Pad Count is a Poor Measure of the Severity of Urinary Incontinence

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Purpose: We analyzed the correlation between pad use, as determined by objective pad count, and the severity of urinary incontinence, as measured by pad weight.

Materials and Methods: We performed a retrospective study of consecutive incontinent patients who wore pads on a daily basis and were instructed to complete a 24-hour pad test. They were told to use the usual pads, change them as usual and place each in a separate plastic bag the day before the scheduled appointment. All pads were weighed and total urine loss was calculated by subtracting dry pad weight from wet pad weight, assuming that a 1 gm weight increase was equivalent to 1 ml of urine loss. The number of pads was correlated to pad weight using the Spearman rank correlation coefficient due to the nonparametric nature of the data.

Results: The 116 patients included 51 men 39 to 89 years old (mean age 66) and 65 women 27 to 95 years old (mean age 72). When comparing the number of pads used to the gm of urine lost, the Spearman ρ was 0.26 ($p = 0.005$) in the total cohort, and 0.40 and 0.26 (each $p < 0.05$) in males and females, respectively.

Conclusions: There was little correlation between the number of pads used and the severity of urinary incontinence ($r = 0.26$). These data suggest that pad count should not be used as an objective measure of incontinence severity. Instead, pad weight on a 24-hour pad test should be used.

Key Words: urinary bladder, urinary incontinence, male, female, lower urinary tract symptoms

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Incontinence severity can be assessed by the volume of urinary loss, the number of incontinence episodes and the degree of patient reported bother. Pad tests are used clinically and as an outcome measure in research to assess the volume of patient urinary loss.[1–5] The volume of urinary incontinence in a 24-hour period can be estimated by the number of pads used or by measuring wet pad weight minus dry pad weight during that time (24-hour pad test).[6–8] Patients may change pads for reasons other than severe incontinence, which may decrease the accuracy of pad count as a measure of incontinence.[9]

To our knowledge only 1 other group has correlated the number of pads used (pad count) to the amount of urine lost in a 24-hour period (24-hour pad test) or to incontinence severity.[10] Rather, most groups have used these measures individually as outcomes.[4,11] We investigated whether the self-reported number of pads used

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Table 1. *Incontinence type in males and females*

Incontinence	No. Males (%)	No. Females (%)
Urgency	6 (12)	32 (49)
Stress	24 (47)	19 (29)
Mixed	21 (41)	14 (22)

per day is an accurate reflection of urinary incontinence severity by comparing this to a 24-hour pad test.

MATERIALS AND METHODS

We performed a retrospective study of consecutive incontinent patients seen at a tertiary care center from 2009 to 2010 who wore urinary pads on a daily basis. All patients were instructed to complete a 24-hour pad test. Patients were permitted to use the usual pads. They were told to change them as they would regularly and upon each pad change place the used pad in a separate sealed plastic bag to minimize evaporative loss. Patients were reminded to use the same brand and type of pad throughout the 24-hour period. All patients were asked to bring all used pads along with 1 unused pad on the day of the scheduled followup appointment.

All pads were weighed. Total urine loss was calculated by subtracting dry pad weight from wet pad weight, assuming that each gm difference in weight was equivalent to 1 ml of urine loss. Outcomes assessed included the number of pads used and total incontinence as recorded on the 24-hour pad test. Incontinence severity was defined as the total amount of urinary incontinence in ml. The objective pad count was determined by a member of the research team who physically counted the number of pads brought in by each patient for the pad test. Patient age, gender and clinical diagnosis were also recorded. Patients were excluded from the study if different brands and types of pads were used during the 24-hour period, and if they failed to bring an unused pad for reference.

The relationship between the number of pads used and the severity of urinary incontinence was analyzed by SPSS®, version 18. We used the Spearman rank correlation coefficient due to the nonparametric nature of the data.

RESULTS

A total of 123 patients were recruited for the study, of whom 7 were excluded because a dry pad was not provided. The 116 study patients included 51 men 38 to 89 years old (mean age 66) and 65 women 27 to 95 years old (mean age 72). Table 1 shows the type of incontinence in men and women.

Table 2 lists the number of pads used, pad weight and incontinence severity overall, and based on gender. There was no statistically significant difference in mean pad count in males vs females ($p = 0.9233$). However, males had statistically significantly greater mean pad weight ($p = 0.0001$) and mean total incontinence ($p < 0.0001$) compared to women.

There was a high degree of variability in the study population in the amount of incontinence captured by each pad and the total urinary incontinence measured by each pad test.

We calculated the Spearman ρ by comparing the number of pads used and the severity of urinary incontinence ($r = 0.26$, $p < 0.005$). In males and females $r = 0.40$ and 0.26, respectively (each $p < 0.05$). The poor relationship between the number of pads used and incontinence severity was also identified by a scatterplot (see figure).

