

# Using Gloves Coated With a Dermal Therapy Formula to Improve Skin Condition

Deborah D. Davis, Robert A. Harper

**F**requent exposure of hands to conditions and agents that compromise the skin's normal barrier properties makes contact dermatitis an occupational health risk for nurses and other health care workers. Hand washing not only removes obvious contamination and skin microbes, it also removes layers of epithelial cells and their associated skin lipids.<sup>1</sup> Alcohol-based rubs can replace some portion of hand washing, but repeated use of these hand rubs for skin antisepsis can lead to dry skin.<sup>2</sup>

The magnitude of the problem of contact dermatitis among nurses was confirmed in a 1997 study of 410 acute care nurses.<sup>1</sup> Approximately 25% of these nurses had signs or symptoms of dermatitis on their hands at the time of the survey, and 86% had a history of skin problems on their hands.

Use of antimicrobial soaps and lengthy scrubs required by presurgical hand antisepsis protocols may put perioperative nurses at high risk of developing hand irritation. Use of brushes in surgical scrubs can further increase the risk of skin damage.<sup>3</sup>

## INFECTION CONTROL

The ramifications of chronic dermatitis among nurses reach beyond the issue of personal discomfort and into the issue of infection control. Dry, irritated skin can be linked to an increased chance of transmission of pathogens between nurses and patients. Dry, irritated skin is more difficult to disinfect than healthy skin,<sup>4</sup> and it is more likely to be colonized with nonresident pathogenic bacteria, which are responsible for most health

care-associated infections.<sup>5,6</sup> Flaking associated with dry, irritated skin further increases the risk of transmitting infection because of the larger numbers of microorganisms shed into the environment with the skin flakes.<sup>7</sup> Irritated skin also has been shown to deter health care workers from washing their hands, which is a fundamental part of hand hygiene.<sup>8</sup>

The use of skin emollients or barrier creams to prevent contact dermatitis is receiving new attention.<sup>9</sup> For example, the "Guideline for hand hygiene in health-care settings"<sup>10</sup> published by the Centers for Disease Control and Prevention (CDC) now recommends that health care workers be provided with hand lotions or creams to reduce the occurrence of irritant contact dermatitis and the associated increased risk of health care-associated infection

## ABSTRACT

- **THIRTY-ONE HEALTH CARE WORKERS**, of whom 24 (77%) were perioperative nurses, evaluated a new nonlatex surgical glove with a coating consisting of ingredients clinically proven to have beneficial effects on skin health.
- **IN THIS ONE-DAY**, clinical self-assessment study, nurses and other health care workers compared the condition of the skin on their hands before and after wearing these surgical gloves.
- **EIGHTY-ONE PERCENT** of the perioperative nurses and health care workers rated the skin on the hand that had worn the glove as less dry than it had been at baseline. Sixty-five percent rated their skin as more hydrated, and 58% rated their skin as smoother and more supple after wearing a surgical glove coated with a dermal therapy formulation. *AORN J* 81 (January 2005) 157-166.

TABLE 1  
Skin Wellness Product Ingredients Used and  
Their Role in Skin Health

Role of ingredient	Glycerin <sup>1,2</sup>	Gluconolactone <sup>4</sup>	Sorbitol <sup>5</sup>	Citric acid <sup>6,7</sup>	Chitosan <sup>8,9</sup>	Panthenol/pro vitamin B-5 <sup>10,11</sup>
Adds moisture to the skin	X	X	X		X	X
Forms a protective barrier on the skin (ie, creates a film)					X	
Inhibits inflammation (ie, reduces irritation and redness)		X			X	X
Promotes wound healing					X	X
Inhibits growth of skin bacteria				X	X	
Decreases appearance of fine lines or wrinkles		X				X
Improves skin integrity (ie, barrier function)		X				X
Reduces roughness (ie, increases smoothness of skin)	X	X	X			X
Improves skin texture	X	X	X			X
Improves skin appearance	X	X			X	X

transmission.<sup>3</sup> In addition, AORN's 2004 *Standards, Recommended Practices, and Guidelines* includes information on choosing appropriate skin moisturizing products to prevent dermatitis and reduce bacterial shedding from the skin.<sup>10</sup>

#### REASONS FOR POOR ADHERENCE

Nurses' ability to comply with the recommended use of hand creams, however, is questionable. High patient loads are known to be associated with poor adherence to hand hygiene,<sup>11</sup> which suggests that nurses who are too busy to wash their hands or use hand rubs between patients are unlikely to have time to apply hand cream between patients.

