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General Sciences

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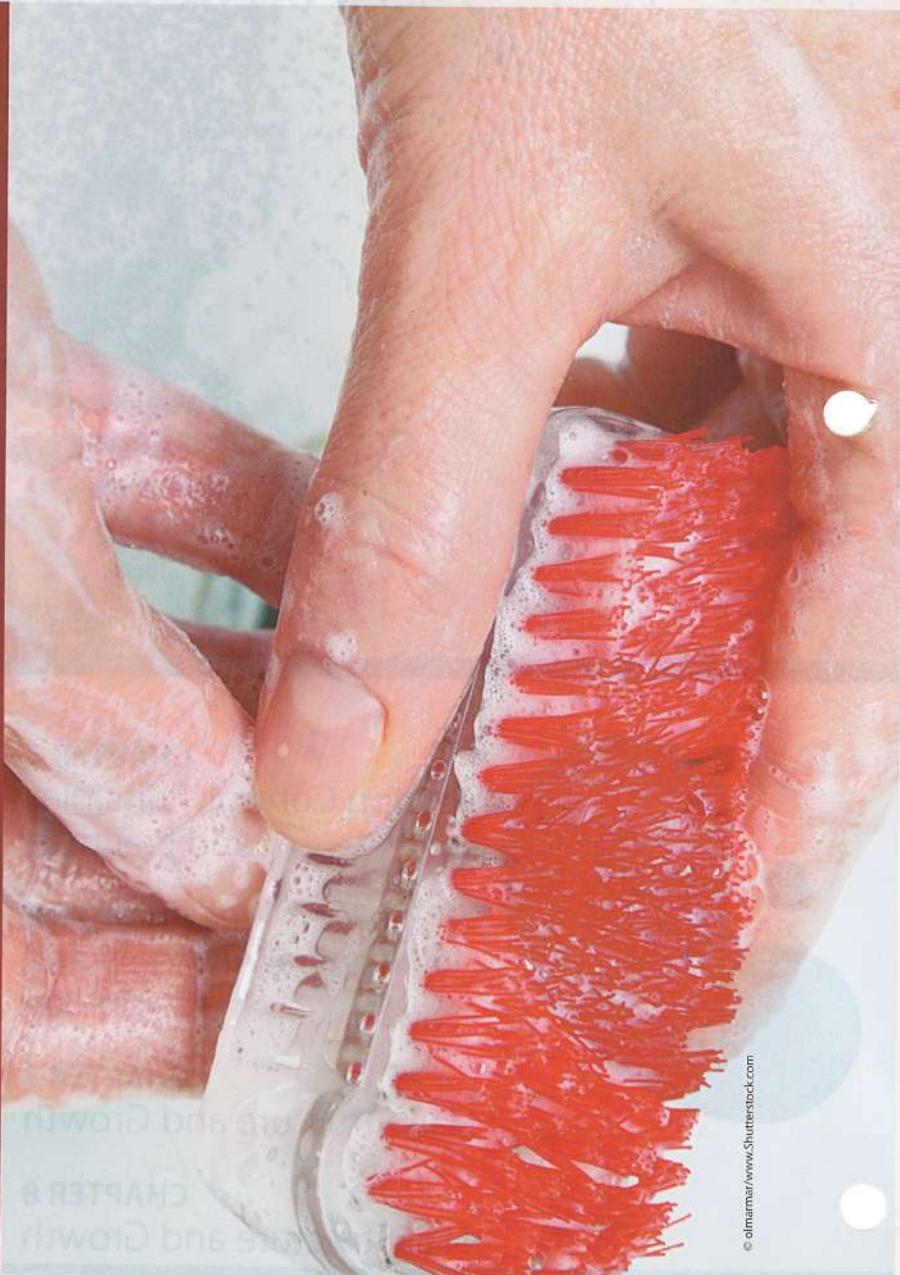
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Infection Control: Principles and Practices

Chapter Outline

- Why Study Infection Control?
- Regulation
- Principles of Infection
- Principles of Prevention
- Standard Precautions
- The Professional Salon Image
- Procedures



CHAPTER 8
Nails and Growth

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Learning Objectives

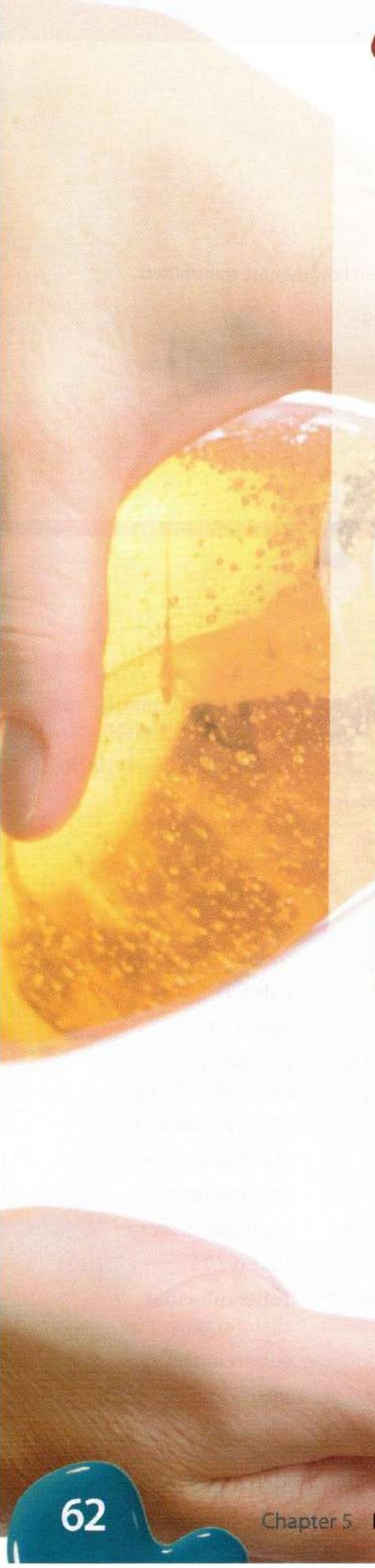
After you have completed this chapter, you will be able to:

- ✓ LO1** Discuss state laws and rules and explain the differences between them.
- ✓ LO2** List the types and classifications of bacteria.
- ✓ LO3** Define hepatitis and human immunodeficiency virus (HIV) and explain how they are transmitted.
- ✓ LO4** Explain the differences between cleaning, disinfecting, and sterilizing.
- ✓ LO5** List the types of disinfectants and how they are used.
- ✓ LO6** Discuss Standard Precautions.
- ✓ LO7** List your responsibilities as a salon professional.
- ✓ LO8** Describe how to safely clean and disinfect salon tools and equipment.

