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Learning objectives

1. Explain the impact of skin condition on the healthcare worker and healthcare environment
2. Explain why a regimen approach to hand hygiene products is important in healthcare settings
3. Explain why clinical studies for mildness are recommended to establish a consistent basis for evaluating products and their impact on skin condition

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The role of skin science in assuring hand hygiene compliance

by Nancy Kaiser, manager, Healthcare Consumable Product Technologies, and Simrit Sandhu, product manager, STERIS Corporation

More than two million patients acquire an infection each year in a healthcare environment.¹ Of those two million healthcare-associated infections (HAI), more than one-third could have been prevented through appropriate hand hygiene programs. The essential components of effective programs are: organized infection control activities run by a trained infection control practitioner; a reasonable practitioner-to-bed ratio; and a system for reporting infection rates to practicing surgeons. Programs with these components have been shown to reduce their hospitals' infection rates by 32%.² Imagine how much lower the infection rates could potentially be if hand hygiene compliance, which is currently estimated at 30% across the healthcare spectrum, was at 100%!

The challenge of hand hygiene compliance

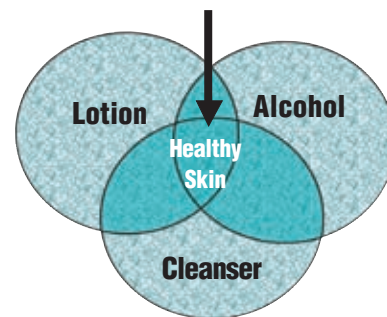
It is difficult for healthcare workers (HCWs) to sustain compliance with hand hygiene practices. There are a number of significant challenges to sustaining compliance, and one of the primary ones is damage to skin from frequent hand washing. As HCWs comply with mandated practices and increase their frequency of handwashing, their skin may be susceptible to becoming dry and irritated. Painful skin can create a situation where HCWs are less likely to continue to maintain the same level of hand hygiene frequency. So, the very act of being compliant can potentially result in poor skin health, which in turn might then result in reduced compliance, the very opposite effect that is desired. *Irritated skin and reduced compliance may result in increased infection rates.*

Products used on the skin as part of a hand hygiene program can affect skin physiology in a positive or negative manner. As counterintuitive as it might seem, water itself can affect the skin surface. These physiological effects, caused either by water alone or the products used, can affect the skin's ability to retain moisture. Dry and irritated skin can exhibit reduced barrier properties, show a change in microflora level and/or type, and increase its shedding of skin squames, all of which can affect the HCW as well as the patients they touch.

Recent surveys have revealed that patients are making more informed choices when it comes to choosing a hospital. They are checking to see whether or not the hospital has patient empowerment programs and patient safety campaigns. These are perceived as indicators of a facility's standard of care, and are important for raising awareness and changing behaviors such as hand hygiene practices. Since products used on the skin as part of a hand hygiene program can affect skin positively or negatively, it is important that hospitals select optimal formulations and combinations of products that can support compliance to recommended hand hygiene practices.

The ideal hand hygiene regimen

A hand hygiene regimen should contain a mix of products that fulfill a variety of needs, based on the hospital environment and its use patterns. The Centers for Disease Control and Prevention (CDC) *Guidelines for Hand Hygiene in Health-Care Settings* recommend the use of washing products when hands are visibly soiled, alcohol hand rubs for routine decontamination of hands, and lotions (or creams) for minimizing the occurrence of irritant contact dermatitis. It is this regimen of products (cleanser, alcohol, lotion) that can help to maintain an adequate level of moisture in the skin in order to sustain good skin health.



Products should be chosen with skin health in mind and to provide a continuum of care for the skin of the HCW. In order to properly select the products to be used as part of a hand

hygiene regimen, it is important to understand a little about skin physiology and how these products interact with the skin.

