

Hand Hygiene and Infection Control

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Introduction

Adequate hand hygiene is essential to the safe and effective administration of health care. Thus, health care professionals should be very familiar with adequate hand hygiene. This course will review recommended hand hygiene procedures and indications, while providing health care professionals with the insight necessary to maintain the integrity of infection control when administering health care to patients in need.

Section 1: Hand Hygiene

Case Study 1

A nurse visits a 42-year-old male patient's room. The nurse walks up to the patient's bed, says hello and places both the left and right hand on the edge of the patient's bed. The nurse then engages the patient in a conversation regarding his pain and overall health. The patient reports he is feeling much better and just needs some help adjusting his pillow. The nurse is glad to hear the patient is doing well and helps him adjust his pillow. To do so, the nurse gently places both hands on the patient's left shoulder to ease the patient upwards. The nurse then adjusts the patient's pillow to his specifications. The patient expresses his gratitude and the nurse leaves the patient's room.

Case Study 2

A nurse visually inspects a 52-year-old female's wound dressing and determines the patient's dressing needs to be changed. The nurse gathers the necessary supplies and thoroughly washes both hands using soap and water for approximately 20 seconds before contacting the patient. The nurse begins to change the patient's dressing when it is determined additional supplies are required. The nurse leaves the patient's room, gathers additional supplies and immediately completes the dressing change. The nurse washes both hands using soap and water after contacting the patient - however, there is not a sufficient supply of paper towel present for the nurse to dry both hands. As a result, the nurse leaves both hands slightly wet and, ultimately, rubs them on the back of a pant leg to dry them as much as possible.

Case Study 3

A nurse is administering medications to a group of patients. The nurse goes from room to room to administer each medication to the correct patient. The nurse is a bit

behind schedule and does not stop to perform hand hygiene between contact with each patient. At one point, the nurse realizes both hands are visibly soiled. The nurse stops the medication administration and uses an alcohol-based handrub to clean both hands. The nurse dries each hand with a paper towel after administering the alcohol-based handrub and continues administering medications. The nurse does not perform any kind of hand hygiene after all of the patient medications have been administered.

The three case studies presented above outline different health care scenarios - however, they all have one thing in common: poor hand hygiene. It has been said, that hand hygiene is an essential component of safe and effective health care and should be practiced by all health care professionals. With that concept in mind the question is, what is hand hygiene and how can health care professionals implement adequate hand hygiene when administering health care? To help health care professionals answer the previously posed question, this section of the course will present information related to hand hygiene. The information regarding hand hygiene will be broken down and presented in informational segments. The information found in this section was derived from materials provided by the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO).^{1,2}

What is hand hygiene?

Hand hygiene may refer to any action of hand cleansing.

What products may be used by health care professionals to carry out adequate hand hygiene?

Health care professionals may use a variety of different products to carry out adequate hand hygiene. The following products are typically available to health care professionals and may be used to carry out adequate hand hygiene:

- ***Detergent (surfactant)*** - detergents may refer to compounds that possess a cleaning action.
- ***Plain soap*** - plain soap may refer to detergents that contain no added antimicrobial agents or may contain these solely as preservatives.
- ***Antimicrobial (medicated) soap*** - antimicrobial (medicated) soap may refer to soap (detergent) containing an antiseptic agent at a concentration sufficient to inactivate microorganisms and/or temporarily suppress their growth. The detergent activity of such soaps may also dislodge transient microorganisms or other contaminants from the skin to facilitate their subsequent removal by water.

- **Antiseptic agent** - An antiseptic agent may refer to an antimicrobial substance that inactivates microorganisms or inhibits their growth on living tissues. Examples include alcohols, chlorhexidine gluconate (CHG), chlorine derivatives, iodine, chloroxylenol (PCMX), quaternary ammonium compounds and triclosan.

- **Alcohol-based handrub** - an alcohol-based handrub may refer to an alcohol-containing preparation (liquid, gel or foam) designed for application to the hands to inactivate microorganisms and/or temporarily suppress their growth. Such preparations may contain one or more types of alcohol, other active ingredients with excipients and humectants.

What are the WHO recommendations regarding the selection and handling of hand hygiene products?

The WHO recommendations regarding the selection and handling of hand hygiene products include the following:

- Health care professionals should select efficacious hand hygiene products that have low irritancy potential.

- When selecting hand hygiene products, health care professionals should determine any known interaction between products used to clean hands, skin care products and the types of glove used in a specific health care facility.

- When selecting hand hygiene products, health care professionals should solicit and evaluate information from manufacturers regarding any effect that hand lotions, creams or alcohol-based handrubs may have on the effects of antimicrobial soaps being used in the institution.

- When selecting hand hygiene products, health care professionals should solicit information from manufacturers about the risk of product contamination.

- Health care professionals should ensure that hand hygiene product related dispensers function adequately and reliably and deliver an appropriate volume of the product.

- Health care professionals should ensure that the dispenser system for alcohol-based handrubs is approved for flammable materials.

- Health care professionals should not add soap or alcohol-based formulations to a partially empty soap dispenser.

- If soap dispensers are reused, health care professionals should follow recommended procedures for cleansing.

What are the different types of hand hygiene available to health care professionals?

There are several types or methods of hand hygiene available to health care professionals such as:

- ***Handwashing*** - handwashing may refer to the process of washing one's hands with plain or antimicrobial soap and water.

- ***Hygienic hand antiseptics*** - hygienic hand antiseptics may refer to the treatment of the hands with either an antiseptic handrub or an antiseptic handwash to reduce the transient microbial flora without necessarily affecting the resident skin flora.

- ***Hygienic handrub*** - hygienic handrub may refer to the treatment of hands with an antiseptic handrub to reduce the transient flora without necessarily affecting the resident skin flora.

- ***Hygienic handwash*** - hygienic handwash may refer to the treatment of hands with an antiseptic handwash and water to reduce the transient flora without necessarily affecting the resident skin flora.

- ***Hand antiseptics/decontamination/degerming*** - hand antiseptics/decontamination/degerming may refer to the process of reducing or inhibiting the growth of microorganisms by the application of an antiseptic handrub or by performing an antiseptic handwash.

- ***Antiseptic handwashing*** - antiseptic handwashing may refer to the process of washing one's hands with soap and water or with other detergents containing an antiseptic agent.

- ***Antiseptic handrubbing (handrubbing)*** - antiseptic handrubbing may refer to the application of an antiseptic handrub to reduce or inhibit the growth of microorganisms without the need for an exogenous source of water and requiring no rinsing or drying with towels or other devices.

- ***Alcohol-based handrubbing*** - alcohol-based handrubbing may refer to the application of an alcohol-containing preparation to the hands in order to reduce the number of viable microorganisms.

- ***Surgical hand antisepsis/surgical hand preparation/presurgical hand preparation*** - surgical hand antisepsis/surgical hand preparation/presurgical hand preparation may refer to the application of an antiseptic handwash or antiseptic handrub, performed preoperatively by the surgical team to eliminate transient flora and reduce resident skin flora.

- ***Surgical handscrub/presurgical scrub*** - surgical handscrub/presurgical scrub may refer to surgical hand preparation with antimicrobial soap and water.

- ***Surgical handrub*** - Surgical handrub may refer to surgical hand preparation with a waterless, alcohol-based handrub.

What are the indications for hand hygiene?

The major indications for hand hygiene can be broken down into the following five key moments:

- 1) Before patient contact
- 2) Before an aseptic procedure or task
- 3) After a body fluid exposure risk occurs
- 4) After touching a patient
- 5) After contact with a patient's surroundings

Additional information regarding indications for hand hygiene may be found below:

- Health care professionals should wash their hands with soap and water when they are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.

