

SKIN HEALTH AND HAND HYGIENE COMPLIANCE: *LET SCIENCE BE YOUR GUIDE*

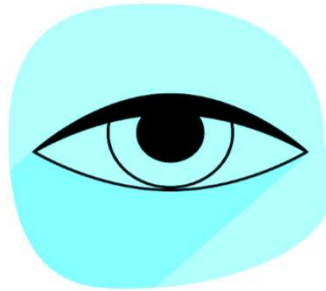
Lori Moore MPH, MSCE, BSN, RN
July 14, 2023

LEARNING OBJECTIVES

Review the science
of soap and sanitizer
and debunk myths
surrounding hand
hygiene products



Recognize the impact
of irritant contact
dermatitis **on hand**
hygiene compliance



Explain the cycle
of skin damage
and best practices
for prevention





*Healthcare
workers can
clean their
hands up to
15 times per
hour*



Why is this important?

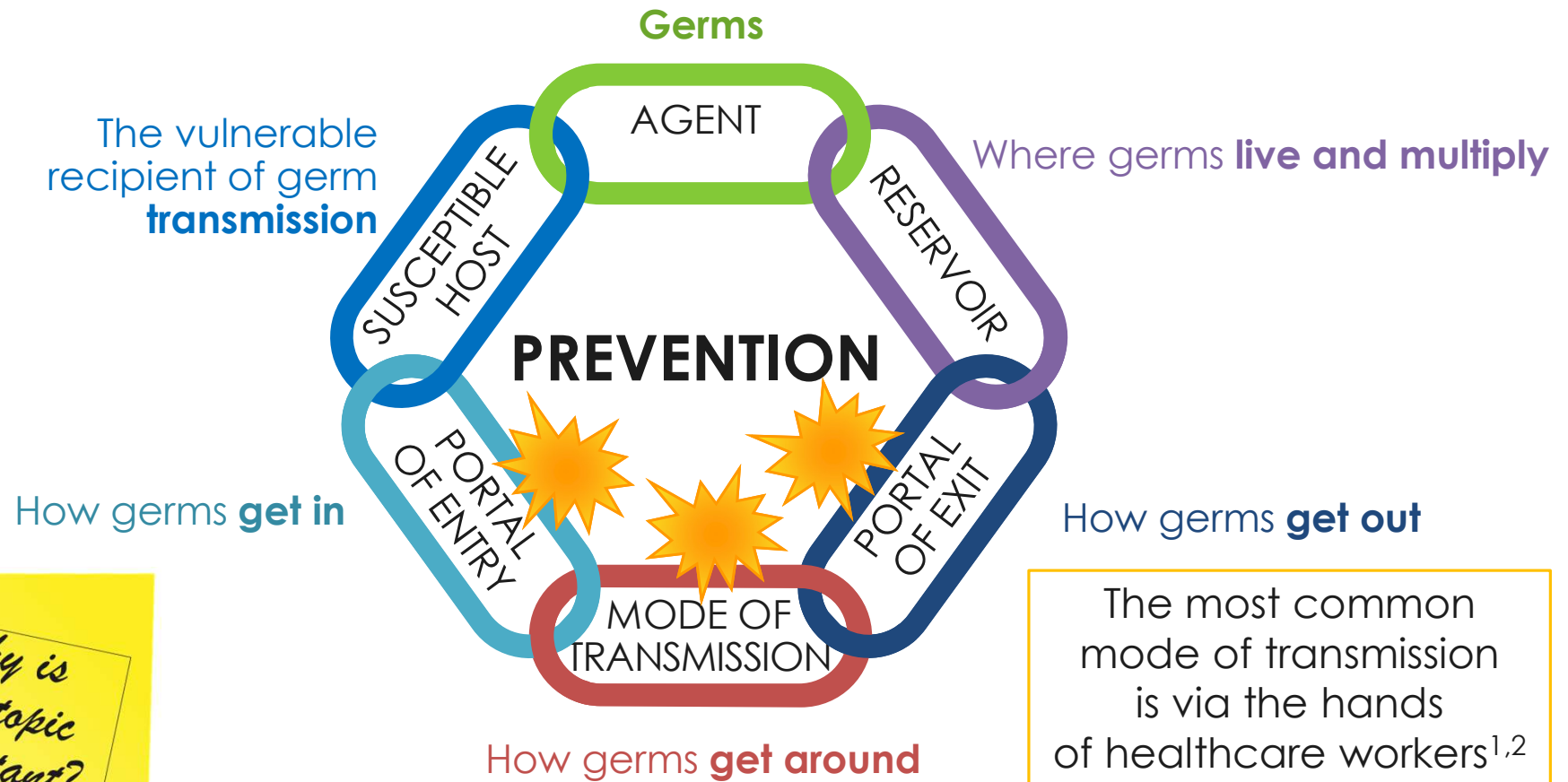
Behroozy & Keegel. Wet-work exposure: A main risk factor for occupational hand dermatitis. Saf Health Work. 2014;175-80

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*Hands are
Healthcare
Workers'
Most
Important
Tool!*

BREAKING THE CHAIN OF TRANSMISSION



Why is this topic important?