Key Terms

Page number indicates where in the chapter the term is used.

acquired immunity / 76	disease / 65	Material Safety Data Sheet (MSDS) / 63	quaternary ammonium compounds (quats) / 80
acquired immunodeficiency syndrome (AIDS) / 74	disinfectants / 65	Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) / 71	Safety Data Sheet (SDS) / 63
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asymptomatic / 85	efficacy / 78	mildew / 75	scabies / 75
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binary fission / 70	fungicidal / 67	natural immunity / 76	spore / 70
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chelating soaps (chelating detergents) / 84	disinfectants / 65	parasites / 75	sterilization / 76
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diagnosis / 72	infectious / 72	pus / 70	virucidal / 67
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direct transmission / 68	inflammation / 70		
	local infection / 71		



4here is a great deal of confusion and misuse of the terms "cleaning," "sanitizing," "disinfecting," and "sterilizing" within the beauty industry, including at the state regulatory level. In previous editions of this chapter, and in many commercially available products, the word **sanitizing** has been used to mean "clean" or "cleaning." The publisher's goal is to end any possible confusion about the use and definition of these words by clearly defining them here and within the glossary. Milady has opted to consistently use "cleaning," instead of using "cleaning" in one sentence and "sanitizing" in another sentence, since these terms have similar meanings and accomplish the same outcome: removing dirt and germs.

The word "cleaning" is defined as a mechanical process (scrubbing) using soap and water or detergent and water to remove dirt, debris, and many disease-causing germs. Cleaning also removes invisible debris that interferes with disinfection.

The word "sanitizing" is defined as a chemical process used to reduce the number of disease-causing germs on surfaces to a safe level, which is what cleaning accomplishes. The word "disinfecting" is defined as a chemical process that uses specific products to destroy organisms on nonporous surfaces.

WHY STUDY INFECTION CONTROL?

Nail technicians should have a thorough understanding of infection control principles and practices because:

- To be a knowledgeable, successful, and responsible professional in the field of nail technology, you are required to understand the types of infections you may encounter in the salon and their modes of transmission.
- Understanding and practicing proper infection control within the laws and rules will safeguard your business.
- Respecting the chemicals in the cleaning and disinfecting products that you use, and knowing how to safely use them, will help keep you, your clients, and your salon environment safe.

REGULATION

Various federal and state agencies regulate the practice of nail technology. Federal agencies set guidelines for the manufacturing, sale, and use of equipment and chemical ingredients; for the type of disinfectants used in salons; and for safety in the workplace, placing limits on the types of services you can perform in the salon. For example, nail professionals are prohibited from cutting or puncturing the living skin and from removing callused skin, warts, corns, in-grown nails, etc. State agencies are responsible for regulating licensing, enforcement, and the conduct of nail technicians when they are working in the salon.

Federal Agencies

Occupational Safety and Health Administration (OSHA)

The Occupational Safety and Health Administration (OSHA) was created as part of the U.S. Department of Labor to regulate and enforce safety and health standards to protect employees in the workplace. Regulating employee exposure to potentially toxic substances and informing employees about possible hazards of materials used in the workplace are key points of the Occupational Safety and Health Act of 1970. This regulation created the Hazard Communication Act, which requires that chemical manufacturers and importers assess the potential hazards associated with their products. The **Material Safety Data Sheet (MSDS)** is a result of this law.

In 2012, along with representatives from most nations who participate in the United Nations (UN), OSHA agreed to comply with the Globally Harmonized System of Classification and Labeling of Chemicals System (GHS). This initiative was designed to create label standards to be used around the globe and includes the use of specific pictograms to indicate possible safety concerns as well as adoption of a 16-category, standard-format **Safety Data Sheet (SDS)** to replace the MSDS. In 1983, the Hazard Communication Standard (HCS) gave workers the "right to know"; however, the new GHS gives workers the "right to understand." Many of the standards set by OSHA are important to the nail industry because of the products used in salons. These standards address issues relating to the handling, mixing, storing, and disposing of products; general safety in the workplace; and the technician's right to know about any potentially hazardous ingredients contained in the nail products he or she uses and how to avoid these potential hazards.

Safety Data Sheet (SDS) Replaces Material Safety Data Sheet (MSDS)

As of June 2015, the HCS requires a manufacturer, distributor, or importer to supply an SDS (previously known as an MSDS) for each professional product sold. Both the MSDS and the SDS contain information compiled by a manufacturer about its product, including the names of potentially hazardous ingredients, safe use and handling procedures, precautions to reduce the risk of accidental harm or overexposure, flammability warnings, useful disposal guidelines, and medical and first aid information, should it ever be needed for any reason.

The new SDS contains 16 categories of information. All SDS sheets will be organized identically. The categories are:



1. Identification: product identifier; manufacturer or distributor with contact information (including emergency phone number); recommended use of product and restrictions on use
2. Hazard identification: All potential hazards of using the product
3. Composition/information on ingredients: includes information on chemical ingredients
4. First-aid measures: includes important symptoms/effects—acute and delayed; required treatment
5. Fire-fighting measures: lists suitable extinguishing techniques; equipment; chemical hazards from fire
6. Accidental release measures: lists emergency procedures; protective equipment; proper methods of containment and cleanup
7. Handling and storage: lists precautions for safe handling and storage, including incompatibilities
8. Exposure controls/personal protection: lists OSHA's permissible exposure limits (PEL); personal protective equipment (PPE)
9. Physical and chemical properties: lists the chemical's characteristics
10. Stability and reactivity: lists chemical stability and possibility of hazardous reactions
11. Toxicology information: includes routes of exposure; related symptoms; acute and chronic effects
12. Ecological information: includes effects on wastewater and environment
13. Disposal consideration: includes proper disposal and disposal restrictions
14. Transport information: includes restrictions on transportation
15. Regulatory information: lists agencies responsible for regulation of product
16. Revision date: lists original date of document and any revision

In addition, pictograms that are internationally recognized will be used to ensure that information is being communicated in easily recognizable formats.

