Preliminary analysis of Broselow tape: Can we make it More Accurate?

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Accurate weight estimation is important not only for calculating appropriate medication dosages, but also determining the rates of fluid replacement, and selecting correct equipment sizes in critically ill children requiring immediate treatment. Each medication should be administered based upon the actual weight of the patient. But often actual measurement of patients’ weight is not possible in a critically ill or a seriously injured child. A length-based measuring tape such as Broselow tape (BT) is used in the emergency department to predict the child weight.

In previous work evaluating Broselow’s measurement and actual weight, we found that BT was not accurate and may underestimate the actual weight especially in overweight population. In this study, we further test the accuracy of BT for weight estimation, and attempt to derive a correction factor based on some of the measures of obesity which helps accurately predicts weight in obese patients and potentially modify BT by adding this correction factor into the BT.
**Methods:** This is a prospective study conducted in pediatric outpatient clinic. Pediatric patients aged 0-8 years were included. Subjects were selected in a nonrandom manner using strict inclusion and exclusion criteria.

Exclusion criteria included: acute illness, presence of any major medical condition affecting weight like amputation, short stature, endocrine disorders, renal disorders, contractures, neurological conditions and length outside of BT range (< 45.9 cm or > 146.5 cm).

The measurements of following variables were recorded

1) Actual weight
2) Height
3) Predicted weight
4) Mid arm circumference
5) Waist circumference
6) Waist to hip ratio
7) Mid-thigh circumference.

We performed a stepwise linear regression model that tested 4 anthropomorphic measurements and keeping Broselow’s measurement in the regression since this is considered standard of care and relating it to actual weight. Although 4 of the 5 factors excluding Waist to hip ratio could be inserted in the model making it highly significant, we wanted to make the model practical and easy to perform. Therefore, we chose 2 variables one of which is Breslow’s measurement. The next most significant variable was Mid-thigh circumference.

**Results:** Data of 95 children were included in this preliminary analysis. 59 were male (62%) and 36 were female (37%). Relating the mid-thigh circumference (MTC) and Broselow's scale to Actual weight, the model had a satisfactory R sq of .85 (P<.0009) the coefficients for the model is presented in the table below.

**Conclusion:** Mid-thigh circumference and broselow scale were the measurements that showed significant correlation with the actual weight. Waist circumference and mid arm circumference also showed some correlation. But not as strong as mid-thigh circumference.
<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95.0% Confidence Interval for B</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Beta</td>
<td>t</td>
<td>Sig.</td>
<td>Lower Bound</td>
</tr>
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<td>1 (Constant)</td>
<td>-11.031</td>
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<td>-10.211</td>
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<td>-13.176</td>
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<tr>
<td>Broselow weight</td>
<td>.232</td>
<td>.278</td>
<td>5.862</td>
<td>.000</td>
<td>.154</td>
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<tr>
<td>Mid thigh circumference</td>
<td>.745</td>
<td>.745</td>
<td>15.722</td>
<td>.000</td>
<td>.651</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Actual Wt.(kg)