Prevention of Heel Ulcers and Plantar Flexion Contractures in High-Risk Ventilated Patients

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Clinical problems targeted in this study

Patients in the intensive care unit (ICU) have a high risk of developing heel pressure ulcers (hPUs) and plantar flexion contractures (PFCs), with prevalence ranging from 14% to 41%, and incidence ranging from 1% to 56%. In one study, approximately 50% of ICU patients with severe sepsis experienced acutely acquired neuromuscular dysfunction, which is a complex process leading to myopathy in the critically ill, the morphology of which is well described in Mills Anesthesia 6th Edition. In addition to the pathophysiological processes associated with high-risk critically ill patients, such as polyneuropathy and myopathy, the new reimbursement policies of the Centers for Medicare & Medicaid Services (CMS) are a strong catalyst for refocusing efforts on preventing negative outcomes and hospital-acquired conditions such as pressure ulcers.

Goals and Objectives

An IRB-approved study (waiver received) was conducted to assess the impact of a heel protector* intervention on hPU rates and PFCs through the use of existing protocols, and several surprising secondary findings:

- 9.4% showed improvement in heel status from entry to discharge
- 11.3% of existing heel skin conditions stayed the same with no change and no worsening in status
- 50% of abnormal heels showed improvement

Methods

This intervention established hPU and PFC prevention protocols in a high-risk patient population in order to ensure earlier recognition of heel skin issues and prevent PFCs if possible.

- Patients who were treated with the heel protector received the same measurements and documentation as patients who received the intervention.

Results

The study resulted in 100% prevention of hPU development, 90% prevention of PFC development, enhanced caregiver compliance with existing protocols, and several surprising secondary findings:

- 9.4% showed improvement in heel status from entry to discharge
- 11.3% of existing heel skin conditions stayed the same with no change and no worsening in status
- 50% of abnormal heels showed improvement

Clinical Practice Implications

hPUs

- Central nervous system disease or injury, and/or spinal cord disease or injury can lead to PFCs. Damage to the peroneal nerve may be caused by critical illness, or immobility which results in shortening of the Achilles tendon (foot drop due to contracture) are all etiologic factors which can contribute to PFCs. Risk factors for PFCs include pharmacologic sedation or paralysis, coma, leg weakness, and/or heavy and tight bed linens which hold the foot in prolonged plantar flexion (extension). Physical therapy can reverse tendon contracture, but prevention is preferable as PFCs can become permanent deformities. Clinical implications of a successful PFC prevention protocol include:
  - Improved quality of life
  - Prevention of potentially permanent deformities
  - Potential for indirect cost savings (decreased length of stay, savings on cost of treatment, decreased nursing staff time, etc.)
  - Prevention of a hospital-acquired condition

PFCs

<table>
<thead>
<tr>
<th>Financial Benefits of hPU Prevention</th>
<th>Prevalent Cost of Steps: $45/1,000 Steps</th>
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<tbody>
<tr>
<td>Prevented Cost of Steps: $14,250/1,000 Steps</td>
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<tr>
<td>Savings on rehabilitation costs for PFC, etc.)</td>
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References


Kapandji IA. Ilustrated Physiology of Joints. 10.


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- Prevention of a hospital-acquired condition

References