- Health care professionals should use an alcohol-based handrub when their hands are not visibly soiled to reduce bacterial counts.

- Health care professionals should engage in hand hygiene if exposure to potential spore-forming pathogens is strongly suspected or proved (handwashing with soap and water is the preferred means).

- Health care professionals should engage in hand hygiene before handling an invasive device for patient care.

- Health care professionals should engage in hand hygiene after contact with body fluids or excretions, mucous membranes, non-intact skin, or wound dressings.
- Health care professionals should engage in hand hygiene if moving from a contaminated body site to another body site during the care of the same patient.
- Health care professionals should engage in hand hygiene after contact with inanimate surfaces and objects (including medical equipment) in the immediate vicinity of a patient.
- Health care professionals should engage in hand hygiene after removing sterile or non-sterile gloves.
- Health care professionals should engage in hand hygiene before handling medications (hand hygiene in the previous case may include the use an alcohol-based handrub or handwashing with either a plain or antimicrobial soap and water).
- Health care professionals should engage in hand hygiene before preparing food (hand hygiene in the previous case may include the use an alcohol-based handrub or handwashing with either a plain or antimicrobial soap and water).
- When engaging in hand hygiene, health care professionals should remember the following note: soap and an alcohol-based handrub should not be used concomitantly.

How should health care professionals wash their hands with soap and water?

Health care professionals should follow the steps in the following procedure when washing their hands with soap and water to optimize hand hygiene results. The duration of the entire handwashing procedure should last between 40 - 60 seconds.

Hand Hygiene Procedure with Soap and Water

- 1) The health care professional should wet his or her hands with water.
- 2) The health care professional should apply enough soap to cover all hand surfaces.
- 3) The health care professional should rub his or her hands palm to palm.
- 4) The health care professional should rub the right palm over the left dorsum with interlaced fingers and vice versa.

- 5) The health care professional should rub his or her hands palm to palm with fingers interlaced.
- 6) The health care professional should rub the backs of fingers to opposing palms with fingers interlocked.
- 7) The health care professional should engage in rotational rubbing of the left thumb clasped in the right palm and vice versa.
- 8) The health care professional should engage in rotational rubbing, backwards and forwards with clasped fingers of the right hand in the left palm and vice versa.
- 9) The health care professional should then rinse his or her hands with water.
- 10) The health care professional should then dry his or her hands thoroughly with a single use towel.
- 11) Finally, the health care professional should use a towel to turn off the faucet.

How should health care professionals perform hand hygiene using an alcohol-based formulation?

Health care professionals should follow the steps in the following procedure when using an alcohol-based formulation to optimize hand hygiene results. The duration of the entire procedure should last between 20 - 30 seconds. When using an alcohol-based formulation health care professionals should note the following: alcohol-based handrubs with optimal antimicrobial efficacy usually contain 75 to 85% ethanol, isopropanol, or n-propanol, or a combination of the aforementioned products.

Hand Hygiene Procedure with an Alcohol-based Formulation

- 1) The health care professional should first apply a palmful of alcohol-based product in a cupped hand, making sure to cover all surfaces.
- 2) The health care professional should then rub his or her hands palm to palm.
- 3) The health care professional should rub the right palm over the left dorsum with interlaced fingers and vice versa.
- 4) The health care professional should rub his or her hands palm to palm with fingers interlaced.

5) The health care professional should rub the backs of his or her fingers to opposing palms with fingers interlocked.

6) The health care professional should engage in the rotational rubbing of the left thumb clasped in the right palm and vice versa.

7) The health care professional should engage in rotational rubbing, backwards and forwards with clasped fingers of the right hand in the left palm and vice versa.

8) Finally, health care professionals should note that their hands are safe once they are dry.

What are the recommendations regarding surgical hand hygiene?

The WHO recommendations regarding surgical hand hygiene or preparation may be found below.

- Health care professionals should remove rings, wrist-watch, and bracelets before beginning surgical hand preparation.

- Health care professionals should note artificial nails are prohibited.

- Health care professionals should use sinks designed to reduce the risk of splashes.

- If hands are visibly soiled, health care professionals should wash their hands with plain soap before surgical hand preparation. Health care professionals should be sure to remove debris from underneath their fingernails using a nail cleaner, preferably under running water.

- Health care professionals should note brushes are not recommended for surgical hand preparation.

- Health care professionals should note surgical hand antisepsis should be performed using either a suitable antimicrobial soap or suitable alcohol-based handrub, preferably with a product ensuring sustained activity, before donning sterile gloves.

- Health care professionals should note if the quality of water is not assured in the operating theatre, surgical hand antisepsis using an alcohol-based handrub is recommended before donning sterile gloves when performing surgical procedures.

- Health care professionals should note the following - when performing surgical hand antisepsis using an antimicrobial soap, health care professionals should scrub their hands and forearms for the length of time recommended by the manufacturer, typically 2 - 5 minutes. Long scrub times (e.g. 10 minutes) are not necessary.

- Health care professionals should note the following - when using an alcohol-based surgical handrub product with sustained activity, health care professionals should follow the manufacturer's instructions for application times. Apply the product to dry hands only. Do not combine surgical hand scrub and surgical handrub with alcohol-based products sequentially.

- Health care professionals should note the following - when using an alcohol-based handrub, health care professionals should use sufficient product to keep hands and forearms wet with the handrub throughout the surgical hand preparation procedure.

- After the application of the alcohol-based handrub as recommended, health care professionals should allow their hands and forearms to dry thoroughly before donning sterile gloves.

How should health care professionals perform a surgical hand preparation procedure with an alcohol-based handrub formulation?

Health care professionals should follow the steps in the following procedure when using an alcohol-based formulation to optimize hand hygiene results.

Surgical Hand Preparation Procedure with an Alcohol-based Handrub Formulation

Before beginning the procedure health care professionals should note the following:

- The hand rubbing procedure for surgical hand preparation should be performed on clean dry hands.

- Health care professionals should handwash with soap and water on arrival to an operating theatre and after having donned theatre clothing (cap/hat/bonnet and mask).

- If any residual talc or biological fluids are present when gloves are removed following the operation, handwash with soap and water.

1) Health care professionals should put approximately 5ml (3 doses) of alcohol-based handrub in the palm of their left hand, using the elbow of their other arm to operate the dispenser.

2) Health care professionals should dip the fingertips of their right hand in the handrub to decontaminate under the nails (5 seconds).

- 3) Health care professionals should spread the handrub on the right forearm up to the elbow, ensuring that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10 - 15 seconds).
- 4) Health care professionals should put approximately 5ml (3 doses) of alcohol-based handrub in the palm of their right hand, using the elbow of their other arm to operate the dispenser.
- 5) Health care professionals should dip the fingertips of their left hand in the handrub to decontaminate under the nails (5 seconds).
- 6) Health care professionals should spread the handrub on the left forearm up to the elbow, ensuring that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10 - 15 seconds).
- 7) Health care professionals should put approximately 5ml (3 doses) of alcohol-based handrub in the palm of their left hand and rub both hands at the same time up to the wrists, following all of the next steps (20 - 30 seconds).
- 8) Cover the whole surface of the hands up to the wrist with alcohol-based handrub, rubbing palm against palm with a rotating movement.
- 9) Rub the back of the left hand, including the wrist, moving the right palm back and forth, and vice-versa.
- 10) Rub palm against palm back and forth with fingers interlinked.
- 11) Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement.
- 12) Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa.
- 13) When the hands are dry, sterile surgical clothing and gloves can be donned.
- 14) Health care professionals should repeat the above procedure (average 60 seconds) the number of times that adds up to the total duration recommended by the alcohol-based handrub manufacturer's instructions. This could be two or even three times.