When necessary, the SDS can be taken to a doctor so that the situation can be properly treated. OSHA and state regulatory agencies require that SDSs for all professional products be kept in the salon, available for reference by nail technicians and other staff during normal hours of business. Either OSHA or state board inspectors can issue fines to salons that do not have SDSs available during regular business hours. There are also SDS-related training requirements. Employers must regularly (e.g., yearly) train workers on how to read and understand SDSs and OSHA regulations.

Federal and state law requires nail salons to obtain an SDS from the manufacturers and/or distributors for each professional product that you use. You can often download them from the product manufacturer's or the distributor's website. The absence of SDSs may pose a health risk to anyone in a salon who is exposed to potentially hazardous materials and is a violation of federal and state regulations. Take the time to read all of this information to be certain that you are protecting yourself and your clients to the best of your ability.

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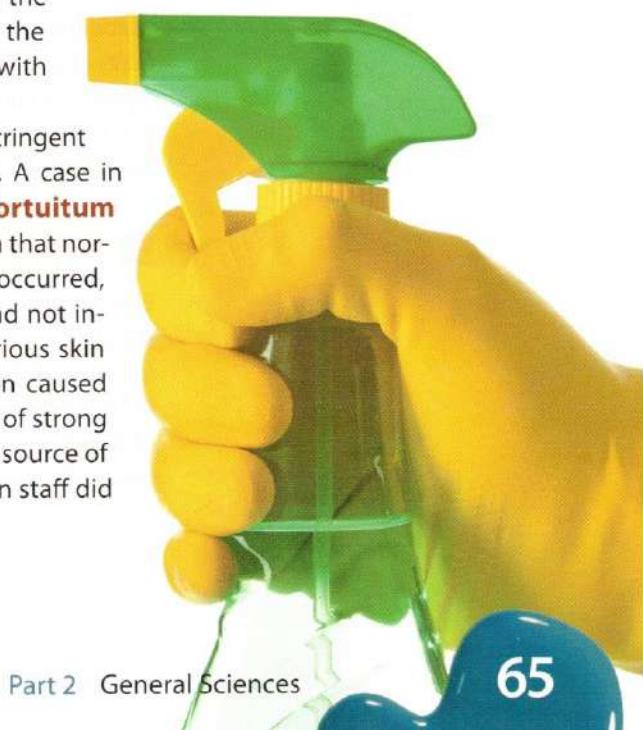
Environmental Protection Agency (EPA)

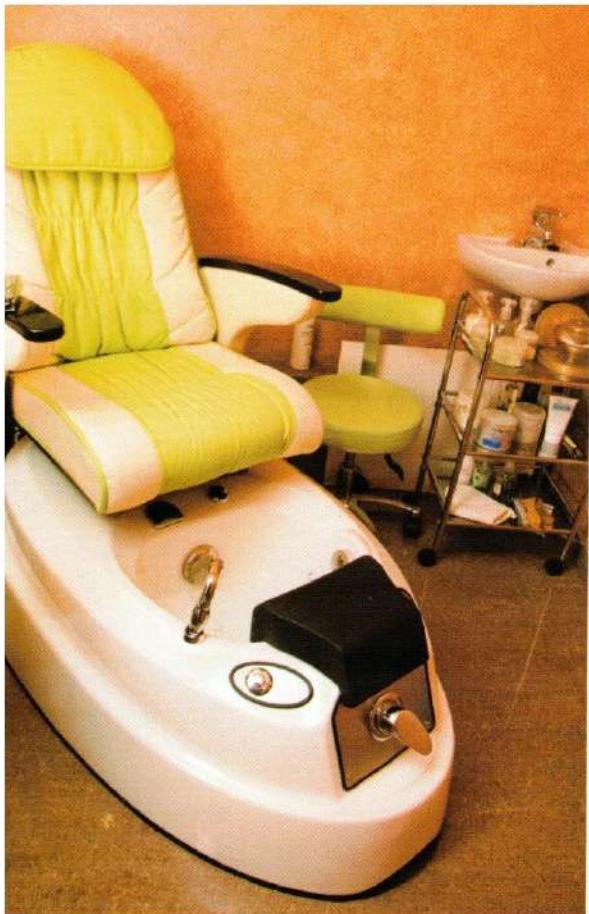
The Environmental Protection Agency (EPA) registers many different types of disinfectants that are sold and used in the United States. **Disinfectants** (**dis-in-FEK-tents**) are chemical products that destroy most bacteria, fungi, and viruses on surfaces. Most disinfectants do not destroy spores. EPA-registered disinfectants are products used on nonporous surfaces that destroy organisms such as bacteria, viruses, and fungi when used according to the instructions on their label. The two types of disinfectants that are used in salons are hospital and tuberculocidal. **Hospital disinfectants** (HOS-pih-tal dis-in-FEK-tents) are effective in cleaning blood and body fluids from nonporous surfaces in the salon, thus controlling the spread of **disease** (dih-ZEEZ)—an abnormal condition of all or part of the body, or its systems or organs, that makes it incapable of carrying on normal function.

Tuberculocidal disinfectants (tuh-bur-kyoo-LOH-sy-dahl dis-in-FEK-tent) are proven to kill the bacteria that causes **tuberculosis** (tuh-bur-kyoo-LOH-sus), a disease that is caused by bacteria that are transmitted by coughing or sneezing, not by salon implements or services. The bacteria that causes tuberculosis is very difficult to kill, so the tuberculosis organism is used to test the efficacy of disinfectants. Tuberculocidal disinfectants are also classified as hospital disinfectants; however, this does not mean that you should use them in the salon. In fact, tuberculocidal disinfectants can be harmful to salon tools and equipment and require special methods of disposal. Review the rules in your state to be sure that the product you choose complies with requirements; also check with the implement or equipment manufacturer to determine if there are any incompatibilities with various disinfectants.

