

# Financial Impact of Improved Pressure Ulcer Staging in the Acute Hospital with Use of a New Tool, the NE1 Wound Assessment Tool

Daniel L. Young, PT, DPT; Jay J. Shen, PhD; Nancy Estocado, PT, BS, CWS; and Merrill R. Landers, PT, DPT, OCS

## ABSTRACT

**OBJECTIVE:** The NE1 Wound Assessment Tool (NE1 WAT; Medline Industries, Inc, Mundelein, Illinois), previously called the N.E. One Can Stage, was shown to significantly improve accuracy of pressure ulcer (PrU) staging. Improved PrU staging has many potential benefits, including improved care for the patient and better reimbursement. Medicare has incentivized good care and accurate identification of PrUs in the acute care hospital through an additional payment, the Medicare Severity–Diagnosis Related Group (MS-DRG). This article examines the financial impact of NE1 WAT use on the acute care hospital relative to MS-DRG reimbursement.

**DESIGN:** PrU staging accuracy with and without use of the NE1 WAT from previous data was compared with acute care hospital PrU rates obtained from the 2006 National Inpatient Sample. Hill-Rom International Pressure Ulcer Prevalence Survey data were used to estimate the number of MS-DRG–eligible PrUs.

**MAIN RESULTS:** There are between 390,000 and 130,000 MS-DRG–eligible PrUs annually. Given current PrU staging accuracy, approximately \$209 million in MS-DRG money is being collected. With the improved staging afforded by the NE1 WAT, this figure is approximately \$763.9 million. Subtracting the 2 reveals \$554.9 million in additional reimbursement that could be generated by using the NE1 WAT.

**CONCLUSION:** There is a tremendous financial incentive to improve PrU staging. The NE1 WAT has been shown to improve PrU staging accuracy significantly. This improvement has the potential to improve the financial health of acute care hospitals caring for patients with PrUs.

**KEYWORDS:** pressure ulcer staging, wound assessment tool, reducing pressure ulcers

ADV SKIN WOUND CARE 2012;25:158–66

## INTRODUCTION

Despite ongoing efforts to reduce the occurrence of pressure ulcers (PrUs) in acute care hospitals, the problem persists. In acute care hospitals, the average prevalence is more than 10% but may be as high as 38% in some cases.<sup>1–3</sup> Current data suggest that new PrU cases per year are in the range of 1 to 2.5 million people.<sup>1,4,5</sup> PrUs are not only a significant health issue for the individual sufferer, but also a financial concern for the entire healthcare system. In the United States, annual costs associated with PrUs approach \$11 billion, with the cost for each PrU ranging from \$500 to \$70,000, depending on the individual circumstances.<sup>3,4</sup> Because PrUs are often a preventable condition, this represents a tremendous burden to individuals, hospitals, and the nation.

As the majority of patients with PrUs are older than 65 years in the United States, Medicare has become the largest payer for the care of individuals with a PrU.<sup>1</sup> Medicare has recently made changes to its reimbursement policy for PrUs to incentivize good care. In the acute care hospital, it provides an additional payment, called a Medicare Severity–Diagnosis Related Group (MS-DRG), for the care of more severe PrUs that are present on admission (POA). However, the MS-DRG is not available if the PrU was a hospital-acquired condition (HAC).<sup>6</sup> Thus, it has become financially important for hospitals to correctly identify and define PrUs on admission and then prevent the development of PrUs during the patients' stay.

Correct identification of PrU severity involves assignment of one of the stages defined by the National Pressure Ulcer Advisory Panel (NPUAP).<sup>7</sup> The NPUAP has defined 4 separate stages of PrU depending on the severity. To summarize, Stage I presents as nonblanchable skin redness; Stage II is partial-thickness loss of the dermis; Stage III is full-thickness skin loss without exposure of bone, tendon, or muscle; and Stage IV is

Daniel L. Young, PT, DPT, is Assistant Professor, Department of Physical Therapy, School of Allied Health Sciences, and Jay J. Shen, PhD, is Associate Professor, Department of Health Care Administration and Policy, School of Community Health Sciences, both at the University of Nevada, Las Vegas. Nancy Estocado, PT, BS, CWS, is Program Supervisor/Rehab Therapy, Sunrise Hospital and Medical Center, Las Vegas, Nevada. Merrill R. Landers, PT, DPT, OCS, is Associate Professor, Department of Physical Therapy, School of Allied Health Sciences, University of Nevada, Las Vegas. Dr Young has disclosed that he is/was a consultant/advisor to Medline Industries, Inc. Dr Shen has disclosed that he has no financial relationships related to this article. Ms Estocado is the owner of NE Solutionz, LLC, and the NE1 Assessment Tool. Dr Landers has disclosed that he has no financial relationships related to this article.

the same as Stage III but with the exposure of bone, tendon, or muscle. They have also defined 2 additional categories relative to PrU presentation that help to provide more clarity on the state of the tissue. *Suspected deep tissue injury* (sDTI) is used to describe a case where there is underlying tissue damage without current loss of the overlying skin as evidenced by color, temperature, or firmness changes. *Unstageable* is used when the wound bed of a full-thickness wound is covered with necrotic tissue, obscuring the deepest layer of involved tissue.<sup>7</sup> Medicare will pay the MS-DRG for Stages III and IV PrUs that are POA. The MS-DRG is not available for Stage I or Stage II PrUs, nor any PrU that is a HAC.

