Understanding therapeutic support surfaces

Correct use of pads, mattresses, and cushions can reduce sheer, friction, moisture, and heat that lead to pressure ulcers.

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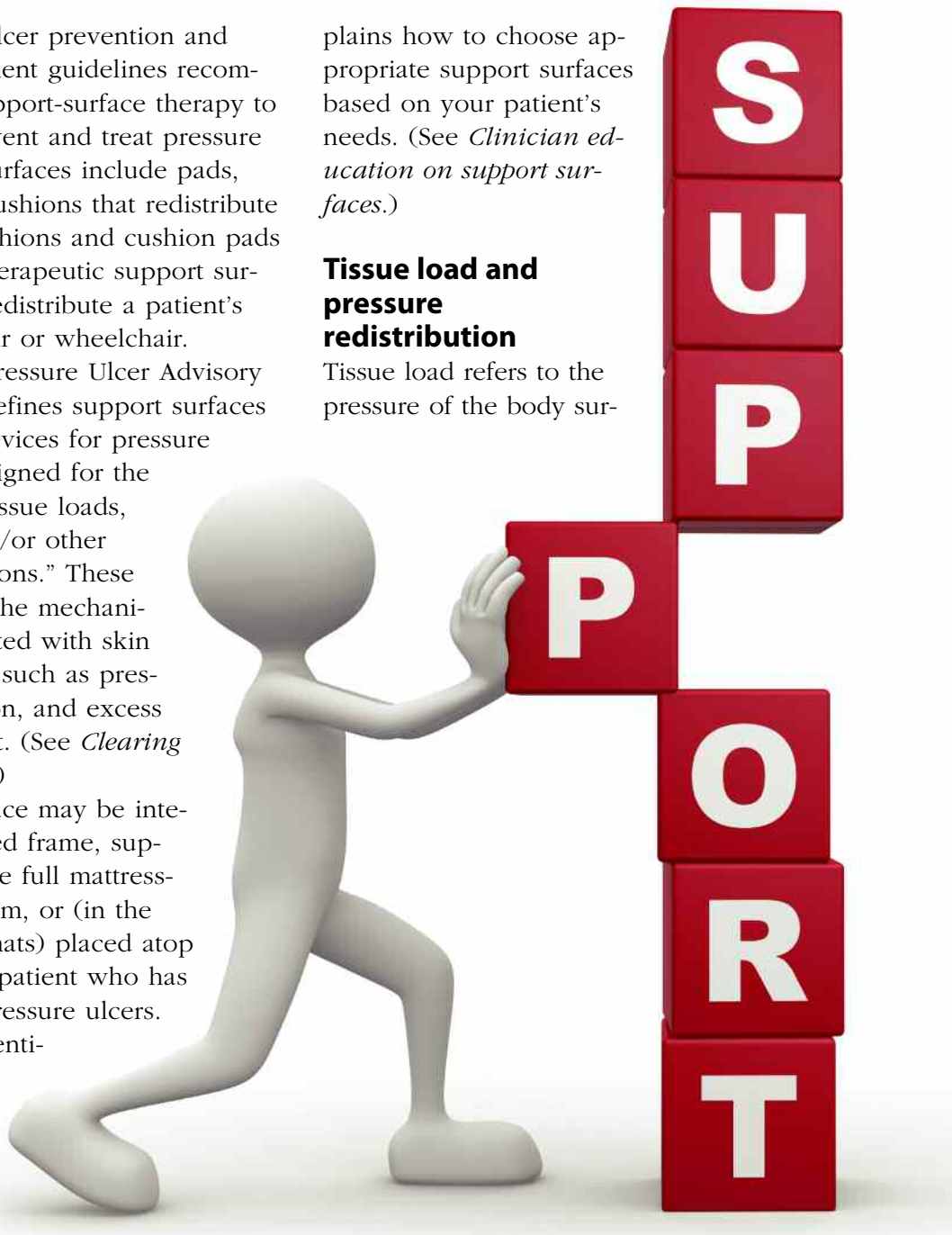
Pressure-ulcer prevention and management guidelines recommend support-surface therapy to help prevent and treat pressure ulcers. Support surfaces include pads, mattresses, and cushions that redistribute pressure. Full cushions and cushion pads are considered therapeutic support surfaces if used to redistribute a patient's pressure in a chair or wheelchair.

