Weight! Weight! … Don't Tell Me!

Authors: Avani Bhalodia, PharmD, BCPS, Mona Hammam, PharmD, MS, BCPS, and Susan F. Paparella, MSN, RN, Horsham, PA
Section Editor: Susan F. Paparella, MSN, RN

CE Earn Up to 5.5 Hours. See page 590.

Weight-based, lifesaving medications are commonly used in hospitals and routinely used in emergency departments.[1] Many weight-based medications are listed in the Institute for Safe Medication Practices (ISMP) high-alert medication list. According to ISMP, "high-alert medications are drugs that bear a heightened risk of causing significant patient harm when they are used in error."[2] These frequently used medications include anticoagulants (eg, heparin and enoxaparin), antibiotics for septic shock (eg, vancomycin and tobramycin), fibrinolytic agents for stroke (eg, alteplase), and antiepileptic drugs (eg, phenytoin and fosphenytoin). Therapeutic management of these medications involves the use of a patient's measured weight to establish an accurate dose, yet obtaining an actual measured metric weight (especially for adults) has been shown to be a challenge in this setting, as emphasized by the cases and literature review that follow.[1]

Error Examples

In an event reported to the ISMP national Medication Errors Reporting Program (MERP), a patient diagnosed with deep vein thrombosis was prescribed a weight-based heparin protocol in the emergency department. The patient reported her weight as 150 lb. During order verification, the pharmacist discovered an entry in the patient's record that noted the patient's weight as being 180 lb. Upon further investigation, the patient admitted to knowingly reporting a lower weight to the physician because she did not want her husband to overhear and know her real weight.[3] This inaccurate reported weight information nearly resulted in a 17% underdose of heparin, which potentially could have had a significant impact on the patient's recovery, including further thrombosis and other serious sequelae.

In another event, a patient presented to the emergency department with headache and facial droop. The stroke team was immediately called to the patient's bedside. During the stroke evaluation, the patient started to exhibit seizure-like activity. A decision was made to start fosphenytoin intravenously. The pharmacist asked the attending physician for the patient's weight to calculate the dose. The physician obtained the patient's weight from his wife, who stated "130," without offering any units of measurement, and there was no clarification by the prescriber. The pharmacist in this case calculated and prepared a dose based on 130 kg, and this dose was later administered. As the patient was taken to the computed tomography scanner, the pharmacist noticed that the patient did not look like he weighed 130 kg (which would be 286 lb). At the time of this realization, the patient had already received the entire infusion of fosphenytoin. The pharmacist recognized that an overdose had occurred and notified the physician. Subsequently, the patient's blood pressure dropped, and he became hemodynamically unstable. Vasopressors were quickly administered and the patient was transferred to intensive care unit.

In a third report made to ISMP, a health care provider estimated a patient's weight as 115 kg when patient's actual weight was 98 kg. The patient was prescribed a heparin bolus and infusion based on the overestimated weight. This patient received an overdose of heparin for 5 hours in the emergency department. Fortunately for this patient, there was no long-lasting harm from this anticoagulant overdose.[3]

Importance of Measuring Actual Body Weights

Analysts reviewing medication event reports to the Pennsylvania Patient Safety Authority in 2016 found that the emergency department was the most frequently involved care

Avani Bhalodia is Institute for Safe Medication Practices (ISMP*)/Food and Drug Administration Safe Medication Management Fellow, Horsham, PA.

Mona Hammam is Institute for Safe Medication Practices (ISMP*)/Food and Drug Administration Safe Medication Management Fellow, Horsham, PA.

Susan F. Paparella is Vice President, Institute for Safe Medication Practices (ISMP*), Horsham, PA.

*ISMP is a nonprofit organization that works closely with health care practitioners, consumers, hospitals, regulatory agencies, and professional organizations to educate caregivers about preventing medication errors. ISMP is the premier international resource on safe medication practices in health care institutions. If you would like to report medication errors to help others, E-mail us at: ismpinfo@ismp.org or call (800)FAIL-SAF(e). This Medication Error Reporting Program keeps information confidential and secure. We will include only the level of detail that the reporter wishes in our publications.

For correspondence, write: Avani Bhalodia, PharmD, BCPS, Institute for Safe Medication Practices, 200 Lakeside Dr, Suite 200, Horsham, PA 19044; E-mail: abhalodia@ismp.org.