The ability of the average, nonexpert clinician (eg, nurse, physical therapist, physician) to correctly stage a PrU is poor, ranging from 23% to 58% correct.<sup>8,9</sup> This number drops to as low as 20% correct when staging MS-DRG-eligible PrUs by nonexperts.<sup>8</sup> However, a recently developed tool, originally called the *NE One Can Stage* but recently renamed the *NE1 Wound Assessment Tool* (NE1 WAT; Medline Industries, Inc, Mundelein, Illinois), aided nonexpert clinicians in improving staging accuracy from 35% correct without the tool to 71% correct when using the tool for all types of PrUs and from 32% correct without the tool to 75% correct with the tool on MS-DRG-eligible PrUs, an improvement of greater than 100% in relative terms.<sup>8</sup> Evidence for the reliability of the NE1 WAT was strong (intraclass correlation coefficient (ICC)[3,1] = 0.794; 95% confidence interval, 0.673–0.873) for different types of healthcare providers who may be involved in PrU staging.<sup>9</sup> The NE1 WAT (Figure 1) is an L-shaped piece of glossy paper with ruled inner edges and pictures and descriptions of wounds on the body of it. The tool is designed for placement on the patient's intact skin bordering the wound. A picture of the wound with the tool in place is then taken to be included in the medical record. The tool guides the clinician in determining the correct stage of PrU and in measuring the wound dimensions.

The use of the NE1 WAT has the potential to improve reimbursement through improved accuracy of PrU staging and subsequent collection of the MS-DRG when appropriate. Before such a statement regarding reimbursement could be used to change practice at acute care hospitals, an analysis of the costs relative to the benefit of the NE1 WAT would be beneficial. Although the value of improved PrU staging may be greatest in terms of improved care for the patient, this is not the focus of this article. The primary goal of this article is to examine the cost of the NE1 WAT relative to the potential benefit in terms of the MS-DRG. Given the wide variety in hospital size, this article also presents results for PrU rates and impact of the NE1 WAT on hospitals of various sizes.

## METHODS

The basic design of this study was to calculate the difference in PrU reimbursement for the acute care hospital setting when current PrU staging accuracy is compared with the improved accuracy that the NE1 WAT affords. To achieve this, PrU staging accuracy data from the study of Young et al,<sup>8</sup> where the validity of the NE1 WAT was tested, was used to compare with historic data of PrU prevalence or volume. For staging without the NE1 WAT (such as typical clinical practice), both a low value (20%, worst accuracy for any discipline tested) and high value (58%, best accuracy for any discipline tested) for accuracy were used.<sup>8</sup> For staging with the NE1 WAT, the average accuracy (75%) for all clinicians was used.<sup>8</sup> The following were the sources used to determine historic prevalence levels of PrUs:

- The 2006 National Inpatient Sample (NIS) that contains discharge data from a stratified clustering sample of 20% of all community hospitals in the United States<sup>10</sup>
- The 2004 State Inpatient Data (SID)<sup>11</sup> of Nevada that contains all discharges from community hospitals in the state. Both NIS and SID data sets included diagnostic codes allowing the data to be searched for numbers of patients with PrUs. The Healthcare Cost and Utilization Project under the Agency for Healthcare Research and Quality maintains these data sets
- The 2004 and 2006 American Hospital Association annual survey data that included hospital characteristics<sup>12</sup>
- Hill-Rom International Pressure Ulcer Prevalence survey data<sup>13</sup>

The NE1 WAT is commercially available for purchase through Medline. Pricing for the tool is determined based on the volume of the purchase but averages close to \$6. For the purpose of this article and calculations, a price in excess of the maximum cost for the tool was desired to ensure that even the smallest purchases of the tool would still allow for a valid comparison to these calculations. Following consultation with Medline Industries, the amount of \$20 was then used as the per-unit price for calculations used in this study. In addition, part of the methodology involved estimating the number of PrUs that would be eligible for the MS-DRG. The Hill-Rom data provided values for the various proportions of different stages of PrUs (Figure 2). Given that sDTI PrUs are full-thickness injuries and “evolution may be rapid exposing additional layers of tissue even with optimal treatment,” they were included with the Stage III and IV numbers.<sup>7</sup> Also, unstageable PrUs are by definition full-thickness and will be Stage III or Stage IV after debridement and thus were included with the totals for Stages III and IV. This number (39%) was then divided into thirds so that a high (39%), mid (26%), and low (13%) value could be examined separately. Finally, the exact value of the MS-DRG for each individual facility will vary slightly based on the variables used by Medicare to determine such payment; thus, an estimate of the MS-DRG


Figure 1.  
THE NE1 WAT

# NE1™

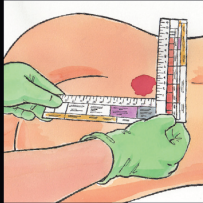
## WOUND ASSESSMENT TOOL

DATE ↓    PT. INITIALS ↓    TIME ↓
RM#/LOC. \_\_\_\_\_

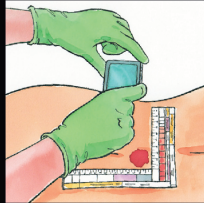
MATCH "WORST COLOR" TISSUE TO PICTURE FOR ANSWER															BODY PART		
OTHER: _____	SUPERFICIAL				PARTIAL THICKNESS				FULL THICKNESS						MEDLINE		
PRESSURE ULCER: _____	CLOSED				PRE STG.I	STG.I	STG.II		STG.III	STG.IV	sDTI		UNSTAGEABLE		MEDLINE		
HEAD ↓ FOOT ↓																	MEDLINE
15   14   13   12   11   10   9   8   7   6   5   4   3   2   1cm   0															MEDLINE		



1. Peel off NE1™ Wound Assessment Tool from the adhesive backing.



2. Frame the tool around the wound, placing it at the 12 o'clock position. Maintain 90° angle. Do not wrap tool around body part.



