

Infection Control (8 hours)

Outline

- Cleaning and disinfecting precautions
- Distinguishing between disinfectants and antiseptics
- Disinfecting tools and sanitizing hands and disinfect tools used in the practice of cosmetology
- Infection control in regards to bacterial, viral, and fungal contaminations
- Infection control in regards to bloodborne pathogens
- Parasite infection and infestation control
- Infection control and MRSA

Learning objectives

After completing this lesson you will be able to

- identify cleaning precautions
- describe cleaning routines
- describe the importance of reading labels
- define the term clean
- describe the properties of ideal disinfectants
- identify sterilization
- describe wet disinfection
- define the purpose of infection control
- list safety and sanitation requirements
- describe cleaning and disinfecting procedures
- identify salon environment requirements
- identify CDC infection control guidelines
- describe chlorine based disinfectants
- describe phenol based disinfectants
- describe QAC based disinfectants
- list types of sterilization techniques
- identify lice and infestation
- define MRSA
- describe infection prevention protocols, regarding MRSA in the salon

Introduction

In this course we will identify infection control, cleaning and disinfecting precautions, disinfectants and antiseptics, hand sanitation, tool disinfection, bacterial, viral, and fungal control, bloodborne pathogens control, parasite infection and infestation control, and precautions regarding MRSA.

Infection Control Procedures, and Disinfecting Precautions

We must take precautions and heed the warnings of all labels regarding the handling, use and storage of cleaning chemicals. Read all directions completely to ensure proper sanitation is being performed.

How should cleaners and disinfectants be used?

Read the label first. Each cleaner and disinfectant has instructions on the label that tell you important facts:

- How to apply the product to a surface.
- How long you need to leave it on the surface to be effective (contact time).
- If the surface needs to be cleaned first and rinsed after using.
- If the disinfectant is safe for the surface.
- Whether the product requires dilution with water before use.
- Precautions you should take when applying the product, such as wearing gloves or aprons or making sure you have **good ventilation** during application.

Facility Cleaning & Disinfection

Cleaning and disinfection should be performed on surfaces that are likely to contact your patron.

- *Cleaning surfaces with detergent-based cleaners or Environmental Protection Agency (EPA)-registered disinfectants is effective at removing germs, viruses and fungi from the environment.*
- It is important to read the instruction labels on all cleaners to make sure they are used safely and appropriately.
- Environmental cleaners and disinfectants should not be used to treat the skin
- The EPA provides a list of EPA-registered products



Illustration 1: Cleaning surfaces

Surfaces to Clean

Focus on surfaces that touch people's bare skin each day and any surfaces that could come into contact with people. Clean large surfaces such as floors and walls when they become visibly soiled or on a regular schedule. There is no evidence that spraying or fogging rooms or surfaces with disinfectants will prevent infections more effectively than the targeted approach of cleaning frequently touched surfaces and any surfaces that have been exposed to infections.

Shared Equipment

Shared equipment that comes into direct skin contact should be cleaned after each use and allowed to dry. Salon equipment, and protective gear, should also be cleaned according to the equipment manufacturers' instructions to make sure the cleaner will not harm the item.

Cleaning Keyboards and other Difficult Surfaces

Many items such as computer keyboards or handheld electronic devices may be difficult to clean or disinfect or they could be damaged if they became wet. If these items are touched by many people during the course of the day, a cleanable cover/skin could be used on the item to allow for cleaning while protecting the item. Always check to see if the manufacturer has instructions for cleaning.

Laundry

Routine laundry procedures, detergents, and laundry additives will all help to make clothes, towels, and linens safe to wear or touch. If items have been contaminated by infectious material, these may be laundered separately, but this is not absolutely necessary.

Proper Water Temperature for Laundry

Read and follow the clothing and soap or detergent label instructions. Water temperatures for laundry depend on the type of fiber or fabric. In general, wash and dry in the warmest temperatures recommended on the fabric label. Also, some laundry detergents are made to clean best at certain temperatures. Not following instructions could damage the item or decrease the effectiveness of the detergent.

Using Bleach for Laundry

Use of bleach as a disinfectant in laundering is optional, and not all fabrics are suitable for bleach. Read the label instructions.

