

# Basic Principles of Infection Control



# **PPE Use in Healthcare Settings: Program Goal**

Improve personnel safety in the healthcare environment through appropriate use of PPE.

PPE Use in Healthcare Settings

The goal of this program is to improve personnel safety in the healthcare environment through appropriate use of PPE.

## **PPE Use in Healthcare Settings: Program Objectives**

- Provide information on the selection and use of PPE in healthcare settings
- Practice how to safely don and remove PPE

PPE Use in Healthcare Settings

The objectives of this program are to provide information on the selection and use of PPE in healthcare settings and to allow time for participants to practice the correct way to don and remove PPE.

## **Personal Protective Equipment Definition**

“specialized clothing or equipment worn by an employee for protection against infectious materials” (OSHA)

PPE Use in Healthcare Settings

Personal protective equipment, or PPE, as defined by the Occupational Safety and Health Administration, or OSHA, is “specialized clothing or equipment, worn by an employee for protection against infectious materials.”



# Regulations and Recommendations for PPE



- OSHA issues workplace health and safety regulations. Regarding PPE, employers must:
  - Provide appropriate PPE for employees
  - Ensure that PPE is disposed or reusable PPE is cleaned, laundered, repaired and stored after use
- OSHA also specifies circumstances for which PPE is indicated
- CDC recommends when, what and how to use PPE

PPE Use in Healthcare Settings

OSHA issues regulations for workplace health and safety. These regulations require use of PPE in healthcare settings to protect healthcare personnel from exposure to bloodborne pathogens and *Mycobacterium tuberculosis*. However, under OSHA's General Duty Clause PPE is required for any potential infectious disease exposure. Employers must provide their employees with appropriate PPE and ensure that PPE is disposed or, if reusable, that it is properly cleaned or laundered, repaired and stored after use.

The Centers for Disease Control and Prevention (CDC) issues recommendations for when and what PPE should be used to prevent exposure to infectious diseases. This presentation will cover those recommendations, beginning with the hierarchy of safety and health controls.

# Hierarchy of Safety and Health Controls

- Training and administrative controls
- Engineering controls
- Work practice controls
- Personal protective equipment

PPE Use in Healthcare Settings

The protection of healthcare personnel from infectious disease exposures in the workplace requires a combination of controls, one of which is the use of PPE. It is important to recognize that your protection as a healthcare worker also involves other prevention strategies. There are four major components to healthcare worker safety programs. First are training, such as you're receiving today, and administrative controls, like isolation policies and procedures, and procedures for recognizing patients with a communicable disease before they expose workers. Second are engineering controls like negative pressure rooms for patients with airborne diseases such as TB; third are work practice controls such as not recapping needles, and finally personal protective equipment. While PPE is last in the hierarchy of prevention, it is very important for protecting healthcare workers from disease transmission.



## Types of PPE Used in Healthcare Settings



- Gloves – protect hands
- Gowns/aprons – protect skin and/or clothing
- Masks and respirators– protect mouth/nose
  - Respirators – protect respiratory tract from airborne infectious agents
- Goggles – protect eyes
- Face shields – protect face, mouth, nose, and eyes

PPE Use in Healthcare Settings

All of the PPE listed here prevent contact with the infectious agent, or body fluid that may contain the infectious agent, by creating a barrier between the worker and the infectious material. Gloves, protect the hands, gowns or aprons protect the skin and/or clothing, masks and respirators protect the mouth and nose, goggles protect the eyes, and face shields protect the entire face.

The respirator, has been designed to also protect the respiratory tract from airborne transmission of infectious agents. We'll discuss this in more detail later.

## Factors Influencing PPE Selection

- Type of exposure anticipated
  - Splash/spray versus touch
  - Category of isolation precautions
- Durability and appropriateness for the task
- Fit

PPE Use in Healthcare Settings

When you are selecting PPE, consider three key things.

**First is the type of anticipated exposure.** This is determined by the type of anticipated exposure, such as touch, splashes or sprays, or large volumes of blood or body fluids that might penetrate the clothing. PPE selection, in particular the combination of PPE, also is determined by the category of isolation precautions a patient is on.

**Second**, and very much linked to the first, is the **durability and appropriateness of the PPE for the task.** This will affect, for example, whether a gown or apron is selected for PPE, or, if a gown is selected, whether it needs to be fluid resistant, fluid proof, or neither.

**Third is fit.** (optional question) How many of you have seen someone trying to work in PPE that is too small or large? PPE must fit the individual user, and it is up to the employer to ensure that all PPE are available in sizes appropriate for the workforce that must be protected.

(Segue to next slide) With this as background, let's now discuss how to select and use specific PPE. After that we'll talk about which PPE is recommended for Standard Precautions and the various Isolation Precaution categories.

## Gloves

- Purpose – patient care, environmental services, other
- Glove material – vinyl, latex, nitrile, other
- Sterile or nonsterile
- One or two pair
- Single use or reusable

PPE Use in Healthcare Settings

Gloves are the most common type of PPE used in healthcare settings. As you can see here, there are several things to consider when selecting the right glove for a specified purpose.

# Gloves

- Purpose – **patient care**, environmental services, other
- Glove material – **vinyl, latex, nitrile**, other
- Sterile or **non-sterile**
- **One** or two pair
- **Single use** or reusable

PPE Use in Healthcare Settings

Most patient care activities require the use of a single pair of nonsterile gloves made of either latex, nitrile, or vinyl. However, because of allergy concerns, some facilities have eliminated or limited latex products, including gloves, and now use gloves made of nitrile or other material. Vinyl gloves are also frequently available and work well if there is limited patient contact. However, some gloves do not provide a snug fit on the hand, especially around the wrist, and therefore should not be used if extensive contact is likely.

Gloves should fit the user's hands comfortably – they should not be too loose or too tight. They also should not tear or damage easily. Gloves are sometimes worn for several hours and need to stand up to the task.

Who uses the other glove options? Sterile surgical gloves are worn by surgeons and other healthcare personnel who perform invasive patient procedures. During some surgical procedures, two pair of gloves may be worn. Environmental services personnel often wear reusable heavy duty gloves made of latex or nitrile to work with caustic disinfectants when cleaning environmental surfaces. However, they sometimes use patient care gloves too.

## Do's and Don'ts of Glove Use

- Work from “clean to dirty”
- Limit opportunities for “touch contamination” - protect yourself, others, and the environment
  - Don't touch your face or adjust PPE with contaminated gloves
  - Don't touch environmental surfaces except as necessary during patient care

PPE Use in Healthcare Settings

Gloves protect you against contact with infectious materials. However, once contaminated, gloves can become a means for spreading infectious materials to yourself, other patients or environmental surfaces. Therefore, the way YOU use gloves can influence the risk of disease transmission in your healthcare setting. These are the most important do's and don'ts of glove use.

**Work from clean to dirty.** This is a basic principle of infection control. In this instance it refers to touching clean body sites or surfaces before you touch dirty or heavily contaminated areas.

**Limit opportunities for “touch contamination” - protect yourself, others and environmental surfaces.** How many times have you seen someone adjust their glasses, rub their nose or touch their face with gloves that have been in contact with a patient? This is one example of “touch contamination” that can potentially expose oneself to infectious agents. Think about environmental surfaces too and avoid unnecessarily touching them with contaminated gloves. Surfaces such as light switches, door and cabinet knobs can become contaminated if touched by soiled gloves.

## Do's and Don'ts of Glove Use (cont'd)

- Change gloves
  - During use if torn and when heavily soiled (even during use on the same patient)
  - After use on each patient
- Discard in appropriate receptacle
  - Never wash or reuse disposable gloves

PPE Use in Healthcare Settings

**Change gloves as needed.** If gloves become torn or heavily soiled and additional patient care tasks must be performed, then change the gloves before starting the next task. **Always** change gloves after use on each patient, and discard them in the nearest appropriate receptacle. Patient care gloves should never be washed and used again. Washing gloves does not necessarily make them safe for reuse; it may not be possible to eliminate all microorganisms and washing can make the gloves more prone to tearing or leaking.

## Gowns or Aprons

- Purpose of use
- Material –
  - Natural or man-made
  - Reusable or disposable
  - Resistance to fluid penetration
- Clean or sterile

PPE Use in Healthcare Settings

There are three factors that influence the selection of a gown or apron as PPE. First is the purpose of use. Isolation gowns are generally the preferred PPE for clothing but aprons occasionally are used where limited contamination is anticipated. If contamination of the arms can be anticipated, a gown should be selected. Gowns should fully cover the torso, fit comfortably over the body, and have long sleeves that fit snugly at the wrist.

Second are the material properties of the gown. Isolation gowns are made either of cotton or a spun synthetic material that dictate whether they can be laundered and reused or must be disposed. Cotton and spun synthetic isolation gowns vary in their degree of fluid resistance, another factor that must be considered in the selection of this garb. If fluid penetration is likely, a fluid resistant gown should be used.

The last factor concerns patient risks and whether a clean, rather than sterile gown, can be used. Clean gowns are generally used for isolation. Sterile gowns are only necessary for performing invasive procedures, such as inserting a central line. In this case, a sterile gown would serve purposes of patient and healthcare worker protection.

## Face Protection

- Masks – protect nose and mouth
  - Should fully cover nose and mouth and prevent fluid penetration
- Goggles – protect eyes
  - Should fit snugly over and around eyes
  - Personal glasses not a substitute for goggles
  - Antifog feature improves clarity

PPE Use in Healthcare Settings

A combination of PPE types is available to protect all or parts of the face from contact with potentially infectious material. The selection of facial PPE is determined by the isolation precautions required for the patient and/or the nature of the patient contact. This will be discussed later.

Masks should fully cover the nose and mouth and prevent fluid penetration. Masks should fit snugly over the nose and mouth. For this reason, masks that have a flexible nose piece and can be secured to the head with string ties or elastic are preferable.

Goggles provide barrier protection for the eyes; personal prescription lenses do not provide optimal eye protection and should not be used as a substitute for goggles. Goggles should fit snugly over and around the eyes or personal prescription lenses. Goggles with antifog features will help maintain clarity of vision.