3. Ensure that the camera is perpendicular to the wound. Take a picture and place in the patient's medical record.


Use the guidelines on the tool to assist with wound evaluation. Always use professional judgement and consult appropriate medical professionals as needed.

**CAUTION:** Do not photocopy. Photocopying this tool may result in incorrect documentation due to altering the tested standardized colors and measurements.

**SINGLE PATIENT USE**  
**EXTERNAL USE ONLY**

**NON-STERILE PRODUCT**  
**REORDER MSCNE1TOOL**

**LATEX FREE**



©2010 NE1™ is a trademark of Medline Industries, Inc. Patent Pending. Manufactured in USA for Medline Industries, Inc., Mundelein, IL 60060 USA RK10BCN

SIGN 1

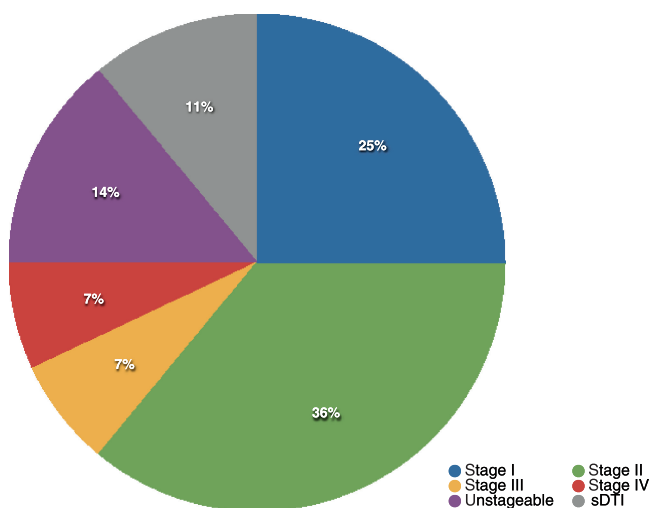
CLINICIAN:

FREE MSCNE1TOOL

© 2010 www.medline.com Medline Industries Inc. To Reorder call: 1-800-MEDLINE

Reprinted with permission from Medline.

**Figure 2.**  
**NATIONAL DISTRIBUTION OF DIFFERENT STAGES OF PrUs**



at \$2680 was used from an example on the Centers for Medicare & Medicaid Services website.<sup>6</sup>

Because the rate of PrUs in acute care hospitals appears to be different based on hospital census or bed count, hospital size was taken into account in the analysis. Examination of results was conducted based on bed count in 100-bed increments. National analyses were then made based on this division. On preliminary analysis of the data, it was observed that Nevada did not appear to follow the national trend on PrU rates for different sizes of hospitals. Separate analysis of Nevada hospitals was then conducted for comparison. Because there were so few Nevada hospitals, they were split into 2 groups of less than and greater than 100 beds, and statistical comparisons between these groups were made using nonparametric Mann-Whitney rank sum tests. As the NIS data provided for a much larger sample of hospitals with different bed counts, these comparisons were made using parametric tests. Statistical analyses of data based on hospital size were all performed using PASW18 (SPSS Inc, IBM, Chicago, Illinois).

Because the NE1 WAT would be used on every patient with a PrU, the cost of using the tool is a straightforward calculation whereby the number of patients with PrU diagnosis, given the population and time frame of interest, can be multiplied by the per-unit cost of \$20. In this study, this was done for the United States collectively, and the state of Nevada separately; it was also calculated as a monthly value based on hospital bed count and the average PrU rate for that size facility.

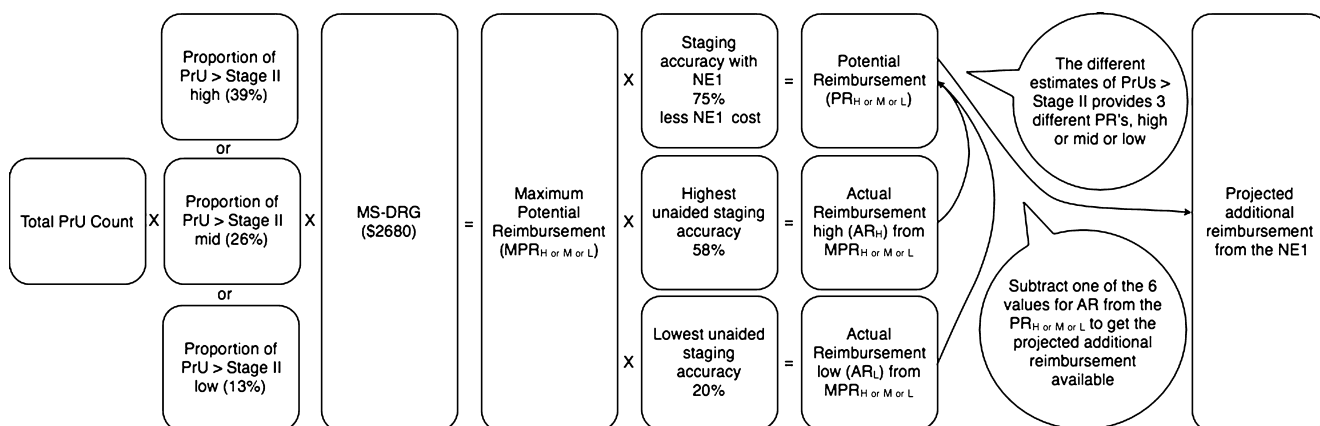
Both NIS and SID data sets did not contain the detail necessary to distinguish between numbers of patients with different stages of PrUs. As previously mentioned, the Hill-Rom data indicated that 39% of all acute care hospital PrUs were greater than Stage II and thus eligible for the MS-DRG. This number was then divided into thirds so that a high (39%), mid (26%), and low (13%) value could be used for calculations. Taking 39%, 26%, or 13% of the total PrUs observed yielded a number that was then multiplied by the MS-DRG value to obtain the maximum potential reimbursement ( $MPR_H$  or  $M$  or  $L$ ). Because accurate unaided staging by the clinician for these MS-DRG-eligible PrUs appears to range from 20% to 58% correct,<sup>8</sup> these percentages were then multiplied by the MPR to obtain the actual reimbursement low ( $AR_L$ ) and the actual reimbursement high ( $AR_H$ ) for each of the 3 MPR values. The impact of the NE1 WAT on the MPR can be calculated by multiplying the MPR by 75%, which was the staging accuracy when the NE1 WAT was used on MS-DRG-eligible PrUs,<sup>9</sup> yielding the potential reimbursement high, mid, or low ( $PR_H$  or  $M$  or  $L$ ). The difference between the PR and the AR is the additional money that could be expected if the NE1 WAT were used. The cost of the tool was subtracted from the PR in all calculations (Figure 3).