Routines

- Facilities should always be kept clean.
- Review cleaning procedures and schedules with the staff.
 - Cleaning procedures should focus on commonly touched surfaces and surfaces that come into direct contact with people's bare skin each day.
 - Cleaning with detergent-based cleaners or Environmental Protection Agency (EPA)-registered detergents/disinfectants will remove bacteria from surfaces.
 - Cleaners and disinfectants, including household chlorine bleach, can be irritating and exposure to these chemicals has been associated with health problems such as asthma and skin and eye irritation.
 - ❑ Take appropriate precautions described on the product's label instructions to reduce exposure. Wearing personal protective equipment such as gloves and eye protection may be indicated.
 - Follow the instruction labels on all cleaners and disinfectants, including household chlorine bleach, to make sure they are used safely and correctly.
 - ❑ Some key questions that should be answered by reading the label include:
 - ❑ How should the cleaner or disinfectant be applied?
 - ❑ Do you need to clean the surface first before using the disinfectant (e.g., precleaned surfaces)?
 - ❑ Is it safe for the surface? Some cleaners and disinfectants, including household chlorine bleach, might damage some surfaces (e.g., metals, some plastics).
 - ❑ How long do you need to leave it on the surface to be effective (i.e., contact time)?
 - ❑ Do you need to rinse the surface with water after using the cleaner or disinfectant?
 - If you are using household chlorine bleach, check the label to see if the product has specific instructions for disinfection.
 - Environmental cleaners and disinfectants should not be put onto skin or wounds and should never be used to treat infections.
- Repair or dispose of equipment and furniture with damaged surfaces that do not allow surfaces to be adequately cleaned.

How to distinguish between disinfectants and antiseptics, How to sanitize hands and disinfect tools used in the practice of cosmetology, Bacterial, viral, and fungal control, Bloodborne pathogens control, and Parasite infection and infestation control

First, let's review disinfectants

What's the difference between cleaners, sanitizers, and disinfectants?

- **Cleaners or detergents** are products that are used to remove soil, dirt, dust, organic matter, and germs (like **bacteria, viruses, and fungi**). Cleaners or detergents work by washing the surface to lift dirt and germs off surfaces so they can be rinsed away with water. The same thing happens when you wash your hands with soap and water or when you wash dishes. Rinsing is an important part of the cleaning process. Use these products for routine cleaning of surfaces.
- **Sanitizers** are used to reduce **germs** from surfaces but not totally get rid of them. Sanitizers reduce the germs from surfaces to levels that are considered safe.
- **Disinfectants** are chemical products that **destroy or inactivate germs** and prevent them from growing. Disinfectants have no effect on dirt, soil, or dust. Disinfectants are regulated by the U.S. Environmental Protection Agency (EPA).

CDC – Infection Control Guidelines

The Centers for Disease Control and Prevention (CDC) have developed Guidelines for Disinfection and Sterilization.

They provide the following information:

Cleaning is the removal of foreign material (e.g., soil, and organic material) from objects and is normally accomplished using water with detergents or enzymatic products. Thorough cleaning is required before high-level disinfection and sterilization because inorganic and organic materials that remain on the surfaces of salon implements and equipment interfere with the effectiveness of disinfection and sterilization.

Also, if soiled materials dry, the removal process becomes more difficult and the disinfection or sterilization process less effective or ineffective.

With manual cleaning, the two essential components are friction and soap/detergents and water.

Friction (e.g., rubbing/scrubbing the soiled area with a brush) is an old and dependable method. Soap/detergents and water is used to remove soil and debris.



Illustration 2: Wash with soap and water

Disinfection

Many chemical disinfectants are used alone or in combinations. These include chlorine and chlorine compounds, phenolics, and quaternary ammonium compounds. Commercial formulations based on these chemicals are considered unique products and must be registered with EPA or cleared by FDA. In most instances, a given product is designed for a specific purpose and is to be used in a certain manner. Therefore, users should read labels carefully to ensure the correct product is selected for the intended use and applied efficiently.

Disinfectants are not interchangeable, and incorrect concentrations and inappropriate disinfectants can result in excessive costs. Because occupational diseases have been associated with use of several disinfectants such as chlorine, precautions (e.g., gloves and proper ventilation) should be used to minimize exposure.

Asthma and reactive airway disease can occur in sensitized persons exposed to any airborne chemical, including germicides.

Clinically important asthma can occur at levels below ceiling levels regulated by OSHA (Occupational Safety and Health Administration) or recommended by NIOSH (the National Institute for Occupational Safety and Health).

The following is information that can be used to select an appropriate disinfectant for any item and use it in the most efficient way.