The National Pressure Ulcer Advisory Panel (NPUAP) defines support surfaces as "specialized devices for pressure redistribution designed for the management of tissue loads, microclimate, and/or other therapeutic functions." These surfaces address the mechanical forces associated with skin and tissue injury, such as pressure, shear, friction, and excess moisture and heat. (See *Clearing up the confusion*.)

A support surface may be integrated into the bed frame, supplied as a separate full mattress-replacement system, or (in the case of pads or mats) placed atop the mattress of a patient who has or is at risk for pressure ulcers. This article differentiates reactive and nonreactive support surfaces and explains how to choose appropriate support surfaces based on your patient's needs. (See *Clinician education on support surfaces*.)

Tissue load and pressure redistribution

Tissue load refers to the pressure of the body sur-



Clearing up the confusion

In 2001, the National Pressure Ulcer Advisory Panel (NPUAP) recognized that many of the terms and definitions used to describe support surfaces were confusing and inconsistent, and that clinicians lacked data for comparing and contrasting support-surface designs and technology. What's more, no standardized consistent laboratory or technical test protocols were available.

Developing standard terms and definitions became a priority for NPUAP, which formed the Support Surface Standards Initiative (S3I) and a standards committee. In 2007, the committee published a list of revised support-surface terms and definitions. NPUAP also is developing standardized test methods and reporting standards for support surfaces to provide an objective way to evaluate and compare characteristics of support surfaces and improve product selection. Although test results will help clinicians compare and contrast the various support-surface designs, they will still have to use their best judgment when choosing appropriate support surfaces for individual patients.

S3I terms and definitions, along with three test methods, were submitted to the International Organization for Standardization for voting, which was in progress when this article was written. For more information on the NPUAP S3I, visit **www.npuap.org/resources/educational-and-clinical-resources/support-surface-standards-initiative-s3i**.

face and underlying tissue that come in contact with the support surface. It encompasses not just the patient's weight but also body composition.

Immersion and envelopment properties

Immersion and envelopment properties of a support surface are crucial. *Immersion* refers to depth of penetration into the support surface by the load (patient's body). *Envelopment* is the ability of the support surface to conform around the body. As the body's contact area with the support material increases, pressure decreases.

Clinicians must ensure the support surface meets the patient's specific needs. If the patient has some mobility, support-surface immersion and envelopment shouldn't impede independent mobility.

Reactive vs active support surface

A support surface is categorized as reactive or nonreactive based on how it interacts with the skin and tissue.

Reactive support surface

A reactive support surface changes its load-redistribution properties only in response to an applied load (such as the patient's body). The load sinks into the support surface and is enveloped by it. A reactive support surface accommodates the load by conforming to the body. It may be powered or nonpowered.

Active support surface

An active support surface is a powered surface capable of changing its load-distribution properties with or without an applied load. Areas or specific cells within the support surface change constantly with inflation or deflation of specific air bladders, based on preset cycles. Changes in pressure within individual cells over a

Clinician education on support surfaces

A recent survey compared clinicians' knowledge of support-surface design and technology with their knowledge of pressure-ulcer prevention and treatment. Results showed they knew more about pressure-ulcer prevention and treatment than support surfaces. When respondents were asked if they'd like additional educational programs on support surfaces, 93% said yes. Clinicians' knowledge of support-surface therapy can promote optimal patient care and clinical outcomes.

preset interval alter pressure on the skin and tissue periodically.