The most common mode of transmission is via the hands of healthcare workers^{1,2}

*Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. MMWR 2002;51:1-45.

*World Health Organization. WHO Guidelines for Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.

COMPLIANCE RULES GUIDELINES REGULATIONS



*Why is
this topic
important?*

PATIENT SAFETY

Centers for Medicare and
Medicaid Services

Facility Hand Hygiene Policy

The Joint Commission

CDC Hand Hygiene Guideline

WHO Hand Hygiene Guidelines

The Leapfrog Group

WHAT IS SETTING US BACK?



HAND HYGIENE MYTHS



THE SCIENCE OF SOAPS USED IN HEALTHCARE SETTINGS

BARRIERS TO PERFORMING HAND HYGIENE

~ 1990s



BARRIERS TO PERFORMING HAND HYGIENE

~ 1990s

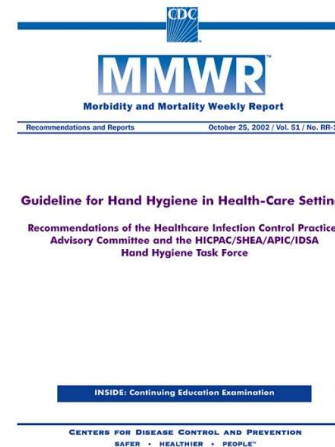


SKIN HEALTH AND COMPLIANCE

FOLLOWING THE SCIENCE

**No Time for Hand
Handwashing!? Can we
Afford 100% Compliance?
Voss and Widmer, 1997**

**Skin Irritation and Dryness
Associated with Two Hand
Hygiene Regimens
Boyce, 2000**



2002



2009

Voss A, Widmer, AF. No time for handwashing!? Handwashing versus Alcoholic Rub: Can we afford 100% compliance? *Infect Control Hosp Epidemiol.* 1997;18:205-208.

Boyce, JM, et al. Skin irritation and dryness associated with two hand hygiene regimens. *ICHE.* 2000;21:442-448.

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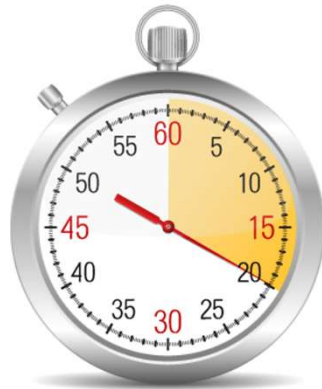
“NO TIME FOR HANDWASHING!?”

CAN WE AFFORD 100% COMPLIANCE?”

(VOSS & WIDMER, 1997)

Soap & water handwashing:

- 60 seconds



ABHR:

- 20 seconds

ICU with 12 nurses/8-hour shift

Soap and water

40% compliance: 2-6.4 hours
100% compliance: 16 hours

ABHR

40% compliance: 1 to 1.6 hours
100% compliance: 4 hours



Compliance can be achieved with soap and water.

“SKIN IRRITATION AND DRYNESS ASSOCIATED WITH TWO HAND-HYGIENE REGIMENS” (BOYCE, 2000)

SELF ASSESSMENT



Skin dryness, irritation and cracking

- **increased** with soap and water
- **decreased** with ABHR

VISUAL INSPECTION



Skin dryness, irritation and cracking

- **increased** with soap and water
- **at parity** with ABHR

SKIN HYDRATION



Epidermal water content

- **decreased** with soap and water
- **improved slightly** with ABHR



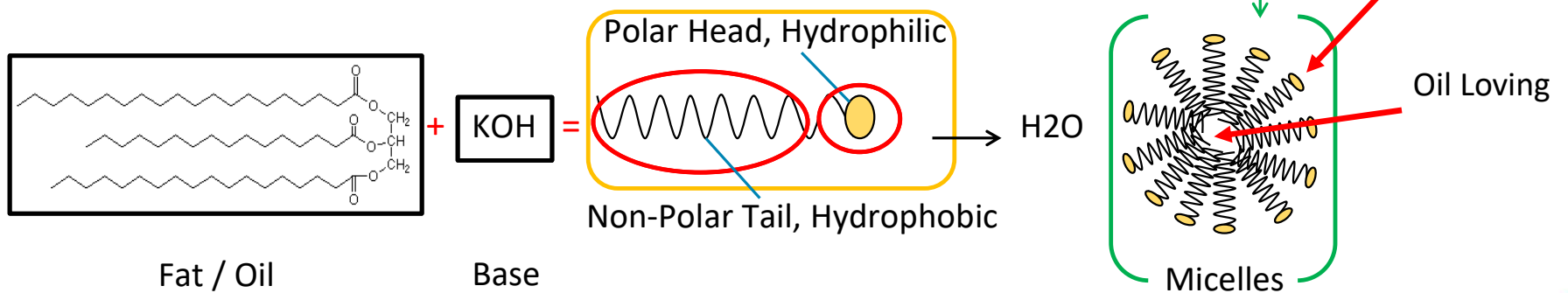
Soap and water is more drying and irritating to hands as compared to ABHR.

