors' Centre
- After a practice session, participants completed two 5-minute CPR sessions on an Actar manikin (using 30:2 ratio, and CCC) – we used concealed blocked random assignment
- Participants allowed to rest after practice session and between CPR sessions
- **Bystander fatigue measures:** Validated Borg scale of perceived exertion, heart rate (HR), and mean arterial pressure (MAP) before and after each CPR session; also completed a survey
- **CPR quality measures:** No. of compressions/min and no. of compressions with adequate depth (measured by Zoll R-series Cardiac Monitor)
- Desired sample size = 60
- Received institutional ethics approval

Participant Characteristics (N=63)

	All	Started with 30:2 (n = 33)	Started with CCC (n = 30)
Age (SD)	70.8 (6.4)	71.6 (6.5)	69.9 (6.3)
Gender (%female)	66.7	69.7	63.3
CFS			
1 (n, %)	39 (61.9)	21 (63.6)	18 (60.0)
2 (n, %)	18 (28.6)	10 (30.3)	8 (26.7)
3 (n, %)	6 (9.5)	2 (6.1)	4 (13.3)
CPR Training (n, %)	38 (60.3)	18 (54.5)	20 (66.7)
CPR Experience (n, %)	6 (9.5)	3 (9.1)	3 (10.0)
Before CPR sessions:			
Borg Score (mean, SD)		7.8 (1.9)	8.3 (2.4)
MAP (mean, SD)		101.6 (10.5)	102.1 (9.9)
HR (mean, SD)		72.0 (9.4)	71.8 (10.1)

Paired T-test Comparisons Between 30:2 and CCC (N=63)

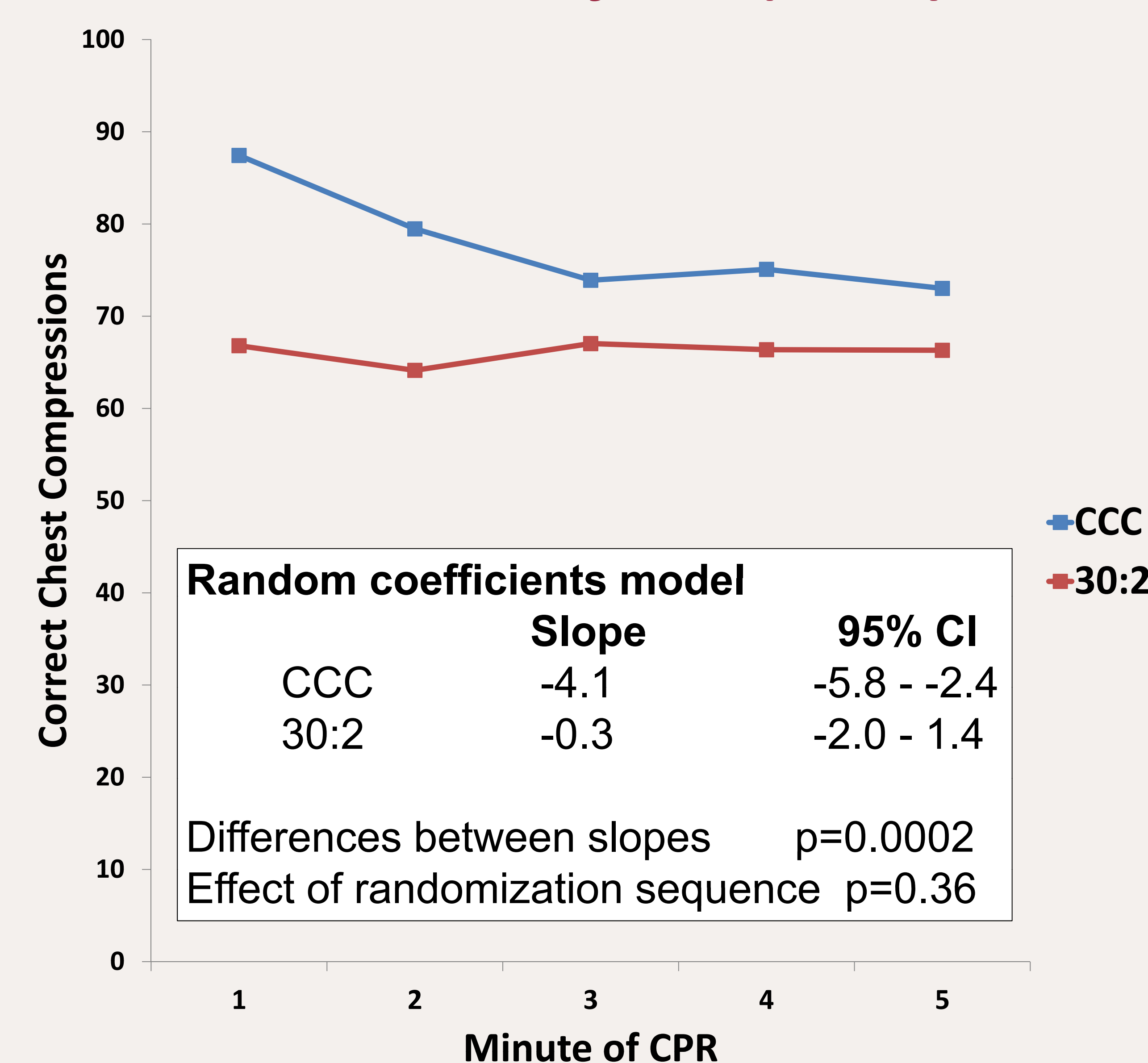
	30:2	CCC	Mean Diff.	95% CI
Participant Fatigue After CPR sessions				
Borg Scale*	11.0	11.5	0.5	0.1 - 0.9
MAP*	107.3	110.3	3.0	-0.6 - 6.7
HR*	82.9	82.3	-0.6	-3.5 - 2.3
CPR Quality				
CC's / min*	101.8	99.7	-2.1	-3.7 - -0.1
Total correct CC**	324.9	381.5	56.6	32.3 - 91.5

*none of these differences are clinically relevant

**clinically and statistically different

Chest compressions (cc)

Number of Correct Chest Compressions Per Minute of CPR (N=63)



Participant Survey Results (N=63)

1. Could you have continued CPR much longer?		
No longer	30:2 6.5%	CCC 16.1%
1 minute	22.6%	22.6%
2 or more minutes	71.0%	62.9%
2. Which method did you prefer?		
	30:2 69.4%	CCC 30.6%
3. Did you feel more tired at the beginning of the second CPR session compared to how you felt at the beginning of the first CPR session?		
Yes	33.9%	No 66.1%

Discussion

- No differences attributable to group assignment (successful randomization)
- Participants maintained a similar level of exertion regardless of the task demand; we did not find clinically relevant differences in fatigue level between groups, but participants preferred the 30:2 method
- CPR quality decreased faster in the CCC group, but the number of adequate compressions per minute remained higher

Conclusions

- CPR quality decreased faster over time with the CCC method, but produced more chest compressions of good quality compared to the 30:2 method, with similar level of fatigue

Acknowledgement

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