

In search for second best: accuracy of tympanic, temporal scan and infrared skin thermometers in children.

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Introduction: Body temperature measurement in children is relevant as marker for disease severity, as screening procedure and as biomarker following a given treatment. Rectal measurement is still considered the gold standard despite several disadvantages. We aimed to describe the accuracy of several non-invasive thermometers when compared to rectal measurement.

Methods: Preliminary analysis of a prospective cohort study was performed. Using an at random approach, rectal (Filac[®]), tympanic (AccuSystem[®]), temporal scan (Exergen[®]) and infrared no contact (ThermoFlash[®]) body temperature readings were collected at one single time point. Every child was only included once. Temperature readings were described by median and range, observations were compared to rectal temperature data using Bland-Altman.

Results: Rectal temperature measurement was refused by 14/105 children. Median temperature readings of rectal, tympanic, temporal skin and infrared skin were 37.3 (36-39.5), 36.6 (34.7-39.5), 37.1 (35.6-39.8), and 36.7 (35-39.7)°C respectively. Using Bland-Altman and rectal temperature as golden standard, there is a mean difference of 0.55 (tympanic), 0.15 (temporal) and 0.41 (infrared no contact)°C. Visual inspection of the Bland-Altman plots shows that the difference in values also depends on the rectal temperature. With low rectal temperature (<37°C), the non-invasive measurement will overestimate the rectal reference temperature, with high rectal temperature, the non-invasive measurements will underestimate the rectal reference temperature.

Conclusions: Compared to rectal temperature, all non-invasive techniques underestimate the rectal temperature. The temporal scan seems to deviate less (-0.15°) than the other techniques. More importantly, all non-invasive techniques overestimate lower temperatures, and underestimate higher temperatures compared to rectal measurement. Further validation of these preliminary results should be based on a further extended cohort and external validation.

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