## Face Protection

- Face shields – protect face, nose, mouth, and eyes
  - Should cover forehead, extend below chin and wrap around side of face

PPE Use in Healthcare Settings

When skin protection, in addition to mouth, nose, and eye protection, is needed or desired, for example, when irrigating a wound or suctioning copious secretions, a face shield can be used as a substitute to wearing a mask or goggles. The face shield should cover the forehead, extend below the chin, and wrap around the side of the face.

## Respiratory Protection

- Purpose – protect from inhalation of infectious aerosols (e.g., *Mycobacterium tuberculosis*)
- PPE types for respiratory protection
  - Particulate respirators
  - Half- or full-face elastomeric respirators
  - Powered air purifying respirators (PAPR)

PPE Use in Healthcare Settings

PPE also is used to protect healthcare workers' from hazardous or infectious aerosols, such as *Mycobacterium tuberculosis*. Respirators that filter the air before it is inhaled should be used for respiratory protection.

The most commonly used respirators in healthcare settings are the N95, N99, or N100 particulate respirators. The device has a sub-micron filter capable of excluding particles that are less than 5 microns in diameter.

Respirators are approved by the CDC's National Institute for Occupational Safety and Health.

Like other PPE, the selection of a respirator type must consider the nature of the exposure and risk involved. For example, N95 particulate respirators might be worn by personnel entering the room of a patient with infectious tuberculosis. However, if a bronchoscopy is performed on the patient, the healthcare provider might wear a higher level of respiratory protection, such as a powered air-purifying respirator or PAPR.

## Elements of a Respiratory Protection Program

- Medical evaluation
- Fit testing
- Training
- Fit checking before use

PPE Use in Healthcare Settings

Prior to your using a respirator, your employer is required to have you medically evaluated to determine that it is safe for you to wear a respirator, to fit test you for the appropriate respirator size and type, and to train you on how and when to use a respirator. YOU are responsible for fit checking your respirator before use to make sure it has a proper seal.

# **PPE Use in Healthcare Settings: How to Safely Don, Use, and Remove PPE**

**SAFER • HEALTHIER • PEOPLE™**

This next segment will address how to safely don, use, and remove PPE.

**NOTE TO TRAINER:** Consider having a participant demonstrate donning and removing PPE as you go through this section.

## Key Points About PPE

- Don before contact with the patient, generally before entering the room
- Use carefully – don't spread contamination
- Remove and discard carefully, either at the doorway or immediately outside patient room; remove respirator outside room
- Immediately perform hand hygiene

PPE Use in Healthcare Settings

There are four key points to remember about PPE use. First, don it before you have any contact with the patient, generally before entering the room. Once you have PPE on, use it carefully to prevent spreading contamination. When you have completed your tasks, remove the PPE carefully and discard it in the receptacles provided. Then immediately perform hand hygiene before going on to the next patient.

## Sequence\* for Donning PPE

- Gown first
- Mask or respirator
- Goggles or face shield
- Gloves

**\*Combination of PPE will affect sequence – be practical**

PPE Use in Healthcare Settings

The gown should be donned first. The mask or respirator should be put on next and properly adjusted to fit; remember to fit check the respirator. The goggles or face shield should be donned next and the gloves are donned last. Keep in mind, the combination of PPE used, and therefore the sequence for donning, will be determined by the precautions that need to be taken.

## How to Don a Gown

- Select appropriate type and size
- Opening is in the back
- Secure at neck and waist
- If gown is too small, use two gowns
  - Gown #1 ties in front
  - Gown #2 ties in back



PPE Use in Healthcare Settings

To don a gown, first select the appropriate type for the task and the right size for you. The opening of the gown should be in the back; secure the gown at the neck and waist. If the gown is too small to fully cover your torso, use two gowns. Put on the first gown with the opening in front and the second gown over the first with the opening in the back.

## How to Don a Mask

- Place over nose, mouth and chin
- Fit flexible nose piece over nose bridge
- Secure on head with ties or elastic
- Adjust to fit



PPE Use in Healthcare Settings

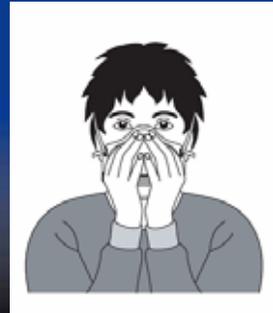
Some masks are fastened with ties, others with elastic. If the mask has ties, place the mask over your mouth, nose and chin. Fit the flexible nose piece to the form of your nose bridge; tie the upper set at the back of your head and the lower set at the base of your neck.

If a mask has elastic head bands, separate the two bands, hold the mask in one hand and the bands in the other. Place and hold the mask over your nose, mouth, and chin, then stretch the bands over your head and secure them comfortably as shown; one band on the upper back of your head, the other below the ears at the base of the neck.

Adjust the mask to fit. Remember, you don't want to be touching it during use so take the few seconds needed to make sure it is secure on your head and fits snugly around your face so there are no gaps.

# How to Don a Particulate Respirator

- Select a fit tested respirator
- Place over nose, mouth and chin
- Fit flexible nose piece over nose bridge
- Secure on head with elastic
- Adjust to fit
- Perform a fit check –
  - Inhale – respirator should collapse
  - Exhale – check for leakage around face



PPE Use in Healthcare Settings

The technique for donning a particulate respirator, such as an N95, N99 or N100, is similar to putting on a pre-formed mask with elastic head bands. Key differences, however, are 1) the need to first select a respirator for which you have been fit tested and 2) fit checking the device, as you have been instructed, before entering an area where there may be airborne infectious disease. Be sure to follow the manufacturer's instructions for donning the device. In some instances, the manufacturer's instructions may differ slightly from this presentation.

You may also be asked to wear an elastomeric or powered air purifying respirator, or PAPR. Guidance on how to use these devices is not included in this presentation. You will need instruction locally to properly use these devices.

## How to Don Eye and Face Protection

- Position goggles over eyes and secure to the head using the ear pieces or headband
- Position face shield over face and secure on brow with headband
- Adjust to fit comfortably

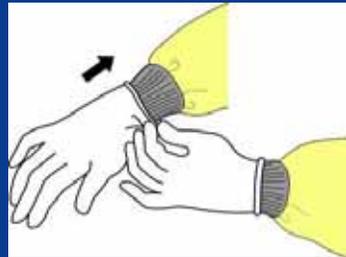


PPE Use in Healthcare Settings

If eye protection is needed, either goggles or a face shield should be worn. Position either device over the face and/or eyes and secure to head using the attached ear pieces or head band. Adjust to fit comfortably. Goggles should feel snug but not tight.

## How to Don Gloves

- Don gloves last
- Select correct type and size
- Insert hands into gloves
- Extend gloves over isolation gown cuffs



PPE Use in Healthcare Settings

The last item of PPE to be donned is a pair of gloves. Be sure to select the type of glove needed for the task in the size that best fits you. Insert each hand into the appropriate glove and adjust as needed for comfort and dexterity. If you are wearing an isolation gown, tuck the gown cuffs securely under each glove. This provides a continuous barrier protection for your skin.

## How to Safely Use PPE

- Keep gloved hands away from face
- Avoid touching or adjusting other PPE
- Remove gloves if they become torn; perform hand hygiene before donning new gloves
- Limit surfaces and items touched

PPE Use in Healthcare Settings

In addition to wearing PPE, you should also use safe work practices. Avoid contaminating yourself by keeping your hands away from your face and not touching or adjusting PPE. Also, remove your gloves if they become torn and perform hand hygiene before putting on a new pair of gloves. You should also avoid spreading contamination by limiting surfaces and items touched with contaminated gloves.

# PPE Use in Healthcare Settings: How to Safely Remove PPE

**SAFER • HEALTHIER • PEOPLE™**

We've talked about donning and using PPE. Now we'll discuss how to safely remove PPE to protect you, your colleagues, and patients from exposure to contaminated materials.

## “Contaminated” and “Clean” Areas of PPE

- Contaminated – outside front
  - Areas of PPE that have or are likely to have been in contact with body sites, materials, or environmental surfaces where the infectious organism may reside
- Clean – inside, outside back, ties on head and back
  - Areas of PPE that are not likely to have been in contact with the infectious organism

PPE Use in Healthcare Settings

To remove PPE safely, you must first be able to identify what sites are considered “clean” and what are “contaminated.” In general, the outside front and sleeves of the isolation gown and outside front of the goggles, mask, respirator and face shield are considered “contaminated,” regardless of whether there is visible soil. Also, the outside of the gloves are contaminated.

The areas that are considered “clean” are the parts that will be touched when removing PPE. These include inside the gloves; inside and back of the gown, including the ties; and the ties, elastic, or ear pieces of the mask, goggles and face shield.

## Sequence for Removing PPE

- Gloves
- Face shield or goggles
- Gown
- Mask or respirator

PPE Use in Healthcare Settings

The sequence for removing PPE is intended to limit opportunities for self-contamination. The gloves are considered the most contaminated pieces of PPE and are therefore removed first. The face shield or goggles are next because they are more cumbersome and would interfere with removal of other PPE. The gown is third in the sequence, followed by the mask or respirator.

## Where to Remove PPE

- At doorway, before leaving patient room or in anteroom\*
- Remove respirator outside room, after door has been closed\*

\* Ensure that hand hygiene facilities are available at the point needed, e.g., sink or alcohol-based hand rub

PPE Use in Healthcare Settings

The location for removing PPE will depend on the amount and type of PPE worn and the category of isolation a patient is on, if applicable. If only gloves are worn as PPE, it is safe to remove and discard them in the patient room. When a gown or full PPE is worn, PPE should be removed at the doorway or in an anteroom. Respirators should always be removed outside the patient room, after the door is closed. Hand hygiene should be performed after all PPE is removed.

## How to Remove Gloves (1)

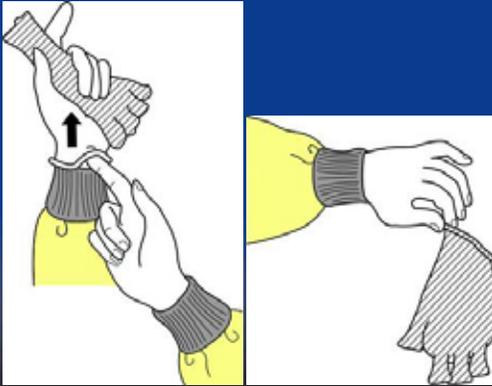


- Grasp outside edge near wrist
- Peel away from hand, turning glove inside-out
- Hold in opposite gloved hand

PPE Use in Healthcare Settings

Using one gloved hand, grasp the outside of the opposite glove near the wrist. Pull and peel the glove away from the hand. The glove should now be turned inside-out, with the contaminated side now on the inside. Hold the removed glove in the opposite gloved hand.