Nurses need products that make it easier for them to moisturize, soothe, and protect their hands to reduce contact dermatitis and the number of health care-associated infections. For this reason, surgical gloves coated with a dermal therapy formula were developed. The gloves are coated with a proprietary blend of ingredients that have established roles in skin health and long histories of use in skin, hair, and nail care products.<sup>12,13</sup> The ingredients in the coating, either individually or in combination, are known to moisturize, aid in skin repair, and contribute to maintenance and protection of the skin barrier (Table 1).<sup>13,14</sup>

One study compared the effects on

TABLE 1  
Skin Wellness Product Ingredients Used and  
Their Role in Skin Health (continued)

Role of ingredient	Glycerin <sup>1,3</sup>	Glucono-lactone <sup>4</sup>	Sorbitol <sup>5</sup>	Citric acid <sup>6,7</sup>	Chitosan <sup>8</sup>	Panthenol/pro vitamin B-5 <sup>9,10</sup>
Increases elasticity		X				X
Improves the integrity of the barrier		X				X
Nourishes the skin	X					X
Conditions the skin			X	X	X	X
Strengthens skin tone						X

1. D Bissett, J McBride, "Skin conditioning with glycerol," *Journal of the Society of Cosmetic Chemists* 35 (November 1984) 345-350.

2. W Shapiro et al, "Glycerin moisturizers," *Symposium on Cosmetic Efficacy: A Supplement to Cosmetic Dermatology* (November 1996) 26-30.

3. A Rawlings et al, "The effect of glycerol and humidity on desmosome degradation in stratum corneum," *Archives of Dermatological Research* 287 no 5 (1995) 457-464.

4. E Berardesca et al, "Alpha hydroxyacids modulate stratum corneum barrier function," *British Journal of Dermatology* 137 (December 1997) 934-938.

5. P A Aikens, S E Friberg, "Emulsifiers," in *Dry Skin and Moisturizers: Chemistry and Function*, ed M Loden, H Maibach (Boca Raton, Fla: CRC Press, 1999) 197.

6. International Cosmetic Ingredient Dictionary and Handbook, eighth ed, J A Wenninger, R C Canterbury, G N McEwen, Jr, eds (Washington, DC: Cosmetic, Toiletry, and Fragrance Association, 2000).

7. C M Ditre et al, "Effects of alpha-hydroxy acids on photoaged skin: A pilot clinical, histologic, and ultrastructural study," *Journal of the American Academy of Dermatology* 34 (February 1996) 187-195.

8. R H Chen, R S Heh, "Film-formation time, skin hydration effects, and physicochemical properties of moisture masks containing different water-soluble chitosans," *Journal of Cosmetic Science* 51 (January/February 2000) 1-13.

9. "D-panthenol," Roche, <http://www.roche.com/vitamins/pdf/dpanth.pdf> (accessed 16 Sept 2004).

10. D Djerassi, "The role of vitamins in aged skin," *Journal of Applied Cosmetology* 11 (January-March 1993) 29-40.

skin health of using surgical gloves coated with a dermal therapy formula to using equivalent surgical gloves without the formula.<sup>22</sup> The study found that gloves coated with the formula produced an increase in skin moisture and skin elasticity from baseline levels. It also found that gloves with a dermal therapy formula caused less deterioration in skin integrity as measured by transepidermal water loss than did gloves without the coating.

#### A ONE-DAY STUDY

The single-day study that is the focus of this article provided perioperative nurses and other health care workers an

opportunity to evaluate the effects of a surgical glove coated with a dermal therapy formula on the overall condition of the skin on their hands. The participants used a self-assessment to report what they found.

A total of 31 health care workers completed the self-assessment. Two of the participants were male, and the rest were female. Participants ranged in age from 30 to 59 years. Twenty-four (77%) study participants were perioperative nurses. The remaining seven participants included two medical/surgical nurses, three physical and occupational therapists, a medical assistant, and a laboratory technician.

*Nearly two-thirds of participants reported having issues with dry or irritated skin on their hands. Many of the participants rated their skin as less dry after wearing the coated gloves.*

All study participants worked in positions that require them to use gloves several times during the day.

Participants were instructed to avoid using creams or lotions on their hands for 24 hours before the self-assessment. On the day of the assessment, the participants performed a surgical scrub

and then completed a two-page questionnaire about hand cleansing and the lotion products they normally use at work, their perception of causes of dry skin, and benefits they associate with certain ingredients commonly found in hand lotions. Participants were asked to rate the feel and appearance of the skin on their hands according to six criteria:

- dry,
- hydrated/moisturized,
- smooth/supple,
- rough/flaking,
- irritated/red, and
- itchy.