It is against federal law to use any disinfecting product contrary to its labeling. Before a manufacturer can sell a product for disinfecting surfaces, salon tools, implements, or equipment, it must obtain approval from the EPA and a registration number. Only then does the product qualify as a disinfectant for use in the salon, and only in the manner dictated by the manufacturer's label. For example, pedicure and manicure basins, bowls, or tubs must be disinfected with a product that is specifically approved by the EPA for use with these types of tools and equipment. If you do not follow the instructions for mixing, contact time, and the type of surface the disinfecting product can be used on, you have not complied with federal law and can be held to blame if there is a lawsuit.

A single nail technician can put many clients at risk unless stringent cleaning and disinfection guidelines are performed every day. A case in point was the spread of a bacterium called **Mycobacterium fortuitum** (MY-koh-bak-TIR-ee-um for-TOO-i-tum), a microscopic organism that normally exists in low concentrations in tap water. Until an incident occurred, health officials had considered it to be completely harmless and not infectious. In 2000, over 100 clients of a California salon had serious skin infections on their legs after receiving pedicures. The infection caused stubborn, ugly sores that lingered for months, required the use of strong antibiotics, and, in some cases, caused permanent scarring. The source of the infection was traced to the salon's whirlpool foot spas. Salon staff did





not clean the foot spas properly, resulting in a buildup of hair and debris that created the perfect breeding ground for bacteria.

The outbreak was a catalyst for change in the industry. As a result, the state of California issued specific requirements for pedicure equipment in the hope of preventing a future outbreak. In spite of their efforts at that time, there have since been other outbreaks affecting hundreds of clients, and not only in California. In Texas, the family of a paraplegic woman sued a salon, charging that the woman died because of an improperly disinfected pumice stone that caused an infection on her foot that spread and resulted in a fatal heart attack. As a result of media scrutiny, many clients have become more aware of the cleanliness practices of nail salons, and the industry has become more enlightened about the importance of cleaning and disinfection practices, especially for pedicure equipment.

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State Regulatory Agencies

State regulatory agencies exist to protect the health and safety of professionals and of consumers who receive nail and pedicure services in salons and spas. State regulatory agencies include licensing agencies, state boards of cosmetology, commissions, OSHA and health departments. These agencies require that everyone working in a nail salon or spa follow specific procedures. Enforcement of the rules through inspections and investigations of consumer complaints is also part of an agency's responsibility. The agency can issue penalties against both the salon owner and the operator that range from warnings to fines, probation, and suspension or revocation of licenses and business permits. It is vital that you understand and follow the laws and rules in your state at all times—your salon's reputation, your license, and the client's safety depend on it.

Laws and Rules—What Is the Difference?

Laws are written by both the federal and state legislatures that determine the scope of practice (what each license allows the holder to do) and establish guidelines for regulatory agencies to make rules. Laws are also called *statutes*. *Rules or regulations* are more specific than laws. Rules are written by a regulatory agency or state board and determine how the law will be applied. Rules establish specific standards of conduct and can be changed or updated frequently.

✓ LO1

■ PRINCIPLES OF INFECTION

Being a salon professional is fun and rewarding, but it also carries a great responsibility. One careless action could cause injury or **infection** (in-FEK-shun)—the invasion of body tissues by disease-causing pathogens—and you could lose your license or ruin the salon's reputation. Fortunately, preventing the spread of infections is easy if you have learned what to do and you practice that at all times. Safety begins and ends with you (**Figure 5–1**).

Infection Control

Infection control is the methods used to eliminate or reduce the transmission of infectious organisms. There are four types of potentially harmful and infectious organisms that are important to practitioners of nail technology: bacteria, fungi, viruses, and parasites. An **infectious disease** is caused by pathogenic (harmful) organisms that enter the body. An infectious disease may or may not be spread from one person to another.

Remember, nail professionals are never allowed to **diagnose**, determine the nature of a disease from its symptoms, treat, or recommend treatments for infections, disease, or abnormal conditions. Never attempt to treat or service any abnormal condition or injury or other unhealthy conditions. Instead, clients must be referred to their physicians for diagnosis and treatment. Nail professionals are only permitted to service healthy nails and skin. What you will learn in this chapter will teach you how to properly clean and disinfect tools and equipment so they are safe to use on clients. These steps are designed to prevent infection or disease. **Disinfection** is a chemical process that uses specific products to destroy organisms on nonporous surfaces. Disinfectants used in salons must be **bactericidal** (back-teer-uh-SYD-ul), capable of destroying bacteria; **fungicidal** (fun-jih-SYD-ul), capable of destroying fungi; and **virucidal** (vy-rus-SYD-ul), capable of destroying viruses. Be sure to mix and use these disinfectants according to the instructions on their labels to ensure their effectiveness.

Contaminated salon tools and equipment may spread infections from client to client if the proper disinfection steps are not taken after every client. You have a professional and legal obligation to protect consumers from harm by using proper infection-control procedures. If clients are infected or harmed because a service or an infection-control procedure is not performed correctly, you may be found legally responsible for their injuries or infections.

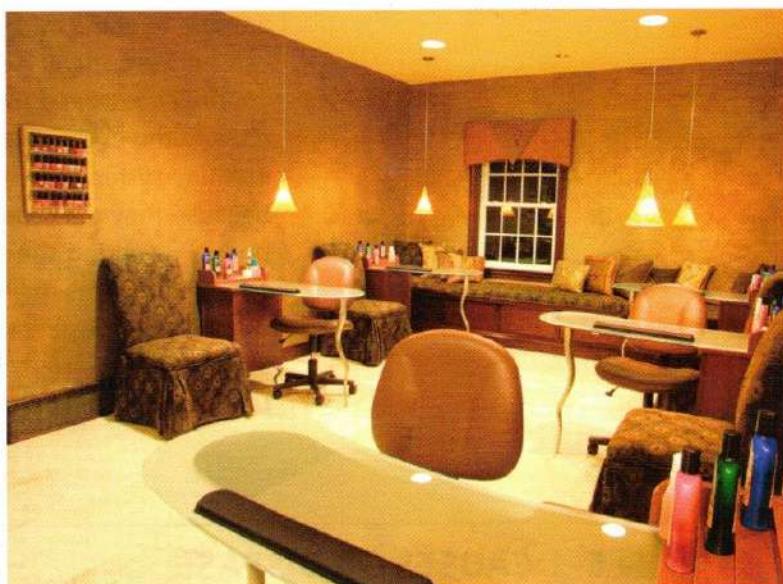
Bacteria

Bacteria (bak-TEER-ee-ah) are one-celled **microorganisms** (my-kroh-OR-gah-niz-ums), organisms of microscopic or submicroscopic size, with both plant and animal characteristics. Some are harmful, some are harmless. Bacteria can exist almost anywhere: skin, water, air, decayed matter, body secretions, clothing, or under the free edge of nails. Bacteria are so small they can only be seen with a microscope. In fact, 1,500 rod-shaped bacteria will fit comfortably on the head of a pin (**Figure 5–2**)!