## How to Remove Gloves (2)



PPE Use in Healthcare Settings

- Slide ungloved finger under the wrist of the remaining glove
- Peel off from inside, creating a bag for both gloves
- Discard

Slide one or two fingers of the ungloved hand under the wrist of the remaining glove. Peel glove off from the inside, creating a bag for both gloves. Discard in waste container.

## Remove Goggles or Face Shield



- Grasp ear or head pieces with ungloved hands
- Lift away from face
- Place in designated receptacle for reprocessing or disposal

PPE Use in Healthcare Settings

Using ungloved hands, grasp the “clean” ear or head pieces and lift away from face. If goggle or face shield are reusable, place them in a designated receptacle for subsequent reprocessing. Otherwise, discard them in the waste receptacle.

## Removing Isolation Gown



- Unfasten ties
- Peel gown away from neck and shoulder
- Turn contaminated outside toward the inside
- Fold or roll into a bundle
- Discard

PPE Use in Healthcare Settings

Unfasten the gown ties with the ungloved hands. Slip hands underneath the gown at the neck and shoulder, peel away from the shoulders. Slip the fingers of one hand under the cuff of the opposite arm. Pull the hand into the sleeve, grasping the gown from inside. Reach across and push the sleeve off the opposite arm. Fold the gown towards the inside and fold or roll into a bundle. (Only the “clean” part of the gown should be visible.) Discard into waste or linen container, as appropriate.

## Removing a Mask



- Untie the bottom, then top, tie
- Remove from face
- Discard

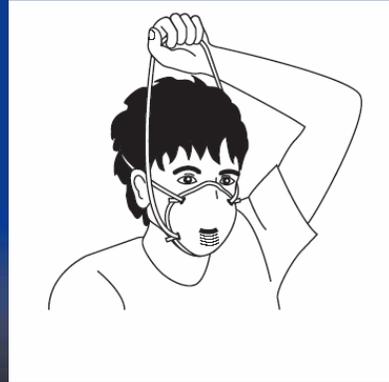


PPE Use in Healthcare Settings

The front of the mask is considered contaminated and should not be touched. Remove by handling only the ties or elastic bands starting with the bottom then top tie or band. Lift the mask or respirator away from the face and discard it into the designated waste receptacle.

## Removing a Particulate Respirator

- Lift the bottom elastic over your head first
- Then lift off the top elastic
- Discard



PPE Use in Healthcare Settings

The bottom elastic should be lifted over the head first. Then remove the top elastic. This should be done slowly to prevent the respirator from “snapping” off the face.

## Hand Hygiene

- Perform hand hygiene immediately after removing PPE.
  - If hands become visibly contaminated during PPE removal, wash hands before continuing to remove PPE
- Wash hands with soap and water or use an alcohol-based hand rub
  - \* Ensure that hand hygiene facilities are available at the point needed, e.g., sink or alcohol-based hand rub

PPE Use in Healthcare Settings

Hand hygiene is the cornerstone of preventing infection transmission. You should perform hand hygiene immediately after removing PPE. If your hands become visibly contaminated during PPE removal, wash hands before continuing to remove PPE. Wash your hands thoroughly with soap and warm water or, if hands are not visibly contaminated, use an alcohol-based hand rub.

# PPE Use in Healthcare Settings: When to Use PPE

SAFER • HEALTHIER • PEOPLE™

Thus far we have discussed the various types of PPE, considered various factors that go into selecting appropriate PPE, and described how to don, use, and remove PPE safely. This last segment of this presentation will discuss **WHEN** to use which PPE.

# Standard and Expanded Isolation Precautions

**SAFER • HEALTHIER • PEOPLE™**

Decisions regarding when and which type of PPE should be worn are determined by CDC recommendations for Standard Precautions and Expanded Isolation Precautions.

## Standard Precautions

- Previously called Universal Precautions
- Assumes blood and body fluid of ANY patient could be infectious
- Recommends PPE and other infection control practices to prevent transmission in any healthcare setting
- Decisions about PPE use determined by type of clinical interaction with patient

PPE Use in Healthcare Settings

Standard Precautions is an outgrowth of Universal Precautions. Universal Precautions was first recommended in 1987 to prevent the transmission of bloodborne pathogens to healthcare personnel. In 1996, the application of the concept was expanded and renamed “Standard Precautions.” Standard Precautions is intended to prevent the transmission of common infectious agents to healthcare personnel, patients and visitors in any healthcare setting. During care for any patient, one should assume that an infectious agent could be present in the patient’s blood or body fluids, including all secretions and excretions except tears and sweat. Therefore appropriate precautions, including use of PPE, must be taken. Whether PPE is needed, and if so, which type, is determined by the type of clinical interaction with the patient and the degree of blood and body fluid contact that can be reasonably anticipated and by whether the patient has been placed on isolation precautions such as Contact or Droplet Precautions or Airborne Infection Isolation.

## PPE for Standard Precautions (1)

- **Gloves** – Use when touching blood, body fluids, secretions, excretions, contaminated items; for touching mucous membranes and nonintact skin
- **Gowns** – Use during procedures and patient care activities when contact of clothing/ exposed skin with blood/body fluids, secretions, or excretions is anticipated

PPE Use in Healthcare Settings

Under Standard Precautions, **gloves** should be used when touching blood, body fluids, secretions, excretions, or contaminated items and for touching mucous membranes and nonintact skin. A **gown** should be used during procedures and patient care activities when contact of clothing and/or exposed skin with blood, body fluids, secretions, or excretions is anticipated. Aprons are sometimes used as PPE over scrubs, such as in hemodialysis centers when inserting a needle into a fistula.

## PPE for Standard Precautions (2)

- **Mask and goggles or a face shield** – Use during patient care activities likely to generate splashes or sprays of blood, body fluids, secretions, or excretions

PPE Use in Healthcare Settings

**Mask and goggles or a face shield** should be used during patient care activities that are likely to generate splashes and sprays of blood, body fluids, secretions, or excretions.

## What Type of PPE Would You Wear?

- Giving a bed bath?
- Suctioning oral secretions?
- Transporting a patient in a wheel chair?
- Responding to an emergency where blood is spurting?
- Drawing blood from a vein?
- Cleaning an incontinent patient with diarrhea?
- Irrigating a wound?
- Taking vital signs?

PPE Use in Healthcare Settings

Listed here are several patient care activities that could indicate a need to wear PPE. What PPE would you wear for the following?

Giving a bed bath? (generally none)

Suctioning oral secretions? (gloves and mask/goggles or a face shield) (Respondents may correctly note that this may depend on whether open or closed suction is being used)

Transporting a patient in a wheelchair? (generally none)

Responding to an emergency where blood is spurting? (gloves, fluid-resistant gown, mask/goggles or a face shield)

Drawing blood from a vein? (gloves)

Cleaning an incontinent patient with diarrhea? (gloves and generally a gown)

Irrigating a wound? (gloves, gown, and mask/goggles or a face shield)

Taking vital signs? (generally none)

**NOTE TO TRAINER:** Encourage discussion of how healthcare personnel decide for themselves which PPE will be worn. Do they over- or under-protect themselves? If a question is raised about use of gloves for giving an injection, indicate that this is largely a matter of local or state policy. OSHA does not require use of gloves for giving an injection.

## What Type of PPE Would *You* Wear?

- Giving a bed bath?
  - Generally none
- Suctioning oral secretions?
  - Gloves and mask/goggles or a face shield – sometimes gown
- Transporting a patient in a wheel chair?
  - Generally none required
- Responding to an emergency where blood is spurting?
  - Gloves, fluid-resistant gown, mask/goggles or a face shield
- Drawing blood from a vein?
  - Gloves
- Cleaning an incontinent patient with diarrhea?
  - Gloves w/wo gown
- Irrigating a wound?
  - Gloves, gown, mask/goggles or a face shield
- Taking vital signs?
  - Generally none

PPE Use in Healthcare Settings

Listed here are several patient care activities that could indicate a need to wear PPE. What PPE would you wear for the following?

Giving a bed bath? (generally none)

Suctioning oral secretions? (gloves and mask/goggles or a face shield) (Respondents may correctly note that this may depend on whether open or closed suction is being used)

Transporting a patient in a wheelchair? (generally none)

Responding to an emergency where blood is spurting? (gloves, fluid-resistant gown, and mask/goggles or a face shield)

Drawing blood from a vein? (gloves)

Cleaning an incontinent patient with diarrhea? (gloves and generally a gown)

Irrigating a wound? (gloves, gown, and mask/goggles or a face shield)

Taking vital signs? (generally none)

**NOTE TO TRAINER:** Encourage discussion of how healthcare personnel decide for themselves which PPE will be worn. Do they over- or under-protect themselves?

## PPE for Expanded Precautions

- Expanded Precautions include
  - Contact Precautions
  - Droplet Precautions
  - Airborne Infection Isolation

PPE Use in Healthcare Settings

In some instances, healthcare personnel are required to wear PPE in addition to that recommended for Standard Precautions. The three Expanded Precaution categories (formerly called Transmission-Based Precautions) where this applies are Contact and Droplet Precautions and Airborne Infection Isolation.

## Use of PPE for Expanded Precautions

- Contact Precautions – Gown and gloves for contact with patient or environment of care (e.g., medical equipment, environmental surfaces)
  - In some instances these are required for entering patient's environment
- Droplet Precautions – Surgical masks within 3 feet of patient
- Airborne Infection Isolation – Particulate respirator\*

\*Negative pressure isolation room also required

PPE Use in Healthcare Settings

Contact Precautions requires gloves and gown for contact with the patient and/or the environment of care; in some instances, use of this PPE is recommended for even entering the patient's environment. Droplet Precautions requires the use of a surgical mask, and Airborne Infection Isolation requires that only a respirator be worn.

