Acoustic Pressure Wound Therapy to Debride Unstageable Pressure Ulcers in the Acute Care Setting: A Case Series

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As of October 1, 2008, prompt identification and accurate staging of pressure ulcers present on admission to acute care hospitals became essential for Medicare reimbursement. In short, Medicare will no longer cover the added costs associated with care of Stage III and Stage IV pressure ulcers not present on admission; such ulcers will be classified as hospital-acquired conditions that could reasonably be prevented with application of evidence-based guidelines. Unstageable pressure ulcers present a particular challenge under the new policy. According to national pressure ulcer guidelines, until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. The authors describe the first three patients (a 61-year-old woman and 52-year-old and 89-year-old men, all with different comorbidities and ulcer locations) to receive acoustic pressure wound therapy (APWT) for rapid debridement of unstageable pressure ulcers at their acute care hospital. Within 2 days, ulcers that had been completely covered with slough and/or eschar were cleared enough to be accurately identified as Stage III or Stage IV. Rapid and efficient debridement maximized reimbursement potential for the additional costs associated with these advanced-stage pressure ulcers.

Key words: acoustic pressure wound therapy, pressure ulcers, wound care, acute care, debridement

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with substantial slough and/or eschar that obscures the true depth of the wound.

In staging pressure ulcers, the key determinant for Stage III or Stage IV classification is depth of tissue damage. The National Pressure Ulcer Advisory Panel (NPUAP) guidelines for pressure ulcer staging are clear: until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. Ulcers classified unstageable on admission could present a particular problem in acute care hospitals, where Stage III and Stage IV pressure ulcers not present on admission are considered by Medicare to be hospital-acquired conditions that "could reasonably have been prevented through the application of evidence-based guidelines." If unstageable ulcers are later classified as Stage III or Stage IV after debridement has exposed true wound depth, they are considered hospital-acquired because they were not present on admission, and the added costs of care for these Stage III or Stage IV ulcers would not be eligible for reimbursement. Therefore, the new policy puts a premium on rapid and efficient debridement of unstageable pressure ulcers in order to identify Stage III and Stage IV ulcers "present on admission" and allow for Medicare reimbursement of the added costs associated with care of these advanced-stage ulcers.

Wound care clinicians have a range of debridement options, including sharp or surgical, mechanical, enzymatic, and autolytic. Ultrasound therapies such as acoustic pressure wound therapy (APWT) are typically classified as mechanical.

This case series describes the authors' experience using APWT to help remove necrotic tissue from...
unstageable pressure ulcers in an effort to expeditiously expose the wound base and stage pressure ulcers accurately on admission to an acute care facility.

Case Series
The authors began using APWT (MIST Therapy® System, Celleration Inc., Eden Prairie, Minn.) at their acute care hospital on a trial basis in September 2008. The patients reported here are the first three patients for which the authors were consulted to evaluate unstageable pressure ulcers and the only three such cases during the 1-month trial period. Pressure ulcer was the primary reason for hospitalization of Patient 1 and a secondary diagnosis for Patients 2 and 3. APWT was utilized to assist with debridement of slough and eschar in the wound beds of pressure ulcers unstageable on admission. Before utilizing APWT for debridement of unstageable pressure ulcers at this facility, such wounds were treated with sharp or enzymatic debridement and moist wound healing. APWT was administered as an adjunct to moist and enzymatic wound dressings, including collagenase and gauze (Patient 1), petrolatum gauze with bismuth tribromophenate followed by hydrocolloids (Patient 2), and papain urea (Patient 3; see footnote to Table 1).

As shown in Table 1, all three wound beds were covered completely with slough and eschar, eliminating the possibility of accurately staging the wounds based on depth of tissue damage. Sufficient debridement to enable accurate staging of all wounds as Stage III or Stage IV was achieved in 2 days. Wound area remained unchanged in Patient 1 (16 cm²) and Patient 3 (8.75 cm²) after 2 days of APWT, but decreased by more than 50% in Patient 2 (1.95 cm² to 0.88 cm²) after 5 days of APWT (see Figure 1). Patients were discharged home within 1 day of the last APWT treatment (Patients 1 and 2 same day, Patient 3 next day) with either hospice staff or family members performing dressing changes.