Properties of an ideal disinfectant

- Broad spectrum: should have a wide antimicrobial spectrum
- Fast acting: should produce a rapid kill
- Not affected by environmental factors: should be active in the presence of organic matter (e.g., blood, sputum, feces) and compatible with soaps, detergents, and other chemicals encountered in use
- Nontoxic: should not be harmful to the user or patron
- Surface compatibility: should not corrode instruments and metallic surfaces and should not cause the deterioration of cloth, rubber, plastics, and other materials
- Residual effect on treated surfaces: should leave an antimicrobial film on the treated surface
- Easy to use with clear label directions
- Odorless: should have a pleasant odor or no odor to facilitate its routine use
- Economical: should not be prohibitively high in cost
- Solubility: should be soluble in water
- Stability: should be stable in concentrate and use-dilution
- Cleaner: should have good cleaning properties
- Environmentally friendly: should not damage the environment on disposal

Barbicide

Barbicide is a disinfectant solution used by barbers and cosmetologists for sterilizing grooming tools such as combs and hair-cutting shears. Manufactured by King Research, it was invented in 1947 by Maurice King and marketed heavily around the United States by his brother James.

Barbicide is a United States Environmental Protection Agency approved combination germicide, pseudomonacide, fungicide, and a viricide effective against the HIV-1 virus (AIDS virus), Hepatitis B, and Hepatitis C. Its active ingredient is Alkyl dimethyl benzyl ammonium chloride (5.12% by volume); sodium nitrite and blue dye are also present. Contact can cause irritation to the skin and eyes, and consumption of 50 mL can cause shock and may lead to death if not treated quickly.

Barbicide is sold as a concentrate diluted for use in a 1:32 ratio with water, with each stylist having a container for treating their own tools. At one time, several US states legally required barber shops to use Barbicide; according to the maker two still did in 1997. A jar of Barbicide sits on display in the Smithsonian Institution's National Museum of American History.



*Illustration 3:
Barbicide jar*

Chlorine and Chlorine Compounds



Illustration 4: Bleach

Hypochlorites, the most widely used of the chlorine disinfectants, are available as liquid (e.g., sodium hypochlorite) or solid (e.g., calcium hypochlorite).

The most prevalent chlorine products in the United States are aqueous solutions of 5.25%–6.15% **sodium hypochlorite, usually called household bleach**. They have a broad spectrum of antimicrobial activity, do not leave toxic residues, are unaffected by water hardness, are inexpensive and fast acting, remove dried or fixed organisms and biofilms from surfaces, and have a low incidence of serious toxicity. Sodium hypochlorite at the concentration

used in household bleach (5.25-6.15%) can produce ocular irritation or oropharyngeal, esophageal, and gastric burns. Other disadvantages of hypochlorites include corrosiveness to metals in high concentrations (>500 ppm), inactivation by organic matter, discoloring or “bleaching” of fabrics, and the **release of toxic chlorine gas when mixed with ammonia or other household cleaning agents**.

EPA has determined the currently registered uses of hypochlorites will not result in unreasonable adverse effects to the environment.

Phenols



Illustration 5:
Lysol concentrate

Phenol has occupied a prominent place in the field of disinfection since its initial use as a germicide by Lister in his pioneering work on antiseptic surgery. In the past 30 years, however, work has concentrated on the numerous phenol derivatives or phenolics and their antimicrobial properties. Phenol derivatives originate when a functional group (e.g., alkyl, phenyl, benzyl, halogen) replaces one of the hydrogen atoms on the aromatic ring. Two phenol derivatives commonly found as constituents of disinfectants are *ortho*-phenylphenol and *ortho*-benzyl-*para*-chlorophenol. The antimicrobial properties of these compounds and many other phenol derivatives are much improved over those of the parent chemical. Phenolics are absorbed by porous materials, and the residual disinfectant can irritate the skin.

Examples of phenol disinfectant cleaners are Pine-Sol and Lysol.

Microbicidal Activity of Phenols

Published reports on the antimicrobial efficacy of commonly used phenolics showed they were bactericidal, fungicidal, virucidal, and tuberculocidal at their recommended use-dilution.

Quaternary Ammonium Compounds

Quaternary Ammonium Compounds (QACs) are a type of chemical that is used to kill bacteria, viruses, and mold. QACs are widely used as disinfectants. The quaternaries are good cleaning agents, but high water hardness and materials such as cotton and gauze pads can make them less microbicidal because of insoluble precipitates or cotton and gauze pads absorb the active ingredients, respectively .