The analysis for this study made some assumptions. First, the assumption that all PrUs greater than Stage II were eligible for the MS-DRG due to POA status. Some unknown percentage of these PrUs are going to be HACs and thus ineligible. The percentage of eligible PrUs was presented at different levels (high, mid, low), offering comparison and examples for this unknown. Second, all inaccuracy in staging was assumed to result in lost MS-DRG; however, as an example, inaccurately staging a Stage IV PrU as Stage III would not cause lost MS-DRG. Another assumption was that all sDTIs would be eligible for the MS-DRG. It is possible that an unknown percentage of these would not progress into Stage III or IV. The final assumption is that all patients with PrU would be covered by Medicare and thus eligible for the MS-DRG. However, Medicare would not be the payer for some unknown percentage of the PrUs included in the calculations. Again, the inclusion of high, mid, and low, or high and low values was done in places where assumptions were made to indicate the range of possible values given these assumptions.

## RESULTS

The 2006 NIS data set revealed 204,247 cases of PrUs, which gave a national estimate of approximately 1 million PrUs per year in the United States, a figure supported by others as well.<sup>1,5</sup> Using this number of total PrUs multiplied by the cost of the NE1 WAT, the national cost for use of the tool

**Figure 3.**  
**CALCULATION FLOWSHEET**



would be \$20 million. When the total number of PrUs was multiplied by the estimates for the percentage that were greater than Stage II (39%, 26%, and 13%), the numbers for MS-DRG-eligible PrUs in the United States were approximately 390,000, 260,000, and 130,000 annually. This gives MPR values (390,000, 260,000, and 130,000 multiplied by \$2680) of \$1045.2 million, \$696.8 million, and \$348.4 million annually. The national AR<sub>L</sub> (\$209 million) subtracted from the PR<sub>H</sub> (\$763.9 million) gives \$554.9 million in additional money that would be collected if PrUs were staged using the NE1 WAT. National values for PR<sub>H</sub>, PR<sub>M</sub>, and PR<sub>L</sub> less either AR<sub>H</sub> or AR<sub>L</sub> amounts are shown in Table 1.

For Nevada in 2004, there were a total of 4951 PrUs. The potential cost for all hospitals in the state to implement use of the NE1 WAT would then be \$99,020. When the total number of PrUs was multiplied by the estimates for the percentage that

was greater than Stage II (39%, 26%, and 13%), the numbers for MS-DRG-eligible PrUs in Nevada were approximately 1931, 1288, and 644 annually. This gives MPR values (1931, 1288, and 644 multiplied by \$2680) of \$5.17 million, \$3.45 million, and \$1.73 million annually. The AR<sub>L</sub> (\$1.03 million) subtracted from the PR<sub>H</sub> (\$3.78 million) gives \$2.75 million in additional money that would be collected if PrUs were staged using the NE1 WAT. Nevada values for PR<sub>H</sub>, PR<sub>M</sub>, and PR<sub>L</sub> less either AR<sub>H</sub> or AR<sub>L</sub> amounts are shown in Table 1.

Nationally, comparisons between hospitals of different sizes (1–99 beds, 100–199 beds, 200–299 beds, 300–399 beds, 400–499 beds, ≥500 beds) were done using 1-way analysis of variance. This test was performed for 8 different measures: PrUs per bed per month (Figure 4), NE1 WAT cost per bed per month (Figure 5), and the 6 different monthly, per bed, values of additional money that could be collected if PrUs were staged