MECHANISM OF ACTION OF SOAP

HOW SOAP WORKS

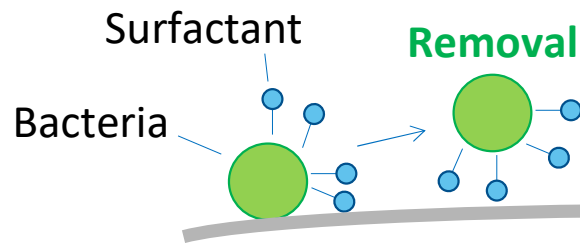
- Soap molecule
 - Water-loving polar head
 - Oil-loving, hydrophobic tail

Micelles attract oil and lipids



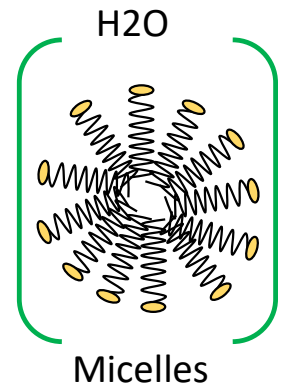
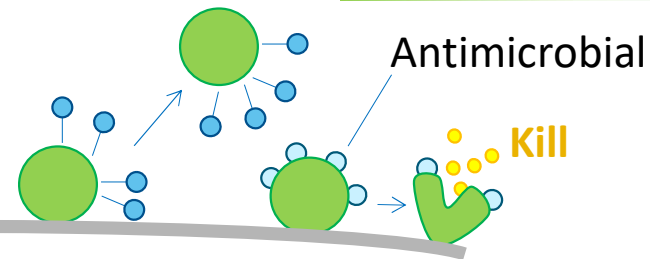
THE REMOVAL OF GERMS FROM HANDS

NON-ANTIMICROBIAL



Removal

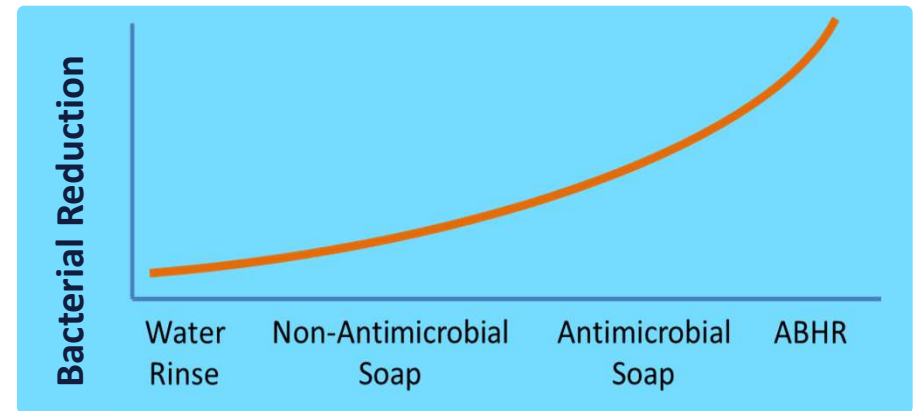
ANTIMICROBIAL



NON-ANTIMICROBIAL vs. ANTIMICROBIAL SOAP

The CDC/WHO recommend the use of **either** antimicrobial **or** non-antimicrobial soap ^{1,2}

- There is no data (in clinical settings) demonstrating a clinical benefit of antimicrobial soaps.