Illustration 6:
Quaternary disinfectant

Examples of QAC products are Lysol Spray and Clorox Disinfectant Spray.

Microbicidal Activity of QACs

Results from manufacturers' data sheets and from published scientific literature indicate that the quaternaries sold as hospital grade disinfectants are generally fungicidal, bactericidal, and virucidal against most viruses.

Salon Computer Keyboards

Quaternary ammonium compounds (as well as 70% isopropyl alcohol, phenolic, and a chlorine-containing wipes effectively (>95%) remove and/or inactivate contaminants from computer keyboards with a 5-second application time. No functional damage or cosmetic changes occurred to the computer keyboards after 300 applications of the disinfectants.

EPA and FDA

In the United States, chemical germicides formulated as sanitizers, disinfectants, or sterilants are regulated in interstate commerce by the Antimicrobials Division, Office of Pesticides Program, EPA, under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947, as amended.

Under FIFRA, any substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest (including microorganisms but excluding those in or on living humans or animals) must be registered before sale or distribution.

To obtain a registration, a manufacturer must submit specific data about the safety and effectiveness of each product. For example, EPA requires manufacturers of sanitizers, disinfectants, or chemical sterilants to test formulations by using accepted methods for microbiocidal activity, stability, and toxicity to animals and humans.

The manufacturers submit these data to EPA along with proposed labeling. If EPA concludes the product can be used without causing "unreasonable adverse effects," then the product and its labeling are registered, and the manufacturer can sell and distribute the product in the United States.

Sterilization

Sterilization destroys all microorganisms on the surface of an article or in a fluid to prevent disease transmission associated with the use of that item. The use of inadequately sterilized items represents a high risk of transmitting pathogens.

The concept of what constitutes "sterile" is measured as a probability of sterility for each item to be sterilized.

This probability is commonly referred to as the sterility assurance level (SAL) of the product and is defined as the probability of a single viable microorganism occurring on a product after sterilization. SAL is normally expressed as 10^{-6} .

For example, if the probability of a spore surviving were one in one million, the SAL would be 10^{-6} . In short, a SAL is an estimate of lethality of the entire sterilization process and is a conservative calculation.

Liquid Chemicals

Several FDA-cleared liquid chemical sterilants include indications for sterilization of implements. The indicated contact times range from 3 hours to 12 hours. These solutions are commonly used as high-level disinfectants when a shorter processing time is required.

Ultraviolet Radiation (UV)

UV radiation has been used in the disinfection of drinking water, air, and contact lenses. Bacteria and viruses are more easily killed by UV light than are bacterial spores.

The wavelength of UV radiation ranges from 328 nm to 210 nm (3280 Å to 2100 Å). Its maximum bactericidal effect occurs at 240–280 nm. Mercury vapor lamps emit more than 90% of their radiation at 253.7 nm, which is near the maximum microbicidal activity. Inactivation of microorganisms results from destruction of nucleic acid through induction of thymine dimers.



Illustration 7: UV Sterilizer

Hand-hygiene

Washing hands at key times with soap and water is one of the most important steps you can take to get rid of germs and avoid spreading germs to those around you.



Illustration 8: Washing hands

How can washing your hands keep you healthy?

Germs can get into the body through our eyes, nose, and mouth and make us sick.

Handwashing with soap removes germs from hands and helps prevent sickness. Studies have shown that handwashing can prevent 1 in 3 diarrhea-related sicknesses and 1 in 5 respiratory infections, such as a cold or the flu.

Handwashing helps prevent infections for these reasons:

People often touch their eyes, nose, and mouth without realizing it, introducing germs into their bodies. Germs from unwashed hands may get into foods and drinks when people prepare or consume them. Germs can grow in some types of foods or drinks and make people sick. Germs from unwashed hands can be transferred to other objects, such as door knobs, tables, or toys, and then transferred to another person's hands.

What is the correct way to wash your hands?

1. Wet your hands with clean running water (warm or cold) and apply soap.
2. Lather your hands by rubbing them together with the soap.
3. Scrub all surfaces of your hands, including the palms, backs, fingers, between your fingers, and under your nails. Keep scrubbing for at least 20 seconds. Need a timer? Hum the “Happy Birthday” song twice.
4. Rinse your hands under clean, running water.
5. Dry your hands using a clean towel or air dry them.

