We will be discussing “Asepsis & Hand Hygiene”. This is Part I of II. In Part I, we will cover aseptic or sterile technique, clean technique, hand hygiene, and recommendations for hand hygiene.

### Slide 2

<table>
<thead>
<tr>
<th>Asepsis</th>
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<tr>
<td>• Absence of pathogenic (disease-producing) microorganisms</td>
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<tr>
<td>• Refers to “aseptic technique”</td>
</tr>
<tr>
<td>• Often interchanged with “sterile technique”</td>
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<tr>
<td>• Gold standard of infection control patient care practices</td>
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</table>

Asepsis is defined as the absence of pathogenic (disease-producing) microorganisms. In terms of technique and infection control, what we are trying to achieve with asepsis is to have either the absence or the least amount of disease producing organisms as possible present so that an infection does not occur. This process is referred to as aseptic technique. As you’ll see next week when we cover patient care practices, almost every type of insertion of a device requires aseptic technique. Aseptic technique is also referred to as “sterile technique”. These two terms are often interchanged. Aseptic technique is considered the gold standard of infection control processes and patient care practices because this is what you want to strive for, in order to reduce or eliminate transmission of infections between patients, staff and visitors.

### Slide 3

<table>
<thead>
<tr>
<th>Aseptic &amp; Clean Techniques</th>
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<tr>
<td>There are two types of techniques used in healthcare settings. These are “aseptic (or sterile) technique” and “clean technique”.</td>
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### Slide 4

<table>
<thead>
<tr>
<th>Sterile (Aseptic) Technique</th>
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<tr>
<td>• Goal: render &amp; maintain objects &amp; areas maximally free of microorganisms</td>
</tr>
<tr>
<td>• Maintain area of sterile field with sterile gowns, gloves, &amp; drapes</td>
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<tr>
<td>• Wear appropriate attire as indicated by procedure risk &amp; area where procedure performed</td>
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Let’s look first at sterile or aseptic technique. Sterile or aseptic technique refers to strategies used in patient care with the goal to render and maintain objects and areas maximally free from microorganisms. Sterile technique involves meticulous hand hygiene; use of sterile barriers; and use of sterile instruments and materials. During the use of sterile technique, there should be no contact with any nonsterile surface or product. Additional attire, such as a sterile gown or a mask, should be worn as appropriate. You will see over and over again next week when we discuss patient care practices, how these concepts are reiterated. It will make a lot more sense when you see specific examples, but the groundwork needs to be laid first. *(Sources: APIC Text of Infection Control Practice; Infection Control In Home Care and Hospice by Emily Rhinehart, 2nd Edition, 2006)*
### Slide 5
**Sterile Technique Examples**
- Surgery
- Insertion of central lines
- Insertion of urinary catheters

Three examples of sterile technique that will be discussed are surgery, putting in a central line, and inserting a urinary catheter.

### Slide 6
**Sterile Technique: Surgery**

In this picture on the left, you can see where surgery is being conducted. A sterile drape surrounds the operative field. On the right is someone putting on all the surgical garb prior to going into surgery. The area below the waist is not considered sterile, as well as behind persons in the surgical area. That is why the person that is tying the ties on the back of the gown isn’t using gloves, because it is not necessary for that part of the field to be sterile.

### Slide 7
**Sterile Technique: Inserting a Central Line**

Another example of sterile technique is during insertion of a central line. As you can see in this picture, the person has on gloves which are sterile, the device is sterile and they have a drape which is around the area where they are working. They have decontaminated that area on the skin with an iodophor or an alcohol or some other antiseptic agent.

### Slide 8
**Sterile Technique: Inserting a Urinary Catheter**

The third example of sterile technique is insertion of a urinary catheter. This picture shows a mannequin that they use in training students to do this procedure. First they set up the sterile field and then do the insertion. A urinary device is a critical item (as you learned in the lectures on “Cleaning, Sterilization & Disinfection), so it must be sterile.