J Emerg Nurs 2019;45:572-5.
0099-1767

https://doi.org/10.1016/j.jen.2019.06.004

area, accounting for 29.4% of all weight-related reported medication errors.[1] This rate was significantly higher than the next highest reported care area, the medical surgical units, with a rate of 7.7%. Results also showed that heparin (a high-alert medication) was involved in almost one third (29.7%) of the reported events.[1]

Some ED practitioners may estimate weights for nonverbal, nonambulatory, or critical patients, particularly during periods of resuscitations. However, it is important to know that these weight "guesstimates" are even more problematic than stated weights resulting in underdosing or overdosing of medication. A study conducted by Fernandes and colleagues[4] found that adult weights estimated by physicians and nurses are unreliable. Weights were estimated within 10% of actual body weight correctly by only 66% of nurses, 66% of physicians, and 97% of patients. The authors also concluded that incorrect weights lead to medication errors.[4] There has also been substantial research on the validity and reliability of estimating the weight of pediatric patients, including the use of the Broselow tape, Mercy method, and PAWPER tape, especially in under-resourced countries where scales are not available.[5-7] However, weight estimates using these methods remain experimental, and thus they are not recommended for use in place of an actual measured weight.[8]

ISMP has learned that barriers to measured, metric weights may include a lack of understanding of the importance of a patient's weight as essential patient information, the belief that an estimated or stated weight is an acceptable equivalent to a measured weight, the perception that staff are often too busy to obtain a patient's actual weight, or the belief that measuring the weight is a noncritical task that can wait until after admission.[9] Unfortunately, such beliefs and perceptions are far from the truth.[9,10] In addition, many staff in the United States also face significant environmental challenges that involve the lack of appropriate scales or stretcher scales in ED locations where actual weights should be obtained.[9-11] Regardless of the source, medication errors with weight-based drugs still occur when accurate metric weight information for patients is not readily available to the care team.

Measure Actual Body Weight in Metric Units Only

Measured metric weights are necessary for accurate doses of weight-based medications and should be obtained as routinely as other vital signs or assessments. Confusion between pound and kilogram weights led to a quarter of the reported weight-based medication errors, according to an analysis conducted in 2009.[12] This occurrence is significant because inaccurate patient weight documented in the emergency department can result in the potential for weight-based medication errors that follow the patient throughout his or her hospital stay and even after discharge.[10,12,13] As previously mentioned in the patient vignette about fosphenytoin administration, it is common for patients to report weight in pounds. Best practices dictate that health care practitioners utilize metric units for dose calculations, forcing health care providers to sometimes compute complicated weight conversions in a high-stress environment.

Safe Practice Recommendations

Recognizing the risk created by the failure to obtain an accurate measured patient weight, the Emergency Nurses Association (ENA) created a position statement that emphasizes the importance of measuring, recording, and displaying patient weights in a common metric unit (kilograms).[14] This position is in alignment with the ISMP's Targeted Medication Safety Best Practices for Hospitals, No. 3, which states, "Weigh each patient as soon as possible on admission and during each appropriate outpatient or emergency department encounter. Avoid the use of a stated, estimated, or historical weight."[15] ISMP also suggests that organizations use scales that only display metric units and consistently document weights in metric units only.[15] In the emergency department, weighing patients in metric units would require not only standing scales in triage but the use of stretchers with built-in metric scales in trauma rooms and other critical locations where nonambulatory patients receive care and where high-alert, weight-based infusions are common therapy. If questions arise regarding the additional cost of these necessary devices, return on investment calculations should include the potential for actual patient harm and litigation costs that may arise when practitioners choose to use a questionable weight value for medication dosing that results in an error.

In September 2018, Pennsylvania's Department of Health enacted a final recommendation (48 Pa.B. 5679) for all acute-care facilities to weigh each patient as soon as possible upon arrival, utilizing only a metric unit system. This notice also supports ISMP's call to action and requires practitioners to avoid the use of historical weights (using a weight found in an old medical record) or stated weights by patients and family members because of safety concerns.[16]

Discussion and Recommendations

Practice change of this magnitude may not be easily implemented and sustained in ED settings.[9,17] Real change involves alignment of values, beliefs, and behaviors,

making it easy to do the right thing for safety (ie, weighing patients using metric designations). We recommend starting by changing the perception of staff about the importance of obtaining an actual metric weight for each patient. It is no longer acceptable to habitually rely on the patient, family, or the patient's caregivers for an estimated weight value. Obtaining an actual metric weight needs to be a standard practice across the department. Sharing error examples from this article or from your own facility may help staff appreciate this risk. Equally as important is developing an organizational standard regarding equipment, policies, procedures, and expectations that addresses the time frame in which an actual weight must be collected and recorded for a patient after a stated or estimated weight was used in an emergency.

Complex practice issues also require environmental strategies to address system-based challenges. Begin by assessing the number, location, and type of scales that are available. Provide easy-to-use standing or chair scales to weigh patients in metric units only and place them in locations to accommodate the busy environment of the emergency department. If possible, acquire stretchers with built-in scales to weigh high-acuity patients, or at a minimum, place these stretchers in areas where critically ill patients typically are treated, because they receive the bulk of weight-based medications. In-floor scales are another device that some hospitals have incorporated into their triage process.[9]

We recommend working with pharmacy and medical staff leadership to ideally incorporate hard stops in computerized physician order entry systems that require a metric weight to be entered prior to order validation by a pharmacist for weight-based medications.[1] If instituted, this recommendation should be evaluated for unintended consequences and *workarounds,* including increasing the number of estimated weights. ENA recommends that all communications, including inter- and intradisciplinary patient handoffs, also should be in metric units only.[14]