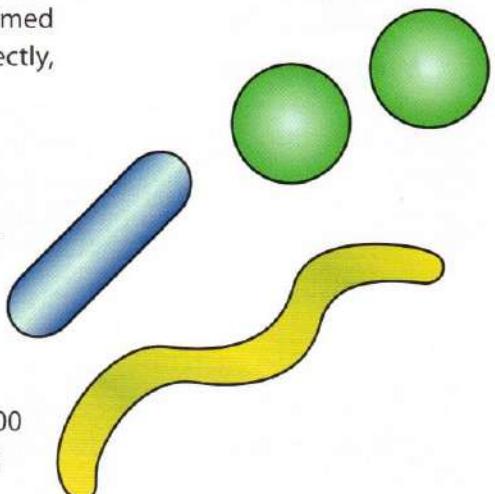
Types of Bacteria

There are thousands of different kinds of bacteria that fall into two primary types: **pathogenic** and **nonpathogenic**. Most bacteria are nonpathogenic (non-pathuh-JEN-ik): they are harmless organisms that may perform useful functions and

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▲ **Figure 5–1** A sparkling-clean salon gains your clients' confidence.



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▲ **Figure 5–2** Some general forms of bacteria.

are safe to come in contact with since they do not cause disease or harm. They can perform many helpful functions. For example, bacteria are used to make yogurt, cheese, and some medicines. In the human body, nonpathogenic bacteria help the body break down food, protect against infection, and stimulate the immune system. **Pathogenic** (path-uh-JEN-ik) bacteria are considered harmful because they may cause disease or infection in humans when they invade the body. Preventing the spread of pathogenic microorganisms is why salons and schools must maintain the highest standards for infection control at all times. If good practices are not learned and followed starting in school, many graduating nail technicians will never learn or practice them. **Table 5–1, Causes of Disease**, presents terms and definitions related to pathogens.

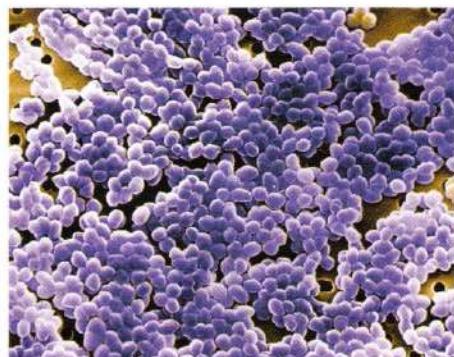
Table 5–1 CAUSES OF DISEASE

TERM	DEFINITION
Bacteria (singular: bacterium)	One-celled microorganisms having both plant and animal characteristics. Some are harmful; others are harmless.
Direct Transmission	The transmission of blood or body fluids through touching (including shaking hands), kissing, coughing, sneezing, and talking.
Indirect Transmission	The transmission of blood or body fluids through contact with an intermediate contaminated object, such as a tweezer, metal pusher, nipper, or an environmental surface.
Infection	The invasion of body tissues by disease-causing pathogens.
Germs	A nonscientific synonym for disease-producing organisms.
Microorganism	Any organism of microscopic or submicroscopic size.
Parasite	Organisms that grow, feed, and shelter on or in another organism (referred to as the host), while contributing nothing to the survival of that organism. Parasites must have a host to survive.
Toxins	Various poisonous substances naturally produced by some microorganisms (bacteria and viruses). All toxins are natural substances.
Virus (plural: viruses)	A parasitic submicroscopic particle that infects and resides in cells of biological organisms. A virus is capable of replication only through taking over the host cell's reproduction function.

Classifications of Potentially Pathogenic Bacteria

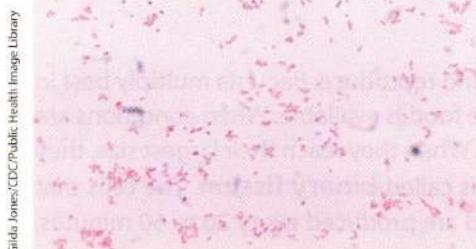
Bacteria have distinct shapes that help to identify them. Potentially pathogenic bacteria are classified as follows:

1. **Cocci** (KOK-sy)—Round-shaped bacteria that appear singly (alone) or in groups (**Figure 5–3**).
 - **Staphylococci** (staf-uh-loh-KOK-sy)—Pus-forming bacteria that grow in clusters, like a bunch of grapes. They cause abscesses, pustules, and boils (**Figure 5–4**).
 - **Streptococci** (strep-toh-KOK-eye)—Pus-forming bacteria arranged in curved lines resembling a string of beads. They cause infections such as strep throat and blood poisoning (**Figure 5–5**).
 - **Diplococci** (dip-lo-KOK-sy)—Spherical bacteria that grow in pairs and cause diseases such as pneumonia (**Figure 5–6**).

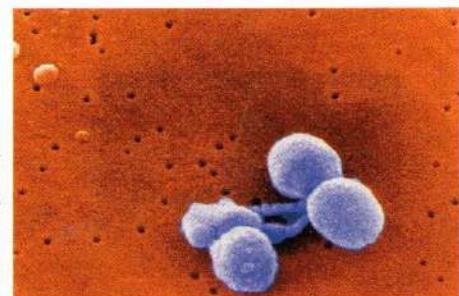


▲ Figure 5–3 Cocci.

Janice Haney Carr/CDC/Public Health Image Library



▲ Figure 5–4 Staphylococci.



