

Researchers examine accuracy of adult body weight estimates in the emergency department

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Knowing a patient's weight is necessary for many weight-based medications such as thrombolytics, anticoagulants and numerous

cardiovascular medications. Scaling drugs to a patient's weight prevents adverse events from overtreatment and treatment failure due to underdosing. Inaccurate weight estimations may lead to inaccurate drug doses, which could cause patient harm.

However, in the [emergency department](#) (ED), during resuscitative care, measuring weight is often impossible. Moreover, little is known about the relative accuracy of different methods currently used to weigh patients during [emergency care](#). For example, when faced with a patient incapacitated by an ischemic stroke in need of urgent thrombolytic therapy but without any recorded weight, the best method for estimating their weight remains unclear.

Theoretically, the ideal method of weight estimation should be accurate, quick, and easy to use in the ED, the [intensive care unit](#) (ICU), or the prehospital environment. It also should preferably require minimal training for effective use and be inexpensive.

Because the current understanding of emergency weight estimation in adults has significant gaps, researchers from Florida Atlantic University's Schmidt College of Medicine conducted a [systematic review](#) to identify, review, analyze and synthesize data from existing published literature on the accuracy of methods of estimating weight in adults.

A total of 95 studies were included, in which 27 different methods of total body weight estimation were described, with 42 studies included in the meta-analysis. Researchers extracted and evaluated study characteristics, quality of the studies, weight estimation methods evaluated, accuracy data, and any information on the ease-of-use of the method.

Results, published in the [American Journal of Emergency Medicine](#), showed that the most accurate methods of estimating weight in

emergency care were 3D camera system estimates (88.8% accuracy); patient self-estimates (88.7% accuracy); the Lorenz method designed for use for dose calculations for thrombolysis in stroke patients, which measures hip and abdominal circumferences (77.5%); and family member estimates (75%).

However, no method was without significant potential limitations during emergency care.

For example, while patients' self-estimate of weight was one of the most accurate of all the estimation methods, during emergency care, there were a significant number of patients who were unable to self-estimate their weight due to being confused or unresponsive. This was as high as 70 to 85% in some of the studies. In addition, while self-estimations were generally accurate in normal-weight individuals, they were significantly less accurate in obese and underweight patients.

"Patient self-estimations of weight were generally very accurate and should be the method of choice during emergency care, when possible," said Mike Wells, Ph.D., senior author and a research assistant professor in the Department of Emergency Medicine, FAU Schmidt College of Medicine.

"However, since alternative estimation methods must be available when confused, or otherwise incapacitated, patients are unable to provide an estimate, alternative strategies of weight estimation also should be available."

Some of the methods of weight estimation that have been studied include estimates by patients themselves, estimates by patients' family members, estimates by health care providers, single variable and multiple variable anthropometric formulas (measurement and proportions of the human body), automated computerized methods, as

well as pediatric weight estimation methods cross-purposed to be applied in adults.

Weight estimation by [health care providers](#) has been the most studied method of weight estimation in adults. Findings from the systematic review show that while some studies reported reasonable accuracy, most studies found health care provider estimates to be unreliable. There was no class of health care provider found to be consistently better than others.

"During emergency care, it is necessary to estimate weight to allow for drug dose calculations, fluid volume calculations, mechanical ventilation settings, and other weight-based interventions," said Richard D. Shih, M.D., co-author and a professor of emergency medicine, Department of Emergency Medicine, FAU Schmidt College of Medicine. "In order to ensure the efficacy of the drug therapy while avoiding harm from overdose, the weight estimation should be as accurate as possible."

Some methods, such as weight estimation using 3D camera systems, showed extraordinary promise, and the researchers say it should be pursued in future research.

"Many of the methods of [weight](#) estimation we reviewed had the potential for failure or reduced accuracy during emergency care, and the ideal method for use during emergencies still needs to be determined in future prospective studies," said Wells. "The significance of our research lies in its provision of the currently available information on this topic with the aim to offer guidance to clinicians and researchers in this matter of important patient safety."

More information: Mike Wells et al, The accuracy of total body weight estimation in adults—A systematic review and meta-analysis, *The American Journal of Emergency Medicine* (2023). [DOI:](#)

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