When should you wash your hands?

- Before, during, and after preparing food
- Before eating food
- Before and after caring for someone who is sick
- Before and after treating a cut or wound
- After using the bathroom, changing diapers, or cleaning up a child who has used the bathroom
- After blowing your nose, coughing, or sneezing
- After touching an animal, animal food or treats, animal cages, or animal feces (poop)
- After touching garbage
- If your hands are visibly dirty or greasy

What type of soap should you use?

You can use bar soap or liquid soap to wash your hands. Many public places provide liquid soap because it's easier and cleaner to share with others. Studies have not found any added health benefit from using soaps containing antibacterial ingredients when compared with plain soap. Both are equally effective in getting rid of germs. If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol.

Hand Sanitizers

Washing hands with soap and water is the best way to reduce the number of germs on them in most situations. If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol. Alcohol-based hand sanitizers can quickly reduce the number of germs on hands in some situations, but sanitizers do **not** eliminate all types of germs and might not remove harmful chemicals.

Hand sanitizers are not as effective when hands are visibly dirty or greasy.

How do you use hand sanitizers?

- Apply the product to the palm of one hand (read the label to learn the correct amount).
- Rub your hands together.
- Rub the product over all surfaces of your hands and fingers until your hands are dry.

Nail Hygiene

Appropriate hand hygiene includes diligently cleaning fingernails, which may harbor dirt and germs and can contribute to the spread of some infections. Before clipping or grooming nails, all equipment should be properly cleaned. Sterilizing equipment before use is especially important. Infections of the fingernails are often characterized by swelling of the surrounding skin, pain in the surrounding area, or thickening of the nail. In some cases, these infections may be serious and need to be treated by a physician.

To help prevent the spread of germs and nail infections:

- Scrub the underside of nails with soap and water (or a nail brush) every time you wash your hands.

- Clean any nail grooming tools before use.
- Sterilize nail grooming tools before use.
- Avoid biting or chewing nails.
- Avoid cutting cuticles, as they act as barriers to prevent infection.
- Never rip or bite a hangnail. Instead, clip it with a clean, sanitized nail trimmer.

Global Handwashing Day

Celebrate Global Handwashing Day to promote handwashing with soap throughout the world. Global Handwashing Day is a way to support a global and local culture of handwashing with soap, shine a spotlight on the act of handwashing in each country, and raise awareness about the benefits of handwashing with soap. Since 2008, Global Handwashing Day has been celebrated annually on **October 15** worldwide. The Global Public-Private Partnership for Handwashing with Soap founded Global Handwashing Day and encourages school children, teachers, and families to get involved.

People and communities around the world will celebrate Global Handwashing day in many ways, including:

- Learning how to wash hands the right way through an online video produced by the Centers for Disease Control
- Watching a Facebook Live talk on why handwashing with soap is so important.
- Sharing handwashing lessons, events, and materials for thousands of students across the state of Georgia, where CDC is based.

How does handwashing help fight antibiotic resistance?

Antibiotic resistance occurs when bacteria resist the effects of an antibiotic – that is, germs are not killed and they continue to grow. Sickesses caused by antibiotic-resistant bacteria can be harder to treat. Simply using antibiotics creates resistance, so avoiding infections in the first place reduces the amount of antibiotics that have to be used and reduces the likelihood that resistance will develop during treatment. Handwashing helps prevent many sicknesses, meaning less use of antibiotics.

Antiseptics

Dictionary.com defines antiseptics as: A substance that inhibits the proliferation of infectious microorganisms. Proliferation is the growth or production of cells by multiplication of parts.

Google explains them this way: antiseptic (anti-sep-tik) n. a chemical, such as **chlorhexidine** or **cetrimide**, that destroys or inhibits the growth of disease-causing bacteria and other microorganisms. Antiseptics are used externally to cleanse wounds and internally to treat infections of the intestine and bladder.

Encyclopedia.com explains antiseptics as:

An antiseptic is a substance that inhibits the growth and development of microorganisms. For practical purposes, antiseptics are routinely thought of as topical agents, for application to skin, mucous membranes, and inanimate objects, although a formal definition includes agents that are used internally, such as the urinary tract antiseptics.

Purpose

Antiseptics are a diverse class of drugs that are applied to skin surfaces or mucous membranes for their anti-infective effects.