After they completed the questionnaire, participants were asked to wear a surgical glove coated with a dermal therapy formula on one hand for three, one-hour wear periods. They were asked to rest the hand for five minutes between the first

two wear periods.

During the study period, participants remained seated quietly, either reading or watching television, and did not eat, drink, or smoke. After the final wear period, participants rested their hands for 15 minutes and then rated the feel and appearance of their skin on the hand that had worn the glove.

#### WHAT PARTICIPANTS SAID

Seventy-one percent of the perioperative nurses and health care workers participating responded "yes" when asked if they have issues with dry or irritated skin on their hands. Eighty-one percent perceived frequent hand washing to be the cause of their dry and irritated hands. Other factors perceived by participants as contributing to dry and irritated hands included

- seasonal/cold weather conditions,
- harsh scrub solutions,
- chemicals used in gloves,
- glove powder, and
- latex allergies (Figure 1).

Most of the participating perioperative nurses and health care workers rated their skin as less dry after wearing a surgical glove coated with the dermal therapy formula, and more than half rated their skin as more hydrated or moisturized after wearing the coated glove (Figure 2). Eighty-three percent of the participants said that their hands felt smooth, soft, supple, hydrated, and moisturized after wearing the glove with the dermal therapy formula. Skin condition was reported as improved after wearing the glove with the dermal therapy formula in four of the six criteria used to rate the feel and appearance of skin (Table 2). The two criteria that were unchanged (ie, irritated/red, itchy) could suggest that the dermal therapy formula is nonirritating.

#### SOLVING THE PROBLEM OF SKIN IRRITATION

Participants in the self-assessment confirmed that they had a high incidence of dry or irritated skin. Participants also noted that as regular glove wearers they recognize factors, such as frequent hand washing, seasonal weather conditions, and harsh scrub solutions, can put them at risk of developing contact dermatitis. Almost all participants

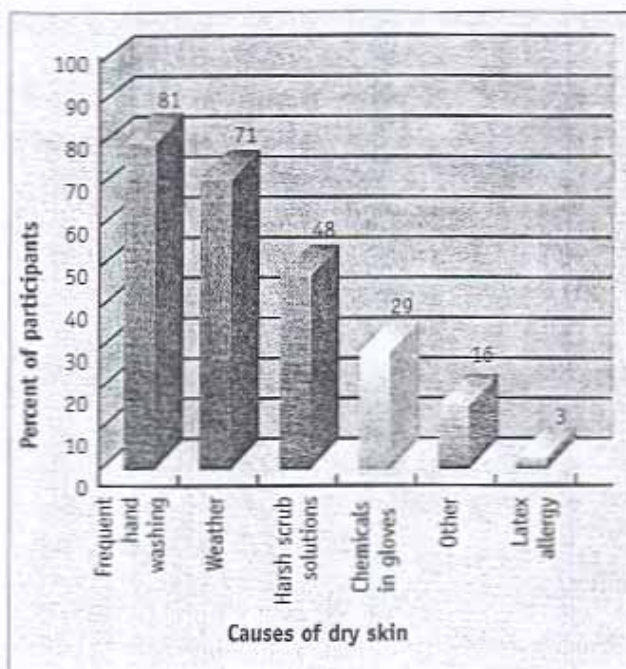


Figure 1 • Participants perceived that there were a variety of causes for their dry or irritated hands.

hand lotion to protect the health of the skin on their hands, but when busy shifts make finding time to wash their hands difficult, finding time to also apply lotion may not be possible. If nurses can improve their skin health without adding another step to hand antisepsis protocols, this could be an advantage for both nurses and patients. Nurses will have healthier hands, and patients will have a decreased risk of acquiring health care-associated infections from staff members with compromised skin.

Skin moisturizing products must be compatible with the gloves used (eg, they must not contain components that may degrade or weaken the glove). Although the dermal therapy formula used in the study gloves is water-based, and individual components are compatible with latex and nonlatex polymers (ie, are not expected to degrade the glove), testing was conducted to demonstrate that there was no decrease in the tensile strength of the glove coated with the dermal therapy formula, even after heat aging.<sup>25</sup>

#### PROVIDING SOLUTIONS

The potential for synthetic polyisoprene surgical gloves coated with a dermal therapy formula to improve the overall condition of the skin of perioperative nurses and other health care workers suggests that these gloves have the potential to play a role in reducing dry, irritated skin among health care workers. They also may play a role in preventing the transmission of health care-associated infections resulting from compromised skin.