Microbiological performance on hands with in vivo testing

Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. MMWR 2002;51 [pg 27]

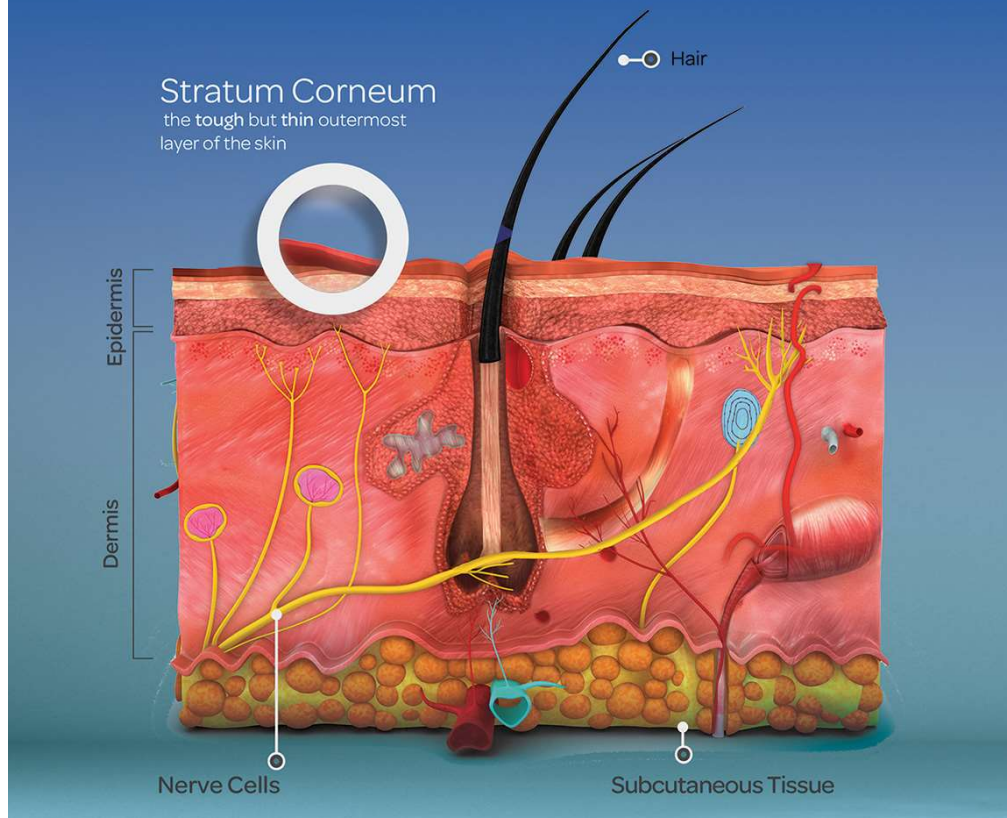


Soap and water are better at removing germs than ABHR.

1. Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. MMWR 2002;51:1-45.
2. World Health Organization. WHO Guidelines for Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.