The skin requires a certain amount of moisture (hydration) to be healthy. The outer layer of the skin, the stratum corneum (SC) will not desquamate (release dead squamous cells) properly if it is too dry, which will result in scaly skin. Cells within the SC generate small water soluble and water binding amino acids, called natural moisturizing factor (NMF). It is this NMF that is responsible for binding water and aiding in the maintenance of appropriate hydration levels. Water can negatively impact skin moisture levels and physiology by removing water soluble compounds from the skin, one of which is NMF. Alcohol can also decrease the levels of moisture in the skin.

Certain cleansing agents can disrupt the lipids in the SC and penetrate to lower layers of the skin, causing an inflammatory response. Damaged skin is stimulated to repair itself and forms too quickly, resulting in abnormal cell architecture. This abnormal SC can be an inadequate barrier with poor water-binding properties.

The critical importance of formulation

Formulation is a scientific process, and products developed with skin science and research can make a difference that can be demonstrated on skin. This can be done by developing the perfect balance of mildness, antimicrobial efficacy, and moisturization in the products used, and by using these balanced products optimally together. The ingredients that make up hand hygiene products and the frequency of their use can have a significant impact on the skin condition of the HCW and thus can impact compliance with recommended hand hygiene practices.

CDC guidelines

In order to address these problems of skin irritation, low compliance to handwashing, and the negative impact of hand hygiene agents, the CDC recommended in the “*Guidelines for Hand Hygiene in Health Care Settings*” that hand hygiene agents should be well accepted, well tolerated and formulated to minimize irritancy. These guidelines were developed by the CDC’s Healthcare Infection Control Practices Advisory Committee (HICPAC), in collaboration with the Society for Healthcare Epidemiology of America (SHEA), the Association of Professionals in Infection Control and Epidemiology (APIC), the Infectious Disease Society of America (IDSA). These guidelines

offer expert insight into ideal hand hygiene practices and recognize the need for the use of a product mix that incorporates cleansers, alcohol hand rubs and lotions.

According to the CDC guidelines, over 25% of nurses report dermatitis, 85% have had a history of skin problems, and the repeated use of hand hygiene products is a primary cause of chronic contact dermatitis. Irritation due to hand hygiene measures and the importance of proper selection and use of products is discussed at length in a number of places in the guidelines. The guidelines’ proposed methods for reducing adverse effects of agents include: replacing products with high irritation potential with preparations that cause less damage to the skin; educating personnel; providing moisturizing skin care products; promoting the use of alcohol-based hand rubs containing emollients; and using lotions and creams regularly.

The guidelines list other factors to consider, such as overall efficacy and acceptance of products by personnel: “Because HCWs may wash their hands ... as many as 30 times per shift, the tendency of products to cause irritation and dryness is a substantial factor that influences acceptance, and ultimate usage.” Skin irritation is considered to be a substantial barrier to HCWs adherence to recommended hand hygiene practices.

Recommendations made by the CDC in the selection of hand-hygiene agents:

- Provide personnel with efficacious hand-hygiene products that have low irritancy potential.
- Do not let the cost of hand hygiene products be the primary factor influencing product selection

For proper skin care:

- Provide HCWs with lotions or creams
- Solicit information on the effects that lotions, creams or alcohol-based hand antiseptics have on the persistent effects of antimicrobial soaps

Importance of clinical data

The negative impact of physically damaged skin and its impact on hand hygiene compliance is a concern for any infection control practitioner who is focused on reducing HAIs. When selecting the products that will be the front line of defense against the transmission

of infection, the goal should be to choose clinically proven products that are mild to the skin even after frequent use. Because the science of skin health is so important in the development of products, infection control professionals should purchase their hand hygiene regimen after careful study of all available products. They should review the clinical data that supports each product’s claims:

- Specifically evaluate the manufacturer’s data on mildness of the product and, as often as possible, benchmark the mildness of the product to the effect of water on skin
- Question the relevance of the product claim in terms of its use with complementary products.

A product claim implies a basis in facts, and in the context of clinical claims, implies that the facts are based on accurate and reliable clinical data. While the healthcare industry is making progress towards establishing rules that would mandate testing final product formulations on human skin, and basing the testing on standards such as the Tentative Final Monograph for Healthcare Antiseptic Drug Products; Proposed Rule (TFM) established by the FDA, we are far from establishing similar rules for mildness testing.

