

Microclimate: A key player in skin integrity



The United States has caught up with other countries dealing with aging populations. It's projected that by 2034, older adults will outnumber children¹ for the first time in the country's history. While Pressure Injuries (PI), incontinence-associated dermatitis (IAD), and other skin issues affect patients of all ages, this demographic shift illustrates a pressing need to build an understanding of the emerging developments and innovations that keep patients comfortable and improve outcomes.

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Pressure Injuries in particular come down to pressure, moisture, friction, and shear, but a fifth and no less impactful element, is microclimate. According to the Wound Healing Society², microclimate has been found to be an independent risk factor for the development of PIs.

Balancing and managing the microclimate, largely through carefully planning which products come in contact with patient skin, has the potential to improve wound care, as well as prevention and treatment of PIs and IAD-related complications.

Understanding microclimate

Microclimate is more than just airflow. In wound care, it is the climate of a small, or restricted area in the body that is different from the surrounding area. Maria Kotula, MSN, BSN, BA, RN, CWON, explains it to her patients as comparable to the difference between the overall climate of a U.S. state, pointing out that what might be happening on the coast of the Carolinas may be very different from the Appalachian mountains on the very same day--where the weather might be colder, windier, or even include snow. While these two



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areas are in the same region and their overall climates are similar, their microclimates can have great variations depending on the conditions of the day.

In terms of moisture and surfaces, she explains microclimate as what happens when you go swimming on a hot day and then take a long break in a plastic Adirondack or metal lawn chair. Kotula explains that the part of your body exposed to the air and sun will likely dry quickly and efficiently, but the parts of your skin that are in contact with the plastic or metal chair, meaning your sitting surface, are going to not only stay wet, but continue to get warmer as your body heats up, trapping heat and moisture against the body's sitting surface.

In a clinical setting, this happens most frequently under bony prominences, such as the sacral-coccyx area, where pressure is high, mobility and movement is often low, and heat build up promotes excessive sweating. Other sources of moisture include wound drainage, contact with a surface that isn't breathable, and incontinence.

Addressing a dangerous cycle

Managing microclimate to encourage skin health largely comes down to preventing, slowing, and stopping the continuous cycle that results in skin erosion.

Excess moisture has the potential to initiate or exacerbate the cycle. Sometimes the cycle starts with body temperature rising and creating moisture from sweat, and other times it's the opposite—moisture from urine or wound drainage can increase both heat and maceration. In both instances, the body's reaction is to increase metabolic processes to cool off and produce perspiration. This in turn, drives up the demand for O₂ and other nutrients. As the cycle continues feeding off itself, the risk of skin breakdown and wounds increases.

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However, there are interventions that can interrupt this cycle, but clinicians need to understand the factors of the microclimate. A strong game-changer for nurses is to pay attention to the surfaces in contact with their patients' skin. Wound care nurses are often called on to lead the charge in educating bedside nurses on how to combat this added PI risk factor. For example, many traditional underpads aren't breathable, therefore doing little to stop the cycle—and in many cases, even exacerbating it by trapping heat and moisture on the skin. An alternative would be to use a premium underpad—making sure it's a selection that wicks urine away from the skin and allows that moisture to leave the skin surface and the pad.

Wound care professionals will benefit from educating themselves on new products available and how those products interact with existing scenarios. Kotula illustrates this concept in the context of choosing the right pad when a specialty bed is in use.

"For example, if you're using an underpad that has a plastic backing or virtually no airflow, you're defeating the purpose of a specialty bed," she says. She explains further, "when you think of the pressure injury components of pressure, moisture, friction, shear and also the microclimate—the goal is to decrease as many of those risk factors as possible. So, if the specialty bed reduces pressure and also provides air flow to decrease moisture and heat, then you wouldn't want to use an underpad that instead collects urine only to trap it on the skin and back to the cycle of moisture and heat build-up." Kotula adds, "It's important to be inquisitive when evaluating and selecting products for your patients and for your team. Under the umbrella of incontinence products, it's also important to look for the key benefit of pH neutralization to prevent IAD. Another factor in choosing a pad is to look for a makeup of layers that are soft on the skin and can potentially decrease friction and shear."

Microclimate's impact on IAD and pressure injuries

Kotula stresses the importance of understanding microclimate in relationship to IAD and PIs.

For IAD in particular, where urine is trapped against the skin, microclimate is an even more critical factor since there is a direct relationship between skin dryness and slowing the cycle that leads to skin erosion. This is because the pH of urine can differ significantly from that of the skin, disturbing the acid mantle and eroding the skin itself. For PIs, microclimate can exacerbate friction and shear. Kotula explains, "when sweat, wound drainage or moisture from urine sit on the skin—that moist skin is often the trigger for friction and shear happens—because as the patient's skeletal structure slides down the bed, their skin sticks to the pad or the sheet and the tissue layers separate."

Kotula emphasizes that understanding the microclimate certainly includes the factors of moisture and heat, but also considering the importance of a third factor—time. She points out, "the microclimate, skin damage, and time usually have a direct proportional relationship—as heat and moisture increases so does skin damage—and the more time a patient is left in those adverse conditions, the worse the damage is going to be." Kotula gives the example that, "patients who have an incontinent episode then are left in moisture while sleeping through the night, will experience skin damage that increases as time passes. A little bit of mindfulness around stopping the cycle and choosing the best products can go a long way in patient care."

For more information on the Microbiome, visit [here](#) for a free CE course. For more information on product solutions that can help prevent, treat, and manage skin concerns visit www.cardinalhealth.com/skinmission



SOURCES:

1. <https://www.census.gov/library/stories/2018/03/graying-america.html>
2. <https://pubmed.ncbi.nlm.nih.gov/26171566/>