## Hand Hygiene

- Required for Standard and Expanded Precautions
- Perform...
  - Immediately after removing PPE
  - Between patient contacts
- Wash hands thoroughly with soap and water or use alcohol-based hand rub

PPE Use in Healthcare Settings

Hand hygiene has been mentioned several times during this presentation. Hand hygiene is an essential infection control practice to protect patients, healthcare personnel and visitors and is required for both Standard and Expanded Precautions. Hand hygiene should be performed immediately after removing PPE, even during PPE changes and removal if necessary, and between patient contacts. Wash your hands thoroughly with soap and warm water or, if hands are not visibly soiled, use an alcohol-based hand rub.

## PPE Use in Healthcare Settings: Final Thoughts

- PPE is available to protect you from exposure to infectious agents in the healthcare workplace
- Know what type of PPE is necessary for the duties you perform and use it correctly

**SAFER • HEALTHIER • PEOPLE™**

These are a few final thoughts before ending today's presentation. Remember, PPE is available to protect you from exposure to infectious agents during healthcare. It is important that you know what type of PPE is necessary for the procedures you perform AND that you use it correctly.

Thank you for your attention and participation. Are there any questions?

## Acknowledgments

The Institute for Healthcare Improvement (IHI) acknowledges the valuable contributions of the following individuals:

- W. Charles Huskins, MD, MSc; Assistant Professor of Pediatrics, Mayo Clinic College of Medicine, Consultant, Pediatric Infectious Diseases, Mayo Clinic, Rochester, MN
- John M. Boyce, MD; Chief, Infectious Diseases Section, Hospital of Saint Raphael, New Haven, CT (SHEA)
- Loretta Litz Fauerbach, MS, CIC; Director, Infection Control, Shands Hospital at the University of Florida, Gainesville, FL (APIC)
- Barbara I. Braun, PhD; Project Director, Center for Health Services Research, Division of Research, JCAHO
- Nancy Kupka, DNSc, MPH, RN; Project Director, Division of Standards and Survey Methods, JCAHO
- Linda Kusek, Rn, BSN, MPH; Associate Project Director, Division of Research, JCAHO

*The purpose of this guide is to help organizations reduce health-care-associated infections, including infections due to antibiotic-resistant organisms, by improving hand hygiene practices and use of gloves among health care workers.*

## The Case for Improving Hand Hygiene and Use of Gloves among Health Care Workers

Health-care-associated infections are an important cause of morbidity and mortality among hospitalized patients worldwide. Such infections affect nearly 2 million individuals annually in the United States and are responsible for approximately 80,000 deaths each year. Transmission of health-care-associated pathogens most often occurs via the contaminated hands of health care workers. Accordingly, hand hygiene (i.e., handwashing with soap and water or use of a waterless, alcohol-based hand rub) has long been considered one of the most important infection control measures for preventing health-care-associated infections. However, compliance by health care workers with recommended hand hygiene procedures has remained unacceptable, with compliance rates generally below 50% of hand hygiene opportunities.

- Jarvis WR. Selected aspects of the socioeconomic impact of nosocomial infections: Morbidity, mortality, cost, and prevention. *Infect Control Hosp Epidemiol.* 1996 Aug;17(8):552-557.
- Pittet D, Mourouga P, Perneger TV. Compliance with handwashing in a teaching hospital. *Ann Intern Med.* 1999;130:126-130.
- Lankford MG, Zemblower TR, Trick WE, Hacek DM, Noskin GA, Peterson LR. Influence of role models and hospital design on hand hygiene of healthcare workers. *Emerg Infect Dis.* 2003;9:217-23.

Many factors have contributed to poor handwashing compliance among health care workers, including a lack of knowledge among personnel about the importance of hand hygiene in reducing the spread of infection and how hands become contaminated, lack of understanding of correct hand hygiene technique, understaffing and overcrowding, poor access to handwashing facilities, irritant contact dermatitis associated with frequent exposure to soap and water, and lack of institutional commitment to good hand hygiene.

- Pittet D, Boyce JM. Hand hygiene and patient care: Pursuing the Semmelweis legacy. *Lancet Infect Dis.* 2001;1:9-20.

## **How-to Guide: Improving Hand Hygiene A Guide for Improving Practices among Health Care Workers**

To overcome these barriers, the Centers for Disease Control and Prevention's (CDC's) Healthcare Infection Control Practices Advisory Committee (HICPAC) published a comprehensive *Guideline for Hand Hygiene in Health-Care Settings* in 2002. One of the principal recommendations of this guideline was that waterless, alcohol-based hand rubs (liquids, gels or foams) are the preferred method for hand hygiene in most situations due to the superior efficacy of these agents in rapidly reducing bacterial counts on hands and their ease of use. Alcohol preparations also rapidly kill many fungi and viruses that cause health-care-associated infections. The guideline recommended that health care facilities develop multidimensional programs to improve hand hygiene practices.

- Boyce JM, Pittet D, et al. 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. *Morbidity and Mortality Weekly Report*. 2002;51(RR16):1-45.

Recognizing a worldwide need to improve hand hygiene in health care facilities, the World Health Organization (WHO) launched its *Guidelines on Hand Hygiene in Health Care (Advanced Draft)* in October 2005. These global consensus guidelines reinforce the need for multidimensional strategies as the most effective approach to promote hand hygiene. Key elements include staff education and motivation, adoption of an alcohol-based hand rub as the primary method for hand hygiene, use of performance indicators, and strong commitment by all stakeholders, such as front-line staff, managers and health care leaders, to improve hand hygiene.

Wearing gloves during patient care is an additional intervention to help reduce transmission of infectious agents in high-risk situations. Gloves protect patients by reducing contamination of the health care worker's hands and subsequent transmission of pathogens to other patients. In addition, when gloves are worn in compliance with CDC's Standard Precautions, gloves protect health care workers from exposure to bloodborne infections such as HIV and hepatitis B and C.

However, gloves must be used properly. Gloves can become contaminated during care and must be removed or changed when moving from a contaminated site to a clean site on the same patient. Gloved hands can also become contaminated due to tiny punctures in the glove material or during glove removal; therefore, hand hygiene must be performed immediately after glove removal. Consequently, use of gloves is an important adjunct to, but not a replacement for, proper hand hygiene practice.

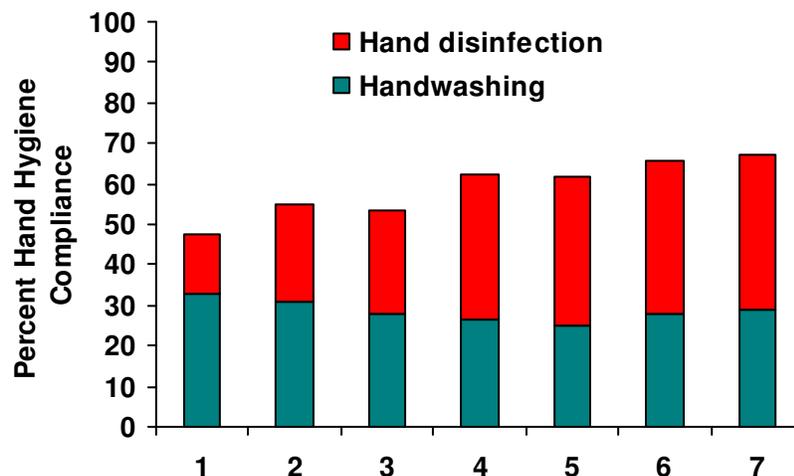
- Pittet D, et al. Bacterial contamination of the hands of hospital staff during routine patient care. *Arch Intern Med.* 1999;159:821-826.
- Pessoa-Silva CL, Richtmann R, Calil et al. Dynamics of bacterial hand contamination during routine neonatal care. *Infect Control and Hosp Epidemiol.* 2004;25:192-197.
- Tenorio AR, Badri SM, Sahgal NB, et al. Effectiveness of gloves in the prevention of hand carriage of vancomycin-resistant *Enterococcus* species by health care workers after patient care. *Clin Infect Dis.* 2001;32:826-829.
- Johnson S, Gerding DN, et al. Prospective, controlled study of vinyl glove use to interrupt *Clostridium difficile* nosocomial transmission. *Am J Med.* 1990;88:137-140.
- Garner JS, Hospital Infection Control Practices Advisory Committee. Guideline for isolation precautions in hospitals. *Infect Control Hosp Epidemiol.* 1996;17:53-80.

## The Potential Impact of Improving Hand Hygiene

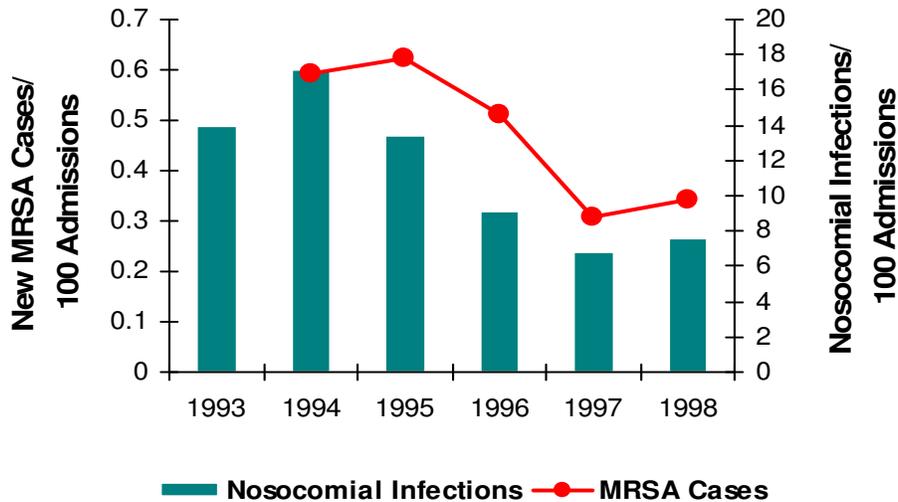
Numerous studies have suggested that hand hygiene compliance can be improved, at least modestly, by a variety of interventions, introduction of alcohol-based hand rub and educational and behavioral initiatives. Most authorities believe that multidimensional interventions are more effective. For example, Pittet et al. implemented a multidisciplinary, multimodal hand hygiene improvement program featuring promotion of alcohol-based hand rub and achieved substantial improvement in hand hygiene compliance. Much of the improvement in compliance was attributed to increased use of the alcohol-based hand rub. As hand hygiene compliance improved, both the incidence of nosocomial infections and new methicillin-resistant *Staphylococcus aureus* (MRSA) cases decreased, although the authors did not assert that they had rigorously demonstrated a causal link (see figures below).