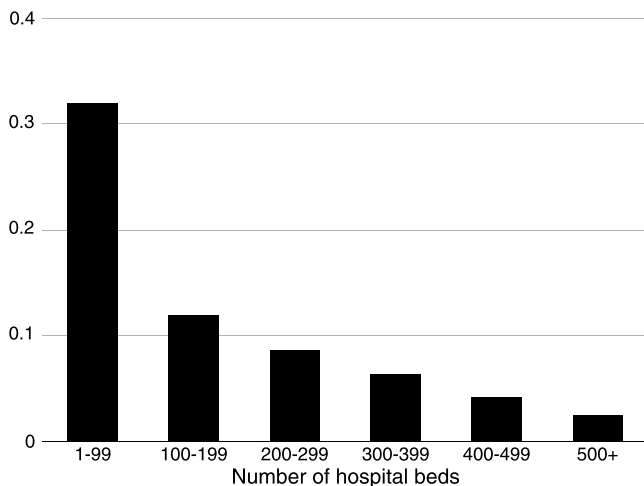
**Table 1.**

**NATIONAL AND NEVADA MPR, PR, AND PROJECTED ADDITIONAL REIMBURSEMENT**

	MPR <sub>H</sub>	MPR <sub>M</sub>	MPR <sub>L</sub>	PR <sub>H</sub>	PR <sub>M</sub>	PR <sub>L</sub>
National	\$1,045,200,000	\$696,800,000	\$348,400,000	\$763,900,000	\$502,600,000	\$241,300,000
Nevada	\$5,174,785.20	\$3,449,856.80	\$1,724,928.40	\$3,782,068.90	\$2,488,372.60	\$1,194,676.30
<b>Projected Additional Reimbursement</b>						
	PR <sub>H</sub> -AR <sub>H</sub>	PR <sub>H</sub> -AR <sub>L</sub>	PR <sub>M</sub> -LR <sub>H</sub>	PR <sub>M</sub> -LR <sub>L</sub>	PR <sub>L</sub> -AR <sub>H</sub>	PR <sub>L</sub> -AR <sub>L</sub>
National	\$157,684,000	\$554,860,000	\$98,456,000	\$363,240,000	\$39,228,000	\$171,620,000
Nevada	\$780,693.48	\$2,747,111.86	\$487,455.66	\$1,798,401.24	\$194,217.83	\$849,690.62

Abbreviations: MPR<sub>H, M, or L</sub>, maximum potential reimbursement: high, medium, or low (theoretical value with 100% staging accuracy for eligible PrUs); PR, MPR × accuracy with use of NE1 WAT; PR<sub>H</sub>, potential reimbursement with NE1 WAT using the high estimate for eligible PrU proportion; PR<sub>M</sub>, potential reimbursement with NE1 WAT using the mid estimate for eligible PrU proportion; PR<sub>L</sub>, potential reimbursement with NE1 WAT using the low estimate for eligible PrU proportion; AR, MPR × accuracy without using NE1 WAT; AR<sub>H</sub>, actual reimbursement using the high estimate for unaided staging accuracy; AR<sub>L</sub>, actual reimbursement using the low estimate for unaided staging accuracy.

**Figure 4.**  
**NATIONAL MONTHLY AVERAGE PrU RATE PER BED**



using the NE1 WAT ( $PR_H - AR_H$ ,  $PR_H - AR_L$ ,  $PR_M - AR_H$ ,  $PR_M - AR_L$ ,  $PR_L - AR_H$ ,  $PR_L - AR_L$ ) (Table 2 and Figure 6). There was a statistically significant difference among the means for PrUs per bed per month,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ; NE1 WAT cost per bed per month,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ;  $PR_H - AR_H$ ,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ;  $PR_H - AR_L$ ,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ;  $PR_M - AR_H$ ,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ;  $PR_M - AR_L$ ,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ;  $PR_L - AR_H$ ,  $F_{5,1017} = 20.929$ ,  $P < .0001$ ; and  $PR_L - AR_L$ ,  $F_{5,1017} = 20.929$ ,  $P < .0001$ . Tukey post hoc analysis revealed that on all measures and between all groups, only hospitals with 1 to 99 beds were different than hospitals of larger sizes (Table 3). For comparisons between all but the smallest hospitals, on all tested variables there were no significant differences,  $P > .221$ .

For Nevada, there was a statistically significant difference in the monthly PrU rate between the large (mean, 0.11 [SD, 0.04] PrU per bed) and small (mean, 0.03 [SD, 0.03] PrU per bed) hospitals,  $U = 14.00$ ,  $z = -3.60$ ,  $P < .0001$ . There was also a difference in the monthly cost of using the NE1 WAT between the large (mean, \$0.68 [SD, \$0.62] per bed) and small (mean, \$2.13 [SD, \$0.80] per bed) hospitals,  $U = 14.00$ ,  $z = -3.60$ ,  $P < .0001$ . Then as expected, a significant difference was also found in the 6 different monthly, per bed, values of additional money that could be collected if PrUs were staged using the NE1 WAT ( $PR_H - AR_H$ ,  $PR_H - AR_L$ ,  $PR_M - AR_H$ ,  $PR_M - AR_L$ ,  $PR_L - AR_H$ ,  $PR_L - AR_L$ ), all with  $U = 14.00$ ,  $z = -3.60$ ,  $P < .0001$  (Table 4).

## DISCUSSION

The cost of the NE1 WAT compared with the potential increase in revenue through MS-DRG payments is dramatic. Even using a high estimate of \$20 per unit for the cost of the NE1 WAT, the difference between it and the MS-DRG is so large that it is easily offset. Although there was a large difference between PrU rates in small versus large Nevada hospitals, the NE1 WAT is used only when a PrU is suspected, and so the per-bed cost is also much less for small compared with large hospitals. Although these data did not examine the benefit in terms of improved patient outcomes, or reduced length of stay through improved staging of PrUs, others have discussed improvements from accurate PrU staging,<sup>14-16</sup> adding to the value of the tool.