### Table 1

<table>
<thead>
<tr>
<th>Patient/Wound</th>
<th>Duration of APWT</th>
<th>Tissue Characteristics</th>
<th>Pressure Ulcer Stage</th>
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<tr>
<td><strong>Patient 1: 89-year-old man</strong>&lt;br&gt;Bedridden, history of pressure ulcers, diabetes, myocardial infarction, dementia&lt;br&gt;Location: sacrum</td>
<td>2 days&lt;br&gt;7 min/day</td>
<td>Pre-APWT: 100% adherent grey slough&lt;br&gt;Post-APWT: 30% slough 70% granulation</td>
<td>Pre-APWT: Unstageable&lt;br&gt;Post-APWT: Stage IV exposed bone</td>
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<tr>
<td><strong>Patient 2: 52-year-old man</strong>&lt;br&gt;Diabetes, hypertension, chronic pain syndrome, chronic morphine use, smoker&lt;br&gt;Location: left lateral ankle</td>
<td>2 days&lt;br&gt;3 min/day</td>
<td>Pre-APWT: 50% eschar&lt;br&gt;Post-APWT: 50% slough 50% granulation</td>
<td>Pre-APWT: Unstageable&lt;br&gt;Post-APWT: Stage III</td>
</tr>
<tr>
<td><strong>Patient 3: 61-year-old woman</strong>&lt;br&gt;Breast cancer with metastasis to lung, not tolerating chemotherapy, radiation, hypertension&lt;br&gt;Location: left heel</td>
<td>2 days&lt;br&gt;4 min/day</td>
<td>Pre-APWT: 100% tan/brown thick slough&lt;br&gt;Post-APWT: 80% yellow slough 20% granulation</td>
<td>Pre-APWT: Unstageable&lt;br&gt;Post-APWT: Stage IV</td>
</tr>
</tbody>
</table>

Note: Sharp debridement performed pre and post APWT; substantially more slough was removed after APWT

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* Although the wound was stageable after 2 days, APWT was continued for 3 more days to promote healing before discharge.

b The US Food and Drug Administration has since issued a statement that topical papain urea products have not been proven safe or effective and are therefore considered unapproved products.
Discussion

With the recent change in Medicare reimbursement policy for pressure ulcers, debridement that facilitates accurate pressure ulcer stage on admission in the acute care setting has become a priority. In these three patients, using APWT to assist with debridement of unstageable pressure ulcers allowed for staging of the wounds as Stage III and Stage IV within 2 days of admission, which should maximize the MS/DRG and potential for reimbursement appropriate to the severity of these wounds.

In their “Guidelines for the Treatment of Pressure Ulcers”, the Wound Healing Society lists several debridement modalities, including sharp or surgical, mechanical, enzymatic, and autolytic. Based on a review of the evidence and expert consensus, these guidelines describe the following benefits and drawbacks to these debridement methods.

Surgical/sharp debridement is indicated for fast and effective removal of large amounts of necrotic tissue. However, these techniques require significant expertise, adequate vascular supply to the wound, and systemic antibacterial coverage in cases of systemic sepsis. Additionally, sharp debridement is contraindicated in patients with bleeding disorders or on anticoagulation therapy. Finally, the pain associated with surgical/sharp debridement often requires narcotic pain medication and can be intolerable despite use of narcotic agents.

Mechanical debridement (using wet-to-dry dressings, wound irrigation, and whirlpool techniques) physically removes necrotic tissue. Although effective in some cases, such strategies also have their drawbacks. Wet-to-dry dressings can be painful and may damage viable newly formed tissue. High- or low-pressure streams or pulsed lavage can cause trauma to the wound bed as well as pain for the patient. Whirlpools may be helpful initially to loosen and remove debris and necrotic tissue but are associated with risk of tissue maceration and bacterial contamination.

Using dressings with endogenous (autolytic debridement) or exogenous enzymes (enzymatic debridement) to soften and remove necrotic tissue can take up to 2 weeks or more. Furthermore, this method is not recommended for infected wounds or very deep wounds that require packing.

To date, the only known contraindications for use of APWT are those common to other ultrasound therapies — ie, areas near electronic implants/prostheses, on the lower back during pregnancy or over a pregnant uterus, and over areas of malignancy must be avoided. Although a range of biophysical effects of APWT on the wound healing process have been described in a recent literature review by Unger (eg, activation of inflammatory cells and fibroblasts; promotion of collagen synthesis, cell division, angiogenesis, and growth factors; and inhibition of matrix metalloproteinase activity), APWT qualifies as a debridement option owing to its indication for “removal of yellow slough, fibrin, tissue exudates, and bacteria”. However, clinical studies to date have not evaluated APWT specifically as a debridement modality. Rather, the randomized and nonrandomized studies have shown a benefit of adjuvant APWT (primarily in lower-extremity ulcers) on healing outcomes, such as proportion of wounds healed, volume reduction, and healing rate, relative to conventional wound therapies alone.

Conclusion

Ultimately, the recent change in Medicare reimbursement policy with regard to pressure ulcer care has put a premium on the rapidity with which acute care clinicians establish the stage of pressure ulcers, including ulcers unstageable on admission. This report of an early experience using APWT to expedite slough/eschar removal and allow for accurate staging of pressure ulcers suggests that APWT may be a clinically useful tool for acute care wound clinicians. Further research into the fastest, most efficient ways to clear necrotic tissue from unstageable pressure ulcers would be of particular value to wound care clinicians in the acute care setting.

References