This may be either bacteriocidal (kills bacteria) or bacteriostatic (stops the growth of bacteria). Their uses include cleansing of skin and wound surfaces after injury, preparation of skin surfaces prior to injections or surgical procedures, and routine disinfection of the oral cavity as part of a program of oral hygiene. Antiseptics are also used for disinfection of inanimate objects, including instruments and furniture surfaces.

Commonly used antiseptics for skin cleaning include benzalkonium chloride, chlorhexidine, hexachlorophene, alcohol, and hydrogen peroxide.

Other agents that have been used for this purpose, but have largely been supplanted by more effective or safer agents, include boric acid and volatile oils such as methyl salicylate (oil of wintergreen).

Chlorhexidine shows a high margin of safety when applied to mucous membranes, and has been used in oral rinses and preoperative total body washes.

Benzalkonium chloride and hexachlorophene are used primarily as hand scrubs or face washes. Benzalkonium may also find application as a disinfecting agent for instruments, and in low concentration as a preservative for drugs including ophthalmic solutions. Benzalkonium chloride is inactivated by organic compounds, including soap, and must not be applied to areas that have not been fully rinsed.

Hydrogen peroxide acts through the liberation of oxygen gas. Although the antibacterial activity of hydrogen peroxide is relatively weak, the liberation of oxygen bubbles produces an effervescent action, which may be useful for wound cleansing through removal of tissue debris. The activity of hydrogen peroxide may be reduced by the presence of blood and pus. The appropriate concentration of hydrogen peroxide for antiseptic use is 3%, although higher concentrations are available.

Precautions

Precautions vary with individual product and use. Hypersensitivity reactions should be considered with organic compounds such as chlorhexidine, benzalkonium and hexachlorophene. Skin dryness and irritation should be considered with all products, but particularly with those containing alcohol.

Most antiseptics have not been rated according to pregnancy category under the pregnancy risk factor system.

Hexachlorophene is schedule C during pregnancy, and should not be used on newborns due to risk of systemic absorption with potential central nervous system (CNS) effects, including convulsions.

Application of hexachlorophene to open wounds, mucous membranes, or areas of thin skin, such as the genitalia, should be avoided, since this may promote systemic absorption.

Chlorhexidine should not be instilled into the ear. There is one anecdotal report of deafness following use of chlorhexidine in a patient with a perforated eardrum. Safety in pregnancy and breastfeeding have not been reported; however there is one anecdotal report of an infant developing slowed heartbeat apparently related to maternal use of chlorhexidine.

Interactions

Antiseptics are not known to interact with any other skin products. However, they should not be used together with any other topical cream, solution, or ointment.

Parasite infection

Lice infestation

A lice infestation, or pediculosis, is caused by parasites living on human skin. Lice are tiny, wingless insects with sucking mouthparts that feed on human blood and lay eggs on body hair or in clothing. Lice bites can cause intense itching.

There are three related species of human lice:

- head lice, *Pediculus humanus capitis*
- body lice, *Pediculus humanus corporis*
- pubic lice, *Phthirus pubis*, commonly called crab lice

Pediculosis capitis is an infestation of head lice. A body lice infestation is called pediculosis corporis. Pediculosis palpebrarum or phthiriasis palpebrarum, caused by crab lice, is an infestation of the pubic hair.

Head lice live and crawl on the scalp, sucking blood every three to six hours. Their claws are adapted for clinging to hair or clothing. Adult head lice can be silvery-white to reddish-brown. They are about the size of a sesame seed. Female lice lay their eggs in sacs called nits that are about 0.04 in (1 mm) long and are glued to shafts of hair close to the scalp. During her one-month lifespan a female louse may lay more than 100 eggs. The nymphs hatch in three to 14 days and must feed on blood within one day. Nymphs are smaller and lighter in color than adults and become sexually mature after nine to 12 days.

Body lice lay their nits in clothing or bedding. Occasionally the nits are attached to body hair. Body lice nits are oval and yellow to white in color. They may not hatch for up to 30 days. Nymphs mature in about seven days.

Pubic lice have large front legs and look like tiny crabs. Females are larger than males. Nits hatch in about one week and the nymphs mature in about seven days.

Transmission

Lice are endemic in human populations, spreading through personal contact or contact with infested clothing or other personal items. They can be transmitted when unaffected clothing is stored with infested items. Among children head lice are commonly transmitted by the sharing of hats, combs, brushes, hair accessories, headphones, pillows, and stuffed **toys**. Pubic lice are sexually transmitted, although occasionally they can be transmitted through infested bedding, towels, or clothing.

