

Pediatric Electronic Board (Ped-E-Board)

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BACKGROUND

- A rapid and accurate weight of a child can be of critical importance for pediatric emergencies and resuscitations.^{1,2}
- The Broselow Tape (BT) is the current gold standard for estimating a child's weight based on their length.³
- There is a worldwide childhood obesity epidemic.⁴
- Studies have shown the BT is no longer accurate.^{5,6,7}
- One study showed the BT has a >10% error almost half the time.⁸
- Technology should exist in the 21st century to safely and accurately determine a child's weight.

OBJECTIVE

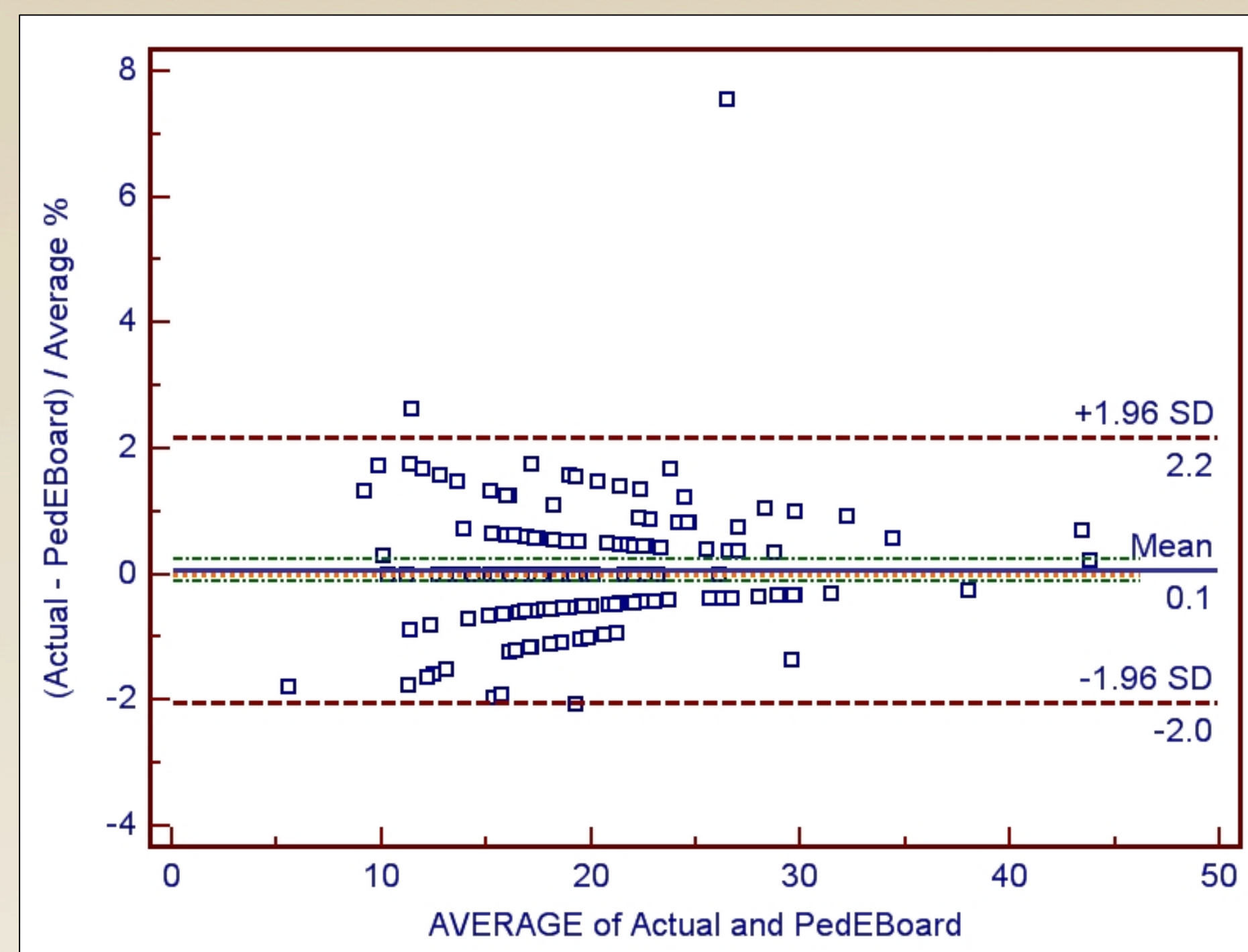
- To create a pediatric spine board capable of determining a child's actual weight in an emergency setting.