The high percentage of study participants interested in using gloves with a dermal therapy formula indicates that these nurses were receptive to the idea of using gloves that moisturize, soothe, and protect their skin. The ability to

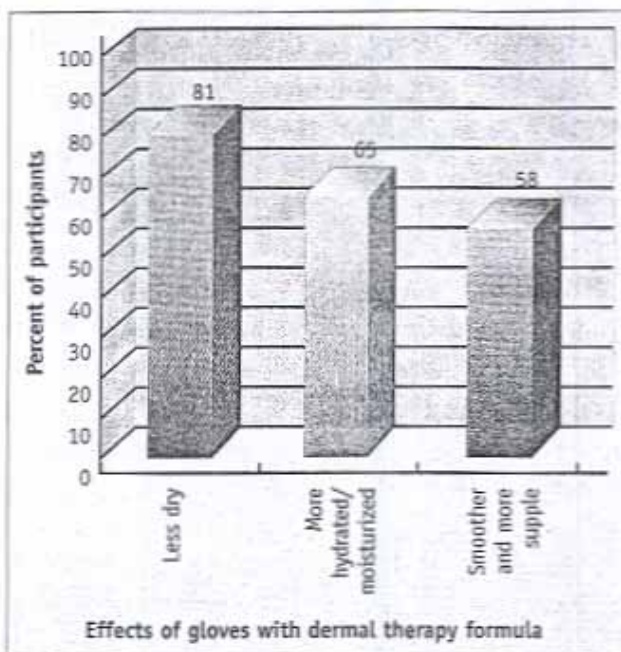


Figure 2 • Many of the clinicians who participated experienced beneficial effects from wearing the study gloves.

said they would use the polyisoprene surgical gloves with a dermal therapy formula if the gloves were available in their institutions.

Investigations of infection outbreaks in hospitals consistently have found that adherence to hand hygiene practices decreases during times of understaffing and high patient loads.<sup>11,20,24</sup> Clinicians know they should apply

**TABLE 2**  
**Summary of Reported**  
**Changes in Skin Condition**

Criteria	Net effect on skin after wearing gloves with dermal therapy coating
Dry	Improved (less dry)
Hydrated/ moisturized	Improved (more hydrated)
Smooth and supple	Improved (smoother and more supple)
Rough/ flaking	Improved (less roughness and flaking)
Irritated/red	No change (nonirritating)
Itchy	No change (nonirritating)

improve skin health by wearing surgical gloves may make it easier for perioperative personnel to comply with CDC guidelines aimed at improving skin health and reducing the number of health care-associated infections. ♦

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#### NOTES

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## Simple Interventions Decrease Catheter-Related Infections

Approximately 28,000 patients die each year in the United States because of catheter-related bloodstream infections, but clinicians could prevent virtually all of these deaths by implementing simple and inexpensive interventions, according to a Nov 30, 2004, news release from Johns Hopkins Medicine, Baltimore. The simple interventions are believed to have prevented more than 40 infections and eight deaths and saved nearly \$2 million in health care costs during a four-year study at Johns Hopkins.

Patients in intensive care units (ICUs) have an increased risk of bloodstream infections because nearly half of them require catheters. Researchers worked with hospital epidemiologists to study catheter-related infection rates from 1998 through 2002 at two Johns Hopkins ICUs that care for adult patients undergoing general, cardiac, transplantation, trauma, vascular, and orthopedic surgery. Rates were calculated based on the number of infections per 1,000 catheter days (ie, the number of patients with a catheter for one day).

Patients in one ICU (ie, the control group) received standard care. In the other ICU, researchers implemented a series of interventions that included

- educating ICU staff members on the prevalence

and prevention of catheter-related infections,

- creating a catheter insertion cart so all necessary equipment was readily at hand,
- asking physicians daily whether catheters could be removed,
- requiring nurses to complete a safety checklist during catheter insertion, and
- empowering nurses to stop procedures if the guidelines were not followed.

The researchers calculated the number of infections that were prevented as well as the potential savings in health care costs associated with catheter infections.

The catheter-related bloodstream infection rate in the ICU that received the intervention decreased from 11.3 infections per 1,000 catheter days in the first quarter of 1998 to zero infections per 1,000 catheter days in the last quarter of 2002. The rate in the control ICU remained unchanged during the study period.

Simple Intervention Nearly Eliminates Catheter-Related Bloodstream Infections (news release, Baltimore: Johns Hopkins Medicine, Nov 30, 2004) [http://www.hopkinsmedicine.org/Press\\_releases/2004/11\\_30\\_04.html](http://www.hopkinsmedicine.org/Press_releases/2004/11_30_04.html) (accessed 8 Dec 2004).