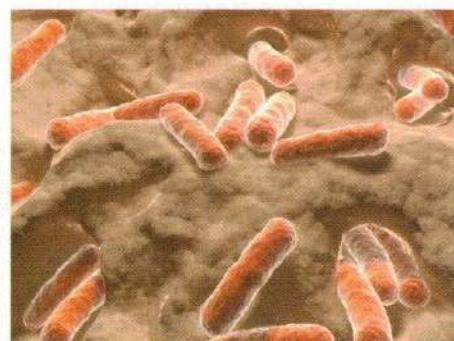
▲ Figure 5–5 Streptococci.



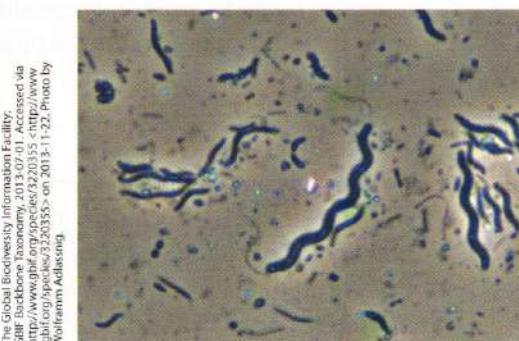
▲ Figure 5–6 Diplococci.

Dr. Norman Jacobs/CDC/Public Health Image Library

2. **Bacilli** (bah-SILL-ee), singular bacillus—Short, rod-shaped bacteria. They are the most common bacteria; some types produce diseases such as tetanus (lockjaw), typhoid fever, tuberculosis, and diphtheria (**Figure 5–7**).
3. **Spirilla** (spy-RIL-ah)—Spiral or corkscrew-shaped bacteria. They are subdivided into subgroups, such as *Treponema pallidum*, which causes syphilis, a sexually transmitted disease (STD); or *Borrelia burgdorferi*, which causes Lyme disease (**Figure 5–8**).

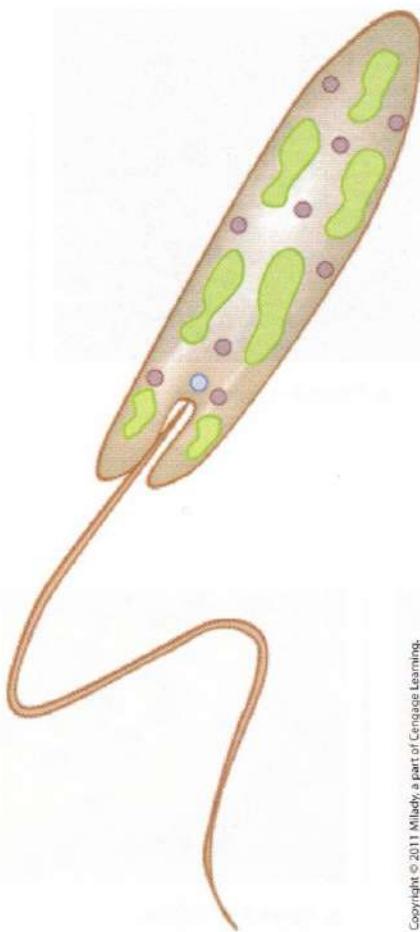


▲ Figure 5–7 Bacilli.



▲ Figure 5–8 Spirilla.

The Global Bioethics Information Facility
Gulf Biodiversity Observatory, 03/30/07, on
http://www.gulfobservatory.org/species/320355, http://www.
gulfobservatory.org/species/20355, on 2013-1-12. Photo by
Wolfgang Adelsang.



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▲ Figure 5–9 Bacteria with flagellum.

Movement of Bacteria

Different bacteria move in different ways. Cocci rarely show active **motility** (moh-TIL-ee-tee), or self-movement. They are transmitted in the air, in dust, or within the substance in which they settle. Bacilli and spirilla are both capable of moving and use slender, hairlike extensions, known as **flagella** (flu-JEL-uh) (singular: flagellum), for locomotion (moving about). A whiplike motion of these hairs moves the bacteria in liquid (Figure 5–9). You may also hear people refer to cilia (SIL-ee-uh) as the hairlike extensions on cells. Cilia are shorter than flagella. Cilia move cells, but cilia and flagella have a different motion. Flagella move in a snake-like motion, while cilia move in a rowing-like motion.

Bacterial Growth and Reproduction

Bacteria are tiny, microscopic bags generally consisting of an outer cell wall that contains liquid called protoplasm. Bacterial cells manufacture their own food from what they can absorb from the surrounding environment. They give off waste products, grow, and reproduce. The life cycle of bacteria consists of two distinct phases: the active stage and the inactive or spore-forming stage.

Active Stage

During the active stage, bacteria grow and reproduce. Bacteria multiply best in warm, dark, damp, or dirty places where food is available. When conditions are favorable, bacteria grow and reproduce. When they reach their largest size, they divide into two new cells. This division is called **binary fission**. The cells that are formed are called daughter cells and are produced every 20 to 60 minutes, depending on the bacteria. The infectious nail pathogen *Staphylococcus aureus* undergoes binary fission every 27 to 30 minutes. When conditions become unfavorable and difficult for them to thrive, the bacteria either die or become inactive.

Inactive or Spore-forming Stage

Certain fungi and bacteria, such as the anthrax and tetanus bacilli, coat themselves with wax outer shells that are able to withstand long periods of famine, dryness, and unsuitable temperatures. In this stage, **spores** can be blown about and are not harmed by most disinfectants, heat, or cold.

When favorable conditions are restored, the spores change into the active form and begin to grow and reproduce. Although spores are dangerous if they enter the body during a surgical procedure and become active, they pose little risk to clients in a salon.

Bacterial Infections

An infection occurs when body tissues are invaded by disease-causing or pathogenic bacteria. There can be no bacterial infection without the presence of pathogenic bacteria. So if they are eliminated, clients cannot become infected.

Pus is a fluid created by tissue **inflammation** (in-fluh-MAY-shun)—a condition in which a part of the body reacts to protect itself from injury, irritation, or infection. Inflammation is an unhealthy condition characterized by redness, heat, pain, and swelling. Inflamed tissues contain white blood cells, bacteria, and dead cells, while the presence of pus is a sign of a bacterial infection. A **local**

infection, such as a pimple or abscess, is confined to a particular part of the body and is indicated by a lesion containing pus. Inflamed skin should never receive services in the salon setting, since it likely indicates infection or some other medical condition.

