

# Study of 70 Pediatric Specialists' Infant CPR Performance on a High Fidelity Infant Simulator with Real-Time Feedback

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**Background** Many studies on adult CPR suggest the need to continue the focus on quality performance, yet research into pediatric CPR is scant. Overall consensus points to a greater need to improve pediatric CPR performance than adult. Niles 2018 and O'Connell 2018 reported issues with CPR quality; the former highlights difficulties in chest compression (CC) depth in pediatric resuscitation and even lower performance in younger patients. No studies provided comprehensive data on pediatric CPR performance before and after training. This study aims to provide up-to-date data on how pediatric specialists perform during their regular recertification training.

**Method** A total 70 in-hospital infant specialists (28 Neonate specialists, 42 PALS specialists), attended a CPR refresher course based on their recertification cycle every two years at their own hospital training centers. All specialists were employed in hospitals with a specialist infant care department. The baseline scores were established by reviewing the CPR resuscitation skills with an instructor before performing 2 cycles of 30:2 on a high fidelity SmartMan infant resuscitation simulator. The simulator recorded detailed data for chest compression (CC) and ventilations (vents) parameters. When the specialists completed this baseline, the instructor showed them a display of their performance and the summary of all of the parameters. At this stage, the performance criteria were reviewed and feedback were explained to each specialist. They were then asked to perform the skills again until they achieved 70% for CC and 60% for vents. Specialists who fell short of the target scores were given multiple attempts with instructors reviewing how to perform the skills if needed. Use of real-time audio and visual feedback was permitted. Post-test scores analyzed were specialists' best performance.

## Results Baseline Scores (Pre-Test)

A total of 3382 CC were performed among the specialists. The average compliant CC score was 12.65%; 450 CC of 3382 were performed to the standards set in AHA guidelines. A total of 310 vents were performed among the specialists. The average

score for vents was 10.17%; 10 vents performed to standards set in AHA guidelines.

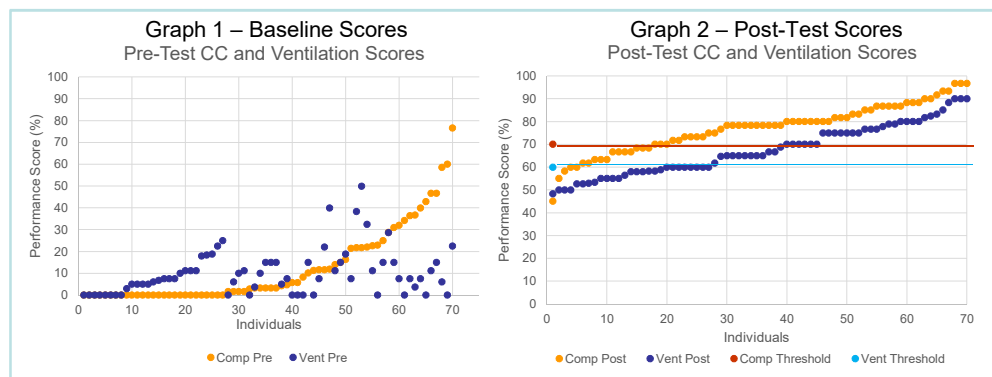
There were 8 people who performed the baseline with 0 CC and 0 vents correct, 27 people performed 0 CC correct and 18 people scored 0 vents correct. Only 1 person scored above 70% for CC. No one scored above 50% for vents. Graph 1 is baseline scores, sorted based on CC scores and then by vents scores.

## Post-Test Scores

The results grouped around the target score set by the instructors. A total of 4200 CC were performed with an average of 76.97%; 3233 CC were compliant to the AHA guidelines. A total of 1860 vents were performed with an average of 67.43%; 1254 vents were compliant to the AHA guidelines. About 24% or 17 people were not able to achieve the target score of 70% for CC and 27% or 19 people who did not achieve the target score of 60% for vents. Graph 2 is post-test scores, sorted by CC score and vents score separately.

| Table 1<br>Performance of<br>70 Specialists | Pre-Test<br>CC<br>Score | Pre-Test<br>Vent<br>Score | Post-Test<br>CC Score | Post-Test<br>Vent<br>Score |
|---|-------------------------|---------------------------|-----------------------|----------------------------|
| Max (%)                                     | 76.7                    | 50                        | 96.7                  | 90                         |
| Min (%)                                     | 0                       | 0                         | 45                    | 48.3                       |
| Range                                       | 76.7                    | 50                        | 51.7                  | 41.7                       |
| Average (%)                                 | 12.65                   | 10.17                     | 76.97                 | 67.43                      |
| Median (%)                                  | 3.3                     | 7.5                       | 78.3                  | 65                         |
| Mode (%)                                    | 0                       | 0                         | 78.3                  | 60                         |
| $\sigma^2$                                  | 304.60                  | 107.31                    | 112.15                | 122.30                     |
| $\sigma$                                    | 17.45                   | 10.36                     | 10.59                 | 11.06                      |
| $\sigma_{\bar{x}}$                          | 2.09                    | 1.24                      | 1.27                  | 1.3218                     |

**Conclusion** This research on infant CPR is consistent with the research on adult CPR that training without high fidelity manikins and without real-time feedback leads to poor skills performance. It also suggests that real time feedback and target performance level influence achievement levels. This study does not deal with retention.



1. Niles D, Duval-Arnould J, Skellett S, et al. Characterization of Pediatric In-Hospital Cardiopulmonary Resuscitation Quality Metrics Across an International Resuscitation Collaborative. *Pediatric Critical Care Medicine* 2018,19(5):421-432.
2. O'Connell K, Kerrey B, Myers S, et al. Pediatric CPR in the Emergency Department: Initial Findings From the Videography in Pediatric Emergency Research Collaborative. *Circulation* 2018,138:A109