Where should alcohol-based handrubs be located within health care settings?

Alcohol-based handrubs should be located at the point-of-care, i.e., the place where a patient, a health care professional, and care or treatment involving contact with the patient or his or her surroundings (within the patient zone) all come together. The previous concept embraces the need to perform hand hygiene at recommended moments exactly where care delivery takes place. This requires that alcohol-based handrub products are easily accessible and as close as possible - within arm's reach of where patient care or treatment is taking place. Point-of-care products should be accessible without health care professionals having to leave the patient zone. The patient zone may refer to the zone or area which contains a patient and his or her immediate surroundings.

Where should handwashing facilities be located within health care settings?

The location of handwashing facilities can be essential to hand hygiene compliance. Ideal locations for handwashing facilities may include the following:

- At the entrance of clinical areas
- Inside patient rooms
- Inside patient bathrooms
- Inside physical examination rooms
- Inside a room with a toilet
- Inside and/or close to a nursing station
- Inside rooms where food may be handled
- In areas where hands may be easily contaminated

What should be included within handwashing facilities?

Ideal handwashing facilities should include the following: sinks which are designed to limit splash-back, liquid soap, paper towel, pedal-operated waste bins, and a poster with instructions on how to adequately wash hands.

What are the factors that typically reduce hand hygiene compliance?

Many factors may reduce hand hygiene compliance among health care professionals, however the factors that are most commonly cited for poor hand hygiene compliance include the following:

- Increases in workloads
- Understaffing
- Insufficient hand hygiene supplies
- Reduced hand hygiene facilities
- A lack of user-friendly hand hygiene equipment in health care settings
- Reported skin irritation from health care professionals
- A lack of education and knowledge regarding hand hygiene

What methods or strategies may be used to increase hand hygiene compliance?

The following methods/strategies may be used to increase hand hygiene compliance:

- Education programs
- Routine health care professional observation
- Making hand hygiene products readily available to health care professionals
- Increasing the number of handwashing facilities within a health care setting
- Hand hygiene posters within health care settings
- Hand hygiene compliance audits
- Hand hygiene incentive programs
- Encourage health care professionals to carry personal hand hygiene products
- Increased access to a safe, continuous water supply at all outlets and access to the necessary facilities to perform handwashing.

- Provide health care professionals with efficacious hand hygiene products that have low irritancy potential.
- Provide health care professionals with information regarding hand-care practices designed to reduce the risk of irritant contact dermatitis and other skin damage.
- Provide health care professionals with confirmed allergies or adverse reactions to standard products used in the health care setting with alternative hand hygiene products.
- Provide health care professionals with hand lotions or creams to minimize the occurrence of irritant contact dermatitis associated with hand antiseptics or handwashing.

Case Studies Revisited

With the previous insight into hand hygiene in mind, the three case studies presented at the beginning of this course will now be revisited to further explore the concepts behind adequate hand hygiene. Each case study will be re-presented below followed by a case study review. Additionally, reflection questions will be posed to encourage further internal debate and consideration regarding the presented case study.

Case Study 1

A nurse visits a 42-year-old male patient's room. The nurse walks up to the patient's bed, says hello and places both the left and right hand on the edge of the patient's bed. The nurse then engages the patient in a conversation regarding his pain and overall health. The patient reports he is feeling much better and just needs some help adjusting his pillow. The nurse is glad to hear the patient is doing well and helps him adjust his pillow. To do so, the nurse gently places both hands on the patient's left shoulder to ease the patient upwards. The nurse then adjusts the patient's pillow to his specifications. The patient expresses his gratitude and the nurse leaves the patient's room. _

Case Study 1 Review

Did the nurse in Case Study 1 achieve adequate hand hygiene? Why or why not?

According to the information presented in Case Study 1, the nurse did not achieve adequate hand hygiene. Details of the nurse's actions which support the aforementioned conclusion, as well as the relevance of each detail, may be found below.

The nurse did not engage in hand hygiene at any time prior to or after interacting with the patient - the previous nurse related detail is relevant because it points to poor hand hygiene. Essentially, the nurse did not perform recommended hand hygiene procedures before key moments of interaction with the patient. In order for hand hygiene to be considered adequate, health care professionals must complete recommended hand hygiene procedures at indicated times. For example, a health care professional must complete recommended hand hygiene procedures before and after patient contact. In this particular case the nurse did not do so, thus one may conclude the nurse did not achieve adequate hand hygiene.

What other details, if any, may be used to support the following conclusion: the nurse in Case Study 1 did not achieve adequate hand hygiene?

How may have the nurse from Case Study 1 achieved adequate hand hygiene?

As previously alluded to, health care professionals may achieve adequate hand hygiene by following recommended hand hygiene procedures and indications. In this particular case, the nurse could have achieved adequate hand hygiene by performing hand hygiene procedures before patient contact, after patient contact, and after contact with the patient's surroundings.

Are there any other considerations regarding the nurse in Case Study 1 and adequate hand hygiene? If so, what are they and how may they apply to Case Study 1?

What methods/strategies may be used to increase hand hygiene compliance in scenarios like the one highlighted in Case Study 1?

There are many different methods/strategies that may be used to increase hand hygiene compliance in health care settings. However, one specific method/strategy that may be used to increase hand hygiene compliance among health care professionals involved in scenarios like the one highlighted in Case Study 1 is to increase the availability of hand hygiene facilities and/or products at the point-of-care. Perhaps the reason why the nurse from Case Study 1 did not engage in a hand hygiene procedure was simply because there was a lack of hand hygiene facilities and/or products at the point-of-care. Due to the minimal amount of patient contact necessary to adjust the patient's pillow, the nurse may not have considered it worth the time to locate a hand hygiene facility/product to carry out a hand hygiene procedure. Thus, the nurse decided to forgo hand hygiene to save time and help the patient. Whatever the case may be, ensuring the availability and accessibility of hygiene facilities and/or products can encourage hand hygiene compliance among health care professionals.

What other methods/strategies may be used to increase hand hygiene compliance among health care professionals?

Case Study 2

A nurse visually inspects a 52-year-old female's wound dressing and determines the patient's dressing needs to be changed. The nurse gathers the necessary supplies and thoroughly washes both hands using soap and water for approximately 20 seconds before contacting the patient. The nurse begins to change the patient's dressing when it is determined additional supplies are required. The nurse leaves the patient's room, gathers additional supplies and immediately completes the dressing change. The nurse washes both hands using soap and water after contacting the patient - however, there is not a sufficient supply of paper towel present for the nurse to dry both hands. As a result, the nurse leaves both hands slightly wet and, ultimately, rubs them on the back of a pant leg to dry them as much as possible.

Case Study 2 Review

Did the nurse in Case Study 2 achieve adequate hand hygiene? Why or why not?

According to the information presented in Case Study 2, the nurse did not achieve adequate hand hygiene. The reason being is simply because the nurse did not follow recommended hand hygiene procedures and indications. As previously alluded to, in order for hand hygiene to be considered adequate, health care professionals must follow recommended hand hygiene procedures and indications. Unfortunately, the nurse from Case Study 2 did not follow recommended hand hygiene procedures or indications. Thus, it may be concluded that the nurse did not achieve adequate hand hygiene. Details of the nurse's actions which support the aforementioned conclusion, as well as the relevance of each detail, may be found below.