As has been previously mentioned, there is a need to evaluate the impact of improved PrU staging through use of the NE1 WAT on quality of care and other patient outcomes. It is important to note that the NE1 WAT is used when a PrU is suspected or already present. It does not function to prevent the development of a PrU. Prevention measures and risk measurement tools must be used in conjunction with the NE1 WAT. However, if PrUs are correctly identified and staged earlier, it may be possible to see a reduction in the progression of PrUs from less to more severe as the stage of the wound guides treatment, including modalities, dressings, specialty beds, and patient-positioning protocols.<sup>14-16</sup> This also addresses the potential concern for Medicare relative to increased MS-DRG payouts to acute care hospitals if the NE1 WAT were

**Figure 5.**  
**NATIONAL MONTHLY AVERAGE COST OF USING THE NE1 WAT PER BED**

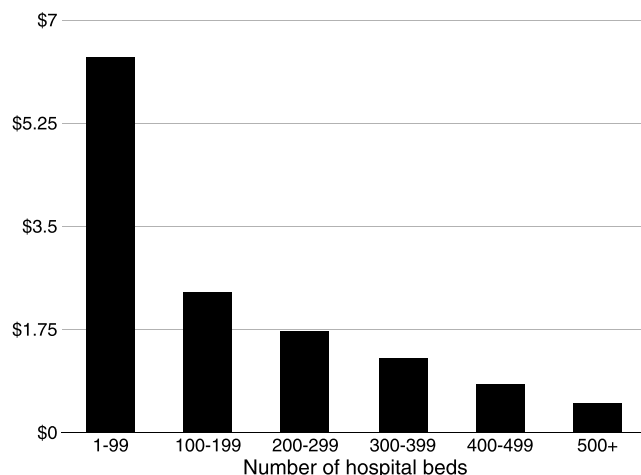


Table 2.

**PROJECTED ADDITIONAL MONTHLY REIMBURSEMENT PER BED WHEN USING THE NE1 WAT**

	PR <sub>H</sub> -AR <sub>H</sub>	PR <sub>H</sub> -AR <sub>L</sub>	PR <sub>M</sub> -AR <sub>H</sub>	PR <sub>M</sub> -AR <sub>L</sub>	PR <sub>L</sub> -AR <sub>H</sub>	PR <sub>L</sub> -AR <sub>L</sub>
1–99 Beds	\$50.33	\$177.09	\$31.42	\$115.93	\$12.52	\$54.78
100–199 Beds	\$18.78	\$66.09	\$11.73	\$43.27	\$4.67	\$20.44
200–299 Beds	\$13.62	\$47.92	\$8.50	\$31.37	\$3.39	\$14.82
300–399 Beds	\$10.05	\$35.38	\$6.28	\$23.16	\$2.50	\$10.94
400–499 Beds	\$6.56	\$23.08	\$4.10	\$15.11	\$1.63	\$7.14
≥500 Beds	\$3.95	\$13.90	\$2.47	\$9.10	\$0.98	\$4.30

Abbreviations: MPR<sub>H, M, or L</sub>, maximum potential reimbursement: high, medium, or low (theoretical value with 100% staging accuracy for eligible PrUs); PR, MPR × accuracy with use of NE1 WAT; PR<sub>H</sub>, potential reimbursement with NE1 WAT using the high estimate for eligible PrU proportion; PR<sub>M</sub>, potential reimbursement with NE1 WAT using the mid estimate for eligible PrU proportion; PR<sub>L</sub>, potential reimbursement with NE1 WAT using the low estimate for eligible PrU proportion; AR, MPR × accuracy without using NE1 WAT; AR<sub>H</sub>, actual reimbursement using the high estimate for unaided staging accuracy; AR<sub>L</sub>, actual reimbursement using the low estimate for unaided staging accuracy.

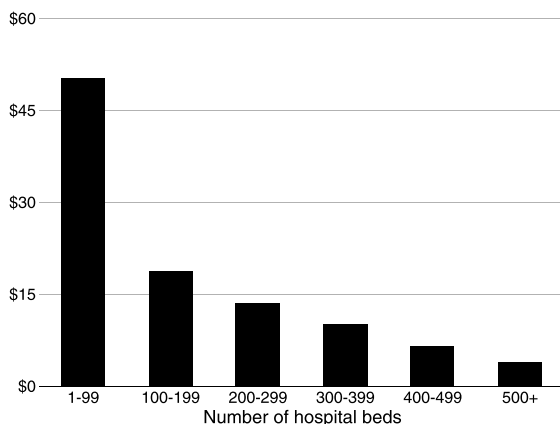
widely adopted. The increased payments would then have the desired effect of improving PrU care in hospitals, subsequently reducing costs for Medicare in care provided following acute care hospital discharge.

As mentioned, the analyses for this study made some assumptions on the data and necessitate caution when interpreting the results. The assumption likely to have the greatest impact on the results is the use of all PrUs greater than Stage II as eligible for the MS-DRG due to POA status. Although hospitals would prefer to report that all PrUs in their facilities were POA, the truth is that some percentage is going to be

HACs. However, in these data, it would have taken only 37 of the 4951 PrUs for the state of Nevada to cover the cost of the NE1 WAT. And, all inaccuracy in staging was assumed to result in lost MS-DRG, whereas some of this inaccuracy would not have affected this reimbursement because both Stages III and IV are eligible for the MS-DRG. However, this number is likely to be quite small based on previous data.<sup>8</sup> Another assumption was that all sDTIs would be eligible for the MS-DRG. The Hill-Rom data indicated that these represented 11% of the observed PrUs. The range of proportions offered in the analysis would more than offset this number. One of the final assumptions was that all patients with PrUs would be covered by Medicare and thus eligible for the MS-DRG. The Hill-Rom data indicate that almost 65% of PrUs occurred in patients older than 60 years, making nearly that many eligible for Medicare coverage. Other studies support the assumption that the majority of PrUs occur in older adults.<sup>1</sup>

Another interesting finding in the authors' data was the significantly lower prevalence of PrUs in Nevada hospitals with fewer than 99 beds. This is opposite the finding from the NIS data where lower PrU rates were observed in the larger hospitals. The Hill-Rom data do not have prevalence data based on bed count, but they do have it based on census size, a closely related metric. In their data, the trend was also opposite that of Nevada, with the lower census counts correlating with higher total PrU prevalence. The reason these opposite trends were observed is unknown. Because reimbursement and regulation are similar throughout the nation, it is unlikely that these factors caused the observed difference. It is most likely that the observation was anomalous for the small sample and time period and that trends over longer periods in the Nevada hospitals would more closely reflect national trends. However, hospital administrators should be cautious when applying these data to their individual hospitals for budgeting and planning, as it is clear that large differences may exist.