METHODS

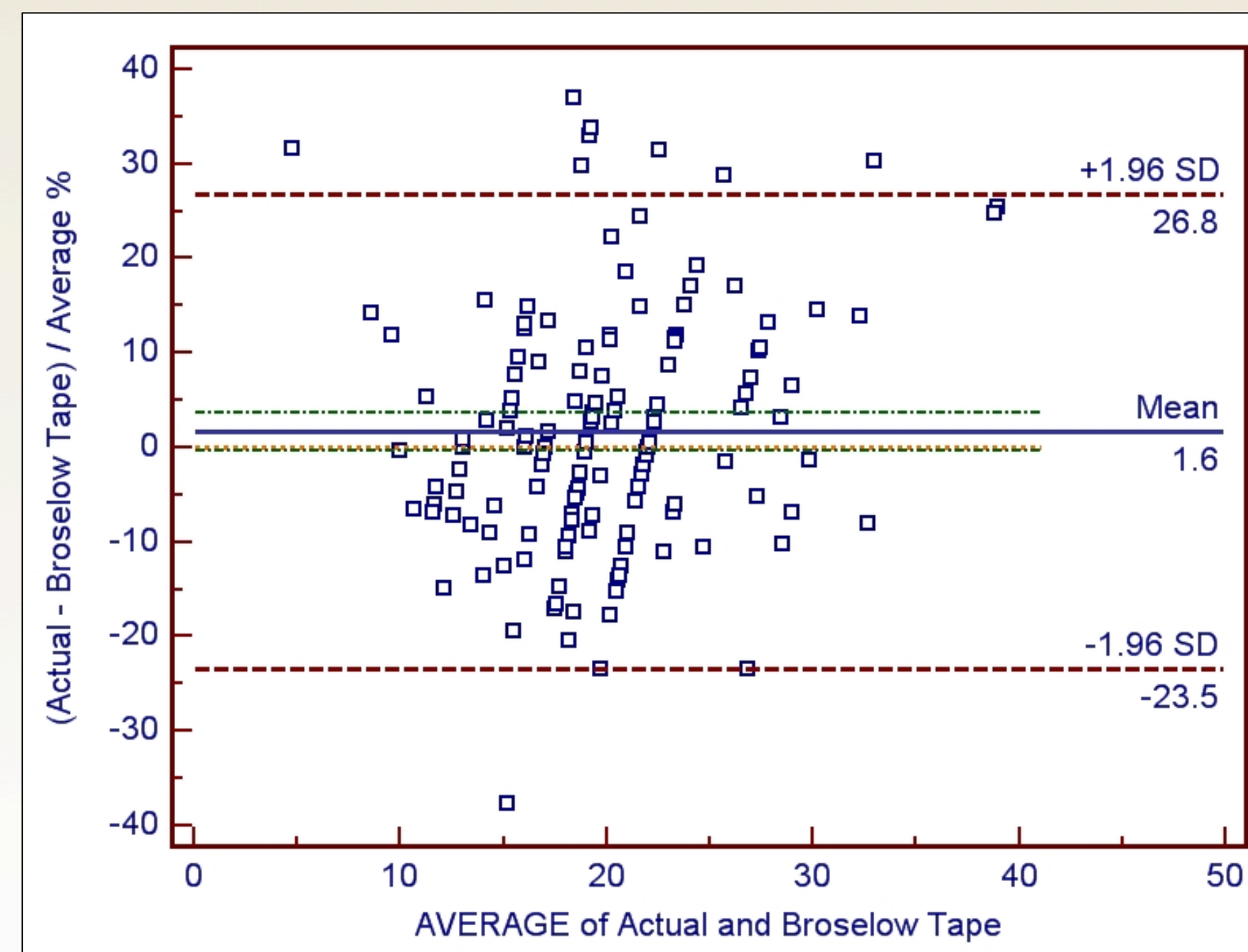
- Ethics approval from Western University
- Power calculation done for sample size to detect 10% error based on a previous published data set⁹

$$n = \left(\frac{Z_{1-\frac{\alpha}{2}}}{E} \right)^2 = \left(\frac{1.96(9.0)}{1.4} \right)^2 = 158.76 \approx 160 \text{ participants required}$$

- Designed and built Ped-E-Board prototype using wood frame, aluminum plate and iHealth® Bluetooth bathroom scale (total cost ~\$200)
- Consent from parents and assent from children >7 years old
- Exclusion criteria: <46.1cm, >146.6cm and non-English speaking
- Testing conducted in March 2014 in a community pediatrician's office
- Actual weight and height measured wearing light-fitting clothes and no shoes by Dr. Lubell
- Ped-E-Board weight obtained by Mr. Milne
- Broselow Tape weight estimate done using the 2002A tape which incorporates the NHANES III reference intervals
- Statistical Analysis: MedCalc for Windows 98, Version 9.6.0.0
- Continuous data were assessed for normal distribution using the D'Agostini-Pearson test. Medians were reported with 95% confidence intervals
- Bland-Altman analysis was used to compare actual weight versus Ped-E-Board weight and BT-estimated weight
- The Spearman coefficient of rank correlation was also calculated



Bland-Altman % Difference Actual vs. Ped-E-Board



Bland-Altman % Difference Actual vs. Broselow Tape



RESULTS

N=160 Children

Bland-Altman % Difference:

- Ped-E-Board 0.1% (95% CI -2.0 to 2.1%)
- BT 1.6% (95% CI -23.5% to 26.8%)

Spearman Coefficient of Rank Correlation:

- Ped-E-Board 0.999 p<0.0001 (95% CI 0.999 to 1.000)
- BT 0.875 p<0.001 (95% CI 0.831 to 0.907)

	Median Weight	95% CI
Actual	18.9kg	17.0 to 19.9
Ped-E-Board	18.8kg	17.4 to 20.0
Broselow Tape	19.0kg	19.0 to 20.0

LIMITATIONS

- No data on the smallest BT category (46-52cm)
- Durability of Ped-E-Board not tested (fluids, temperatures, impact, etc.)
- Reliability of Ped-E-Board not assessed

CONCLUSIONS

- Ped-E-Board was just as accurate as a pediatrician's scale in determining the weight of a child.
- Ped-E-Board was more accurate than the weight estimated by the Broselow Tape.

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