The nurse washed both hands with soap and water before contacting the patient for approximately 20 seconds - the previous nurse related detail is relevant because it points to poor hand hygiene. The nurse did engage in hand hygiene before contacting the patient, i.e., the nurse engaged in handwashing with soap and water prior to touching the patient - however, the nurse's handwashing procedure only lasted approximately 20 seconds, which is less than the recommended handwashing procedure time of 40 - 60 seconds. When engaging in hand hygiene procedures such as handwashing, health care professionals should be sure to follow all of the steps of the procedure and pay close attention to the duration of the procedure in order to ensure adequate hand hygiene. Health care professionals should also follow recommendations/indications for specific hand hygiene procedures such as the

following: health care professionals should wash their hands with soap and water when they are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet, health care professionals should use an alcohol-based handrub when their hands are not visibly soiled to reduce bacterial counts.

The nurse stopped the patient's dressing change, gathered additional supplies, and concluded the patient dressing change without engaging in hand hygiene - the previous nurse related detail is relevant because it points to poor hand hygiene. During the patient's dressing change the nurse determined additional supplies were required, forcing the nurse to interrupt the dressing change to collect the required supplies. Once the nurse acquired the necessary supplies, the nurse concluded the patient's dressing change without ever engaging in hand hygiene at anytime during the previous process. Essentially, the nurse's efforts during the patient's dressing change missed all of the following five major indications for hand hygiene: before patient contact, before an aseptic procedure or task, after a body fluid exposure risk occurs, after touching a patient, after contact with a patient's surroundings. With that in mind, health care professional should always make an effort to engage in hand hygiene at indicated times when interacting with patients.

After the nurse engaged in hand hygiene at the conclusion of the case, the nurse left both hand slightly wet and, ultimately, rubbed them on the back of a pant leg to dry them as much as possible - the previous nurse related detail is relevant because, once again, it points to poor hand hygiene. Much like with the first detail the nurse did not follow the recommended procedure for hand hygiene. The nurse did not effectively dry both hands after washing them. Hand drying is an essential step to the handwashing procedure, and ignoring the hand drying step can lead to poor hand hygiene. Health care professionals should be sure to follow all of the recommended steps of a hand hygiene procedure, and they should always attempt to avoid drying their hands on an article of clothing to ensure adequate hand hygiene.

What other details, if any, may be used to support the following conclusion: the nurse in Case Study 2 did not achieve adequate hand hygiene?

How may have the nurse from Case Study 2 achieved adequate hand hygiene?

Simply put, the nurse from Case Study 2 could have achieved adequate hand hygiene by following the recommended hand hygiene procedures and indications. For example the nurse could have engaged in hand hygiene procedures for recommended durations and at indicated times such as: before and after patient contact.

Are there any other considerations regarding the nurse in Case Study 2 and adequate hand hygiene? If so, what are they and how may they apply to Case Study 2?

What methods/strategies may be used to increase hand hygiene compliance in scenarios like the one highlighted in Case Study 2?

There are many different methods/strategies that may be used to increase hand hygiene compliance in health care settings. However, one specific method/strategy that may be used to increase hand hygiene compliance among health care professionals involved in scenarios like the one highlighted in Case Study 2 is education. Due to the overall poor nature of the nurse's hand hygiene in Case Study 2, education may be the most warranted action to increase compliance. Perhaps the nurse from Case Study 2 simply lacked knowledge regarding adequate hand hygiene (or the use of gloves which may be relevant in this case) and thus acted in a manner where hand hygiene was not central to the safe and effective administration of health care. Hand hygiene may appear to be a basic aspect of health care that every health care professional should understand and perform. Unfortunately, the simple truth of the matter is that adequate hand hygiene is often not performed effectively in the administration of health care due to a lack of understanding, among health care professionals, of hand hygiene procedures and indications. Thus, education can be essential to increasing compliance and helping health care professionals like the nurse from Case Study 2 achieve adequate hand hygiene on a consistent basis.

What other methods/strategies may be used to increase hand hygiene compliance among health care professionals?

Case Study 3

A nurse is administering medications to a group of patients. The nurse goes from room to room to administer each medication to the correct patient. The nurse is a bit behind schedule and does not stop to perform hand hygiene between contact with each patient. At one point, the nurse realizes both hands are visibly soiled. The nurse stops the medication administration and uses an alcohol-based handrub to clean both hands. The nurse dries each hand with a paper towel after administering the alcohol-based handrub and continues administering medications. The nurse does not perform any kind of hand hygiene after all of the patient medications have been administered.

Case Study 3 Review

Did the nurse in Case Study 3 achieve adequate hand hygiene? Why or why not?

According to the information presented in Case Study 3, the nurse did not achieve adequate hand hygiene. Details of the nurse's actions which support the aforementioned conclusion, as well as the relevance of each detail, may be observed below.

The nurse does not perform hand hygiene between contact with each patient while administering medications - the previous nurse related detail is relevant because it points to poor hand hygiene. Basically, the nurse from Case Study 3 did not follow the indications for hand hygiene. Health care professionals should engage in hand hygiene before and after patient contact.

The nurse realizes both hands are visibly soiled and uses an alcohol-based handrub to clean both hands - the previous nurse related detail is relevant because it points to poor hand hygiene. Once again, the nurse did not follow the indications for hand hygiene. If hands are visibly soiled, health care professionals should perform handwashing with soap and water.

The nurse dried each hand with paper towel after administering the alcohol-based handrub - the previous nurse related detail is relevant because it points to poor hand hygiene. The nurse from Case Study 3 did not effectively follow the procedure for an alcohol-based handrub. The recommended alcohol-based handrub procedure does not involve hand drying with a paper towel. Health care professionals should follow hand hygiene procedures as recommended to ensure adequate hand hygiene is achieved.

What other details, if any, may be used to support the following conclusion: the nurse in Case Study 3 did not achieve adequate hand hygiene?

How may have the nurse from Case Study 3 achieved adequate hand hygiene?

The nurse from Case Study 3 could have achieved adequate hand hygiene by engaging in hand hygiene at indicated times such as between patient to patient contact. The nurse could have also achieved hand hygiene by effectively performing a handwashing procedure after observing both hands where visibly soiled.

Are there any other considerations regarding the nurse in Case Study 3 and adequate hand hygiene? If so, what are they and how may they apply to Case Study 3?

What methods/strategies may be used to increase hand hygiene compliance in scenarios like the one highlighted in Case Study 3?

Two factors which typically reduce hand hygiene compliance are increases in workloads and understaffing. The nurse in Case Study 3 was behind schedule and

appeared to be rushing. Perhaps the nurse was behind schedule and rushing because of an increase in workload and/or understaffing. Work flow patterns can play an important role in health care. Interruptions or increases in work flow can cause health care professionals to lose sight of important aspects of health care such as hand hygiene. The nurse in Case Study 3 may have lost sight of adequate hand hygiene due to a change or increase in work flow. Keeping work flow patterns consistent can help health care professionals focus on important aspects of health care such as hand hygiene. Thus, in this particular case, encouraging a consistent work flow without significant impact from understaffing could assist in increasing hand hygiene compliance.

What other methods/strategies may be used to increase hand hygiene compliance among health care professionals?

Section 1: Summary

Adequate hand hygiene is essential to the safe and effective administration of health care. Health care professionals may achieve adequate hand hygiene by following recommended hand hygiene procedures and indications. Due to the importance of hand hygiene, health care professionals should encourage the practice of adequate hand hygiene among their peers and look for opportunities to increase hand hygiene compliance in health care settings.

