



Position Statement

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Weighing All Patients in Kilograms

Description

The Institute of Medicine's (IOM's) landmark report, *To Err is Human*, established that medication errors are a major cause of preventable morbidity (2000). Medication errors are multifaceted, underreported, and can be difficult to measure (Wittich et al., 2014), which makes understanding, identifying, and preventing them a complex issue. However, dosing-related errors, specifically, have consistently been identified as significant sources of medication errors by organizations that investigate root causes (Bailey et al., 2016; ECRI 2015; National Coordinating Council for Medication Error Reporting and Prevention [NCCMERP], 2018; PA Patient Safety Authority, 2009; The Joint Commission [TJC], 2008; Wichmann & Larios, 2020). Missing or inaccurate patient weights have been clearly identified as major sources of dosing related medication errors (Bailey et al., 2016; ECRI 2015; NCCMERP, 2018; PA Patient Safety Authority, 2009; TJC, 2008; Wichmann & Larios, 2020).

As the portal of entry for many patients who require healthcare services, the emergency department (ED) is one of the top three areas for medication errors with serious consequences (Bailey et al., 2016; IOM, 2000). Characteristics that include a high-stress environment fraught with frequent interruptions and numerous transitions in care are all factors that contribute to the high risk of medication errors occurring in the ED setting (Lee et al., 2018). The varied processes of obtaining, documenting, and communicating patient weights in the ED create distinct opportunities for incorrect data, leading to medication errors that perpetuate throughout a patient's hospital stay. Recording an accurate patient weight has implications for a variety of clinical tasks both in and beyond the emergency department including accurate medication prescribing, fluid assessment, and nutritional and obesity screenings (Flentje et al., 2018).

The United States is one of only two industrialized nations in the world that has not fully converted to metric measurement (Central Intelligence Agency [CIA], 2016). However, product labeling for medications with weight-based dosing utilizes the metric system (e.g., mg/kg, units/kg) (Institute for Safe Medication Practices [ISMP], 2020; NCCMERP, 2018; Wichmann & Larios, 2020). Formulas used to estimate creatinine clearance to aid in medication dosing, and to calculate basal metabolic rate, also rely on accurate metric weights (NCCMERP, 2018). Certain populations such as oncologic, geriatric, those with renal or liver disorders, pediatric, and neonatal patients are at even greater risk for adverse drug events and are more vulnerable to the effects of any errors that result from incorrect weights being documented or communicated (Flentje et al., 2018; NCC MERP, 2018). As a result, patients of all ages are at risk for potentially fatal medication errors due to incorrect weight documentation in the ED (Shaw et al., 2013; Wichmann & Larios, 2020).

Reasons for inaccurate weight documentation are varied, including the incorrect unit of measure entry, failure to enter the unit of measure, erroneous estimation of patient weight, use of a historical weight, and failure to convert between pounds and kilograms correctly. In the United States, most patients weigh themselves in pounds (Hoffman et al., 2018). Converting from pounds to kilograms is an error-prone



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process and can result in more than two-fold dosing errors (Hoffman et al., 2018). Medication errors due to an incorrect weight recorded in the ED can easily be passed on to other units throughout the patient's hospital stay and continue after discharge if prescriptions are written based on an erroneous weight (Condren & Desselle, 2015).

ENA Position

It is the position of the Emergency Nurses Association (ENA) that:

1. Patient weights are measured, recorded, communicated, and documented in the health record using kilograms only.
2. Multiple types of scales are available in the emergency setting, all configured to record weights in kilograms only (e.g., examples are stretchers with built-in scales, built-in floor scales, chair scales, and portable standing scales).
3. Conversion charts for pounds to kilograms are available near all ED scales for patient or caregiver reference.
4. Clinical decision support (CDS) functions are available for emergency nurses to use for patients under age 18, enabling comparison of entered weight with expected weight (e.g., based on growth charts) and provide real-time alerts whenever underdose or overdose is suspected.
5. Electronic health record (EHR) upgrades include revisions to incorporate best practices for documentation of weights, including kilogram-only weight fields, notification of substantial changes in weight (e.g., 10%), and the capability to integrate weight data from scales directly into the record.
6. ED EHRs only allow weight entries in kilograms.
7. ED EHRs be configured to have "hard stops" in place that prevent drugs or prescriptions from being ordered without a weight documented in kilograms.
8. Preprinted order forms, prescriptions, and other paper documents prompt users to enter weight in kilograms.
9. The patient's weight in kilograms is included in all inter- and intra-disciplinary patient handoffs.
10. ED's institute policies and procedures requiring actual weight measurements in all cases except when patient condition prohibits or when delays can negatively impact patient outcomes.
11. Emergency nurses participate in research and quality improvement activities that involve the analysis of the root causes of medical errors and the mitigation of factors contributing to those errors.
12. As medical error reporting systems evolve and/or are customized, they are designed to capture weight-based medical errors via error categorization rather than only by in-depth root cause



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analyses.