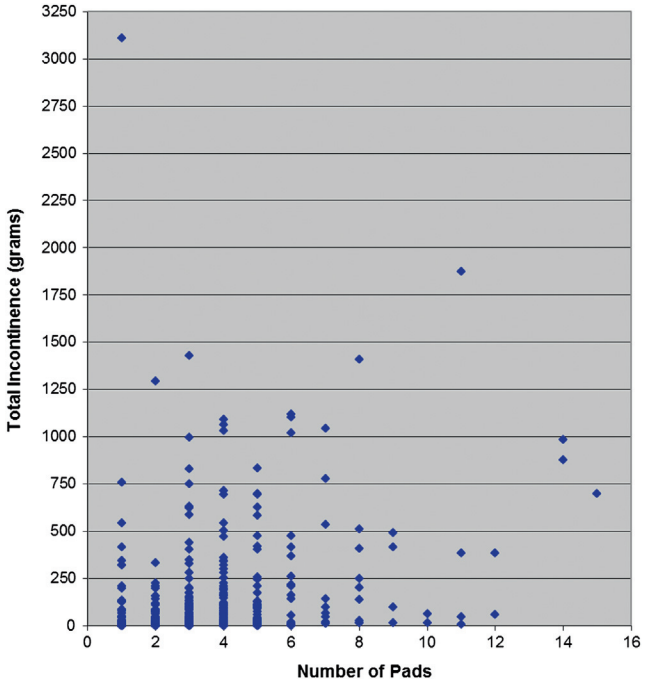
DISCUSSION

Our study shows a weak correlation between the number of pads used and incontinence severity on a 24-hour pad test (Spearman ρ 0.26, $p < 0.005$). This weak correlation may be attributable to the simple fact that patients may change pads for various medical and nonmedical reasons unrelated to incontinence severity.[12] Discrepancies in patient preference regarding acceptable hygiene levels can result in pad changes based on different levels of absorbed incontinence. For example, while a patient may feel uncomfortable with only 20 ml of leakage and change the pad, another may change after 1,000 ml of leakage. Pads may also be changed due to convenience. For example, the patient may use the restroom to defecate and find it convenient to change the pad at that time. Others may change the pad each time they void. Nonmedical causes may also impact pad count, eg financial considerations may drive some patients to change pads less frequently. The 24-hour pad test may better assess the degree of incontinence by minimizing the impact of these variables.

To our knowledge, only Dylewski et al also examined the relationship between the number of pads used and the total amount of incontinence measured on a 24-hour pad test.[10] They investigated the validity of patient reported pad use, thus

Table 2. *Number of pads used, pad weight and incontinence severity based on gender and overall*

	Mean ± SD/Median Male	Mean ± SD/Median Female	Mean ± SD/Median Overall (range)
No. pads	3.76 ± 2.46/4	4.18 ± 2.88/4	4 ± 2.7/4 (1–15)
Pad wt (gm)	156.95 ± 438.74/78	38.51 ± 92.10/9.33	–
Urinary incontinence (ml):			
Each pad	–	–	90 ± 303/26 (0–3,110)
24 Hrs	387.92 ± 513.07 (251)	132.94 ± 256.54 (27)	245 ± 409/72 (0–3,110)



Number of pads used and total urinary incontinence measured by each pad test.

correlating pad weight to a patient reported measure of incontinence. We used the actual pad count and compared it to pad weight. This is significant because our method added more rigor to the study and showed that recall bias is not what causes patient reported pad use to be an unreliable measure of incontinence. Nevertheless, in our study and that by Dylewski et al the conclusion is that pad count is an unreliable indicator of incontinence severity.

Despite the study by Dylewski et al,[10] the notion that pad count is an unreliable measure of incontinence severity has not gained use in clinical practice. Many groups have used the actual or recalled pad count as an objective outcome measure of incontinence severity and clinical improvement.[1,3,5,7,8,11]

Our series and that by Dylewski et al[10] suggest that pad count is an unreliable metric for assessing incontinence severity and has limited use as an outcome measure. This concept of pad weight as a more accurate outcome measure of incontinence severity is supported by the study by Albo et al.[13] They correlated pad weight with numerous measures of incontinence severity, such as incontinence episode frequency on 3-day voiding diary, the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. The strongest correlation was between pad weight and incontinence episode frequency (Spearman correlation coefficient 0.61). These results intuitively support the assertion that the pad weight determined by a 24-hour pad test is a more reliable assessment of incontinence severity than pad count since patients do not necessarily change pads after each incontinent episode. In fact, Dowell et al reported that some women dried urine soaked pads with a heater for later use, counting each pad only once, while others stuffed used pads with toilet paper to save the cost of buying new pads.[14]

Although a 24-hour pad test is a better outcome measure than 24-hour pad count, there are also potential weaknesses of using this method that our study did not address. For example, the degree of patient activity can affect the results of a 24-hour pad test in an individual. In clinical research using the 24-hour pad test as an outcome measure, Painter et al concluded that instructions to minimize physical activity should be given to decrease the variation in activity across patients.[6] Fluid consumption, which is not measured by the pad test, can also impact the amount of incontinence measured.

Notably, we used a 24-hour pad test instead of a 48 or 72-hour test because the total pad weight gain is sufficiently reliable across all 3 objective measures.[9] Moreover, a decrease in patient compliance is associated with an increase in the test period.

A study limitation is that we did not include a validated subjective measure of incontinence severity. This type of secondary outcome may have brought to light important questions that arise from this study, such as why patients change pads and whether there are discrepancies across gender, age, etc. Using a secondary outcome measure such as a questionnaire would also answer questions about overall lower urinary tract symptoms and bother.

CONCLUSIONS

The number of pads used and the severity of urinary incontinence correlated weakly, as measured by pad weight ($r = 0.26$). These data suggest that pad weight is a more accurate measure of incontinence severity than pad count and pad count is not a good metric of incontinence severity.

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