Section 1: Key Concepts

- Adequate hand hygiene is an essential component of safe and effective health care and should be practiced by all health care professionals.
- Health care professionals may use a variety of different products to carry out adequate hand hygiene such as: detergents, plain soaps, antimicrobial (medicated) soaps, antiseptic agents and alcohol-based hand rubs.
- There are several types or methods of hand hygiene available to health care professionals such as: handwashing, hygienic hand antiseptics, hygienic handrub, hygienic handwash, hand antiseptics/decontamination/degerming, antiseptic handwashing, antiseptic handrubbing (handrubbing), alcohol-based hand rubbing, surgical hand antiseptics/surgical hand preparation/ presurgical hand preparation, surgical handscrub/presurgical scrub and surgical handrubbing .-
- The five major indications for hand hygiene include the following: before patient contact, before an aseptic procedure or task, after a body fluid exposure risk occurs, after touching a patient and after contact with a patient's surroundings.

- Health care professionals may achieve adequate hand hygiene by following recommended hand hygiene procedures and indications.
- The following methods/strategies may be used to increase hand hygiene compliance: education programs, routine health care professional observation, making hand hygiene products readily available to health care professionals, increasing the number of handwashing facilities within a health care setting, hand hygiene posters within health care settings, hand hygiene compliance audits, hand hygiene incentive programs, encouraging health care professionals to carry personal hand hygiene products, providing health care professionals with efficacious hand hygiene products that have low irritancy potential, providing health care professionals with information regarding hand-care practices designed to reduce the risk of irritant contact dermatitis and other skin damage, providing health care professionals with confirmed allergies or adverse reactions to standard products used in the health care setting with alternative hand hygiene products and providing health care professionals with hand lotions or creams to minimize the occurrence of irritant contact dermatitis associated with hand antisepsis or handwashing.

Section 1: Key Terms

Hand hygiene - any action of hand cleansing

Point-of-care - the place where a patient, a health care professional, and care or treatment involving contact with a patient or his or her surroundings (within the patient zone) all come together

Patient zone - the zone or area which contains a patient and his or her immediate surroundings

Section 1: Personal Reflection Question

What are the recommended procedures and indications for adequate hand hygiene?

Section 2: Infection Control

Infectious agents and Infections

It has been established that hand hygiene is essential to the administration of safe and effective health care. The only questions that remains is - why? Why is hand hygiene essential to the administration of safe and effective health care? It has been argued that there are two fundamental reasons why hand hygiene is essential to the

administration of safe and effective health care, the first of which may be very apparent - to help prevent the transmission of infectious agents among patient populations. It is believed that the majority of infectious agents causing health care-associated infections are transmitted to patients on the hands of health care professionals.¹ Thus, hand hygiene is often looked upon as the primary measure to reduce infections within health care settings. With that in mind, what are the typical infectious agents/infections that may be spread from health care professionals to patient populations? The remainder of this subsection will answer the previous question by providing examples of the most commonly transmitted infectious agents/infections within the health care setting. The aforementioned information will be presented below in informational segments. The information found in this subsection was derived from materials provided by the CDC ,WHO and the United States Food and Drug Administration (FDA).^{1,2,3}

Clostridioides difficile

Background notes - Clostridioides difficile, otherwise referred to as C. diff, is one of the most common agents of infection associated with poor hand hygiene. C. diff is a bacterium that can cause diarrhea and colitis. It is believed C. diff causes close to half a million illnesses each year. C. diff can affect people of all ages, however C. diff is especially concerning for individuals over the age of 65. According to materials provided by the CDC, it is believed one in 11 people over 65 diagnosed with a health care-associated C. diff infection die within a month.

Symptoms of infection - Symptoms of a C. diff infection include: diarrhea, nausea, stomach tenderness, stomach pain, loss of appetite and fever.

Spreading of the infectious agent - C. diff may spread via infected surfaces and/or due to poor hand hygiene.

Prevention - The spread of C. diff may be prevented by the cleaning of surfaces in rooms where C. diff patients are treated with EPA-approved, spore-killing disinfectants. The spread of C. diff may also be prevented through the practice of adequate hand hygiene. With that in mind, health care professionals should remember to engage in handwashing with soap and water if the potential for C. diff is present (the use of an alcohol-based handrub, as the primary means of hand hygiene, is not recommended when the potential for C. diff is present).

Norovirus

Background notes - Another common agent of infection associated with poor hand hygiene is norovirus. A norovirus is a type of virus that typically causes acute gastroenteritis (infection of the stomach and intestines). A norovirus-related illness may often be referred to as a stomach flu. However, health care professionals should note that a norovirus-related illness is not related to influenza. Health care professionals should also note a norovirus-related illness can be life-threatening to specific patient populations including both young children and older adults.

Symptoms of infection - Symptoms of a norovirus-related illness may include: nausea, vomiting, diarrhea and stomach pain.

Spreading of the infectious agent - A norovirus may spread via direct contact with an infected individual, through contaminated food and water and via contact with contaminated surfaces, i.e., touching a contaminated surface and then placing a hand or hands near, around or in the mouth.

Prevention - The transmission of norovirus may be prevented through the practice of adequate hand hygiene and by the routine disinfecting of potentially contaminated objects/surfaces.

Rotavirus

Background notes - Rotavirus is another type of virus that can also cause gastroenteritis (inflammation of the stomach and intestines). Rotavirus infections can be common among infants and children, however adults may also be affected by a rotavirus-related illness. Health care professionals should note that rotavirus infections may lead to severe dehydration. Due to the potential for severe dehydration, a rotavirus-related illness may be life-threatening for some patient populations.

Symptoms of infection - Symptoms of a rotavirus-related illness may include: severe diarrhea, nausea, vomiting, abdominal pain and fever. Health care professionals should note that rotavirus-related symptoms are typically less severe in adult populations.

Spreading of the infectious agent - Rotavirus may spread through contaminated food and/or through contact with contaminated objects and/or surfaces, i.e., touching a contaminated object/surface and then placing a hand or hands near, around or in the mouth. Rotavirus may also spread via contact with an infected individual, i.e.,

touching an infected individual and then placing a contaminated hand or hands near, around or in the mouth.

Prevention - To prevent the spreading of rotavirus among patient populations, health care professionals should follow hand hygiene procedures and indications. Health care professionals should also note the transmission of rotavirus may be prevented through vaccination.

Hepatitis A Virus

Background notes - The hepatitis A virus may not initially come to mind when considering infectious agents transmitted via poor hand hygiene, however the hepatitis A virus may be associated with poor hand hygiene. The hepatitis A virus is a virus that can lead to hepatitis A, a type of liver infection. Hepatitis A can be very contagious and may lead to death in specific patient populations.

Symptoms of infection - Symptoms of hepatitis A may include: diarrhea, nausea, vomiting, abdominal pain, loss of appetite, fever, dark urine, joint pain and jaundice (yellowing of the skin and eyes). Health care professionals should note that the symptoms of hepatitis A can appear approximately 4 weeks after exposure.

Spreading of the infectious agent - The hepatitis A virus may spread through contaminated food and/or water. Health care professionals should also note that the hepatitis A virus may spread via contact with those individuals infected with the hepatitis A virus or by coming in contact with contaminated surfaces, i.e., touching a contaminated surface and then placing a hand or hands near, around or in the mouth.

Prevention - The spread of the hepatitis A virus may be prevented through the practice of adequate hand hygiene. Health care professionals should also note the spread of the hepatitis A virus may be prevented through vaccination.

Adenoviruses

Background notes - Another group of viruses associated with poor hand hygiene are the adenoviruses. Adenoviruses may refer to a group of viruses that cause a range of different illnesses including conjunctivitis, otherwise referred to as pink eye. Health care professionals should note that individuals with weakened immune systems are at a higher risk of developing severe illnesses from adenovirus-related infections.