**Figure 6.**  
**NATIONAL PROJECTED ADDITIONAL MONTHLY REIMBURSEMENT PER BED WHEN USING THE NE1 WAT (PR<sub>H</sub>-AR<sub>H</sub>)**



Abbreviations: MPR<sub>H, M, or L</sub>, maximum potential reimbursement: high, medium, or low (theoretical value with 100% staging accuracy for eligible PrUs); PR, MPR × accuracy with use of NE1 WAT; PR<sub>H</sub>, potential reimbursement with NE1 WAT using the high estimate for eligible PrU proportion; AR, MPR × accuracy without using NE1 WAT; AR<sub>H</sub>, actual reimbursement using the high estimate for unaided staging accuracy.

Table 3.

### POST HOC ANALYSIS FOR MONTHLY, PER-BED RATES OF TESTED VARIABLES

Tested Variable	Group	Group	Mean Difference	SE
PrU rate	1	2	0.2001 <sup>a</sup>	0.0285
		3	0.2328 <sup>a</sup>	0.0330
		4	0.2554 <sup>a</sup>	0.0414
		5	0.2776 <sup>a</sup>	0.0534
		6	0.2941 <sup>a</sup>	0.0414
		NE1 WAT cost in \$	1	2
3	4.66 <sup>a</sup>			0.66
4	5.11 <sup>a</sup>			0.83
5	5.55 <sup>a</sup>			1.07
6	5.88 <sup>a</sup>			0.83
PR <sub>H</sub> – AR <sub>H</sub> in \$	1			2
		3	36.71 <sup>a</sup>	5.21
		4	40.27 <sup>a</sup>	6.52
		5	43.77 <sup>a</sup>	8.43
		6	46.38 <sup>a</sup>	6.52
		PR <sub>H</sub> – AR <sub>L</sub> in \$	1	2
3	129.17 <sup>a</sup>			18.32
4	141.71 <sup>a</sup>			22.95
5	154.01 <sup>a</sup>			29.65
6	163.19 <sup>a</sup>			22.95
PR <sub>M</sub> – AR <sub>H</sub> in \$	1			2
		3	22.92 <sup>a</sup>	3.25
		4	25.15 <sup>a</sup>	4.07
		5	27.33 <sup>a</sup>	5.26
		6	28.96 <sup>a</sup>	4.07
		PR <sub>M</sub> – AR <sub>L</sub> in \$	1	2
3	84.56 <sup>a</sup>			12.00
4	92.77 <sup>a</sup>			15.02
5	100.82 <sup>a</sup>			19.41
6	106.83 <sup>a</sup>			15.02
PR <sub>L</sub> – AR <sub>H</sub> in \$	1			2
		3	9.13 <sup>a</sup>	1.30
		4	10.02 <sup>a</sup>	1.62
		5	10.89 <sup>a</sup>	2.10
		6	11.54 <sup>a</sup>	1.62
		PR <sub>L</sub> – AR <sub>L</sub> in \$	1	2
3	39.95 <sup>a</sup>			5.67
4	43.83 <sup>a</sup>			7.10
5	47.64 <sup>a</sup>			9.17
6	50.48 <sup>a</sup>			7.10

Abbreviations: MPR<sub>H, M, or L</sub>, maximum potential reimbursement: high, medium, or low (theoretical value with 100% staging accuracy for eligible PrUs); PR, MPR × accuracy with use of NE1 WAT; PR<sub>H</sub>, potential reimbursement with NE1 WAT using the high estimate for eligible PrU proportion; PR<sub>M</sub>, potential reimbursement with NE1 WAT using the mid estimate for eligible PrU proportion; PR<sub>L</sub>, potential reimbursement with NE1 WAT using the low estimate for eligible PrU proportion; AR, MPR × accuracy without using NE1 WAT; AR<sub>H</sub>, actual reimbursement using the high estimate for unaided staging accuracy; AR<sub>L</sub>, actual reimbursement using the low estimate for unaided staging accuracy.

Group 1 = 1–99 beds, group 2 = 100–199 beds, group 3 = 200–299 beds, group 4 = 300–399 beds, group 5 = 400–499 beds, group 6 = ≥500 beds.

<sup>a</sup>*P* < .0001.

Table 4.

### NEVADA PROJECTED ADDITIONAL MONTHLY REIMBURSEMENT PER BED WHEN USING THE NE1 WAT

		n	Mean	SD
PR <sub>H</sub> – AR <sub>H</sub>	1–99 beds	12	\$5.39	4.91
	≥99 beds	14	\$16.81	6.29
PR <sub>H</sub> – AR <sub>L</sub>	1–99 beds	12	\$18.97	17.29
	≥99 beds	14	\$59.16	22.15
PR <sub>M</sub> – AR <sub>H</sub>	1–99 beds	12	\$3.37	3.067
	≥99 beds	14	\$10.50	3.93
PR <sub>M</sub> – AR <sub>L</sub>	1–99 beds	12	\$12.42	11.32
	≥99 beds	14	\$38.73	14.50
PR <sub>L</sub> – AR <sub>H</sub>	1–99 beds	12	\$1.34	1.22
	≥99 beds	14	\$4.18	1.57
PR <sub>L</sub> – AR <sub>L</sub>	1–99 beds	12	\$5.87	5.35
	≥99 beds	14	\$18.30	6.85