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

**Impact of Interventions on Handwashing and Hand Disinfection with an Alcohol-Based Hand Rub**



## Impact of Hand Hygiene on Incidence of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Nosocomial Infections



### The Hand Hygiene Intervention Package

The hand hygiene intervention package is a group of best practices that individually improve care, but when applied together should result in substantially greater improvement. The science supporting each intervention is sufficiently established to be considered a standard of care.

The following four components of the hand hygiene intervention package are critical aspects of a multidimensional hand hygiene program. Glove use is included in this package because proper glove use is inextricably linked to effective hand hygiene.

1. Clinical staff, including new hires and trainees, understand key elements of hand hygiene practice (demonstrate knowledge)
2. Clinical staff, including new hires and trainees, use appropriate technique when cleansing their hands (demonstrate competence)
3. Alcohol-based hand rub and gloves are available at the point of care (enable staff)

4. Hand hygiene is performed at the right time and in the right way and gloves are used appropriately as recommended by CDC's Standard Precautions (verify competency, monitor compliance, and provide feedback)

### **1. Clinical staff, including new hires and trainees, understand key elements of hand hygiene practice (demonstrate knowledge)**

Health care workers' hands can become contaminated by touching the body secretions, excretions, nonintact skin, and wounds of patients; however, they can also become contaminated by touching intact skin of patients and environmental surfaces in the immediate vicinity of the patients. Health care workers should demonstrate accurate knowledge that their hands can become contaminated during all of these activities.

- Pittet D, Dharan S, Touveneau S, Savan V, Perneger TVI. Bacterial contamination of the hands of hospital staff during routine patient care. *Arch Intern Med.* 1999;159:821-826.
- Duckro AN, Blom DW, Lyle EA, Weinstein RA, Hayden MKI. Transfer of vancomycin-resistant enterococci via health care worker hands. *Arch Intern Med.* 2005;165:302-307.

Compared to handwashing, alcohol-based hand rubs have been shown to be more effective in reducing the number of viable bacteria and viruses on hands, require less time to use, can be made more accessible at the point of care, and cause less hand irritation and dryness with repeated use. Handwashing is required when hands are visibly contaminated and is also appropriate after caring for patients with diarrhea, including patients with *Clostridium difficile* associated diarrhea, before eating, and after use of the restroom. Health care workers should demonstrate accurate knowledge of the advantages of the use of hand rubs in most situations as well as the specific indications for handwashing.

- Boyce JM, Pittet D. 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. *Morbidity Mortality Weekly Report.* 2002;51:1-45.

- *WHO Guidelines on Hand Hygiene in Health Care (Advanced Draft): A Summary*. World Health Organization; 2005.

### »What changes can we make that will result in improvement?

Hospital teams across the United States and in other countries around the world have developed and tested change strategies that allowed them to improve knowledge of key elements of hand hygiene practice. Successful strategies include:

- Discussing the types of patient care activities that result in hand contamination as a supplement to educational material provided to health care workers
- Discussing with clinical staff the relative advantages and disadvantages of handwashing and use of alcohol-based hand rubs at the point of care
- Emphasizing the important role that contaminated hands play in transmission of health-care-associated pathogens, including multidrug-resistant pathogens and viruses
- Informing clinical staff of the morbidity and mortality caused by health-care-associated infections

## **2. Clinical staff, including new hires and trainees, use appropriate technique when cleansing their hands (demonstrate competency)**

To be optimally effective, an appropriate volume of alcohol-based hand rub or soap must be applied to all surfaces of the hands and fingers for a sufficient length of time. Failure to do so will reduce the efficacy of the hand hygiene regimen. Accordingly, clinical staff should demonstrate competency in performing hand hygiene correctly. Competent hand rubbing requires that a sufficient volume of an alcohol-based rub is applied to cover all surfaces of the hands and fingers and that at least 15 seconds of rubbing is necessary before the hands are dry. Competent handwashing requires that a sufficient volume of soap is applied to cover all surfaces of the hands and fingers, and that at least 15 seconds of scrubbing with friction is performed before rinsing. Care should be taken to avoid contamination of hands after handwashing (paper towels or

single use cloth towels should be used; if the faucet is hand-operated, the towel should be used to turn of the spigot).

- Larson EL, Eke PI, Wilder MP, Laughon BE. Quantity of soap as a variable in handwashing. *Infect Control*. 1987;8:371-375.
- Widmer AE, Dangel M. Alcohol-based hand rub: Evaluation of technique and microbiological efficacy with international infection control professionals. *Infect Control Hosp Epidemiol*. 2004;25:207-209.

### »What changes can we make that will result in improvement?

Hospital teams have developed and tested change strategies that allow them to improve competence with hand hygiene practices. Some of these changes include:

- Conducting live demonstrations of correct techniques for using an alcohol-based hand rub and handwashing during educational sessions for health care workers
- Providing videotape presentations of correct handwashing and hand rubbing technique in educational material for health care workers
- Emphasizing that an appropriate volume of hand rub or soap must be used if hand hygiene is to be effective
- Using fluorescent dye-based training methods to demonstrate correct hand hygiene techniques to clinical staff
- Periodically monitoring the adequacy of hand hygiene technique among clinical staff, and giving them feedback regarding their performance

### **3. Alcohol-based hand rub and gloves are available at the point of care (enable staff)**

Placing alcohol-based hand rub dispensers near the point of care has been associated with increased compliance by health care workers with recommended hand hygiene procedures.

For example, Bischoff et al. found that compliance by health care workers was significantly greater when dispensers for alcohol-based hand rub were adjacent to each patient's bed than when there was only one dispenser for every four beds. In critical care, availability of alcohol-based hand rub at the point of care proved to minimize the time constraint associated with hand hygiene during patient care and to predict better compliance. In a study of hand hygiene among physicians, Pittet et al. found that easy access to an alcohol-based hand rub was an independent predictor of improved hand hygiene compliance.

- Bischoff WE, Reynolds TM, Sessler CN, Edmond MB, Wenzel RP. Handwashing compliance by health care workers: The impact of introducing an accessible, alcohol-based hand antiseptic. *Arch Intern Med.* 2000;160:1017-1021.
- Pittet D, Hugonnet S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Lancet.* 2000;356:1307-1312.
- Hugonnet S, Perneger TV, Pittet D. Alcohol-based hand rub improves compliance with hand hygiene in intensive care units. *Arch Int Med.* 2002;162:1037-1043.
- Pittet D, Simon A, Hugonnet S, et al. Hand hygiene among physicians: Performance, beliefs, and perceptions. *Ann Intern Med.* 2004;148:1-8.

Availability of alcohol-based products at the point of care should be supplemented by availability of gloves in appropriate sizes for use in the high-risk situations described previously for which barrier technique is indicated. Sterile gloves are not required for this purpose; studies have shown that clean single-use gloves have negligible numbers of non-pathogenic microorganisms when cultured.

### »What changes can we make that will result in improvement?

Hospital teams that have developed and tested change strategies to make alcohol-based hand rub and clean gloves readily available to health care workers saw improved hand hygiene compliance. Some of these changes include:

- Placing dispensers for alcohol-based hand rub and boxes of clean gloves of various sizes near the point of care, such as:
  - Next to each patient's bed
  - Attached to the frame of patient beds

- Near the door to each patient's room (either adjacent to the door in the corridor or just inside the door)
- At nursing stations or on medication carts
- Supplied as portable (pocket or belt) individual dispensers for personal use
- Installing alcohol-based hand rub dispensers in locations that are compliant with local and federal fire safety regulations
- Assigning responsibility for checking alcohol-based hand rub dispensers and glove boxes on a regular basis to assure that:
  - Dispensers and glove boxes are not empty
  - Dispensers are operational
  - Dispensers provide the correct amount of the product
- Evaluating the design and function of dispensers before selecting a product for use since poorly functioning dispensers may adversely affect hand hygiene compliance rates

**4. Hand hygiene is performed and gloves are used appropriately as recommended by CDC's Standard Precautions (verify competency, monitor compliance, and provide feedback)**

Clinical staff should clean their hands according to recommendations listed in the CDC *Guideline for Hand Hygiene in Health-Care Settings*. These recommendations include:

- Washing hands with plain soap or with antimicrobial soap and water, as follows:
  - When hands are visibly dirty or contaminated with proteinaceous material or with blood or other body fluids
  - Before eating
  - After using the restroom
  - After caring for patients colonized with *Clostridium difficile*
- If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating hands in the following situations:

- Before direct contact with patients
- Before donning sterile gloves when inserting a central intravascular catheter
- Before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices
- After direct contact with a patient's skin
- After contact with body fluids, mucous membranes, nonintact skin, and wound dressings if hands are not visibly soiled
- When moving from a contaminated body site to a clean body site during patient care
- After contact with inanimate objects in the immediate vicinity of the patient
- After removing gloves
- If there has been any contact with the patient or the patient's environment, hands should be decontaminated when leaving the patient's bedside or room
- Boyce JM, Pittet D, et al. 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. *Morbidity and Mortality Weekly Report*. 2002;51(RR16):1-45.
- *WHO Guidelines on Hand Hygiene in Health Care (Advanced Draft): A Summary*. World Health Organization; 2005.

Clinical staff should wear gloves according to recommendations listed in CDC's Standard Precautions. These recommendations include:

- Wearing gloves when contact with blood or other potentially infectious body fluids, excretions, secretions (except sweat), mucous membranes, and nonintact skin could occur
- Removing gloves after caring for a patient — personnel should not wear the same pair of gloves for the care of more than one patient
- Changing gloves during patient care when moving from a contaminated body site to a clean body site
- Performing hand hygiene immediately after removal of gloves

- Garner JS, Hospital Infection Control Practices Advisory Committee. Guideline for isolation precautions in hospitals. *Infect Control Hosp Epidemiol.* 1996;17:53-80.
- *WHO Guidelines on Hand Hygiene in Health Care (Advanced Draft): A Summary.* World Health Organization; 2005.