Symptoms of infection - Symptoms of adenovirus-related infections may vary depending on the type of infection, site of infection and patient specific factors. With

that said, the symptoms of conjunctivitis (pink eye) may include the following: redness in the white(s) of the eye, itchy eye(s), burning eye(s) and blurred vision.

Spreading of the infectious agent - Adenoviruses may spread through direct contact with infected individuals and/or through contact with contaminated objects and/or surfaces, i.e., touching a contaminated object/surface and then placing a hand or hands near, around or in the mouth/eyes. Adenoviruses may also spread through the air via coughing and sneezing.

Prevention - To prevent the spreading of adenoviruses among patient populations health care professionals should follow hand hygiene procedures and indications.

Staphylococcus aureus

Background notes - Staphylococcus aureus, otherwise referred to as Staph aureus, is a type of bacteria. Staph aureus may be found on the hair and skin as well as in the noses and throats of both humans and animals. Staph aureus may lead to a variety of different types of infections including skin infections and food poisoning. Health care professionals should note that the transmission of methicillin-resistant Staphylococcus aureus (MRSA) is also possible via poor hand hygiene. MRSA infections can be life-threatening to specific patient populations.

Symptoms of infection - Symptoms of a Staph aureus-related infection of the skin can include boils. Symptoms of food poisoning associated with Staph aureus may include: nausea, vomiting and diarrhea .

Spreading of the infectious agent - Staph aureus may be spread by direct contact with infected individuals or contaminated objects and/or surfaces. Staph aureus may also spread via infected droplets.

Prevention - To prevent the spreading of Staph aureus among patient populations health care professionals should follow hand hygiene procedures and indications. The transmission of Staph aureus may also be prevented through the routine disinfection of potentially contaminated objects/surfaces.

Streptococcus (group A strep)

Background notes - Streptococcus (group A strep) is a form of bacteria that can lead to many different types of infections such as strep throat.

Symptoms of infection - Symptoms of Streptococcus (group A strep)-related infections may vary depending on the type of infection, site of infection and patient specific factors.

Spreading of the infectious agent - Streptococcus (group A strep) may spread via poor hand hygiene. Streptococcus (group A strep) bacteria may also spread via infected droplets.

Prevention - To prevent the spreading of Streptococcus (group A strep) among patient populations, health care professionals should follow hand hygiene procedures and indications.

Vancomycin-resistant Enterococci (VRE)

Background notes - VRE are specific types of antimicrobial-resistant bacteria that are resistant to vancomycin, the medication often used to treat infections caused by enterococci. VRE can lead to infections of the urinary tract, the bloodstream, or of wounds associated with catheters or surgical procedures. Health care professionals should note that specific patient populations, e.g., patients with weakened immune systems, may be more susceptible to VRE-related infections.

Symptoms of infection - Symptoms of VRE-related infections may vary depending on the type of infection, site of infection and patient specific factors. With that said, common symptoms of VRE-related infections may include fever and chills.

Spreading of the infectious agent - VRE is often spread to patient populations by the contaminated hands of health care professionals. VRE may also spread via contact with contaminated objects and/or surfaces.

Prevention - To prevent the spreading of VRE among patient populations, health care professionals should follow hand hygiene procedures and indications. The transmission of VRE may also be prevented through the routine disinfection of potentially contaminated objects/surfaces.

Pseudomonas aeruginosa

Background notes - Pseudomonas aeruginosa is a type of bacteria that can lead to severe infections. Pseudomonas aeruginosa-related infections typically occur within hospital settings and among patients with weakened immune systems. Health care professionals should note that patients on breathing machines or those with devices such as catheters, and patients with wounds are more likely to develop severe, life-threatening Pseudomonas aeruginosa-related infections.

Symptoms of infection - Symptoms of Pseudomonas aeruginosa-related infections may vary depending on the type of infection, site of infection and patient specific factors.

Spreading of the infectious agent - In health care settings, Pseudomonas aeruginosa may spread on the hands of health care professionals or via contaminated equipment, objects and/or surfaces.

Prevention - To prevent the spreading of Pseudomonas aeruginosa among patient populations, health care professionals should follow hand hygiene procedures and indications. The transmission of Pseudomonas aeruginosa may also be prevented through the routine disinfection of potentially contaminated equipment, objects and surfaces.

Klebsiella

Background notes - Klebsiella is a type of Gram-negative bacteria that can cause different types of health care-associated infections including: pneumonia, bloodstream infections, wound or surgical site infections, and meningitis. Klebsiella bacteria are normally found in the human intestines. Klebsiella infections commonly occur among patients whose care requires ventilators, intravenous (vein) catheters and patients who are taking long courses of antibiotics. Essentially, Klebsiella-related infections typically occur among patients who are receiving treatment for other serious conditions.

Symptoms of infection - The signs and symptoms of a Klebsiella-related infection can vary depending on the site of infection. With that said, patients suffering from a Klebsiella-related infection may experience fever, chills and body aches.

Spreading of the infectious agent - Klebsiella may be spread via direct contact with infected individuals or contaminated objects and/or surfaces. Health care professionals should note that patients on ventilators or have intravenous (vein) catheters or wounds may be more susceptible to a Klebsiella-related infection.

Prevention - To prevent the spreading of Klebsiella among patient populations, health care professionals should follow hand hygiene procedures and indications. The routine disinfecting of potentially contaminated objects/surfaces may also prevent the transmission of Klebsiella-related infections.

Candida auris

Background notes - *Candida auris*, also referred to as *C. auris*, is a fungus that can cause serious infections. Individuals are typically affected by *C. auris* via colonization. Colonization can occur when an individual has *C. auris* somewhere on his or her body but does not have an infection or symptoms of infection.

Symptoms of infection - The most common symptoms of a *C. auris*-related infections are fever and chills.

Spreading of the infectious agent - As previously alluded to, *C. auris* may spread via contact with *C. auris* colonized individuals.

Prevention - To prevent the spreading of *C. auris* among patient populations, health care professionals should follow hand hygiene procedures and indications.

Standard Precautions

At the beginning of this section the following question was posed - why is hand hygiene essential to the administration of safe and effective health care? It was then indicated that hand hygiene is essential to the administration of safe and effective health care for two fundamental reasons, the first of which being to help prevent the transmission of infections among patient populations, i.e., hand hygiene can help prevent health care-associated infections transmitted to patients on the hands of health care professionals. That being said, what is the second fundamental reason why hand hygiene is essential to the administration of safe and effective health care? The second fundamental reason why hand hygiene is essential to the administration of safe and effective health care is closely related to the first reason. In essence, the second fundamental reason why hand hygiene is essential is because it is one part of a greater set of practices centered around infection control known as Standard Precautions. Standard Precautions may refer to the minimum infection prevention practices that apply to all patient care, independent of the suspected or confirmed infection status of a patient, in any setting health care is administered.¹ The goal of Standard Precautions is to prevent the spread of infections. In addition to hand hygiene, Standard Precautions typical include the following elements: the use of personal protective equipment (PPE), respiratory hygiene, sharps safety, safe injection practices, sterile instruments and devices as well as methods to clean and disinfect environmental surfaces.¹ All of the aforementioned elements of Standard Precautions are vital to health care and their related procedures and indications are typically required by all health care professionals. With that said, of the previously listed elements of Standard Precautions, one of the most important elements of

Standard Precautions, and perhaps the one most closely related to hand hygiene, is the use of PPE. For those reasons, the remainder of this section will focus on PPE. The information regarding PPE will be broken down and presented in informational segments. The information found in the remainder of this section was derived from materials provided by the CDC and WHO.^{1,2}

Personal Protective Equipment (PPE)

PPE can refer to equipment designed to protect, shield and minimize exposure to hazards that may cause serious injury, illness and/or disease. PPE can include a variety of different types of equipment such as: gowns, masks, goggles, face shields, respirators and, of course, gloves.