### Slide 9
**Sterile Technique: Setting up a Sterile Field**

Here is an example of a sterile field being set up prior to the procedure of inserting a urinary catheter. You may not be doing the procedure in the operating room; it may be at the bedside. You want to have a sterile field so that everything on this drape is sterile and that you don’t contaminate it. The person should be wearing sterile gloves. The goal is, that by the time these devices are inserted into a patient, they have still not become contaminated; they are still sterile.
These diagrams illustrate how to put on (also called “donning”) sterile gloves using sterile technique and then how to take them off. In this figure on the left you see that the right glove is put on first, with the left hand touching only the area inside the cuff, which is going to be facing inside once the glove is put on (and thus not in a sterile area). Next, the right gloved hand is inserted into the outside of the left glove under the cuff, the left glove is pulled on with the right hand, and the person is now only touching the very outside of the cuff of the left glove with the right glove, thus still maintaining sterility. So it is possible to put on two pairs of gloves without contaminating the outside. That is technique that has to be taught. When taking off gloves, what you want to be able to do is pull one off by touching the least amount as possible, so that when you pull them off you are not contaminating your hands further. You try and pull one off inside the other so that you are holding it up and not releasing any of the organisms that are there or not contaminating yourself any further. After this, hand hygiene should be performed either with an alcohol-based hand rub or with soap and water.

“Clean technique” refers to practices used in patient care to reduce the overall number of microorganisms present or to prevent or reduce the transmission of microorganisms from one person to another or one place to another. Clean technique involves meticulous hand hygiene with either an antiseptic hand rub product or an antibacterial soap and water with adequate rinsing; using barriers and sterile materials and supplies, and maintaining a clean environment; and preparing a clean field to prevent the direct contamination of materials and supplies. Clean technique employs a concept entitled the “no-touch technique”. The “no-touch technique” is a method of changing surface dressings without touching the wound or the surface of any dressing that might be in contact with the wound. Dressings that adhere to the wound are grasped by the corner and slowly removed, whereas gauze dressings can be pulled up from the center of the wound and then lifted off. (Sources: APIC Text of Infection Control Practice; Infection Control In Home Care and Hospice by Emily Rhinehart, 2nd. Edition, 2006).

Three examples of clean technique are changing a dressing, doing wound care, or drawing blood.
### Slide 13
**Clean Technique: Changing Dressing**

It is possible (and you have all probably done this) to put a band-aid on a cut without touching the inside of the band-aid. So in that situation you are trying to do that so that you don’t deposit microorganisms on that steriley packaged band-aid that you are going to put on the wound site. You can do that with the “no touch technique”. When you open the band-aid, it has those two little paper pieces that allow you to touch it without contaminating the inside of the band-aid. That is a very good example of the “no touch technique”.

### Slide 14
**Wound care using “no-touch” technique**

In this example, two persons are changing a dressing from a very large area of interrupted skin. They are using the “no touch technique” and obviously this is a very large wound. In this situation, they want to take care not to get organisms on themselves as well as to replace the old contaminated dressings with supplies that are sterile, using meticulous hand hygiene, and maintaining the working area to be as free of microorganisms as possible when they put on new dressings.

### Slide 15
**Clean Technique: Drawing Blood**

Drawing blood is another example of a clean technique. In this situation, it is very important to differentiate between the technique and the device. If you have someone drawing your blood, the device needs to be sterile because it is entering the vascular system, so it is a critical item. Have any of you ever had your blood drawn where they came in and they put a drape around you and they used sterile gloves and they put on a gown and they drew blood without touching anything? Probably not, because the technique employed is “clean technique”, not “sterile technique”. They use a clean technique and a sterile device. Make sure you understand the difference there. Some phlebotomists, even though it is a recommendation that you wear gloves when you are drawing blood, may use their finger to palpate the vein before they swab it with alcohol. The other goal of getting your blood drawn, besides having a nice clean site, is that somebody doesn’t have to stick you multiple times. You don’t want that happening. Some very skilled phlebotomists can do it with gloves, but others will take an alcohol wipe and clean the skin and then they will wipe their finger to be able to palpate before they enter. So that is why this is not sterile technique, it is clean technique but you use a sterile device.

### Slide 16
**Sterile vs. Nonsterile Gloves**

The use of non-sterile versus sterile gloves for routine changing of surgical site dressings remains an unresolved issue. You will find out what an unresolved issue is when you read the Hand Hygiene Guidelines. It is because wounds can still be colonized and they are not sterile so that the rationale behind that is, why use a sterile glove if you are going to change a wound dressing when it isn’t sterile?
On slide #10, there was a figure showing how to put on and take off sterile gloves using sterile technique. On this slide is a diagram for how to do this with exam gloves and clean technique. Removal of the exam gloves is the same procedure as with sterile gloves. The source of this diagram is from the fourth Required Reading, “W.H.O. Guidelines on Hand Hygiene in Healthcare”, page 21.

