

Innovative Medical Products: Primer on Pressure Ulcers

Article IV: Product Solutions Designed To Assist in Pressure Ulcer Prevention

(by Greg Prentiss, Gel Product Manager, Innovative Medical Products)

The first three articles in this series focused on the new classifications of pressure ulcers, the identification of at-risk populations susceptible to pressure ulcers, and the caregiver team approach that is critical to pressure ulcer prevention and treatment. This final article assesses the various support surface products that are designed to assist in pressure ulcer prevention.

Let's review why pressure ulcers occur in the first place. Pressure ulcers usually develop when oxygen is cut off to living tissue (especially oxygen-demanding muscle tissue) when direct or indirect (sheer) pressure blocks off the blood supply to that tissue area. The primary reason why this happens is immobility of the patient or lack of pressure redistribution away from bony prominences. The patient either has a health condition causing immobility or is temporarily immobile for a significant period of time (e.g., undergoing a lengthy operation under anesthesia). The latter, of course, occurs in a hospital or ambulatory surgery facility; the former may occur in an acute care setting, a long-term nursing facility, rehab center, or even in the home.

Although many factors such as nutrition and physical therapy are important in pressure ulcer prevention, pressure ulcers are mainly avoided through continual pressure redistribution. Pressure redistribution can be independently activated by the patient or, if the patient is virtually immobile, by the methodical turning of the patient by caregivers or nursing staff. Assisting in the management of pressure redistribution are the various support surfaces (pads, mattresses, air beds, etc.) that play an auxiliary but not insignificant role in pressure ulcer prevention. "In the operating room, it is often impractical or impossible to reposition the patient during a surgical procedure. In a long-term care facility, for example, sometimes the standard every-two-hour turning schedule is not enough; in this case, having the proper pressure redistributing support surface can be the difference between the patient developing a pressure ulcer or not," said Michelle Kunsman, faculty member in the University of Hartford's department of physical therapy.

In general, support surfaces can be made from any of the three basic elements of matter: gas, liquid or a solid. Of the three, a liquid is non-compressible and theoretically the most effective in pressure redistribution. Gas, on the other hand, is compressible; the more you compress it, the more it resists or pressurizes. Solids, of course, have no pressure redistribution value whatsoever. Following are brief descriptions of some of the main categories of support surfaces:

Foam

A foam support surface is more like a gas because foam is compressible. In fact, the more pinpoint pressure placed on a foam surface, the higher the compressibility will be at that point (think of a bowling ball dropped on a foam surface; where the ball comes to rest or "bottoms out" will be the area of complete compression or the highest pressure point in the material). Foam support surfaces can be constructed of mostly foam material or a combination of foam (gas) and liquid (gel) or combined with rubberized material to form a foam mattress with encapsulated air.

Foam support surfaces are popular because of their low cost and light weight. They tend, however, to increase body temperature, retain moisture, and once contaminated have to be discarded as waste. (If a reusable, fabric cover is placed over the foam pad to help prevent contamination, it only adds to the support surface's sheer force.) Finally, as a rather large amount of foam material is needed to adequately support the patient, the bulky volume of the material will take up a lot of precious storage space.

Air-Fluidized Beds

While foam may be the simplest and least expensive support surface (but probably the least effective solution), the air-fluidized bed comes the closest to providing the patient a total immersion experience (like floating in a swimming pool) and therefore the maximum in pressure redistribution. Air-fluidized beds were originally developed for burn patients. The beds consist of millions of silicon beads encased in a low-shear polyester sheet; the beads exhibit fluid characteristics when warm, while pressurized air (run from an outside electrical power source) is forced up through the beads with adjustable pressure¹ levels for addressing individual patient needs. Although the ultimate in pressure redistribution, an air-fluidized bed is very expensive to purchase and operate and therefore not practical for routine pressure ulcer prevention. The bed is mostly used for patients who already have severe pressure ulcers.

Gel Products

Gel support surfaces, being in the liquid category, come closer to mimicking the water-immersion effect than foam pads or mattresses. (Full disclosure: your author is the gel product manager at Innovative Medical Products.) Even though thinner than foam, gel doesn't "bottom out." Heavier than foam, gel pads are more practical and durable, easier to clean and reuse, take up less storage space, and provide a better overall cost of ownership for the healthcare facility. The best gel products come with a supple, soft outer layer (a "second skin") that helps reduce sheer force. Generally in a hospital setting, gel pads are placed over the foam mattresses on the operating table to provide more effective pressure redistribution.²

Gel support surfaces are suitable for a hospital's ICU or emergency department where patients are severely limited in their movements, and especially for the operating room where patients are undergoing surgeries lasting several hours (i.e., more than two). Pressure ulcers frequently start deep within living tissue on the operating table as the patient is totally immobile under anesthesia. (It is estimated that one in four surgical patients are at risk for developing pressure ulcers which may only present themselves as late as five days after surgery.³) As for nursing homes and long-term care facilities, gel support surfaces can give caregivers some "extra time" in the constant patient-turning cycle required of the staff.

Conclusion

Although any plan of care that leaves out support surfaces is incomplete, there is no perfect support surface only because support surfaces are but one aspect of a total, holistic approach to pressure ulcer prevention. It is important to assess the strengths and deficiencies of each

¹ In addition to air-fluidized beds, alternating pressure support surfaces are systems in which air is periodically pumped into the chambers of the material to inflate and deflate the chambers, changing the location of the contact pressure. This pulsating or massaging action positively contributes to blood flow and pressure redistribution.

² Often the standard OR table pad is 2 inches thick covered with laminate material – a significant contributor to pressure ulcer development.

³ See "Prevent Patient Positioning Problems," *Outpatient Surgery Magazine*, December 2006.

solution before making a product choice. Whatever the choice, it should always be made, first and foremost, with the health of the patient in mind.