### »What changes can we make that will result in improvement?

Hospital teams have developed and tested change strategies that allow them to improve hand hygiene practice and use of gloves by health care workers. Some of these changes include:

- Incorporating the indications for hand hygiene and use of gloves in educational material presented to health care workers. Examples of educational materials include:
  - Periodic lectures given by knowledgeable personnel, including interactive, audience-response software, if possible
  - Videotapes and PowerPoint presentations that demonstrate the importance of proper hand hygiene techniques in health care settings
  - Interactive, computer-assisted learning available to clinical staff via the hospital's Intranet
- Conducting educational programs for personnel that include instructions for proper technique when washing hands with soap and water, or when using an alcohol-based hand rub
- Ensuring that providers understand the rationale for hand hygiene and gloves and can comply with best practices and improve patient outcomes (self-efficacy)
- Initiating a multi-component publicity campaign (e.g., posters with photos of celebrated hospital doctors/staff members recommending hand hygiene and use of gloves; drawings by children in pediatric hospitals; screen savers with targeted messaging)
- Using opinion leaders as role models and educators (“academic detailing”)
- Creating a culture where reminding each other about hand hygiene and use of gloves is encouraged and makes compliance the social norm

- Enabling health care workers to comply with best hand hygiene and glove practices by creating reliable systems that ensure alcohol-based hand hygiene products and gloves in appropriate sizes are always readily available at the point of care
- Engage patients and families in hand hygiene efforts by providing patient safety “tip sheets” outlining appropriate hand hygiene and glove practices, and encouraging them to remind health care providers to comply with these standards
- Monitoring compliance by health care workers with recommended indications for hand hygiene and use of gloves, including real-time feedback to personnel and trending compliance over time

## **How to Begin Improvement in Your Organization**

### **Forming the Team**

The Institute for Healthcare Improvement (IHI) recommends a multidisciplinary team approach to improving hand hygiene among health care workers. Improvement teams should be heterogeneous in make-up, but unified in mindset. The value of bringing diverse personnel together is that all members of the care team are given a stake in the outcome and work together to achieve the same goal.

Including all stakeholders in the process to implement proper hand hygiene techniques will help gain buy-in and cooperation of all parties. For example, teams without nurses are bound to fail. Teams led by nurses and therapists may be successful, but often lack leverage; physicians must also be part of the team. The team should include, at a minimum, an administrator or senior leader who can help remove barriers to implementation, as well as a member of the department that supplies hand hygiene agents to clinical areas. Involve the team in designing or selecting hand hygiene posters or other motivational and educational materials.

Some suggestions for attracting and retaining excellent team members include: using data to define and solve the problem; finding champions and opinion leaders within the hospital to lend the effort immediate credibility; and engaging individuals who want to work on the project rather than trying to convince those who do not.

Commitment of institutional leadership is a key determinant of success. There must be alignment of leadership, including the board, executives, heads of clinical departments, and the infection control team. Leadership should give encouragement, set expectations, remove barriers, and celebrate success. Concrete, “raise-the-bar” goals (i.e., those that strive to achieve unprecedented levels of performance) set the stage for achieving rates of compliance well beyond historical levels. An “all-or-none” mentality for compliance (i.e., performing all elements of good practice) is necessary to achieve the highest possible levels of reliable performance. From the patient’s perspective, compliance with all elements of appropriate hand hygiene and glove practice is a reasonable expectation.

Once high levels of compliance are achieved, a “process owner” must be identified — the person who will ensure that high levels of performance are maintained and help to troubleshoot key aspects of the hand hygiene program if the compliance rate falls.

### **Setting Aims**

Dramatic improvement requires setting clear aims and quantitative time-specific improvement targets. An organization will not improve without a firm commitment and measurable goals. Teams are more successful when they have unambiguous, focused aims. Setting numerical goals clarifies the aims, creates tension for change, directs measurement, and focuses initial changes. Once aims have been established, the team needs to be careful not to back away from the aims deliberately or “drift” away unconsciously. Appropriate resources and personnel time must be allocated to achieve raise-the-bar targets.

An example of an appropriate aim for improving hand hygiene compliance can be as modest as, “Increase hand hygiene compliance by 25% within one year.” However, more aggressive targets are desirable. Consistent with the JCAHO’s National Patient Safety Goal #7, a raise-the-bar aim would be to improve hand hygiene compliance to greater than 90%. This latter goal helps change the focus from hand hygiene as a laudable practice to hand hygiene as a mandatory procedure. Regardless of the exact numeric target, the aim should be endorsed completely and enthusiastically by institutional leadership and opinion leaders.

### **Using the Model for Improvement**

In order to move this work forward in your organization, IHI recommends using the Model for Improvement. Developed by Associates in Process Improvement, the Model for Improvement is a simple yet powerful tool for accelerating improvement that has been used successfully by hundreds of health care organizations to improve many different health care processes and outcomes.

The model has two parts:

- Three fundamental questions that guide improvement teams to: 1) set clear aims; 2) establish measures that will tell if changes are leading to improvement; and 3) identify changes that are likely to lead to improvement.
- Plan-Do-Study-Act (PDSA) cycles — small-scale tests of change in real work settings. Teams plan a test, try it, observe the results, and act on what is learned. It is critical for tests to be small and rapid (e.g., a test with two intensive care unit patients tomorrow). This is the scientific method applied to action-oriented learning.

Implementation:

After testing a change on a small scale, learning from each test, and refining the change through several PDSA cycles, the team can implement the change on a broader scale — for example, try to determine the best location for alcohol-based hand hygiene

products and gloves at the point of care in just one or two rooms in the ICU; try including checks on the availability of alcohol-based hand hygiene products and compliance with hand hygiene and glove policies in multidisciplinary rounds.

Spread:

After successful implementation of a change or package of changes for a pilot population or an entire unit, the team can spread the changes to other parts of the organization or to other organizations.

## **Getting Started**

Do not expect that the hand hygiene and glove intervention package can be implemented successfully overnight. A successful program involves careful planning, testing to determine if the processes are working, making modifications as needed, re-testing, and carefully implementing best practices.

- Select the team and the ward(s) for initial testing of change ideas.
- Assess current practice and compliance. Even if there is a hand hygiene and glove program currently in place, work with staff to begin preparing for changes to achieve raise-the-bar performance targets. Perform a survey to determine baseline hand hygiene and glove compliance rates. Determine how these compliance rates compare to those published in the literature.
- Organize an educational program. Teach the core principles of hand hygiene and glove practices to clinical staff throughout the hospital. Providing feedback to staff using baseline compliance data will open people's minds to opportunities for improvement.
- Assess satisfaction with current hand hygiene products. If an alcohol-based hand hygiene product is already available in the institution, interview caregivers about

their satisfaction with the product in terms of degree of skin irritation, consistency (“stickiness”), drying time, scent, and ease of use and reliability of dispensers.

- If an alcohol-based hand hygiene product is not currently available in the institution, have nurses and some physicians trial two or three products to determine which one(s) are most acceptable to clinical staff before selecting the product to be used. It is also important to evaluate the design and function of dispensers before selecting a product for use since poorly functioning dispensers may adversely affect hand hygiene compliance rates.
- Solicit input from clinical staff (including nurses, physicians, respiratory therapists, and others on the care team) about the best locations for installing alcohol-based hand hygiene product dispensers.
- Introduce the hand hygiene intervention package to all staff.

### **First Test of Change**

Once a team has prepared the way for change by studying the current process and educating health care providers, the next step is to begin testing the hand hygiene intervention package.

- Select a few nursing units on which to begin using the intervention package.
- Make sure that alcohol-based hand hygiene product dispensers have been installed at the point of care and are functioning properly.
- Ensure that there is an adequate supply of clean gloves of various sizes available at the point of care.
- Conduct educational sessions on individual nursing units, or sessions that can be attended by personnel from multiple nursing units. Include patient care managers in early educational sessions.
- Give demonstrations on the appropriate techniques for using an alcohol-based hand rub and handwashing with soap and water.
- Have a member of the team (e.g., an infection control professional) visit the nursing unit(s) to answer any questions about using an alcohol-based hand hygiene product routinely for cleansing hands and appropriate use of gloves.

- Place hand hygiene promotion posters in highly visible locations throughout the hospital and begin a multi-modal campaign to improve performance.
- Engage patients and families by providing a patient safety “tip sheet,” including information about hand hygiene best practices. Encourage patients and families to remind clinical staff to comply with hand hygiene and glove policies.

## **Measurement**

Measurement tools have been included as appendices in this guide:

- Appendix 1. Hand Hygiene Knowledge Assessment Questionnaire
- Appendix 2. Checklist for the Availability of Alcohol-Based Hand Rub and Clean Gloves
- Appendix 3. Hand Hygiene and Glove Use Monitoring Form

For Appendices 2 and 3, please refer to the forms for specific information regarding the recommended process and outcome measures for improving hand hygiene.

Compliance with all aspects of each of the four interventions in the hand hygiene package should be measured as “all-or-none.” In other words, if staff demonstrate correct knowledge of some, but not all, of the aspects of hand hygiene and glove use, they are not in compliance with the intervention package. If staff demonstrate only partial competency, they are not yet competent. If alcohol is present at the point of care but the dispenser is empty or gloves are not available, this is not compliant with the package. Similarly, all aspects of hand hygiene and glove use must be performed correctly during a patient encounter. This measurement strategy recognizes that raise-the-bar performance requires highly reliable care processes, and that from the patient’s point of view, partial compliance is unacceptable.

Measurement is the only way to know whether a change represents an improvement. There are a number of measures that can be used to determine if hand hygiene and glove use are improving.

## **1. The percentage of caregivers who answer *all five questions* correctly on a standardized hand hygiene knowledge assessment survey**

This measure assesses the proportion of clinical staff who demonstrate adequate knowledge of the key elements of hand hygiene and glove use. A simple, rapid, and low technology strategy is to assess the knowledge of caregivers in real time on the ward. Consider selecting a random sample of 10 clinical providers from diverse disciplines each month (or at other intervals specified by the hospital) to answer a five-question survey (see Appendix 1) in tandem with a competency check (see measure 2 below). Specific questions can be designated by the hospital and/or selected from examples in the survey in Appendix 1.