Why do you need to know about clean and sterile technique? Because these are essential infectious disease prevention strategies and an important part of infection prevention & control. As you will see next week, over and over again, they are what make up patient care practices in varying degrees and situations, via putting in a line, putting in a catheter, changing a ventilator, handling tubing, doing tracheotomy care, etc.

Next we are going to discuss hand hygiene. Your first Required Reading for this week is the most recent set of guidelines from the Centers for Disease Control & Prevention on Hand Hygiene, dated 2002. You will hear over and over when people talk about infection control, that hand hygiene is one of the most important procedures for preventing infection, preventing transmission between HCWs, patients, and visitors. When you read in the literature, with many outbreaks in hospitals, nursing homes, daycare centers, etc., they are very often related to inadequate hand hygiene. This is a very hard thing with which to achieve compliance of 100% among HCWs, so this is not surprising.

Important terms are defined in these next 2 slides. The universal term that now encompasses all aspects of cleaning hands, is “hand hygiene”, not “handwashing”, as it used to be. “Hand hygiene” includes handwashing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis. “Handwashing” is now defined as washing hands with plain soap & water. “Hand antisepsis” refers to either an antiseptic handwash, or antiseptic hand rub. If you wash hands with water and soap or other detergents containing an antiseptic agent, it becomes an “antiseptic handwash”. So the best way to remember “handwashing” is washing hands with a plain soap that doesn’t have an antimicrobial or antiseptic agent. If you use an antimicrobial agent-containing soap or detergent and water, it steps it up to “hand antisepsis”.

| Slide 17 | Putting on & removing exam gloves: Clean technique
| Slide 18 | Why Do You Need to Know This?
| Slide 19 | Hand Hygiene
| Slide 20 | Definition of Terms 1

### Slide 17
- Putting on & removing exam gloves: Clean technique
- Source: RR#4

### Slide 18
- **Why Do You Need to Know This?**
  - They are essential infectious disease prevention strategies
  - They are important part of infection prevention & control
  - Patient care practices involve both techniques in varying situations

### Slide 19
- **Hand Hygiene**
  - One of the most important procedures for preventing transmission of disease-producing organisms or infections
  - Many hospital outbreaks of infections related to inadequate hand hygiene

### Slide 20
- **Definition of Terms 1**
  - **Hand hygiene**: handwashing, antiseptic handwash, antiseptic hand rub, or surgical hand antisepsis
  - **Handwashing**: washing hands with plain (non-antimicrobial) soap & water
  - **Hand antisepsis**: refers to either antiseptic handwash or antiseptic hand rub
  - **Antiseptic handwash**: washing hands with water and soap or other detergents containing an antiseptic agent
An "antiseptic hand rub" refers to the process of applying an antiseptic hand rub product to all surfaces of the hands to decrease the numbers of microorganisms present. No water is used in this process. An "alcohol-based hand rub" is what is usually used to perform an antiseptic hand rub. In the U.S., such preparations usually contain 60-95% ethanol or isopropanol. The final term to define is "surgical hand antisepsis". This is a procedure performed by surgical personnel, preoperatively, to eliminate transient and reduce resident hand flora. Remember what we learned last week, that antiseptic agents are those used on living tissue, so we wouldn’t use that term for disinfectants and sterilization processes that are used on devices or inanimate surfaces.

Hands have two different types of organisms on them, with different properties, and they are removed in different ways. These 2 major types of organisms are called “resident flora” and “transient flora”.

Transient flora are not permanent residents of the skin; rather, they colonize the superficial layers of the skin. Transient flora can be thought of as hitchhikers. HCWs can pick them up when they are doing procedures on patients or when they are having contact with contaminated inanimate objects. The good news is that transient flora are more amenable to removal by just using routine handwashing with plain soap and water. The bad news is that transient flora are the organisms most frequently associated with healthcare-associated infections.