It is possible to study and evaluate *in vivo* data for mildness in just the same way as it is done for efficacy – using the standardized “final formulation” *in vivo* tests as outlined by the TFM. Tests such as Forearm Controlled Application Tests (FCAT) are run on human subjects and employ various instruments to measure skin condition. These instruments allow quantifiable measurements to be made of hydration (moisture levels) and TEWL - transepidermal water loss (skin barrier disruption), which can reflect the amount of barrier damage that skin has sustained. Using more quantifiable measurement techniques and testing on human subjects can help establish a clinical basis for evaluating and benchmarking mildness claims for healthcare products.

Conclusion

The bottom line is that no matter how effective a hand hygiene product might be against microbes, if peoples’ hands are irritated, they

Answers	1.F 2.A 3.B 4.C 5.E 6.D 7.F 8.A 9.B 10.D
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Products in use	Skin Health	To Optimize Skin Moisture
Use of a mild cleanser, moisturizing alcohol rub and lotion	Good	Balanced
Use of a mild cleanser and a non-moisturizing alcohol rub	Mildly damaged	Need more lotion and/or a moisturizing alcohol product
Use of a moderately drying cleanser with a moisturizing alcohol rub	Mildly damaged	Need more lotion
Use of a moderately drying cleanser and a non-moisturizing alcohol rub	Damaged	Need more lotion or more moisturizing alcohol rub

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may avoid complying with some or all hand hygiene recommendations and this will defeat the purpose and benefits of a hospital's hand hygiene program. Ultimately, it may impact the facility's infection reduction rates.

The solution lies in the formulations of the hand hygiene products that are regularly used by healthcare staff. Formulations based on skin science and thorough clinical testing are critical for balanced regimens of hand hygiene products that add moisture to the skin with each application. Such formulations indirectly support successful infection prevention programs in healthcare settings. **HPN**

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Continuing Education Test - July 2006

The role of skin science in assuring hand hygiene compliance

CIRCLE THE CORRECT ANSWER

- Irritated skin may result in:**
 - Reduced barrier properties
 - Changes to microflora level and type
 - Increased shedding of skin squames
 - Consequences for the HCW
 - Decreased compliance with hand hygiene recommendations
 - All of the above
- Which of the following is a measurement of skin barrier intactness?**
 - TEWL (transepidermal water loss)
 - Time Kill Study
 - HCPH Test
 - None
- Hand hygiene compliance across healthcare providers is believed to be at:**
 - 10%
 - ~ 30%
 - 70%
 - ~ 90%
- What percentage of nurses has reported a history of skin problems?**
 - 10%
 - 25%
 - 85%
 - 50%

- According to the recommendations of the Guidelines for Hand Hygiene in Health-care Settings, what should be considered in the selection of hand hygiene products?**
 - Cost
 - Low irritation potential
 - Efficacy
 - Both a + c
 - Both b + c
- A Hand Hygiene Regimen should consist of what product types:**
 - Skin cleansers
 - Alcohol hand rubs
 - Lotions
 - All of the above
- Essential components of a Hand Hygiene Program are:**
 - Education
 - Organized infection control activities
 - A trained infection control practitioner
 - Reasonable ratio of ICP to beds
 - System for reporting infection rates
 - All of the above

- What is one reason HH Compliance is difficult to sustain?**
 - Compliance can result in skin damage
 - People don't care
 - Compliance doesn't reduce infection rates
 - Cost of products
- Mildness can't be quantified**
 - True
 - False
- In what ways should infection control professionals evaluate their hand hygiene purchases?**
 - They should review the clinical data that supports the product's claims
 - They should evaluate the manufacturer's data on mildness of the product and benchmark the mildness of the product to the effect of water on skin when possible
 - They should question the relevance of the product claim in terms of its use with complementary products
 - All of the above

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