Effectiveness of Chest Compressions in Various Football Equipment Conditions

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Debate exists over the best practices for applying effective lifesaving techniques to an athlete wearing football equipment. The extent of equipment removal necessary to provide effective chest compressions (CCOMP) during cardiopulmonary resuscitation has not been determined. **PURPOSE:** To determine the effectiveness of CCOMP in various football equipment conditions. **METHODS:** High-fidelity patient simulators fitted with football shoulder pads and a helmet measured CCOMP effectiveness of 16 certified athletic trainers (age=31.4 ± 6.3 years, years certified=8.8 ± 5.7). A total of 4 equipment conditions were investigated: 1) fully equipped; 2) shoulder pads lifted to expose the chest; 3) shoulder pads splayed open to expose the chest; and 4) shoulder pads removed. Mean CCOMP depth (mm), CCOMP rate (CCOMP/min), percentage of correctly released CCOMP, and percentage of adequate (correct) and too shallow (incorrect) CCOMP depths were calculated and compared using repeated measures one-way ANOVA. **RESULTS:** We observed significant differences in mean CCOMP depth ($F_{3,45}$=15.77, p<0.001), percentage of adequate CCOMP depth ($F_{3,45}$=23.97, p<0.001), and percentage of too shallow CCOMP depth ($F_{3,45}$=12.51, p<0.001) between the equipment conditions (see table). **CONCLUSION:** CCOMP are ineffective when performed over shoulder pads. However, only slight differences were found between pads removed, pads splayed open, and pads lifted conditions. Our data demonstrate that CCOMP should be performed directly on the chest without interference from shoulder pads. Sports medicine professionals should consider the need for shoulder pad removal when developing proper emergency action plans.
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Equipment Condition	Mean CCOMP Depth (mm)	CCOMP Rate (CCOMP/min)	% of Correctly Released CCOMP	% of Adequate CCOMP Depth	% of Too Shallow CCOMP Depth
1	45.0 ± 8.6*	104.1 ± 18.3	83.9 ± 27.7	26.9 ± 30.7*	62.6 ± 37.9‡
2	53.1 ± 5.8	108.5 ± 17.0	74.5 ± 34.7	75.0 ± 37.2	20.9 ± 35.6
3	53.6 ± 5.6	107.3 ± 17.8	84.3 ± 24.4	79.9 ± 28.7	15.6 ± 23.9
4	53.9 ± 3.9	109.3 ± 15.1	82.2 ± 22.7	90.8 ± 23.8‡	17.6 ± 23.3

* Significantly less than all other conditions
‡ Significantly greater than all other conditions