On the other hand, resident flora are those that colonize the skin for longer periods. They are more resistant to removal. Examples of resident flora are coagulase negative Staph or diptheroids. As resident flora are attached to much deeper layers of the skin, antimicrobial agents need to be used to decontaminate the skin. So plain soap and water are not the optimal agents to use against resident flora. These flora are what are targeted to be removed before surgery, from the hands of surgical personnel. That is why, historically, scrub brushes and longer scrub times have been employed. Therefore, you have to take longer to remove resident flora before you do an invasive procedure.
Hand Hygiene Agents

- Plain (non-antimicrobial) soap
- Alcohols
- Chlorhexidine
- Iodine & iodophors
- PCMX (Chloroxylenol)
- Hexachlorophene
- Triclosan
- Quaternary ammonium compounds

See RR#1: Appendix “Antimicrobial Spectrum & Characteristics of Hand-Hygiene Antiseptic Agents”

This slide summarizes some concepts from page 45 (Appendix) in Required Reading #1. Just as there were many disinfectants that we talked about last week, for hand hygiene, there are numerous hand hygiene agents available. The first is plain non-antimicrobial soap. Plain soap has minimal antimicrobial activity, but it can remove loosely adherent transient flora. Alcohol, (which is the primary component of the alcohol hygienic hand rub) has excellent activity against gram +, and gram - vegetative bacteria, including multi-drug resistant pathogens like MRSA and VRE; Mycobacterium tuberculosis; various fungi; and certain lipophilic viruses such as hepatitis B and hepatitis C. Alcohol has a fast speed of action but does not have persistent activity; plus it is flammable. Chlorhexidine, which can be a 2% or a 4% formulation, is a good hand hygiene agent because it has some residual properties as well as only rare allergic reactions. Then there are iodine and iodophors, with intermediate speed of action. Iodine can cause skin burns, so iodophor is less irritating than iodine. PCMX is a phenolic compound available in several concentrations. Results of studies on its efficacy have been contradictory. We have hexachlorophene which traditionally has been used in the nursery, because it is very effective against Staphylococcus aureus, which is common in infants. However, its strength against gram + organisms like Staph. aureus is offset by its weakness for gram- organisms. It can also have potential neurotoxic effects. Triclosan is an intermediate-acting agent whose acceptability on hands varies. Quaternary ammonium compounds or “quats”, have a relatively slow speed of action and are weak against gram – organisms. Newer formulations that also contain benzalkonium chloride need efficacy studies. For the CIC exam, practitioners are required to know the main properties of these agents. In this course, we are not going to get into that much detail, but I would like for you to look in that appendix to compare the different agents, to see what the advantages and disadvantages are. Some of these can be drying, some of them have a residual or persistent activity, some have no persistent activity. This results in different situations where one agent might be beneficial over the other.

Special Situations

- None of these agents are reliably sporicidal (Bacillus or Clostridium)
- Hands contaminated with B. anthracis or C. difficile-contaminated items should be washed with a non-antimicrobial or antimicrobial soap & water

“The widespread prevalence of healthcare-associated diarrhea caused by Clostridium difficile and the recent occurrence in the U. S. of human Bacillus anthracis infections associated with contaminated items sent through the postal system have raised concerns regarding the activity of antiseptic agents against spore-forming bacteria. None of the agents (including alcohols, chlorhexidine, hexachlorophene, iodophors, PCMX, and triclosan) used in antiseptic handwash or antiseptic hand-rub preparations are reliably sporicidal against Clostridium spp. or Bacillus spp. Washing hands with non-antimicrobial or antimicrobial soap and water may help to physically remove spores from the surface of contaminated hands. HCWs should be encouraged to wear gloves when caring for patients with C. difficile-associated diarrhea. After gloves are removed, hands should be washed with a non-antimicrobial or an antimicrobial soap and water or disinfected with an alcohol-based hand rub. During outbreaks of C. difficile-related infections, washing hands
with a non-antimicrobial or antimicrobial soap and water after removing gloves is prudent. HCWs with suspected or documented exposure to *B. anthracis*-contaminated items also should be encouraged to wash their hands with a non-antimicrobial or antimicrobial soap and water*. (Source: CDC 2002 Hand Hygiene Guidelines).

Hand hygiene has become more complicated in the last decade. There are new terms often used interchangeably with older terms. Practices that people had ingrained into their mind that they would never do, are now being done doing and things that we thought would never change, have changed. When you change something that someone has done for a long time, this is very difficult. What we are finding now is that we can’t just accept patient care practices that haven’t been tested, that haven’t been studied, that we can’t demonstrate to reduce infection, save cost or both. It is becoming more difficult to make a recommendation if you can’t back it up with a study that has been conducted. The other thing that is complicated about hand hygiene is that it involves patient safety, HCW safety and visitor safety. Many factors have been integrated into the whole set of practices on hand hygiene, which is why they are very long. There is a history to them, there are a whole set of practices that have been changed and there is a whole new set of recommendations. That is why it is very important for you to read the guidelines on hand hygiene (RR#1).