Gown

Background information - The gown may be one of the most recognizable pieces of PPE. The purpose of a gown is to protect an individual's torso and arms from potential contamination. Gowns are typically clean or sterile and often resistant to fluids.

Donning PPE - When putting on a gown, a health care professional should make sure the gown completely covers his or her torso from the neck to the knees. The gown should also completely cover a health care professional's arms and wrists. Additionally, a gown should be wrapped around the back and fastened at the back of the neck and waist.

Removing PPE - To effectively remove a gown, a health care professional should unfasten the gown's ties and pull the gown away from the neck and shoulders. When the gown is removed from the body, it should be rolled or folded and placed in the appropriate waste container. Health care professionals should wash their hands or use an alcohol-based hand sanitizer after removing all PPE.

Mask

Background information - The mask is another very recognizable piece of PPE. The purpose of a mask is to protect a health care professional's face from potentially infectious materials.

Donning PPE - When putting on a mask, a health care professional should make sure the mask completely covers his or her mouth and nose. A health care professional should also ensure a mask fits snug to the face and below the chin. Often masks can be secured to the head and neck via separate ties.

Removing PPE - To effectively remove a mask, a health care professional should untie the bottom ties, if applicable, followed by the upper ties. The mask should then be pulled off and discarded in the appropriate waste container. A health care professional should not touch a contaminated mask. Health care professionals should wash their hands or use an alcohol-based hand sanitizer after removing all PPE.

Goggles

Background information - Goggles are typically worn with a mask. The purpose of goggles is to protect the eyes from potentially infectious materials.

Donning PPE - When putting on goggles, a health care professional should make sure the goggles fit snugly around the eyes. If a health care professional wears personal prescription lenses, the goggles should fit snugly around his or her personal prescription lenses. Furthermore, goggles should be properly adjusted on the face to maximize vision and protection.

Removing PPE - To effectively remove goggles from the face, a health care professional should take off the goggles from the back by lifting the goggle's band and pulling them forward. If the goggles are not reusable they should be placed in the appropriate waste container. A health care professional should not touch contaminated goggles. Health care professionals should wash their hands or use an alcohol-based hand sanitizer after removing all PPE.

Face Shields

Background information - A face shield can be worn in place of goggles. The purpose of a face shield is to protect the eyes, nose and mouth from potentially infectious materials.

Donning PPE - When putting on a face shield, health care professionals should make sure the face shield covers the forehead, extends below the chin and wraps around the side of the face.

Removing PPE - To effectively remove a face shield, a health care professional should take off the face shield from the back by lifting the face shield's band and pulling it forward. If the face shield is not reusable, it should be placed in the appropriate waste container. A health care professional should not touch a contaminated face shield. Health care professionals should wash their hands or use an alcohol-based hand sanitizer after removing all PPE.

Respirator

Background information - The purpose of a respirator is to protect a health care professional from hazardous and/or infectious aerosols. There are many types of respirators available to health care professionals including: particulate respirators, half-face elastomeric respirators, full-face elastomeric respirators and powered air purifying respirators. The most common type of respirators used by health care professionals are particulate respirators. When selecting a specific type of respirator, health care professionals should consider the type of exposure risk associated with patient care. A "fit test" may be required to determine the appropriate size respirator need for each individual health care professional. Health care professionals may also require training regarding how and when to use a respirator.

Donning PPE - When putting on a respirator, a health care professional should make sure the respirator completely covers his or her mouth and nose. Health care professionals should also ensure the respirator fits snug to the face and below the chin. Additionally, a health care professional should be sure the respirator is properly sealed.

Removing PPE - To effectively remove a respirator, a health care professional should untie the bottom ties, if applicable, followed by the upper ties. The respirator should then be pulled off and discarded in the appropriate waste container. A health care professional should not touch a contaminated respirator. Health care professionals should wash their hands or use an alcohol-based hand sanitizer after removing all PPE.

Gloves

Background information - Gloves are often the most common piece of PPE used by health care professionals. The two main reasons why health care professionals should wear gloves include the following - to reduce the risk of contamination of health care professionals' hands with blood and other body fluids and to reduce the risk of germ dissemination to the environment and/or transmission from the health care worker to the patient and vice versa, as well as from one patient to another. When wearing gloves, health care professionals should avoid touch contamination. Touch contamination may refer to touching one's self and/or other surfaces such as tables, light switches and doors while wearing gloves. Touch contamination may lead to contamination and/or the passing of potentially infectious materials. Health care professionals should also remember to change their gloves as they administer care to different patients, i.e., a new patient means a new pair of gloves. Additional information and recommendations regarding gloves may be found in Figure 1.

Donning PPE - When putting on a pair of gloves, a health care professional should make sure the gloves extend to cover the wrists of isolation gowns, if applicable. Gloves are often the last piece of PPE donned when putting on required PPE. When donning gloves, health care professionals should follow the following steps:

- 1) Health care professionals should note the following - when an indication for hand hygiene precedes contact that also requires glove usage, hand rubbing with an alcohol-based handrub or handwashing with soap and water should be performed before donning gloves.
- 2) Take out a glove from its original box.
- 3) Health care professionals should be sure to touch only a restricted surface of a glove corresponding to the wrist (at the top edge of the cuff).
- 4) Don the first glove.
- 5) Take the second glove with the bare hand and be sure to touch only a restricted surface of a glove corresponding to the wrist (at the top edge of the cuff).
- 6) Health care professionals should note the following - to avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand (don the second glove).
- 7) Health care professionals should note the following - once both hands are gloved, hands should not touch anything else that is not defined by indications and conditions for gloved use.

Removing PPE - To effectively remove a pair of gloves, a health care professional should use one gloved hand to grasp the palm area of the other gloved hand. Once the health care professional has a firm grip on the palm of one gloved hand, the health care professional should then peel off the first glove. After removing the first glove, the health care professional should then hold that glove in one hand. Using his or her fingers, the health care professional should slide the fingers off his or her ungloved hand under the remaining glove at the wrist and peel off the second glove right over the first glove. Both gloves should then be placed in the appropriate waste container.

If health care professionals are wearing a gown with gloves, they may also remove their gloves when they are removing their gowns. To do so, health care professionals should peel off each glove as they roll or fold their gowns before disposal. Both the gloves and the gown should then be discarded in the appropriate waste container.

When removing a pair of gloves with a gown, health care professionals should ensure they do not touch the gloves or the gown with their bare hands. Health care professionals should wash their hands or use an alcohol-based hand sanitizer after removing all PPE.

