Evaluation of a smartphone based application for neonatal heart rate assessment: a simulation study

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Background:
Accurate assessment of heart rate is crucial in neonatal resuscitation. NeoTap is a newly developed free android application. When assessing the neonatal heart rate by auscultation or palpation, NeoTap converts the tapping on the screen of a smartphone to an onscreen value visible to the whole team (figure 1), based on the average of the last three taps. We aimed to determine the precision of the algorithm and user-friendliness of the software.

Method:
An observational study was conducted at Sachs’ Children and Youth Hospital, in 2014. Staff members of different backgrounds and various levels of resuscitation skills were asked to assess heart rate using NeoTap from a randomly generated heart rate (true value) on a Laerdal SimNewB™ manikin (figure 2). Assessment was done by auscultation of the heart and palpation of a pulse.

Results:
Altogether 1300 heart rate measurements were done by 32 staff members. The mean acquisition time for heart rate was 14.9 seconds. The correlation between the true and measured value was excellent by auscultation (correlation coefficient 0.993). When heart rate was categorized into ‘very low’, (20-59), ‘low’ (60-99) and ‘normal’ (100-139), the correlation was lower in the ‘very low’ group compared to the other groups (0.92 vs. 0.97). Pulse assessed by palpation had slightly lower correlation (0.986). Overall, 90 % of all measurements differed by 5 beats or less from true value (figure 3).

Conclusion:
The use of NeoTap allows fast and accurate heart rate acquisition on a manikin avoiding stressful calculations. The next step is a trial in real life situations.

Figure 1. NeoTap, tap the screen to register heart rate.
Figure 2. A staff member assesses heart rate on a SimNewB™ manikin using NeoTap.
Figure 3. Difference between true value and value estimated through Neotap.