This slide shows some examples of excuses that healthcare workers (HCWs) have for not washing their hands. “I didn’t have time.” That is a very common HCW comment. “It was an emergency and I decided that it was more important to save a person’s life than to wash my hands.” This is often heard from emergency department, trauma, intensive care unit, or emergency medical service personnel. “There was no soap, there was no water”-mechanical reasons also related to human factors (not replacing soap when empty or unavailability of enough sinks). “I was wearing gloves” (we will learn about that more in a few minutes). “I’m not going to touch anything.” Our neonatal intensive care unit (NICU) had a mandated 3 minute handwashing procedure before entering. It wasn’t so much the regular staff, but other departments and consultants, who would go in and not wash their hands with the excuse that they were not going to touch anything. It is really interesting how you could go into a neonatal intensive care patient care area and not touch anything. Very often they did touch things, so that is a problem. Now that we have hand hygiene agents that do not require soap and water, it does save time.
In the hand hygiene universe, there are some situations where you use soap and water, and some situations where you can decontaminate hands without the presence of water. You will learn about these differences in a few more slides.

Compliance among HCWs with hand hygiene is suboptimal. When we are talking about using soap and water, especially in older hospitals, the location or inadequate number of sinks may be barriers to compliance. In the hospital where I worked in California, the 24-bed neonatal intensive care unit only had 4 sinks. The rooms were lined up with bassinets, and if you wanted to wash your hands you had to go all the way across the room to do that. If there was a critically ill infant that needed immediate care right next to another infant, someone might not choose to walk over to the sink to wash his/her hands before caring for that critically ill infant. The time it takes to use soap and water is often an excuse for not washing hands. There may not be time to wash hands in a emergency situation. The skin is the first barrier of defense against infection, so you want to make sure that it is in the best condition as possible. Different handwashing agents can effect the pH, lipid content, cause across-skin water loss, and result in microbial shedding. If there is too much irritation and scrubbing or an irritating solution, it can actually cause more shedding of microorganisms so it defeats the purpose of getting rid of them. So these are all issues that are in the argument using soap and water, to clean hands. As you have already read or will soon find out, sometimes there are situations where you have to use soap and water.

We have now have evolved into using a hygienic handrub with an alcohol-based product. It was used in the only program with sustained improvement in hand hygiene compliance and decreased infection rates. It is more convenient because it has excellent spreading when using an alcohol hand rub and it evaporates quickly so it decreases the chance that you will have wet hands, which can also have microorganism. No water is necessary. Alcohol has an optimal action against bacteria, fungi, viruses and yeasts. The other advantage is that is acts very quickly. Because of all of these factors, and the studies that have supported them, it is now considered the preferred method for decontaminating hands, except in certain situations. You will learn these situations in a few more slides.
**Slide 32**

**How to Clean without Water (hygienic hand rub)**
- Spread recommended amount into palm of one hand
- Rub thoroughly over all surfaces until hands dry
- Not recommended when hands soiled with organic material
- Wash with soap & water after 5-10 times

This is how to clean hands without water, using a hygienic hand rub. First, spread the recommended amount into the palm of one hand. On the bottle it will tell you the recommended amount: e.g., one squirt, a dime-sized amount, a quarter-sized amount, etc. It is really important to read those instructions because there is a lot of variety among hand rub products. Also, keep in mind that more is not necessarily better. If you use too much, alcohol can dry your skin and if there isn’t an emollient (or softener) in there, you can damage the skin if you use this repeatedly. Rub thoroughly over all surfaces of the hands until they are dry. How many of you have noticed after you use these products 5-10 times, your hands start to feel sticky? The recommendation is, you should go to a sink and wash your hands with soap and water after the manufacturers’ recommendations for the number of hand rubs that should be followed by a soap and water handwash.

**Slide 33**

**How to Wash with Soap & Water**
- wet hands
- soap up
- wash for 15 seconds
- vigorously rub all surfaces
- rinse
- dry

When washing with soap and water, wet the hands first with water, apply an amount of product to the hands as recommended by the manufacturer, and rub hands together vigorously for at least 15 seconds. Hands should then be rinsed with water and dried thoroughly with a disposable towel (when available). Use a towel to turn of the faucet (when towels are available). This is a **Category IB** recommendation.