THE IMPACT OF SOAP ON SKIN HEALTH

Healthy skin is your first line of defense



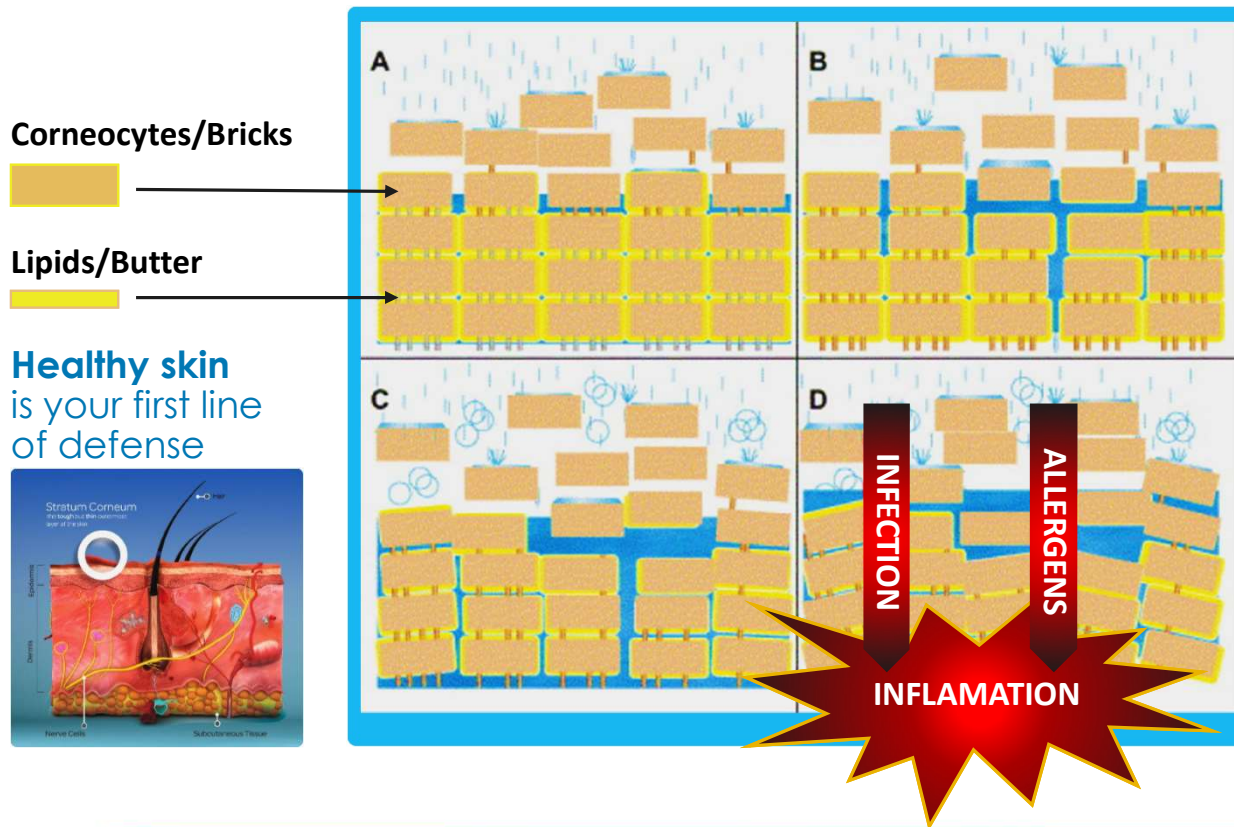
Part of the immune system

Very thin, but tough and protective

Protects the living cells beneath it

- Prevents penetration of microbes, allergens, chemicals
- Prevents the dehydration of underlying tissues

SOAP'S EFFECT ON THE STRATUM CORNEUM



- A. Skin cells tightly packed
- B. Lipids dissolving
- C. Water penetrating deeper layers
- D. Allergens and pathogens entering

REPETITIVE EXPOSURE TO SOAP AND WATER

Soap has a twofold effect on skin

1. Removes some protective natural oils with each washing
2. Once oils are removed soap reaches living cells and damages them, leading to inflammation and reduced oil production



SYSTEM CHANGE ~ 2002 (CDC), 2009 (WHO)

Paradigm shift...

Alcohol-based hand rubs (ABHR) became the primary means for hand hygiene in healthcare settings

Hand hygiene compliance improved¹⁻²

Saves
Time

Promotes
Skin Health

Better
Efficacy

¹Vermeil T, et al. Hand hygiene in hospitals: anatomy of a revolution. J of Hosp Infect. 2018;1-10.

²Pittet D, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Lancet. 2000;356:1307-1312.

GUIDELINES AND RECOMMENDATIONS

SOAP AND WATER (ONLY)

- When hands are **visibly soiled or contaminated** with blood or other bodily fluids
- **In outbreaks of *C. difficile* or norovirus**
- Before eating
- After using the restroom
- Per facility policy

ALCOHOL-BASED HAND RUB

- **In all other clinical situations** if hands are not visibly soiled

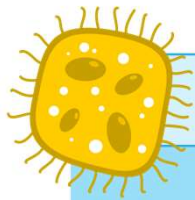
Hand sanitizing with alcohol-based hand rub is the gold standard **in all situations** when hands are **not visibly soiled**

Visibly soiled =
Hands on which dirt or body fluids are readily visible

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World Health Organization. WHO Guidelines for Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.

THE SCIENCE OF ALCOHOL-BASED HAND RUBS USED IN HEALTHCARE SETTINGS

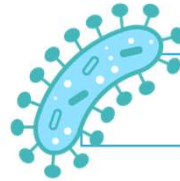
TARGET ORGANISMS FOR HAND HYGIENE



TRANSIENT ORGANISMS



- In superficial layers of skin
- Picked up on hands during contact with patients and surfaces
- Easily removed by routine hand hygiene
- Usually associated with transmission of infection
- Target for handwashing with soap and water



RESIDENT ORGANISMS

- In deeper layers of skin
- Permanent flora; normally reside in skin
- Not easily removed by routine hand hygiene
- Not generally associated with transmission of infection
- Target for pre-surgical hand scrubs/rubs

**MYTH
BUSTED**

ABHR kills the good germs.

HOW DOES ABHR WORK?

Damages cell membrane of the bacteria

- Loss of cell integrity
- Inactivates proteins inside cells (“denatures”)*
- Reduces the number of pathogens on hands

→ *Not associated with resistance development*

- *Alcohol acts and evaporates very quickly*
- *Alcohol evaporates within seconds*



*ABHRs with an alcohol concentration from 60% to 95% are appropriate for clinical settings**



ABHR creates super bugs.

ABHR VOLUME

HOW MUCH IS ENOUGH?