Abbreviations: MPR<sub>H, M, or L</sub>, maximum potential reimbursement: high, medium, or low (theoretical value with 100% staging accuracy for eligible PrUs); PR, MPR × accuracy with use of NE1 WAT; PR<sub>H</sub>, potential reimbursement with NE1 WAT using the high estimate for eligible PrU proportion; PR<sub>M</sub>, potential reimbursement with NE1 WAT using the mid estimate for eligible PrU proportion; PR<sub>L</sub>, potential reimbursement with NE1 WAT using the low estimate for eligible PrU proportion; AR, MPR × accuracy without using NE1 WAT; AR<sub>H</sub>, actual reimbursement using the high estimate for unaided staging accuracy; AR<sub>L</sub>, actual reimbursement using the low estimate for unaided staging accuracy.

such as long-term acute care, rehabilitation, home health, and long-term care. The Hill-Rom data indicate that the rates of PrUs in long-term acute-care facilities are much higher than in other facilities, and this may be a setting in which the earlier and more accurate staging of PrUs combined with effective protocols for treatment may have the largest impact on outcomes and cost of providing care. In addition, there is a financial incentive for home health providers to accurately stage PrUs as Medicare pays additional money for patients with more severe PrUs, similar to the acute care hospital.

## CONCLUSION

The difference between the cost of the NE1 WAT and the increased reimbursement that comes from improved PrU staging is substantial. When considered in light of the Medicare policy for reimbursement of PrUs in acute care hospitals, accurate PrU staging of patients on admission is essential. In Nevada, there is a significant difference between hospitals with fewer than 99 beds and those with more than 99 beds in the prevalence of PrUs. Regardless of PrU prevalence, the NE1 WAT is used only when a PrU is present or suspected; thus, a lower prevalence also lowers the facility cost for use of the tool proportional to the PrU prevalence. The implementation of this tool is attractive for acute care hospitals because the improved accuracy in PrU staging will result in increased reimbursement through the MS-DRG. ●

This article was limited to an analysis of the acute care hospital, and it would be valuable to examine the impacts of improved PrU staging through use of this tool in other settings,



## REFERENCES

- Whittington KT, Briones R. National Prevalence and Incidence Study: 6-year sequential acute care data. *Adv Skin Wound Care* 2004;17:490-4.
- Vangilder C, Macfarlane GD, Meyer S. Results of nine international pressure ulcer prevalence surveys: 1989 to 2005. *Ostomy Wound Manage* 2008;54(2):40-54.
- Cuddigan J, Berlowitz D, Ayello E. Pressure ulcers in America: prevalence, incidence, and implications for the future. An executive summary of the National Pressure Ulcer Advisory Panel monograph. *Adv Skin Wound Care*. 2001;14(4):208-15.
- Kuhn BA, Coulter SJ. Balancing the pressure ulcer cost and quality equation. *Nurs Econ* 1992;10:353-9.
- Reddy M, Gill SS, Rochon PA. Preventing pressure ulcers: a systematic review. *JAMA* 2006;296:974-84.
- Overview hospital-acquired conditions (present on admission indicator). <http://www.cms.gov/HospitalAcqCond>. Last accessed January 23, 2012.
- National Pressure Ulcer Advisory Panel (NPUAP). <http://www.npuap.org/pr2.htm>. Last accessed January 23, 2012.
- Young DL, Estocado N, Landers MR, Black J. A pilot study providing evidence for the validity of a new tool to improve assignment of National Pressure Ulcer Advisory Panel stage to pressure ulcers. *Adv Skin Wound Care* 2011;24:168-75.
- Lyder CH, Yu C, Emerling J, et al. The Braden scale for pressure ulcer risk: evaluating the predictive validity in Black and Latino/Hispanic elders. *Appl Nurs Res* 1999;12(2):60-8.
- Introduction to the HCUP Nationwide Inpatient Sample (NIS), 2006. [http://www.hcup-us.ahrq.gov/db/nation/nis/NIS\\_Introduction\\_2006.jsp](http://www.hcup-us.ahrq.gov/db/nation/nis/NIS_Introduction_2006.jsp). Last accessed January 23, 2012.
- The Healthcare Cost and Utilization Project. Overview of the State Inpatient Databases (SID). <http://www.hcup-us.ahrq.gov/sidoverview.jsp>. Last accessed January 23, 2012.
- American Hospital Association. Statistics and studies. <http://www.aha.org/aha/resource-center/Statistics-and-Studies/index.html>. Last accessed January 23, 2012.
- Hill-Rom, Inc. Hill-Rom International Pressure Ulcer Prevention Training. [http://www.hill-rom.com/usa/Info\\_IPUP.htm](http://www.hill-rom.com/usa/Info_IPUP.htm). Last accessed January 23, 2012.
- Beeckman D, Schoonhoven L, Fletcher J, et al. EPUAP classification system for pressure ulcers: European reliability study. *J Adv Nurs* 2007;60:682-91.
- Nixon J, Thorpe H, Barrow H, et al. Reliability of pressure ulcer classification and diagnosis. *J Adv Nurs* 2005;50:613-23.
- Stotts NA, Rodeheaver GT, Thomas DR, et al. An instrument to measure healing in pressure ulcers: development and validation of the Pressure Ulcer Scale for Healing (PUSH). *J Gerontol A Biol Sci Med Sci* 2001;56(12):M795-9.

# CALL FOR PAPERS

Advances in

# SKIN & WOUND CARE

*Advances in Skin & Wound Care* is soliciting manuscripts on a variety of topics, including original investigations, clinical reviews, and innovative treatments.

Consult the journal's Web site, [www.woundcarejournal.com](http://www.woundcarejournal.com), for the Author Guidelines.