**Slide 34**

**Category Recommendations**
- **IA** = strongly recommended for implementation & strongly supported by well-designed studies
- **IB** = strongly recommended for implementation & supported by some studies & strong theoretical rationale
- **1C, II & No Recommendation** = Unresolved Issue

When looking at guidelines from this point on, there is a classification system for recommendations. A **Category 1A** is strongly recommended for implementation and it has been supported by well-designed experimental, clinical or epidemiologic studies. A **Category 1B** is strongly recommended for implementation, supported by certain experimental, clinical or epidemiologic studies and a strong theoretical rationale. Category 1A and 1B’s are pretty strong. A **Category 1C** recommendation is required for implementation, as mandated by federal or state regulation or standard. A **Category II** recommendation is suggested for implementation and supported by suggestive clinical or epidemiological studies or a theoretical rationale. **NO Recommendation** is equivalent to an “Unresolved Issue”. These are practices for which there is insufficient evidence or no consensus regarding efficacy exists. The focus of the rest of this discussion will be on **Category 1A** recommendations for hand hygiene.
Here is the first Category 1A recommendation. If hands are not visibly soiled with organic material, or blood, the alcohol-based hand rub is the preferred method for decontaminating hands in all clinical situations. When you should do this alcohol hand rub (decontaminate the hands) is after you have had contact with someone’s body fluids, non-intact skin, or mucous membranes, changing their dressings, suctioning them, even touching their nonintact skin, because it can be colonized with methicillin resistant Staph. aureus or another resistant organism. Obviously if you touch a contaminated dressing, you need to clean your hands afterwards. There are two exceptions to using an alcohol hand rub and those are if there are spores present (e.g., anthrax, C. difficile), or if hands are visibly soiled, then you don’t use an alcohol hand rub. This is a very important point.

A second Category 1A recommendation is to make an alcohol-based hand rub available at the entrance to the patient’s room, other convenient locations, and in individual pocket-sized containers to be carried by HCWs. This latter part of the recommendation was absolutely unheard of 15 years ago. The policy then was to NOT allow individual sized containers of soap or lotion to be carried around by HCWs.

As part of a multi-disciplinary program to improve hand hygiene adherence, another Category 1A is that HCWS should be provided with a readily-accessible alcohol-based hand-rub product. It is recommended that alcohol hand rub NOT be placed near the sink. The rationale is that people might think it is soap and use water with it. About 10-12 years ago, fire inspectors were concerned when healthcare facilities starting placing these containers on the walls outside of patient rooms or procedure rooms. If the halls were too narrow, it was a fire hazard. It is also a fire hazard in large quantities, as these products with alcohol are flammable. We were trading one hazard for another. You don’t want these by the sink, but you have to have them somewhere so people will clean their hands. Now the policies that have to do with this limit the amount of the hand rub that you have in a container and the size of the container so that they are not a fire hazard (as a potential hazard of alcohol is flammability).

If hands are visibly dirty or contaminated with proteinaceous material or visibly soiled with blood or other body fluids, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap & water. You have two choices in this case.
**Lotions protect hands from cracking**

Provide HCWs with lotions that can have petroleum in them.

When hands are cracked, don't get washed as often. Lotions can help protect the skin on hands from cracking. When hands are cracked, they don't get washed as often. Thus, there are some protective qualities of lotions.

It is important, however, to read the ingredients on lotions. There are some lotions that can destroy the integrity of latex gloves if they have petroleum in them.

**Artificial Nails**

- More likely to harbor gram (-) organisms
- Traced to outbreaks of infection in neonatal intensive care units & others
- Chipped nail polish may support growth of T#s of organisms on fingernails

According to the Hand Hygiene Guidelines, “studies have demonstrated that subungual areas (beneath the nail) of the hand harbor high concentrations of bacteria, most frequently coagulase-negative Staphylococci, gram-negative rods (including *Pseudomonas spp.*), Corynebacteria and yeasts. Nail polish that has been freshly applied does not appear to increase the number of bacteria, but chipped nail polish may support the growth of large numbers of organisms on fingernails, even after careful handwashing or the use of surgical scrub agents. The contribution of artificial nails to transmission of healthcare-associated infections is not known. However, HCWs who wear artificial nails are more likely to harbor gram-negative pathogens on their fingertips than those who have natural nails, both before and after handwashing.” (2002 Hand Hygiene Guidelines, p. 29).