Lice do not jump, hop, or fly and they do not live on pets. Head lice cannot survive without a human host for more than a few days at most. Body lice can live without human contact for up to 10 days. Pubic lice can survive for one to two weeks without human contact.

Head lice infestations are extremely common among children in schools, childcare facilities, camps, and playgrounds.

They are the second most common communicable health problem in children, after the common cold, and appear to be on the increase.

Some 6 to 12 million American children get head lice every year.

In developing countries more than 50 percent of the general population may be infested. Although anyone can get head lice, children aged three to ten and their families are most affected

Lice infestations are characterized by intense itching caused by an allergic reaction to a toxin in lice saliva

The itching can interfere with sleep and concentration. Repeated bites can lead to generalized skin eruptions or inflammation. Swelling or inflammation of the neck glands are common complications of head lice.

Prevention

Prevention of lice infestation depends on adequate personal hygiene and consistently not sharing combs, brushes, hair accessories, hats, towels, or bedding.

Hair should be checked weekly for lice and nits. Prevention includes sanitation and sterilization of salon equipment and implements as directed using an EPA approved product.

Infection Control and MRSA

MRSA (Methicillin-Resistant Staphylococcus Aureus)

In health news reports, awareness of one particular type of invasive staph infection has come to the forefront. It is called MRSA.

It is also known as “the flesh eating disease”. The results of having this disease is often bodily disfigurement. Bodily damage occurs in varying degrees of severity.

An outbreak of “USA300 strain” MRSA: methicillin-resistant Staphylococcus aureus occurred in a Cosmetologist and 2 of her customers.

Eight other persons, who were either infected or colonized, were linked to this outbreak, including a family member, a household contact, and partners of customers.

The CA-MRSA USA300 strain is known to cause outbreaks among population groups, such as:

- native Americans,
- prison inmates,
- military personnel,
- men who have sex with men, and
- competitive sports participants,
- and accounts for 97% of MRSA isolates obtained in emergency departments across the United States from patients with soft tissue infections.

CA-MRSA is associated with invasive infections. The USA300 strain, which is also found in Europe was first isolated in the Netherlands in 2002.

Overall prevalence of MRSA in the Netherlands is low (2%).

In 2006, 3.8% of all MRSA isolates sent to the National Institute for Public Health were identified as the USA300 strain.

We report an outbreak of the USA300 strain related to a Beauty Salon in the Netherlands, in a:

- Cosmetologist
- A family member
- A household contact and
- Customers and their partners.

In September 2005, a medical microbiologist from the regional medical microbiology laboratory reported to the municipal health department a recurring MRSA infection in a Cosmetologist. From December 2004 onwards, the woman had recurrent infections on the:

- legs,
- buttocks, and
- groin

resulting in treatment to include incision and drainage of lesions. When an abscess developed in the genital area in July 2005, MRSA was cultured from a wound swab.

In December 2005, the Cosmetologist was declared MRSA-free after antimicrobial treatment.

Swabs were taken 3 times in 1-week intervals from:

- nose,
- throat,
- perineum, and
- wound

and used for enrichment culture of MRSA.

In March 2006, the woman was tested again for MRSA colonization; test results showed that she had been reinfected or that therapy had failed. The Cosmetologist had eczema. Because of the "hands on" nature of her work, she was advised to temporarily stop providing services to customers.

The municipal health department conducted a risk assessment of the woman's household contacts and the Beauty Salon. The Netherlands does not require that MRSA infections be reported. Therefore, the municipal health department depends upon the consent and full cooperation of index patients and contacts for further investigation of outbreaks.

Consequently, in this instance, household contacts for screening were identified but had not presented themselves for screening. Contacts who had complaints sought treatment at the emergency department, where the observant infection control practitioner and microbiologists related them to the MRSA outbreak.

Nurses obtained specimens by swabbing each patient's nose, throat, and wounds. A case was defined as a patient who had a culture-confirmed MRSA infection during the outbreak period July 2005–December 2006 and a direct epidemiologic link to the index patient.

In April 2006, a salon customer was hospitalized with an abscess of the breast caused by MRSA; in July 2006, another customer who had had boils since February 2006 was found to be MRSA positive. Both customers had been given wax treatments by the Cosmetologist during the period in which she had an infected hair follicle in her armpit.