An alternative strategy is to assess knowledge using an Intranet-based learning or knowledge management system. Such electronic systems are being adopted rapidly by health care institutions in the United States. The clear advantage of this approach is that the entire clinical staff can be tested annually, or a sample may be tested at more frequent intervals. Completion of the assessment can be documented electronically and used for recertification purposes. Some systems can document which questions are being answered incorrectly, allowing direct measurement of the percent of caregivers who answer all of the questions correctly and facilitating design of targeted educational programs. However, some systems do not capture incorrect answers, and others allow personnel to retake the test as often as necessary to achieve a perfect score, making it impossible to calculate the required measure.

## **2. The percentage of caregivers who perform *all three key* hand hygiene procedures correctly**

This is a simple, rapid, low technology strategy that can be used in tandem with the method described in measure 1. Randomly select a sample of 10 clinical providers from diverse disciplines each month (or at other intervals specified by the hospital) and

observe them to determine if they perform the three key hand hygiene procedures correctly: handwashing, alcohol-based hand rub, and gloves. This method has the strength of direct evaluation and feedback, but is time consuming. It also provides an opportunity to ensure that providers are not wearing artificial nails or nail extenders and have their nails trimmed to less than ¼ inch.

- Boyce JM, Pittet D. 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. *Morbidity and Mortality Weekly Report*. 2002;51:1-45.

Alternatively, competence can be assessed by monitoring hand hygiene practices during actual work (see measure 4 below). This has the advantage of being unobtrusive and integrated with other monitoring activities, but precludes direct feedback and adds complexity to the monitoring process.

- Handwashing: Wash hands with soap and water, including contact with soap for at least 15 seconds, covering all surfaces (palm, back of hand, fingers, fingertips, and fingernails); rub with friction
  - Turn off water without recontaminating hands: If the faucet is hand-operated, use paper towel to turn off the faucet; if the faucet is automatic, credit for compliance is given for correct performance
  - Dry hands with fresh paper towel
- Alcohol-based hand hygiene product (rub, gel, or foam): Use enough to cover all surfaces (palm, back of hand, fingers, fingertips, and fingernails); rub until dry (at least 15 seconds), which ensures sufficient volume has been applied
- Remove gloves using correct technique (so as not to contaminate the hands with a contaminated glove surface)

**3. The percentage of bed spaces at which there are clean gloves in appropriate sizes *and* dispensers (wall-mounted or free-standing bottles) for alcohol-based hand rub/gel/foam that contain product, are functional, and dispense an appropriate volume of product**

Make direct observations monthly (or at other intervals specified by the hospital) using a standardized procedure and form (see Appendix 2) on the same nursing units where measures 1 and 2 are monitored. Alternatively, availability can be assessed periodically as part of routine multidisciplinary rounds.

- Dispenser of alcohol-based product must be present, readily accessible at the point of care, not empty, functional, and capable of delivering the appropriate volume of product. If hand/pocket bottles are used, an adequate supply must be readily available and accessible on the ward.
- At least two sizes of gloves should be available and readily accessible at the point of care.

#### **4. The percentage of patient encounters in which there is compliance by health care workers with all components of appropriate hand hygiene and glove practices**

Compliance is monitored with direct observation by a trained observer using a standardized procedure and form (see Appendix 3). Independent observers are strongly recommended, preferably individuals who routinely are on the ward for other purposes and are not part of the care team. (This independent monitoring can be reinforced with monitoring by the care team during routine multidisciplinary rounds, which permits immediate assessment and feedback.) Observation periods should be 20-30 minutes (repeated if necessary) so that approximately 25-30 patient encounters are observed. The emphasis should be on observing complete encounters so that the proper measure of *complete* compliance with all components of the hand hygiene and glove intervention package can be calculated. Divide the number of encounters in which all components were performed correctly by the number of encounters observed and multiply by 100 to calculate the percentage compliance rate.

“Complete compliance” is defined by the adherence with the hand hygiene techniques and use of gloves as outlined in the table below. Gloves should be worn for all types of contact if the patient is on isolation precautions that require the use of gloves for contact with the patient and the environment, or if there is a unit-based procedure for universal gloving (wearing gloves for contact with all patients and their immediate environment).

<b>Type of contact</b>	<b>Hand hygiene before</b>	<b>Hand hygiene after</b>	<b>Use of gloves</b>
Patient contact that involves an invasive procedure (i.e., insertion of an intravascular catheter, urinary catheter, or other invasive device)	Yes	Yes	Yes
Patient contact that involves direct contact or potential contact with blood, body fluids, secretions (except sweat), excretions, mucous membranes, and nonintact skin (i.e., wounds, ulcers)	Yes	Yes	Yes
Patient contact not involving those noted above (i.e., taking vital signs, examination, repositioning, etc.)	Yes	Yes	*
Contact with the patient environment	--	Yes	*

*\* Gloves should be worn for all types of contact if the patient is on isolation precautions that require the use of gloves for contact with the patient and the environment, or if there is a unit-based procedure for universal gloving (wearing gloves for contact with all patients and their immediate environment).*

The following additional measure can also be used, but it does not replace direct observation of health care worker compliance during patient encounters:

- Volume of alcohol-based hand hygiene product consumed per week (or per month) divided by the number of patient days in the corresponding time period

Self-reporting by personnel or patients is not a reliable measure of compliance.

## Barriers That May Be Encountered

- **Reluctance to change, tolerance of the status quo:** All change is difficult. The antidote is knowledge about the deficiencies of the present process and optimism about the potential benefits of a new process. The rate of compliance in most institutions is woeful, and dramatic improvement is possible.
- **Lack of leadership commitment and follow-through:** Hard work and good intentions cannot produce dramatic, long-term change without leadership buy-in and support.
- **Failure to educate and communicate:** Staff must understand the rationale for hand hygiene and glove practices, the danger of non-compliance to themselves and their patients, and the effectiveness and tolerability of hand hygiene products.
- **Failure to tailor product selection to staff preferences:** Staff should test products before they are introduced.
- **Lack of staff self-efficacy and empowerment:** Staff must believe that they have the ability and power to make major improvements.
- **Failure to make compliance a social norm and establish a culture of safety:** Staff must be empowered to remind other caregivers, regardless of rank or position, to practice hand hygiene. This should be reinforced by patients.
- **Failure to provide real time feedback of performance data:** Performance data should be communicated regularly and properly. Post trended data prominently.
- **Lack of a cohesive approach to behavior change:** A multi-factorial, creative approach to behavior change is essential.
- **Lack of physician buy-in:** Opinion leaders, role models, and physician champions, armed with educational materials and evidence, are essential.

## Appendix 1. Hand Hygiene Knowledge Assessment Questionnaire

Use this questionnaire to periodically survey clinical staff about their knowledge of key elements of hand hygiene. Select 5 questions from this survey, or use other questions derived from your hospital's existing educational program. **[NOTE: The correct answer for each question has been indicated below.]**

1. In which of the following situations should hand hygiene be performed? **[Correct answer: #4]**

- A. Before having direct contact with a patient
- B. Before inserting an invasive device (e.g., intravascular catheter, foley catheter)
- C. When moving from a contaminated body site to a clean body site during an episode of patient care
- D. After having direct contact with a patient or with items in the immediate vicinity of the patient
- E. After removing gloves

Circle the number for the best answer:

- 1. B and E
- 2. A, B and D
- 3. B, D and E
- 4. All of the above

2. If hands are not visibly soiled or visibly contaminated with blood or other proteinaceous material, which of the following regimens is the most effective for reducing the number of pathogenic bacteria on the hands of personnel? **[Correct answer: C]**

Circle the letter corresponding to the single best answer:

- A. Washing hands with plain soap and water
- B. Washing hands with an antimicrobial soap and water
- C. Applying 1.5 ml to 3 ml of alcohol-based hand rub to the hands and rubbing hands together until they feel dry

3. How are antibiotic-resistant pathogens most frequently spread from one patient to another in health care settings? **[Correct answer: C]**

Circle the letter corresponding to the single best answer:

- A. Airborne spread resulting from patients coughing or sneezing
- B. Patients coming in contact with contaminated equipment
- C. From one patient to another via the contaminated hands of clinical staff
- D. Poor environmental maintenance

4. Which of the following infections can be potentially transmitted from patients to clinical staff if appropriate glove use and hand hygiene are not performed? **[Correct answer: E]**

Circle the letter corresponding to the single best answer:

- A. Herpes simplex virus infection
- B. Colonization or infection with methicillin-resistant *Staphylococcus aureus*
- C. Respiratory syncytial virus infection
- D. Hepatitis B virus infection
- E. All of the above

5. *Clostridium difficile* (the cause of antibiotic-associated diarrhea) is readily killed by alcohol-based hand hygiene products **[Correct answer: False]**

- True
- False

6. Which of the following pathogens readily survive in the environment of the patient for days to weeks? **[Correct answer: #3]**

- A. *E. coli*
- B. *Klebsiella spp.*
- C. *Clostridium difficile* (the cause of antibiotic-associated diarrhea)
- D. Methicillin-resistant *Staphylococcus aureus* (MRSA)
- E. Vancomycin-resistant enterococcus (VRE)

Circle the number for the best answer:

- 1. A and D
- 2. A and B
- 3. C, D, E
- 4. All of the above

7. Which of the following statements about alcohol-based hand hygiene products is accurate? **[Correct answer: C]**

Circle the letter corresponding to the single best answer:

- A. They dry the skin more than repeated handwashing with soap and water
- B. They cause more allergy and skin intolerance than chlorhexidine gluconate products
- C. They cause stinging of the hands in some providers due to pre-existing skin irritation
- D. They are effective even when the hands are visibly soiled
- E. They kill bacteria less rapidly than chlorhexidine gluconate and other antiseptic containing soaps

## Appendix 2. Checklist for the Availability of Alcohol-Based Hand Rub and Clean Gloves

Unit/Dept.: \_\_\_\_\_ Day of Week: \_\_\_\_\_ Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Time: \_\_\_\_\_ : \_\_\_\_\_ AM/PM to \_\_\_\_\_ : \_\_\_\_\_ AM/PM Initials \_\_\_\_\_