Efficacy testing requirements

Healthcare Personnel Handwash (HCPHW) Test



The FOCUS is on **germ reduction**




Not volume


FDA	HCPHW test:	Bacterial Reduction (\log_{10})
Wash 1	2-log	99%
Wash 10	3-log	99.9%

Department of Health and Human Services: Food and Drug Administration. Tentative Final Monograph for Health-Care Antiseptic Drug Products; Proposed Rule. Federal Register. 1994;59(116):31402-31452.
Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. MMWR 2002;51:1-45.

HEALTHCARE PERSONNEL HANDWASH TEST

A hand is shown with numerous small, colorful icons representing bacteria. A red arrow points from the text box to the hand.

EXAMPLE: 2-log reduction
10,000 bacteria at baseline
2- \log_{10} reduction achieved
99% bacteria eliminated
100 organisms remain

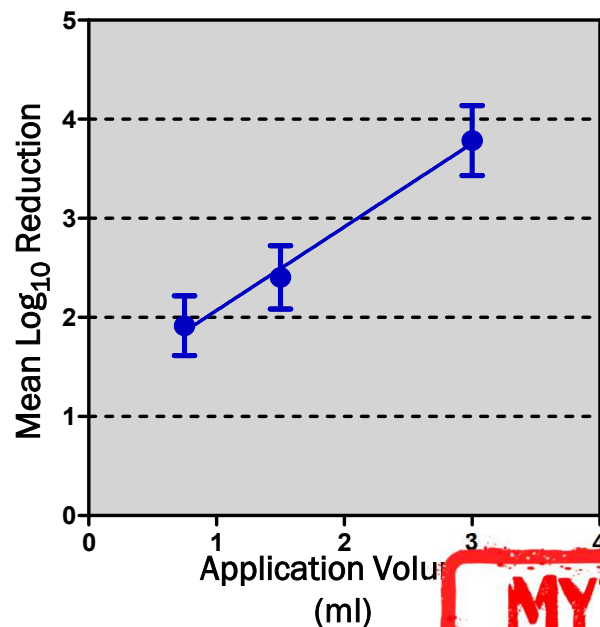
A hand is shown with a few small, colorful icons representing bacteria. A red arrow points from the text box to the hand.

EXAMPLE: 3-log reduction
10,000 bacteria at baseline
3- \log_{10} reduction achieved
99.9% bacteria eliminated
10 organisms remain

FDA Requirement

FDA	HCPHW Test: Bacterial Reduction (\log_{10})	
Wash 1	2-log	99%
Wash 10	3-log	99.9%

INFLUENCE OF APPLICATION VOLUME ON ABHR EFFICACY



ABHR efficacy increases linearly
with application volume

Volume matters for efficacy:
More is better

Product efficacy is directly proportional
to quantity of product applied to hands

**MYTH
BUSTED**

The amount of ABHR that I use is not important.

HEALTHCARE WORKERS' PERCEPTIONS OF ABHR APPLICATION VOLUME AND EFFICACY



3/4 of healthcare workers **do not believe** ABHR volume influences efficacy

Macinga et al. Abstract. APIC's 39th Annual Educational Conference & International Meeting San Antonio, TX. June 2012

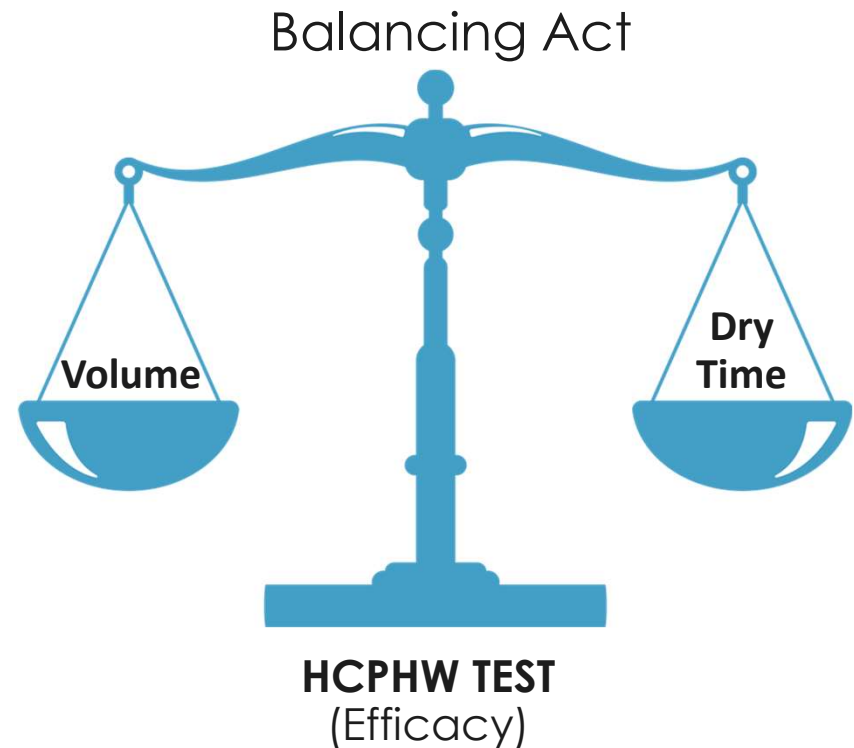
PRODUCT VOLUME AND DRY TIME

Recommendations and guidelines

“Ideal volume of product to apply to the hands is not known and may vary for different formulations.”^{1,2}