Swabs taken from this site showed that the beautician was infected with the same MRSA strain as before. Concern arose about the risk for infection to customers through:

- instruments,
- materials (wax), or
- contact with other employees.

The index patient and the other 6 employees of the salon regularly provided services to each another.

A nurse and a member of the municipal health department visited the salon in June 2006 to check on hygiene protocols and to advise on preventive measures to reduce risk for further transmission. All working procedures and protocols were investigated, and the salon was advised to clean and disinfect instruments and procedure rooms. More specifically, the health department observed a total waxing procedure performed by the staff.

Ten swabs were taken from:

- used wax,
- wax implements, and
- the treatment room.

All 6 employees were screened and informed about MRSA and the current situation. Arrangements were also made to test 22 regular customers who had received wax treatments by the index patient in the previous 2 months.

In the following weeks, these customers were screened at the municipal health office and informed about MRSA.

Of the 22 regular customers, 21 completed a questionnaire and 19 were actually screened for MRSA by culturing samples from nose and throats.

All employees and the 19 selected regular customers were negative for MRSA colonization. All environmental swabs were also negative for MRSA. It was noted that the 70% alcohol used to disinfect the skin after waxing was diluted with water because customers had complained about the stinging effect of the alcohol on treated skin. Furthermore, it became apparent that after performing waxing treatments the Cosmetologist would touch the waxed skin of customers with ungloved hands to check for remaining hairs. She did not wash her hands after removing the gloves.

During the outbreak investigation, more background information became available from those who were MRSA colonized or infected and who could be indirectly linked to the beautician or her customers. During the week that the first infected customer was identified (in April 2006), another customer was hospitalized with an abscess in the groin. Unfortunately, no culture was taken from this patient. The partner of the second infected customer was also infected with MRSA that was related to an abscess on his leg. By the end of 2006, a MRSA-positive couple was identified as a contact of the second infected customer. In August 2006 another couple was reported to be MRSA positive; both had abscesses on the thighs. Because no further epidemiologic data could be obtained, whether the couple's infection was linked to the beauty salon is not clear.

A total of 45 persons who had been in direct or indirect contact with the beautician were screened for MRSA:

- 3 family members
- 3 roommates
- 11 other persons (including secondary contacts)
- 6 beauty salon employees and
- 22 customers (including regular customers)

Fifteen persons had skin infections and 10 of them were colonized with MRSA

- Cosmetologist
- family member
- roommate
- ex-partner of the roommate
- customers and
- partners of customers

Although skin infections never developed in the Cosmetologist's family members, tests did show MRSA colonization in one of them. The beautician's boyfriend, a native of the United States, had already lived for 2 years in the Netherlands.

Although he had skin lesions, no MRSA was found. The girlfriend of a sport mate who regularly exercised with the partner of a customer was colonized with MRSA at the end of 2006. She had immigrated recently from the United States to the Netherlands, but her first screening test results were negative. The mean age of the patients was 29 years (range 21–40 years).

Eleven people were found to be MRSA positive.

Of these 11:

3 persons with a direct link to the beauty salon (the Cosmetologist and 2 customers)
6 with an indirect link (family member, roommate, ex-partner of roommate, partner of a customer, sport mate of partner of a customer and his partner), and
a couple from whom no epidemiological data could be obtained were infected with the same MRSA strain as the Cosmetologist.

All MRSA isolates were identical and identified as the well-known CA-MRSA USA300 strain. All MRSA isolates had identical susceptibility patterns: resistant to oxacillin (and thus to all β -lactam antimicrobial drugs) and erythromycin, and susceptible to rifampicin, ciprofloxacin, gentamicin, clindamycin, vancomycin, teicoplanin, tetracycline, cotrimoxazole, mupirocin, and fusidic acid.

Conclusions

Outbreaks of CA-MRSA strains have been reported with increased frequency. Several reports involved outbreaks among:

competitive sports participants
military personnel
men who have sex with men
prisoners
native Americans
and drug users

Skin treatments in a beauty salon likely led to MRSA transmission as a result of contact with an infected Cosmetologist.

Unless outbreaks occur in a defined group, MRSA remains undetected in the general population because reporting is not mandatory. Although the prevalence of MRSA in the Netherlands is low, local microbiologic laboratories should report outbreaks, when detected, to the local municipal health department for further investigation. More research is necessary to better understand the risk factors involved in these outbreaks.

To fully prevent infection control in the salon, we must always observe the highest level of sanitation standards.