Conclusion

Accurate patient metric weights are necessary to administer the correct dose of many high-alert medications used regularly in the emergency department. When patients are not actually weighed, it can place them in serious jeopardy for a medication error. Reliance on stated weights or estimated weights has been shown to be both risky and error prone. In many locations, pediatric weights are considered a mandatory part of the triage assessment, yet this practice has not been equally established as routine for adult patients. Emergency departments are the "front door" for many admitted patients and are where care begins.[18] As such, emergency departments should work to overcome the inherent obstacles in this process for both adults and pediatric patients and set the example about the importance of obtaining an *actual metric patient weight*. Integrating measured metric weights as a best practice is a solid step toward reducing harm from *preventable* medication errors.

REFERENCES

1. Bailey BR, Gaunt MJ, Grissinger M. Update on medication errors associated with incorrect patients weights. *Pa Patient Saf Advis*. 2016;13(2):50-57.
2. Institute for Safe Medication Practices. High-alert medications in acute care settings. https://www.ismp.org/recommendations/high-alert-medications-acute-list. Accessed June 14, 2019. Updated August 23, 2018.
3. Institute for Safe Medication Practices. *Medication Error Reporting Program [confidential database]*. Horsham, PA: Institute for Safe Medication Practices; 2019.
4. Fernandes CM, Clark S, Price A, Innes G. How accurately do we estimate patients' weight in emergency departments? *Can Fam Physician*. 1999;45:2373-2376.
5. Georgoulas VG, Wells M. The PAWPER tape and the Mercy method outperform other methods of weight estimation in children at a public hospital in South Africa. *S Afr Med J*. 2016;106(9):933-939. https://doi.org/10.7196/samj.2016.v106i9.10572.
6. Abdel-Rahman SM, Paul IM, James LP, Lewandowski A. Evaluation of the Mercy TAPE: performance against the standard for pediatric weight estimation. *Ann Emerg Med*. 2013;62(4):332-339. https://doi.org/10.1016/j.annemergmed.2013.02.021.
7. Wells M, Goldstein LN. Optimising emergency weight estimation in underweight and obese children [published online ahead of print July 23, 2018]. Eur J Emerg Med. https://doi.org/10.1097/mej.0000000000000561.
8. Thomas DO, Bernardo LM. Health history and physical assessment. In: *Core Curriculum for Pediatric Emergency Nursing*. Des Plaines, IL: Emergency Nurses Association; 2009:61.
9. Institute for Safe Medication Practices. Confidential proactive medication safety risk assessment findings, 2016-2018. Horsham, PA: Institute for Safe Medication Practices.
10. Paparella S. Weighing in on medication safety. *J Emerg Nurs*. 2009;35(6):553-555. https://doi.org/10.1016/j.jen.2009.07.003.
11. Getting closer to the bull's eye: 2014-2015 targeted medication safety best practicesSmetzer J, Cohen M, Shastay A, Jenkins R, eds. *ISMP Medication Saf Alert*. 2015;20(3):1-5.
12. Commonwealth of Pennsylvania Patient Safety Authority. Medication errors: significance of accurate patient weights. http://patientsafety.pa.gov/ADVISORIES/Documents/200903_10.pdf. Accessed June 14, 2019. Published 2009.
13. Condren ME, Desselle SP. The fate of pediatric prescriptions in community pharmacies. *J Patient Saf*. 2015;11(2):79-88. https://doi.org/10.1097/pts.0b013e3182948a7d.

14. Stone E. Weighing all patients in kilograms. https://www.ena.org/docs/default-source/resource-library/practice-resources/position-statements/weighingallpatientsinkilograms.pdf?sfvrsn=9c0709e_6; 2016. Accessed June 14, 2019. Published 2016.
15. Institute for Safe Medication Practices. 2018-2019 Targeted medication safety best practices for hospitals. https://www.ismp.org/sites/default/files/attachments/2017-12/TMSBP-for-Hospitalsv2.pdf. Accessed June 14, 2019.
16. Hoffman RM, Levine RL. Notices: Patient Safety Authority, Department of Health. Final recommendation to ensure accurate patient weights [48 Pa.B. 5679]. https://www.pabulletin.com/secure/data/vol48/48-36/1430.html. Accessed June 14, 2019. Published September 8, 2018.
17. Solomon A. A road map to just culture. *Top Patient Saf*. 2016;16(2):1-4. https://www.patientsafety.va.gov/docs/TIPS/TIPS_AprilMayJune16.pdf. Accessed June 14, 2019.
18. Centers for Disease Control and Prevention. FastStats: Emergency department visits. https://www.cdc.gov/nchs/fastats/emergency-department.htm. Accessed June 14, 2019. Reviewed January 19, 2017.

Submissions to this column are encouraged and may be sent to

Susan F. Paparella, MSN, RN
spaparella@ismp.org