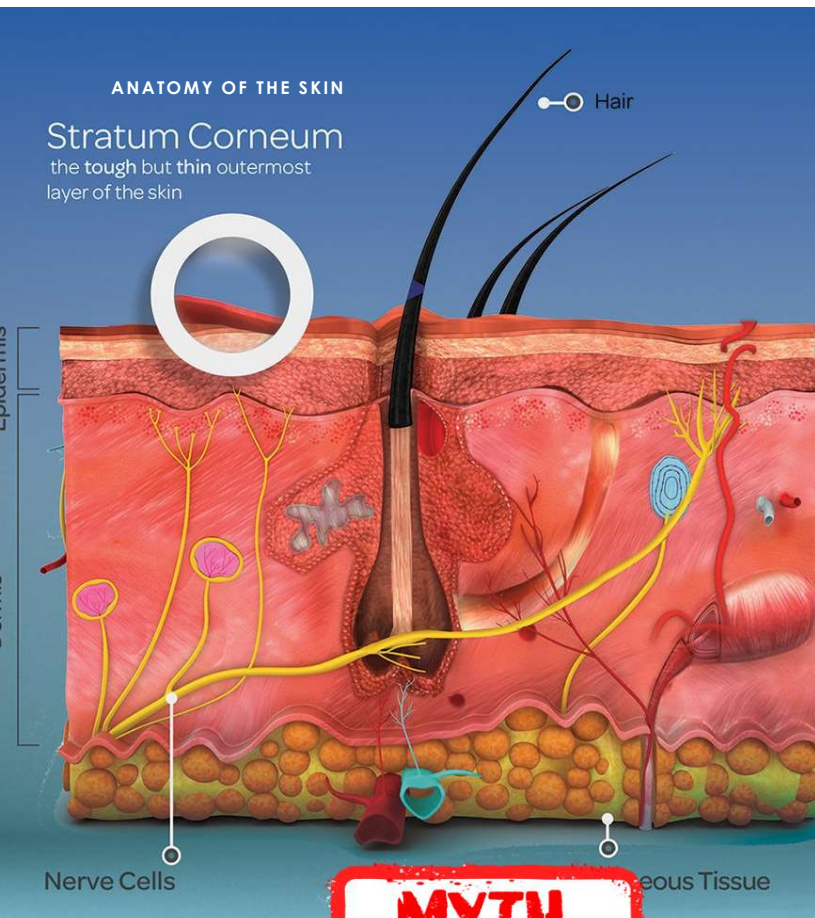
“However, if hands feel dry after rubbing hands together for 10–15 seconds, an insufficient volume of product likely was applied”¹

“Apply a palmful of alcohol-based hand rub and cover all surfaces of the hands. Rub hands until dry.”²



1. Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. MMWR 2002;51:1-45.
2. World Health Organization. WHO Guidelines for Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.

THE IMPACT OF HAND HYGIENE PRODUCTS ON SKIN HEALTH

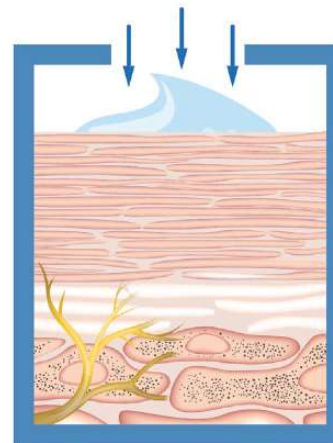


**MYTH
BUSTED**

IMPACT OF SANITIZER vs. SOAP

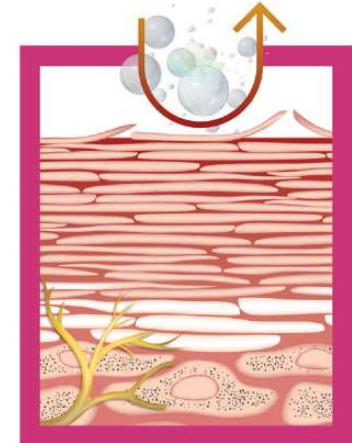
Using a properly formulated hand sanitizer and soap are essential for promoting the health of your skin.

