

Can the Surface Area of a Pediatric Patient's Palm Accurately Predict His/Her Weight: a Research Proposal

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Background:

For decades, the standard for pediatric weight estimation in resuscitation has been the Broselow® tape. Using a child's height, the tape separates the patient into one of eight different weight range categories. The given category then provides dosages of emergency resuscitation medications, equipment (i.e. endotracheal tube), and electrical therapy (defibrillation dosage).

Why do we need to update our method of determining Predicted Body Weight?

Growing Trends of obesity are showing that are traditional methods of pediatric weight estimation are falling short, leading to under-dosing important interventional medications. The Broselow® tape may also overestimate a child's weight in malnourished populations.

What is our research based upon?

Prior research has looked for mathematical correlations between total body surface area, height, and weight of both pediatric and adult patients.

The DuBois formula ($\text{Height(cm)}^{0.725} \times \text{Weight (kg)}^{0.425} \times 0.007184$) has been found to lose its accuracy in patients with decreased overall surface area (aka pediatrics). Haycock et. al. formulated a nomogram for calculating body surface area in pediatric patients using geometric derivations by dividing different parts of the body into equivalents of cylinders and spheres. Other research has looked for correlations between surface area of the hand or palm to surface area of the patient's body, primarily in estimating percentages of burn injuries.

How can we incorporate newer technology?

Newer mobile devices have two cameras, giving stereoscopic capabilities for perspective photography and distance calculations. Countless apps are made available at one's fingertips for references, calculation, and even consulting. It stands to reason, therefore, that one device could place weight estimation and clinical reference into the palm of the clinician's hand.

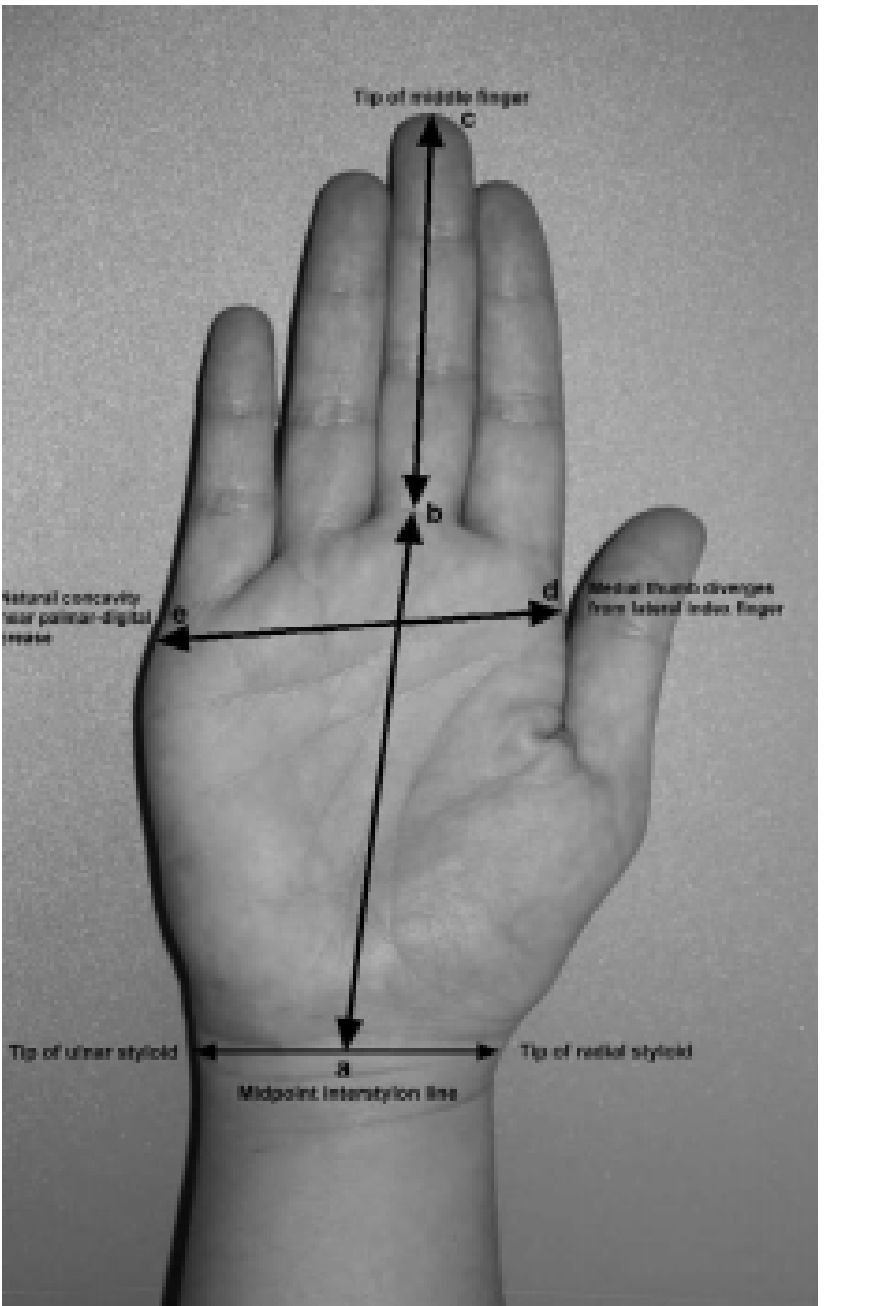
Objectives:

Primary Objective: To determine if the surface area of a pediatric patient's palm will reliably estimate his or her body weight

Secondary Objective: To determine whether the surface area of a child's palm can be accurately measured using a mobile device

Methods

Upon encountering a pediatric patient, the patient's height and weight will be measured. A designated mobile device will then be used to obtain a measurement of the palmar surface of the patient's hand. Previously recommended points of measure include: tip of the ulnar styloid to tip of the radial styloid, natural concavity near the base of the 5th digit to medial thumb divergence point from the lateral index finger, length from mid-styloid line to base of 3rd finger, and length from base of 3rd finger to tip of 3rd finger. Surface area of the palm will be calculated. The measurement of the palm will be done with the child's hand placed against a standardized grid.



Data Collection and Range of Study:

Primary site: All pediatric patients in Arnot Ogden Emergency Department

Secondary Site: The Arnot Medical Services Pediatric(s) office(s)

Tertiary Site (If Needed): Arnot Public Mall

The study will be conducted until the 75 subjects are enrolled. We estimate this to be about one year.

Discussion:

The goal of this study is to find a correlation between palm size and weight of a pediatric patient in a readily reproducible mobile format. If a reliable correlation and rapid data acquisition method can be found (i.e. an app for the mobile device of one's choice), the possibilities are endless for clinical application in pediatric resuscitation, both in-hospital and out, as well as general pediatric care.

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