Letter to the Editor

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Underpad weight to estimate urine output in adult patients with urinary incontinence

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To the Editor

Monitoring urine output remains essential to the care of adult patients admitted to the hospital. In acute, decompensated heart failure, ongoing assessment of urine output is required to adjust diuretic dosing in keeping with current recommendations for hospitalized patients.[1] In patients with acute kidney injury, assessment of urine output is essential for diagnosis and management. The diagnosis of circulatory shock is supported by renal hypoperfusion as measured by low urine output.[2] Indwelling urinary catheters are routinely used for the “strict” monitoring of urine output, which is an accepted indication.[3]

At the same time, the overuse of indwelling urinary catheters has become discouraged in elderly patients, because they are associated with increased risk of urinary tract infection, genital tract injury, and delirium.[3] There is data that “condom” catheters in males might be a safer option but these devices are not risk-free.[4] Bedpans, plastic urinals, and bedside commodes are other alternative techniques to measure urine output, but require the cognitive and physical capacity to comply; many elderly patients are not able to cooperate with these non-invasive methods due to dementia, delirium, or urinary incontinence.

Incontinence is a very common problem for elderly patients, particularly when ill and admitted to the hospital.[5] Drugs used commonly in the inpatient setting, such as diuretics, can exacerbate underlying urinary incontinence. One temporizing measure in common use is the placement of adult diapers or absorbent pads during hospitalization.[5] While not without its own complications, such as perineal dermatitis, this practice is widespread.[6]

The assessment of urine output in an incontinent adult patient wearing a diaper or using an absorbent pad is typically subjective: nurses and nurse’s aide’s record the presence or absence of urine throughout the day. However, underpad use is a missed opportunity for a more accurate estimate of urine output. Diaper weight is commonly used in pediatric and neonatal ICU practice to monitor urine output.[7,8] This practice is rooted in the principle that by definition, the mass of one liter of pure water is one kilogram.[9] Urine is an aqueous solution that contains many solutes at varying concentrations. Nevertheless, even higher molecular weight compounds (such as proteins, which are present in the urine in various kidney diseases) exist in small quantities relative to the overall water content of urine.[10] Therefore, despite physiologic or pathophysiologic changes in urine concentration, urine mass is still likely a reasonable way to grossly approximate urine volume.

Given comparatively low neonatal urine outputs, attention to small differences in diaper dry weight become important; individual diapers are typically weighed prior to application and then this value is subtracted from the wet weight. I propose that for adults, a reasonable estimation of urine output could be obtained by first “zeroing” a scale with a large bucket and an unused underpad (Figure 1A). Next, a urine-soaked underpad can be placed in the bucket to obtain the mass of urine present. Here, for demonstration purposes, 1 L of normal saline was used (Figure 1B) and reveals a mass very close to 1 kg (Figure 1C). This taring strategy to estimate urine output in incontinent adults is a low-technology practice that would be easy to implement on a hospital ward. The accuracy of assessing urine volume in elderly patients by tared underpad urine mass should be studied across various disease states such as acute kidney injury and heart failure. Further studies are also needed to assess whether implementing this practice on hospital wards.
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Figure 1. The use of an unused underpad to “zero” a scale (A); an underpad soaked with one liter of normal saline is demonstrated to weigh close to 1 kg (B & C).

could reduce indwelling urinary catheter placement in incontinent adults.

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References