Addressing the skin's microclimate

The microclimate is the skin's heat and humidity (temperature and moisture level). Moist skin can result from sensible water loss (as with urinary incontinence) or insensible water loss (perspiration). Moist skin is a risk factor for pressure-ulcer development. Research shows that as the skin warms, moisture increases, weakening the skin. Other influences added to fragile skin, such as the mechanical forces of shear and friction, further increase pressure-ulcer risk.

> If the patient has some mobility, support-surface immersion and envelopment shouldn't impede independent mobility.

Low-air-loss support surfaces help correct the skin's microclimate. They maintain the skin's heat and relative humidity by providing a flow of air that cools the skin and wicks away moisture. Managing the pressure along with the skin's microclimate is important in preventing and healing pressure ulcers.

Addressing shear

Shear is the force per unit area exerted parallel to the plane of interest. Shear forces cause tissue distortion and impede blood flow to the tissues, decreasing blood flow and tissue oxygenation. Forces that alter the skin's blood flow and tissue perfusion are major risk factors for pressure ulcers.

Always consider shear forces when choosing a support surface for a patient. Shear causes a strain on tissues, leading to deformation where blood vessels are located. Most support surfaces have a cover that interfaces with the skin and reduces shear force. Usually, this material promotes sliding or gliding of the body or holds the patient in place to reduce shear.

Addressing friction

Friction is resistance to motion in a parallel direction relative to the common boundary of two surfaces. Sliding one surface across another surface promotes friction. Friction usually occurs in conjunction with shear forces. The sliding motion may increase skin temperature. If moisture and heat have already weakened the patient's skin, friction may contribute to superficial pressure ulcers. The cover of the support surface may help protect against the effects of friction, as can a turning sheet, turning device, and powered mechanical lifting and movement equipment.

Clinical application

When caring for a patient who has pressure ulcers or is at risk for developing them, consider the following NPUAP guidelines on selecting support-surface therapy:

- Choose a support-surface therapy that corresponds correctly to the patient's condition.
- While the patient is receiving support-surface therapy, be sure to turn and reposition him or her based on individual needs.
- If pressure ulcers don't heal, reevaluate the situation as needed and change or replace the support-surface therapy as required.

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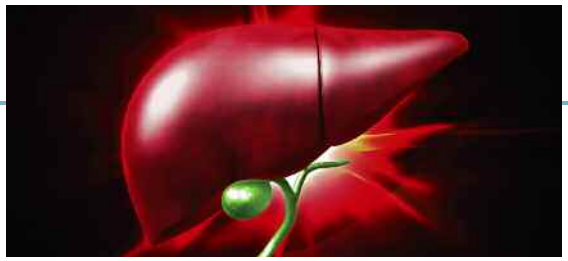
nomic analysis used in health care to determine cost-effectiveness
- interpret information on the cost and cost-effectiveness of wound-management modalities and protocols
- make an appropriate case for cost-effective wound management in their locality
- set up systems to collect the data needed for the analysis of the cost and cost-effectiveness of wound management.

Sections include demystifying cost-effectiveness, interpreting cost studies, and data collection for economic analysis. The section on making a case for cost-effective wound management walks readers through this complex process and provides practical tips.



WHO guidelines for hepatitis C

About **130 to 150 million people** worldwide have chronic hepatitis C infection. For information on handling this global chronic condition, access "**Guidelines for the screening, care and treatment of persons with hepatitis C infection**" from the World Health Organization (WHO).

The guidelines contain nine key **recommendations**, including approaches to increase the number of people screened for hepatitis C infection, advice on how to mitigate liver damage for those who are infected, and how to select and provide appropriate treatments for chronic hepatitis C infection.

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Call for clinical outcome data

NPUAP encourages clinicians and researchers to provide clinical outcome data on the specific design, therapies, features, and benefits of specific support surfaces. Collection and publication of such data, in conjunction with clinician education on support surfaces, could advance the clinical effectiveness of support-surface therapy.

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