Background

The ISMP publishes a guidelines document titled *ISMP Targeted Medication Safety Best Practices for Hospitals* every two years in order to identify specific medication safety issues that have continued to cause fatal and harmful errors in patients (2020). The ISMP has included weighing only in metric only within “Best Practice 3” since 2014–2015 (2020).

While the link between wrong-weight documentation and medical error may be intuitive to healthcare professionals, collecting evidence to communicate the link to administrators and other stakeholders can be challenging and resource-intensive. Most of the literature to support the critical importance of metric weights has come from adverse event and sentinel event reporting by medical safety organizations such as ISMP and TJC. Few studies available in the current literature include analyses that drill down to wrong-weight documentation as the root cause of specific medical errors. This is likely due to multiple factors such as limitations in error reporting systems and the retrospective nature of error reporting data (Flentje et al, 2018). Analyses of medication errors involving patient weights are limited by the information reported through reporting systems, which include specific error categories and reasons why the events occurred (Bailey et al., 2016). For example, medication error event types reported to the Pennsylvania Patient Safety Authority from December 2008 to November 2015 included the following Event Type categories, which all included cases ultimately involving incorrect patient weights: *wrong dose/over dosage*, *wrong dose/under dosage*, *wrong rate (intravenous)*, *monitoring error*, and *other*. There was no *wrong weight* category, but comprehensive chart reviews were able to identify wrong weights as the root cause of errors made within all five of the above categories (Bailey et al., 2016).

Early reports to the U.S. Food and Drug Administration (FDA) indicated that dosing errors comprised more than 40% of fatal medication errors (Phillips et al., 2001). The Pennsylvania Patient Safety Authority (2009) performed one of the first larger-scale studies of weight-based medication errors that drilled down beyond the general categories to determine whether wrong-weights were responsible for the errors. Their analysis of 479 errors in weight-based medication dosing found that 40% were categorized as wrong dose/overdosage events, and 25% were due to confusion between pounds and kilograms, and that simply having the option to weigh in either unit contributed to wrong weight entries (PA Patient Safety Authority, 2009). This study served as a resource for several organizations to develop policy or position statements on the importance of metric weights, including ENA. The Pennsylvania Patient Safety Authority has since published a similar study of 1,291 weight-related medication errors with very similar results (Bailey et al., 2016).

In the ED, several barriers can exist that hinder healthcare professionals in obtaining accurate patient



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weights. For example, patients with certain emergent conditions or who are non-ambulatory may not be clinically or physically stable enough to stand on traditional scales. If alternative scales such as bed scales or wheelchair scales are not available, healthcare professionals may feel it necessary to estimate the patients' weights or rely on historical weights. These are both unsafe practices that contribute to medication errors and adverse events (Hoffman et al., 2018; ISMP, 2020; NCCMERP, 2018;).

Respondents to an environmental assessment survey by TJC indicated that in 2017 51% of hospitals surveyed reported they were weighing adults in kilograms only and 69% were weighing pediatric patients in kilograms. Medication errors related to inaccurate patient weights persist despite recommendations from several health and safety organizations. These errors are often system failures related to equipment related issues, limitations in the EHR, and cost-related barriers that occur when hospitals make a system wide shift to metric measurement.

Converting to metric weights and documentation involves systemwide changes that may include significant costs, resources, education, policy modification, and software modification. However, as potential sources of medical errors are detected, it is important that systems be updated. National healthcare, quality, and safety organizations have recognized the impact of obtaining and recording patient weights in kilograms only on decreasing medication errors and support a standardized, multidisciplinary, system-wide strategy for this practice (Hoffman et al., 2018; ISMP 2020; NCCMERP 2018; Remick et al., 2018; Wichmann & Larios, 2020). Some of the strategies that have been shown to reduce weight-based medication errors include incorporating Clinical Decision Support (CDS) into the EHR to provide "hard stops" alerting the provider to the absence of a weight parameter for weight-based medications (Bailey et al., 2018), stating patient weights in kilograms during handoffs, incorporating prescribing alerts for suspected wrong-weight entries, wrong-dose entries, and significant changes in patient weight (Lee et al., 2018; Bailey et al., 2016; NCCMERP, 2018), and using pre-printed medication order forms that prompt the user to enter a weight in kilograms (Lee et al., 2018, Bailey et al., 2018; NCCMERP, 2018). It is the responsibility of institutional leadership to introduce systemwide strategies aimed at preventing medication errors and the responsibility of individual practitioners to use them.

Resources

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