Staphylococci (staph) are among the most common human bacteria, and are normally carried by about one-third of the population. Staph can be picked up on doorknobs, countertops, and other surfaces, but are more frequently spread through skin-to-skin contact, such as shaking hands or using unclean files or implements when performing services. If these bacteria get into the wrong place they can be very dangerous. Although rare considering the number of nail services performed, every year there are lawsuits brought against nail salons and nail technicians for allegedly causing staph infections during the performance of their services. Don't let this happen to you or your clients.

Staph is responsible for food poisoning and a wide range of diseases, including toxic shock syndrome. Some types of infectious bacteria are highly resistant to certain antibiotics—for example, the staph infection **Methicillin-resistant *Staphylococcus aureus* (MRSA)**. Historically, MRSA occurred most frequently among people with weakened immune systems or those who had undergone medical procedures. Today, it has become more common in otherwise healthy people. Clients who appear completely healthy may carry this organism and bring it into the salon to infect others. Some may not be aware of their infection; others may show more obvious symptoms. The symptoms usually appear as skin infections, such as pimples and boils, that can be difficult to cure. MRSA infections have at times resulted in death, which is why it is important to clean and disinfect all tools and implements used in the nail salon. You owe it to yourself and your clients. Remember: If proper cleaning and disinfection procedures had been observed, these deaths could likely have been avoided. There is a large amount of scientific and medical evidence to prove that cleaning and disinfection work very well to protect against the spread of infection. When consistently and properly performed, they are the best way to ensure that your clientele are protected.

Also, *never* perform your services if the client's hands or feet show visible signs of infections or other unhealthy conditions. Nail technicians are only allowed to work on healthy nails and skin. Nail technicians are *never* permitted to diagnosis, treat, or service unhealthy conditions, nor can they suggest or prescribe any type of treatment for these conditions. To do so is in violation of federal law.

When a disease spreads from one person to another, it is said to be a **contagious disease** (kon-TAY-jus dih-ZEEZ). Some of the more common contagious diseases that will prevent a salon professional from servicing a client are the common cold, ringworm, conjunctivitis (pinkeye), viral infections, and natural nail or toe and foot infections. The chief source for spreading these infections is dirty hands, especially dirt under the fingernails and on the webs between the fingers. Disease may also be spread by contaminated implements, cuts, infected nails, open sores, pus, mouth and nose discharges, shared drinking cups, telephone receivers, door knobs, and towels. Uncovered coughing or sneezing and spitting in public also spread germs. **Table 5–2, Terms Related to Disease**, lists general terms and definitions that are important for an understanding of disease in general.

Did You Know?

One of the main causes of infection from a salon's whirlpool foot spas can be traced to debris building up to create a thin, film-like coating called biofilms.

Biofilms are a highly protective breeding ground for bacteria and fungi and can serve as nests in which huge colonies of these microorganisms can grow and multiply. Biofilms are often highly resistant to solely soaking in an EPA-registered disinfectant. Once biofilms have a chance to form and get established, they can only be removed by a thorough scrubbing with a stiff bristle brush and soap and water. The bad-tasting film in your mouth and on your teeth when you wake up each morning is an example of a biofilm. The biofilm forms each night while you sleep. Brushing your teeth only temporarily removes the biofilm; it will quickly reform. This is one of the main reasons why we must brush our teeth often to keep them healthy. Just as rinsing your mouth out in the morning won't get your teeth and mouth clean, quickly washing and rinsing basins, tools, and implements won't get them clean, either. A proper cleaning requires the use of a brush with bristles that are stiff enough to thoroughly scrub the surface free of biofilms and other debris. Don't let biofilms build up in your salon; use a brush that has been properly cleaned and disinfected!

Table 5–2 TERMS RELATED TO DISEASE

TERM	DEFINITION
Allergy	A reaction due to extreme sensitivity to certain foods, chemicals, or other normally harmless substances.
Contagious Disease	Also known as <i>communicable disease</i> ; a disease that is spread from one person to another. Some of the more contagious diseases are the common cold, ringworm, conjunctivitis (pinkeye), viral infections, and fungal nail or toe and foot infections.
Contamination	The presence, or the reasonably anticipated presence, of blood or other potentially infectious (caused by or capable of being transmitted by infection) materials on an item's surface or visible debris or residue such as dust, hair, and skin.
Decontamination	The removal of blood or other potentially infectious materials on an item's surface and the removal of visible debris or residue such as dust, hair, and skin.
Diagnosis	The determination of the nature of a disease from its symptoms and/or diagnostic tests. Federal regulations prohibit nail professionals from performing a diagnosis.
Disease	An abnormal condition of all or part of the body, or its systems or organs, that makes the body incapable of carrying on normal function.
Exposure Incident	Contact with nonintact (broken) skin, blood, body fluid, or other potentially infectious materials that is the result of the performance of an employee's duties.
Infectious Disease	Disease caused by pathogenic (harmful) microorganisms that enter the body. An infectious disease may or may not be spread from one person to another person.
Inflammation	Condition in which a part of the body reacts to injury, irritation, or infection. An inflammation is characterized by redness, heat, pain, and swelling.
Occupational Disease	Illnesses resulting from conditions associated with employment, such as prolonged and repeated overexposure to certain products or ingredients.
Parasitic Disease	A disease caused by parasites, such as lice and mites.
Pathogenic Disease	A disease produced by organisms, including bacteria, viruses, fungi, and parasites.
Systemic Disease	A disease that affects the body as a whole, often due to under- or overfunctioning internal glands or organs. The disease is carried through the blood stream or the lymphatic system.

Viruses

A **virus** (VY-rus) is a parasitic submicroscopic particle that infects and resides in the cells of a biological organism. A virus is capable of replication only when it takes over the host cell's reproduction machinery. Viruses are so small that they can only be seen under the most sophisticated and powerful microscopes. They cause common colds and other respiratory and gastrointestinal (digestive tract) infections. Other viruses that plague humans are measles, mumps, chicken pox, smallpox, rabies, yellow fever, hepatitis, polio, influenza, and HIV, which causes AIDS.