Leave-On Products



Alcohol-based hand rubs are **leave-on** products and **do not physically remove skin lipids**. These products contain conditioners and emollients which can **benefit the skin**.

Rinse-Off Products



Hand washes are **rinse-off** products and by their very nature, **can reduce the skin's oils and lipids** creating pathways to deeper layers of the skin where nerve cells are located which leads to **exposure**.

Soap and water are gentler on my skin than ABHR.

GUIDELINES AND RECOMMENDATIONS

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World Health Organization. WHO Guidelines for Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.

THE CYCLE OF SKIN DAMAGE

DAMAGED HANDS ARE **NOT** HEALTHY HANDS



Damaged hands^{1,2}

Increased bacterial load

Disruption in healthy bacteria

Increase in unhealthy (pathogenic) bacteria

1. Larson EL, Hughes CA, Pyrek JD, Sparks SM, Cagatay EU, Bartkus JM. Changes in bacterial flora associated with skin damage on hands of health care personnel. *Am J Infect Control*. 1998;26:513-521.

2. Rocha LA, Ferreira de Almeida E, Borges L, Gontijo Filho PP. Changes in hands microbiota associated with skin damage because of hand hygiene procedures on the health care workers. *Am J Infect Control*. 2009;37:155-159.

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TYPES OF DERMATITIS

Two types of dermatitis:

Irritant contact dermatitis (ICD) – most common

Allergic contact dermatitis (ACD) – infrequent

May have similar clinical presentations

Clinical diagnosis needed by a trained professional



THE CYCLE OF SKIN DAMAGE

Overuse of soap and water



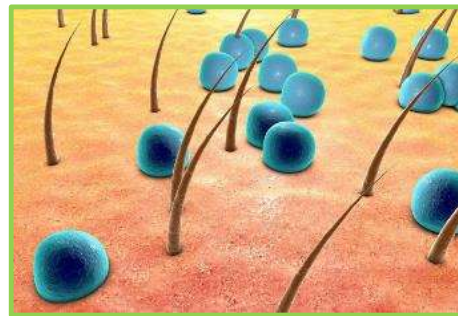
BEST PRACTICES FOR SKIN HEALTH

BENEFITS OF WELL-FORMULATED PRODUCTS

Antimicrobial Efficacy
(Skin Microbiology)

Skin Health

(Maintain, Protect & Repair)



Skin Feel

(Aesthetics) End user Acceptance



There is no “one-product-fits all”*

**MYTH
BUSTED**

All products are created equal.

*Pittet D, Boyce, JM, Allegranzi, B. Hand hygiene: A handbook for medical professionals. Hoboken, NJ: John Wiley & Sons; 2016.

FOLLOW BEST PRACTICES FOR HEALTHY SKIN



Use **alcohol-based hand rubs** as preferred **method** when hands are not visibly soiled or contaminated.



Minimize handwashing with **soap and water**, except when hands are **visibly spoiled** or **contaminated**, and when specified by your hospital policy.



Use **lukewarm** or **cooler water** (not hot), wet hands before applying soap, and **rinse well**.



Pat hands gently when drying with a paper towel. Vigorous rubbing can irritate skin.



Do not don gloves when hands are still wet with hand sanitizer or water. This can trap moisture underneath the gloves and irritate skin.



Use a facility-approved lotion frequently during your shift. Use lotions that are compatible with the provided hand hygiene products and gloves.



Protect your skin when you're not working, too! Wear gloves in cold, dry weather, use a mild soap at home, and apply a thick, high quality lotion – especially before going to sleep.

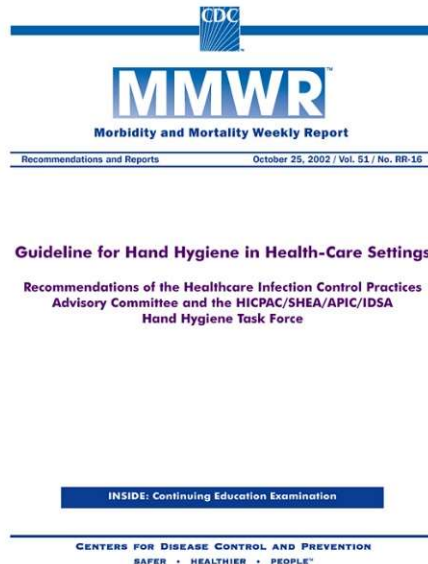
HAND HYGIENE MYTHS



MYTH BUSTER RESOURCES

Centers for Disease Control and Prevention Guideline for Hand Hygiene in Health-Care Settings

2002



World Health Organization WHO Guidelines on Hand Hygiene in Health Care

2009



**MYTHS
BUSTED**

THANK YOU