



Fatigue during cardiac compression (CC) exercise using neonatal patient simulators

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BACKGROUND

- Adult, pediatric, and neonatal patient simulator studies have shown that CC performance quality decreases over time.
- The physical effort required to successfully perform CC in adolescents and adults is comparable to performing a demanding physical activity, such as running or high impact aerobics.
- Regular exercise can improve clinicians' ability to deliver effective thoracic compressions.
- Both adult and pediatric resuscitation guidelines recommend that persons administering CC rotate every two minutes.
- This recommendation has not yet been incorporated into neonatal resuscitation guidelines.

OBJECTIVES

- Primary: To assess the impact of physical fatigue on the quality of cardiac compressions performed by pediatric healthcare providers, when applied in combination with ventilation on a neonatal simulator.
- Secondary: To evaluate the contribution of gender, body mass index (BMI), and regular physical exercise on caregiver fatigue during the simulation exercise.

METHODS

- Neonatal providers were instructed to administer CC as if they were performing an actual resuscitation on a live newborn patient.
- Participants were told to discontinue CC in the event of extreme fatigue, otherwise the procedure continued for 10 minutes.
- Oxygen Saturation and HR of the participants were measured.

METHODS cont.

- CC depth of one third of chest diameter was defined as adequate quality.
- 4 consecutive CC below target depth was considered as fatigue equivalent.
- A student-T test was used to evaluate continuous measures. Comparisons were made using a square Chi test, for all categorical data. A $p < 0.05$ significance value was used for all statistical tests.

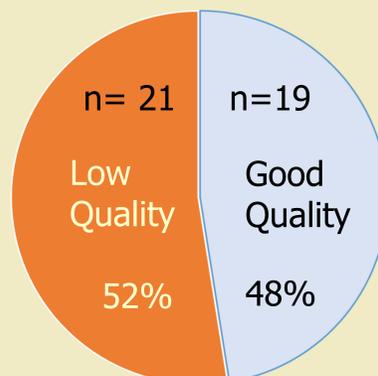


The simulator used in this study was a Laerdal Resusci Baby@QCPR®, calibrated for newborns. No real time feedback was provided to the participants.

RESULTS

40 subjects were enrolled: 25 females (62%)
No exercise in the last 3 months: 17 (42%)

Chest compression performance during 10 minutes



Mean time for fatigue : 7.7 minutes (range 3.5-9)

RESULTS cont.

HR and saturation

n total: 40	before	after	P value
HR Mean (SD)	77.9 (14.2)	101.4 (17.3)	< 0.0001
Saturation Mean (SD)	97.7 (2)	98 (0.9)	0.5444

Gender, routine exercise and BMI association with fatigue

N= 40	NO FATIGUE 19 (48%)	FATIGUE 21 (52%)	P value
Female	11 (44.0)	14 (56.0)	0.57
Male	8 (53.3)	7 (46.7)	
Routine Aerobic Activity (yes) N=23	14 (74)	9 (43)	0.0489
BMI normal	14 (60.9)	9 (39.1)	0.0489
Overweight	5 (35.7)	9 (64.3)	
Obese	0	3 (100)	

CONCLUSIONS

- CC performance quality decreases frequently before 10 minutes on a neonatal simulator.
- Providers' heart rate increased significantly after 10 minutes of CC administration.
- Fatigue was associated with both the lack of provider aerobic activity and provider obesity.
- These findings support the need for guidelines requiring frequent rotation of CC providers during prolonged neonatal resuscitation.