FIGURE 1: RECOMMENDATIONS REGARDING THE USE OF GLOVES

- The use of gloves does not replace the need for hand hygiene by either handrubbing or handwashing.
- Gloves do not provide complete protection against hand contamination.
- Health care professionals should remove gloves after caring for a patient.
- When wearing gloves, health care professionals should change or remove gloves in the following situations: during patient care if moving from a contaminated body site to another body site (including a mucous membrane, non-intact skin or a medical device within the same patient or the environment).
- Health care professionals should be sure to wear gloves when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes or non-intact skin, will occur.
- The prolonged use of gloves for contact precautions in the absence of considering the need to perform hand hygiene can result in the transmission of germs.
- When an indication for hand hygiene precedes a contact that also requires glove usage, hand rubbing or hand washing should be performed before donning gloves.
- When an indication for hand hygiene follows a contact that has required gloves, hand rubbing or hand washing should occur after removing gloves.
- When an indication for hand hygiene applies while the health care professional is wearing gloves, then gloves should be removed to perform handrubbing or handwashing.
- The use of contaminated gloves caused by inappropriate storage, inappropriate moments and techniques for donning and removing, may also result in germ transmission.
- Typically, gloves are single-use items, glove decontamination and reprocessing are not recommended and should be avoided.

Section 2: Summary

Adequate hand hygiene is essential to the safe and effective administration of health care. There are two fundamental reasons why adequate hand hygiene is essential to the safe and effective administration of health care. The first reason why adequate hand hygiene is essential is because it can help prevent the transmission of infectious agents among patient populations. It is believed that the majority of infectious agents causing health care-associated infections are transmitted to patients on the hands of health care professionals. Thus, adequate hand hygiene can be a means to help prevent health care-associated infections transmitted to patients on the hands of health care professionals. With that said, the typical infectious agents/infections that may be spread from health care professionals to patient populations include the following: *Clostridioides difficile* (*C. diff*), norovirus, rotavirus, the hepatitis A virus, adenoviruses, *Staphylococcus aureus* (*Staph aureus*), *Streptococcus* (group A strep), VRE, *Pseudomonas aeruginosa*, *Klebsiella* and *C. auris*. Each of the aforementioned infectious agents can lead to various infections/illnesses and can affect patients in different ways. Some of the aforementioned infectious agents may even be life-threatening to specific patient populations. Therefore, health care professionals must follow hand hygiene procedures and indications to prevent the transmission of such infectious agents to patients.

The second reason why hand hygiene is essential to the safe and effective administration of health care is because it is one part of a greater set of practices centered around infection control known as Standard Precautions. Standard Precautions may refer to the minimum infection prevention practices that apply to all patient care, independent of the suspected or confirmed infection status of a patient, in any setting health care is administered. The goal of Standard Precautions is to prevent the spread of infections. In addition to hand hygiene, Standard Precautions typical include the following elements: the use of PPE, respiratory hygiene, sharps safety, safe injection practices, the use of sterile instruments and devices as well as methods to clean and disinfect environmental surfaces. Health care professionals should adhere to the elements of Standard Precautions at applicable times when administered health care to patients in order to maintain the integrity of infection control in health care settings.

Section 2: Key Concepts

- Adequate hand hygiene can be a means to help prevent health care-associated infections transmitted to patients on the hands of health care professionals.

- Adequate hand hygiene is one part of a greater set of practices centered around infection control known as Standard Precautions.
- Standard Precautions typical include the following elements: hand hygiene, the use of PPE, respiratory hygiene, sharps safety, safe injection practices, the use of sterile instruments and devices as well as methods to clean and disinfect environmental surfaces.
- Health care professionals should adhere to all of the elements of Standard Precautions to help maintain the integrity of infection control in health care settings.

Section 2: Key Terms

Standard Precautions - the minimum infection prevention practices that apply to all patient care, independent of the suspected or confirmed infection status of a patient, in any setting health care is administered

Personal Protective Equipment (PPE) - equipment designed to protect, shield and minimize exposure to hazards that may cause serious injury, illness and/or disease

Touch contamination - touching one's self and/or other surfaces such as tables, light switches and doors while wearing gloves

Section 2: Personal Reflection Question

How can health care professionals maintain the integrity of infection control while administering health care to patients in need?

Course Review

The following questions are presented below to further review the concepts found in this course. By reviewing these questions, health care professionals can obtain practical knowledge which may be used to safely and effectively administer health care to patients.

What products may be used by health care professionals to carry out adequate hand hygiene?

Health care professionals may use a variety of different products to carry out adequate hand hygiene such as: detergents, plain soaps, antimicrobial (medicated) soaps, antiseptic agents and alcohol-based hand rubs. Health care professionals

should note that hand hygiene product selection should be based on recommended indications for use.

What are the five major indications for hand hygiene?

There are several indications for hand hygiene - however, the five major or fundamental indications for hand hygiene include the following: before patient contact, before an aseptic procedure or task, after a body fluid exposure risk occurs, after touching a patient and after contact with a patient's surroundings.

When should health care professionals engage in handwashing?

There are several recommendations and indications regarding handwashing - however, when health care professionals are considering when to engage in handwashing, they should follow the following fundamental indication - health care professionals should wash their hands with soap and water when they are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.

Where should alcohol-based handrubs be located within health care settings?

There are several recommendations regarding the location of alcohol-based handrubs - however, when health care professionals are considering the location of alcohol-based handrubs, they should follow the following fundamental recommendation - alcohol-based handrubs should be located at the point-of-care, i.e., the place where a patient, a health care professional, and care or treatment involving contact with a patient or his or her surroundings (within the patient zone) all come together. The previous concept embraces the need to perform hand hygiene at recommended moments exactly where care delivery takes place. This requires that alcohol-based handrub products are easily accessible and as close as possible - within arm's reach of where patient care or treatment is taking place. Point-of-care products should be accessible without health care professionals having to leave the patient zone.

What are the symptoms of C. diff?

The typical symptoms of a C. diff infection include the following: diarrhea, nausea, stomach tenderness, stomach pain, loss of appetite and fever. Health care professionals should note that they can help prevent the transmission of C. diff and other infectious agents by engaging in adequate hand hygiene.

When should health care professionals don gloves?

There are several recommendations and indications regarding gloves - however, when health care professionals are considering when to don gloves they should follow the following fundamental indication - health care professionals should be sure to wear gloves when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes or non-intact skin, will occur. Additionally, health care professionals should remember to remove their gloves after caring for a patient.

Conclusion

Adequate hand hygiene is essential to the safe and effective administration of health care. Health care professionals may achieve adequate hand hygiene by following recommended hand hygiene procedures and indications. The recommended hand hygiene procedures include the following: handwashing, hygienic hand antisepsis, hygienic handrub, hygienic handwash, hand antisepsis/decontamination/degerming antiseptic handwashing, antiseptic handrubbing (handrubbing), alcohol-based hand rubbing, surgical hand antisepsis/surgical hand preparation/ presurgical hand preparation, surgical handscrub/presurgical scrub and surgical handrubbing. Health care professionals should be familiar with the step-by-step process of the aforementioned hand hygiene procedures as well as related indications. The five major indications for hand hygiene include the following: before patient contact, before an aseptic procedure or task, after a body fluid exposure risk occurs, after touching a patient and after contact with a patient's surroundings. Due to the importance of hand hygiene, health care professionals should encourage the practice of adequate hand hygiene among their peers and look for opportunities to increase hand hygiene compliance in health care settings.

Adequate hand hygiene is essential to the administration of safe and effective health care for two fundamental reasons. The first reason is that adequate hand hygiene can help prevent health care-associated infections transmitted to patients on the hands of health care professionals.

The second reason why hand hygiene is essential to the safe and effective administration of health care is because it is one part of a greater set of practices centered around infection control known as Standard Precautions. Standard Precautions typically includes the following elements: hand hygiene, the use of PPE, respiratory hygiene, sharps safety, safe injection practices, the use of sterile instruments and devices as well as methods to clean and disinfect environmental

surfaces. Health care professionals should adhere to all of the aforementioned elements of Standard Precautions, including hand hygiene, at applicable times in order to maintain the integrity of infection control while administering health care to patients in need.

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