The wearing of artificial nails has been epidemiologically linked in several outbreaks of infections caused by gram-negative organisms and yeasts. This is an area where additional studies are needed.
There is a category 1A recommendation that states “Do NOT wear artificial fingernails or extenders when having direct contact with patients at high risk (e.g., intensive care units, operating rooms). Note, in the guideline, it says “e.g.” intensive care unit, operating room. There are actually two challenges with complying with this particular recommendation. First, wearing of nails is a personal dress code issue, so it is hard to enforce. The second challenge is that they leave it up to the facility to decide what a high risk area is by giving examples.

Bacteria on hands of surgical personnel can cause wound infections if introduced into operative fields during surgery. Bacteria multiply rapidly on gloved hands if only plain soap is used. One of the most radical recent changes regarding hand hygiene has to do with surgical hand antisepsis. The goal of the surgical hand antisepsis is to remove the resident flora from the hands. Studies have found that 5 minutes of scrubbing can be just as effective as 10 minutes. Two stage scrubs, for example, using chlorhexidine gluconate, followed by alcohol, can be just as effective as using a 5 minute antiseptic scrub. Finally, the use of brushes may actually increase shedding and increase skin damage.

I think it is important to mention two Category 1B recommendations regarding scrubbing. The first one states “scrub hands and forearms (usually up to the elbow) for the length of time that is recommended by the manufacturer (2-6 minutes)”. The second one states “Long scrub times (e.g., 10 minutes) are NOT necessary”. I can’t emphasize this enough: longer is not necessarily better. Each product has been tested and the manufacturer gives specific recommendations about how long and how much to use. When these guidelines first came out, I went to go talk with our chief of surgery. I told him that we didn’t have to use brushes anymore nor do a long scrub and he laughed at me. So I had to sit there and show him the guidelines and show him the studies that were done. I can tell you that is probably took 3 years for that guideline to get implemented to a point where surgical personnel would consider scrubless surgical hand antisepsis AND those Category 1B recommendations. Remember, just because a new regulation or guideline is released doesn’t mean people are going to follow it, especially if it requires a change in a long-standing practice such as scrubbing.

Why do hands need to be washed after removing gloves? The temperature on a gloved hand is warm. There is moisture on the skin on gloved hands. Bacteria and other organisms can grow rapidly under these conditions. The other thing to think about is if you are using instruments, you can tear a glove. (Some facilities have policies that during surgery or a long procedure, that gloves are changed every two hours. This reduces the chance that if a glove is torn, a HCW is exposed for very long to a patient’s body fluids.) Thus, for these reasons, it is necessary to wash hands after gloves are removed.
We started out this session today talking about how hand hygiene is one of the most important procedures for reducing transmission of infections and that HCWs have suboptimal compliance. Now there is a recommendation about monitoring HCW hand hygiene compliance. It is very difficult to monitor HCW compliance with hand hygiene. If you have observers on the unit, which is one of the most accurate ways to monitor, HCWs may know they are being watched and may act differently (Hawthorne effect). It is also costly to have monitors. In the fall disease surveillance class, you are asked to think about strategies for monitoring hand hygiene by using surveillance, but we are not going to get into that during this class. In the U.S., the person who has done the most research with hand hygiene is Dr. Elaine Larson. She is the editor of the American Journal of Infection Control, which is the APIC publication. In Europe, there is someone named Didier Pittet, who conducted studies on the effectiveness of different hand hygiene practices and is one of the authors of the 2002 guidelines. He is also behind a large W.H.O. global hand hygiene campaign. If you have the chance to read any articles by either of them, I would recommend doing so. We have seen advances in technology related to hand hygiene: automated sinks, timed sinks, badges on HCWs that monitor the number of times hands are cleaned, etc. These will all need to be studied to determine their effect on the frequency and effectiveness of hand hygiene.

There is a Category 1A recommendation that states, “Monitor HCWs’ adherence with recommended hand hygiene practices and provide personnel with information regarding their performance”. The Joint Commission (TJC) has a patient safety campaign. They give hospitalized patients a booklet with different categories of recommendations. In relation to hand hygiene, if a HCW is going to do a procedure on a patient, they can ask the HCW “did you wash your hands or will you please wash your hands?”. This is another effort to decrease healthcare-associated infections. How the healthcare facility monitors compliance is up to that healthcare facility. This has been the topic of numerous journal articles in the past decade.

This concludes Part I. In Part II, we will discuss global efforts to improve hand hygiene.