



Impact of Personal Protective Equipment on Pediatric CPR Performance



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Background

- Personal protective equipment (PPE) is worn by healthcare providers (HCPs) to protect them from toxic or infectious agents
- Studies of HCPs performing simulated adult CPR have shown that chest compression (CC) quality declines more rapidly while wearing PPE
- Data on PPE use during pediatric procedures is lacking in current literature



Hypothesis

- During simulated pediatric CPR, HCPs performing CCs in PPE will demonstrate faster deterioration in CPR quality and report greater fatigue than during CCs in normal attire

Methods

- Prospective multicenter observational study
- HCPs (nurses, physicians, and prehospital HCPs) completed two study sessions separated by at least two weeks
 - Session 1: Normal attire
 - Session 2: Full PPE
- During each session, each subject performed 5 mins of uninterrupted chest compressions (CC) on a pediatric manikin

Methods (cont.)

- CC quality was measured using a monitor/feedback device which was set without audio or visual prompts to the HCP (i.e. without real time feedback)
- CC rate, depth, and release velocity (RV) were reported in ten sequential 30-second epochs
- Change in rate, depth, and RV was measured:
 - Between epoch 1 and epoch 10
 - Between epoch 1 and epoch 4 (corresponding to the 2 min recommended duration of CPR prior to provider switch)
- At 60 sec increments, subjects self-reported their level of fatigue on a scale of 1 to 10
- Change in fatigue score was measured between time zero and time 5 minutes as well as between time zero and time 2 minutes

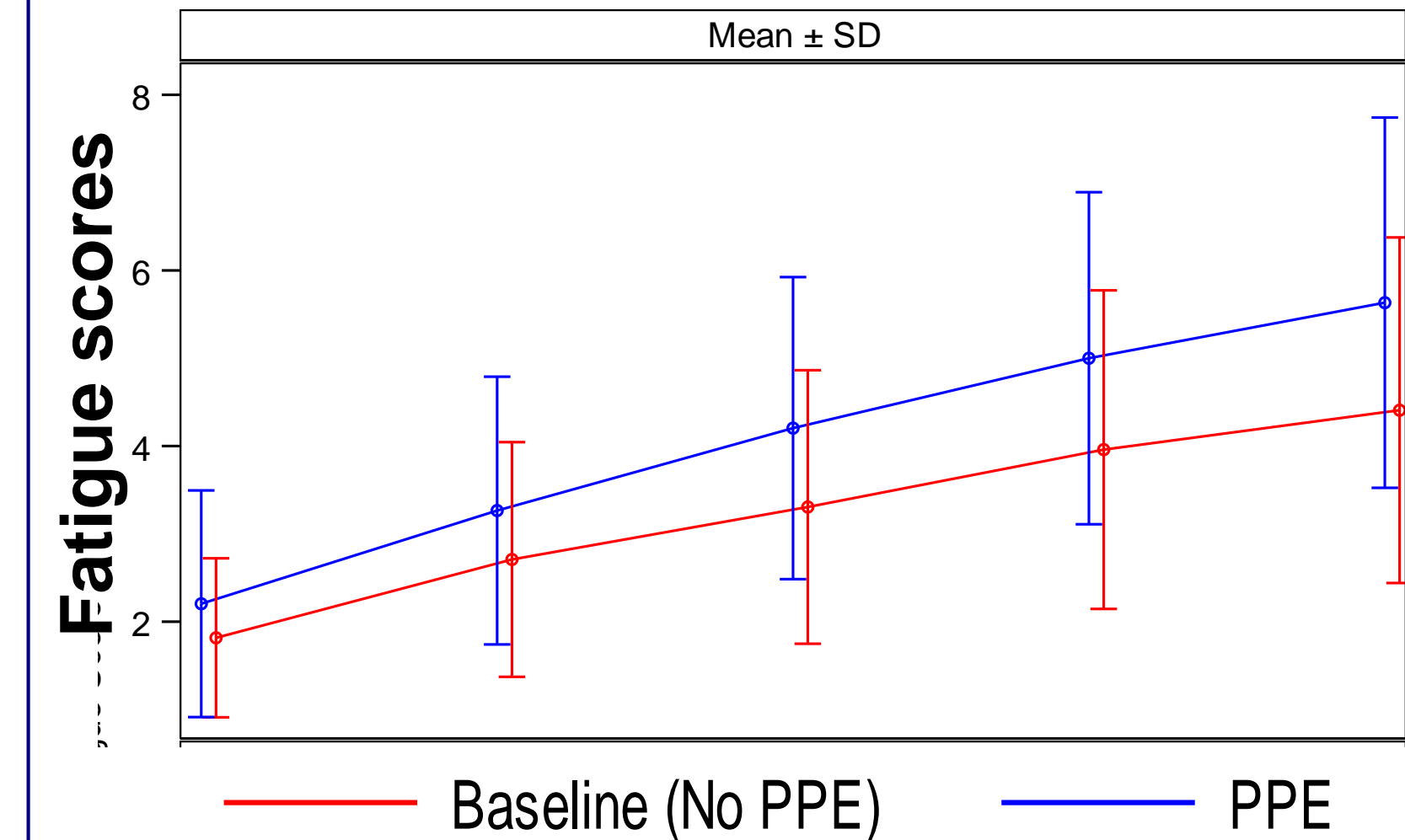
Results

- 109 HCPs completed both sessions

CPR parameter	Epoch	Baseline (mean ± SD)	PPE (mean ± SD)
CC rate (CC per minute)	Epoch 1 (time 0)	111 ± 15	112 ± 13
	Epoch 4 (time 2 mins)	108 ± 16	110 ± 13
	Epoch 10 (time 5 mins)	111 ± 17	113 ± 15
CC depth (inches)	Epoch 1 (time 0)	2.5 ± 0.6	2.5 ± 0.5
	Epoch 4 (time 2 mins)	2.3 ± 0.6	2.2 ± 0.6
	Epoch 10 (time 5 mins)	2.2 ± 0.6	2.1 ± 0.6
Release velocity (mm/s)	Epoch 1 (time 0)	420 ± 105	411 ± 95
	Epoch 4 (time 2 mins)	352 ± 90	343 ± 78
	Epoch 10 (time 5 mins)	346 ± 86	333 ± 80

CPR parameter	Median Change from Epoch 1 to Epoch 4			Median Change from Epoch 1 to Epoch 10		
	Base-line	PPE	p	Base-line	PPE	p
CC rate (cpm)	-2.03	-0.88	0.14	+0.75	+1.75	0.47
CC depth (in)	-0.21	-0.21	0.85	-0.29	-0.32	0.74
Release velocity (mm/s)	-65	-65	0.85	-72	-70	0.85

Results (cont.)



Conclusions and Next Steps

- Change in CC quality and provider fatigue was not significantly different over 5 min
 - The trend towards higher fatigue in PPE group at 5 min was not statistically significant
- Over a clinically realistic 2 minute period, neither CC quality deterioration nor self-reported fatigue was significantly worse while wearing PPE compared to normal attire
- Our data suggest that pediatric BLS recommendations for CC providers to change every 2 minutes need not be altered in the setting of PPE use.