The EZ-IO intraosseous (IO) needle is available in 2 needle sizes for children based on the patient weight. To date, there is no published evidence validating the use of weight-based scaling in children. We hypothesized that pretibial subcutaneous tissue thickness (PSTT) does not correspond with patient weight but rather with age and body mass index (BMI)” Al-Shibli et al (2019).

Abstract:

OBJECTIVE: The EZ-IO intraosseous (IO) needle is available in 2 needle sizes for children based on the patient weight. To date, there is no published evidence validating the use of weight-based scaling in children. We hypothesized that pretibial subcutaneous tissue thickness (PSTT) does not correspond with patient weight but rather with age and body mass index (BMI). Our objective was to describe the relationship of a patient’s PSTT to their weight, age, and BMI in children less than 40 kg.

METHOD: One hundred patients who weighed less than 40 kg were recruited prospectively from October 2013 to April 2015 at a tertiary care pediatric emergency department. All sonographic assessments were performed by 1 of 2 emergency physicians certified in point-of-care ultrasound. A single sonographic image was taken over the proximal tibia corresponding to the site of IO insertion. In patients where both sonographers performed independent measurements, a Pearson correlation coefficient was determined. Univariate
linear regression was performed to determine the relationship between age, weight, and BMI with PSTT.

RESULTS: One hundred participants were recruited and ranged in age from 10 days to 14 years (mean, 5.01 [3.14] years). Fifty-seven percent of participants were male. Patients’ weights ranged from 3.5 to 39.3 kg (mean, 21.42 [9.12] kg), and BMI ranged from 12.1 to 45.0 kg/m (mean, 17.31 [4.00]). The mean (SD) PSTT across participants was 0.68 (0.2) cm. The intraclass correlation coefficient for agreement between the 2 sonographers was moderate (intraclass correlation coefficient, 0.602). There were significant positive correlations between BMI and PSTT (r = 0.562, P = <0.001) as well as weight and PSTT (r = 0.293, P < 0.003). There was a weak correlation between age and PSTT (0.065, P = 0.521).

CONCLUSIONS: Pretibial subcutaneous tissue thickness correlates most strongly with BMI, followed by weight, and weakly with age. Our findings suggest that current IO needle length recommendations should be based on BMI rather than weight. This would suggest that clinicians need to be aware that young patients in particular with large BMIs may pose problems with current weight-based needle length recommendations.

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