Room #	Bedspace #	Hand rub bottle or dispenser				Disperses correct volume	Clean gloves near patient	Adherence to all elements	Comments		
		Near patient	Not empty	Functional							
1		Y	N	Y	N	Y	N	Y	N		
2		Y	N	Y	N	Y	N	Y	N		
3		Y	N	Y	N	Y	N	Y	N		
4		Y	N	Y	N	Y	N	Y	N		
5		Y	N	Y	N	Y	N	Y	N		
6		Y	N	Y	N	Y	N	Y	N		
7		Y	N	Y	N	Y	N	Y	N		
8		Y	N	Y	N	Y	N	Y	N		
9		Y	N	Y	N	Y	N	Y	N		
10		Y	N	Y	N	Y	N	Y	N		
11		Y	N	Y	N	Y	N	Y	N		
12		Y	N	Y	N	Y	N	Y	N		
13		Y	N	Y	N	Y	N	Y	N		
14		Y	N	Y	N	Y	N	Y	N		
15		Y	N	Y	N	Y	N	Y	N		
16		Y	N	Y	N	Y	N	Y	N		
17		Y	N	Y	N	Y	N	Y	N		
18		Y	N	Y	N	Y	N	Y	N		
19		Y	N	Y	N	Y	N	Y	N		
20		Y	N	Y	N	Y	N	Y	N		
21		Y	N	Y	N	Y	N	Y	N		
22		Y	N	Y	N	Y	N	Y	N		
23		Y	N	Y	N	Y	N	Y	N		
24		Y	N	Y	N	Y	N	Y	N		
25		Y	N	Y	N	Y	N	Y	N		
26		Y	N	Y	N	Y	N	Y	N		
27		Y	N	Y	N	Y	N	Y	N		
28		Y	N	Y	N	Y	N	Y	N		
29		Y	N	Y	N	Y	N	Y	N		
30		Y	N	Y	N	Y	N	Y	N		
<b>Total # Y</b>											
<b>% Present</b>											

## Appendix 2. Checklist for the Availability of Alcohol-Based Hand Rub and Clean Gloves (continued)

### Instructions:

1. Each row should be used to record data regarding the availability of an alcohol-based hand rub (liquid, gel, or foam) and clean gloves at the point of care for an individual patient. A point of care is a bedside, exam room, or treatment/procedure area. If multiple hand rub bottles or dispensers are available at a specific point of care, only one need be assessed. If pocket/belt bottles or dispensers are the primary way hand rub is dispensed in the unit or department, each row should be used to assess the bottle or dispenser for an individual health care worker providing care to patients in this unit or department during the assessment period.
2. The room number and bedside fields are used to facilitate a complete assessment of all points of care in a unit or department and for reference if problems are noted with the availability of hand-rub bottles or dispensers or clean gloves, or if additional comments are recorded.
3. To qualify as being near the patient, a hand-rub bottle or dispenser and clean gloves should be accessible to a health care worker who is standing or sitting at the point of care (i.e., close to the patient's bed or attached to the frame of the bed) or to a health care worker who approaches the point of care (i.e., inside the patient's room just inside the door or in the corridor adjacent to door).
4. For the purposes of this measurement exercise, each bottle or dispenser should be assessed with regard to its capacity to dispense the correct volume into the hand of the user when activated once (i.e., that the bottle is not empty, is functional and does not spray aberrantly, and dispenses correct volume of product). Additional comments regarding bottles that are poorly placed, nearly empty, or functioning incorrectly can be noted in the comments section of the form to facilitate remedial action.
5. Codes are: Y = Yes, N = No.
6. In the Adherence field, use the following rule: Y = if **all** elements are Y (that is, Near patient, Not empty, Functional, Dispenses correct volume, and Clean gloves near patient are **all** Y); N = if not.
7. Count the total number of Y for each column and record the total in box at the bottom of each column.
8. Calculate the percent adherence using the formula below and record the percent in the box at the bottom of each column.  
Total # of Y ÷ Total # of Points of Care (number of rows with data recorded) x 100

### Appendix 3. Hand Hygiene and Glove Use Monitoring Form

Unit/Dept.:		Day of Week:		Date:		Time:		AM/PM to		AM/PM Initials					
Type of Healthcare Worker (circle only one)		Type of contact		Hand hygiene before		Gloves		Hand hygiene after		Adherence					
		Patient	Environment	Alc	HW	Required	Used	Alc	HW	Hand hygiene	Glove use	Overall			
1	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
2	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
3	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
4	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
5	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
6	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
7	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
8	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
9	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
10	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
11	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
12	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
13	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
14	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
15	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
16	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
17	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
18	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
19	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
20	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
21	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
22	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
23	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
24	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
25	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
26	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
27	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
28	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
29	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
30	D N TH PH XR ES TR OT	Y	N	Alc	HW	Y	N	Alc	HW	Y	N	Y	N	Y	N
<b>Type of Healthcare Worker:</b> D = attending, fellow, resident, PA, med stud; N = nurse, aide, TH = therapist (RT, PT, OT); PH = phlebotomy/IV team; XR = radiology technician; ES = environmental services; TR = transporter; OT = other										Total # of Y		%			
<b>Hand hygiene before/after:</b> Alc = alcohol-based hand rub; HW = handwashing with soap and water; N = none										% Adherence		%			
<b>Gloves Required:</b> Y if isolation requiring gloves or contact involves an invasive procedure or contact with blood, body fluids, secretions/excretions, mucous membranes, or non-intact skin; N if not										%		%			
<b>Adherence:</b> Hand hygiene -- Y if patient contact and hand hygiene before and after are both Y or if environmental contact only and hand hygiene after is Y; N = if not / <b>Glove use</b> -- Y if Gloves Required and Used are both Y; N if Gloves Required is Y and Used is N; NA if Gloves Required is N / <b>Overall adherence</b> -- Y if Hand hygiene is Y and glove use is Y or NA; N if not										%		%			

### Appendix 3. Hand Hygiene and Glove Use Monitoring Form (continued)

#### Instructions:

- Each row should be used to record an encounter between one healthcare worker (HCW) and one patient that involves touching by the HCW of the patient or the patient's immediate environment. In situations involving and extended or complicated encounter, it is appropriate to use more than one row (see #4 below). Encounters that do not involve touching (i.e., only verbal communication between the HCW and the patient) should not be recorded.
- An encounter may involve patient contact, environmental contact or both.
- Patient contact involves touching the patient's body, gown, or clothes. Environmental contact involves touching the patient's bed or bed linen, bedside equipment, or other equipment, supplies, articles, or surfaces in the patient's bedside or room.
- For the purposes of this measurement exercise, an encounter begins when a healthcare worker enters the patient's room or approaches the patient's bedside (for multibed rooms) and ends when the healthcare worker leaves the room or bedside. In a situation where a patient requires extended or complicated care (such as in an ICU), an encounter may involve multiple contacts and it may be appropriate to record these individually if they are distinct activities. For example, a nurse may perform multiple patient care tasks at the bedside, complete this care, and then begin a series of contacts with the patient's environment. Or a nurse may complete a task that involves contact with mucous membranes and secretions, such as suctioning a patient, and then take on a separate task at a separate body site, such as changing a dressing. To the extent that these contacts can be observed and distinguished clearly, they may be recorded separately on separate rows.
- The observer must be aware of whether a patient is on any type of isolation precautions that require the use of gloves. This information is necessary to determine whether gloves are required (see below).
- For patient contact, the observer should be aware of the nature of the contact. This information is necessary to determine whether gloves are required (see below). It is important to distinguish three general subtypes of patient contact:
  - contact that involves performing an invasive procedure (i.e., inserting an intravascular catheter or indwelling urinary catheter);
  - contact that involves actual or potential contact with blood, body fluids, secretions (except sweat), excretions, mucous membranes or non-intact skin (i.e., suctioning an intubated patient, emptying a urinal or bedpan, changing an dressing on an open wound);
  - other patient contact that does not qualify for a or b (i.e., measuring vital signs, examining a patient, repositioning a patient, etc.).
- Use the following codes to record data (Note: Y = Yes, N = No, unless otherwise noted):

Type of Healthcare Worker: D = attending physician, fellow, resident, physician's assistant, medical student; N = nurse, aide, TH = therapist (respiratory therapist, physical therapist, occupational therapist); PH = phlebotomy/IV team; XR = radiology technician; ES = environmental services; TR = transporter; OT = other;

Hand hygiene before/after: Alc = alcohol-based hand rub (liquid, gel, or foam); HW = handwashing with soap and water; N = none;

Gloves Required: Y if the patient is on any type of isolation precautions requiring gloves or the Type of Contact involved an invasive procedure or actual/potential contact with blood, body fluids, secretions/excretions, mucous membranes, or non-intact skin; N if not.
- In the Adherence section, use the following rules to record Y or N for Hand Hygiene, Glove Use, and Overall Adherence:

Hand hygiene: Y if the Type of Contact was patient contact and Hand hygiene before and after are both Y or if the Type of Contact was Environmental Contact only and Hand hygiene after is Y; N = if not;

Glove use: Y if Gloves Required and Used are both Y; N if Gloves Required is Y and Used is N; NA if Gloves Required is N;

Overall: Y if Hand hygiene is Y and Glove Use is Y or NA; N if not.
- In the Adherence section, count the number of Y for Hand hygiene, Glove use, and Overall and record the total in box at the bottom of each column.
- In the Adherence section, calculate the percent adherence using the formulas below and record the percent in the box at the bottom of each column  
Hand hygiene:  $\text{Total \# of Y} \div \text{Total \# of Encounters (number of rows with data recorded)} \times 100$   
Glove use:  $\text{Total \# of Y} \div [\text{Total \# of Encounters (number of rows with data recorded)} - \text{Total \# of NA}] \times 100$   
Overall:  $\text{Total \# of Y} \div \text{Total \# of Encounters (number of rows with data recorded)} \times 100$



“This course was developed from the public domain document: Guidance for the Selection and Use of Personal Protective Equipment (PPE) in Healthcare Settings – Institute for Healthcare Improvement.”