An example of a common viral infection often seen in nail salons is the human papillomavirus (HPV) (**Figure 5–10**). The virus can infect the bottom of the foot and resembles small black dots, usually in clustered groups. HPV is highly contagious, difficult to kill, and can be passed from pedicure client to pedicure client by dirty implements and foot baths. If the client shows signs of HPV infection, do not perform a pedicure service. However, many people have no visible symptoms, making infection control for every client even more important!

One difference between viruses and bacteria is that a virus can live and reproduce only by penetrating other cells and becoming part of them, while bacteria can live and reproduce on their own. Bacterial infections can usually be treated with specific antibiotics, while viruses are hard to kill without harming the body in the process. Viruses are also not affected by antibiotics. When available, vaccinations prevent viruses from growing in the body but are not available for all viruses. Vaccines are available for hepatitis B and varicella (the virus that causes the shingles); you should consider receiving these vaccines as well as those for the seasonal flu and pneumonia. **LO2**

Warts

A wart is caused by a highly contagious virus that has infected an area of the skin and created a generally small, rough growth that resembles a solid blister with a cauliflower-like appearance. The virus gains access through broken tissue to create a localized area of infection that can grow and spread to other areas. In the salon, warts are most likely found on the bottom of the feet (plantar warts) or on the fingers or palms (palmar wart). A typical infection can last months or years and may disappear only to spontaneously recur. Treatments are available, but preventing the spread of the virus is easily accomplished by always properly following cleaning and disinfection practices and procedures. Nail professionals should *never* attempt to treat any wart nor provide services to these areas of skin. Clients with warts on their feet or hands should be referred to a physician for diagnosis and treatment, if required.

Bloodborne Pathogens

Disease-causing microorganisms that are carried in the body by blood or body fluids, such as hepatitis and HIV, are called **bloodborne pathogens**. The spread of bloodborne pathogens is possible through nipping, clipping, facial treatments, waxing, tweezing, or any time the skin is cut, shaved, or broken. Use great care to avoid cutting or damaging clients' skin during any type of service. Intentional cutting of any living skin is considered outside the scope of the nail technician's licensed and approved practices. Federal law allows only qualified



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Photography by Joseph S. Zelner

▲ **Figure 5–10** Plantar wart caused by human papillomavirus (HPV).

medical professionals to cut living skin, since this is considered a medical procedure. This means that nail technicians are not allowed to trim or cut the skin around the nail plate. Cutting hardened tissue and removing a callus are both considered medical procedures. Cutting the living tissue is what creates the hardened tissue, as the body seeks to protect itself from the injury. Even if the client insists, nail technicians may not intentionally cut any living skin for any reason. Normally, once the cutting is discontinued, the hardened tissue will eventually disappear and the skin around the nail plate will revert back to a healthy, normal appearance.

Hepatitis

A bloodborne virus causes **hepatitis** (hep-uh-TY-tus), a disease that damages the liver. In general, it is difficult to contract hepatitis; however, hepatitis is easier to contract than HIV because it can be present in all body fluids of those who are infected. Unlike HIV, hepatitis can live on a surface outside the body for long periods of time. It is vital that all surfaces with which a client comes into contact are thoroughly cleaned.

There are two types of hepatitis that are of concern within the salon: hepatitis B and hepatitis C. Hepatitis B is the most difficult to kill on a surface, so check the label of the disinfectant you use to be sure that the product is effective against it. Hepatitis B and C are spread from person to person through blood and less often through other body fluids, such as semen and vaginal secretions. Those who work closely with the public can be vaccinated against hepatitis B. You may want to check with your doctor to see if this is an option for you.

HIV/AIDS

Human immunodeficiency virus (HIV) (HYOO-mun ih-MYOO-noh-di-FISH-en-see VY-rus) is the virus that causes **acquired immunodeficiency syndrome (AIDS)** (uh-KWY-erd ih-MYOO-no-di-FISH-en-see sin-drohm). AIDS is a disease that breaks down the body's immune system. HIV is spread from person to person through blood and less often through other body fluids, such as semen and vaginal secretions. A person can be infected with HIV for many years without having symptoms, but testing can determine if a person is infected within six months after exposure to the virus. Sometimes, people who are HIV-positive have never been tested and do not know they are infecting other people.

HIV is spread mainly through the sharing of needles by intravenous (IV) drug users, and less often by unprotected sexual contact or accidents with needles in healthcare settings. The virus is less likely to enter the bloodstream through cuts and sores. It is not spread by holding hands, hugging, kissing, sharing food, or using household items such as the telephone or toilet seats. There are no documented cases of the virus being spread by food handlers; insects; casual contact; or hair, skin, nail, and pedicure salon services.

If you accidentally cut a client who is HIV-positive and you continue to use the implement without cleaning and disinfecting it, you risk puncturing your skin or cutting another client with a contaminated tool. Know that proper disinfection will completely eliminate any **contamination** risks. However, it is important to understand that there is no indication that salon services transmit HIV nor does any authoritative body believe that salon services are a source of HIV transmission.  **LO3**

Fungi

Fungi (FUN-jl), single-cell organisms that grow in irregular masses that include molds, mildews, and yeasts, can produce contagious diseases, such as ringworm. **Mildew** (MIL-doo) affects plants or grows on inanimate objects, but does not cause human infections in the salon. Nail infections can be spread by using dirty implements or by not properly preparing the surface of the natural nail before enhancement products are applied. Nail infections can occur on both hands and feet. Fungal infections are much more common on the feet than hands, but bacterial infections can occur on both. Both bacterial and fungal infections can be spread to other nails, or to other clients, unless everything that touches the client's skin is either properly disposed of (disposable or single-use items) or properly cleaned and disinfected before reuse. The FDA has determined that topical treatments applied directly to the fingernails, skin, and toenails are not effective in eliminating fungal infections. In short, they don't work. The FDA prohibits the sale of antifungal products for fingernails and toenails without a medical prescription (**Figure 5-11**).

How Pathogens Enter the Body

Pathogenic bacteria, viruses, or fungi can enter the body through:

- Broken skin, such as a cut or scratch (intact skin is an effective barrier to infection).
- The mouth (contaminated water, food, or fingers).
- The nose (inhaling dusts or sprays from sneezing).
- The eyes or ears (less likely, but possible).
- Unprotected sex.

The body prevents and controls infections with:

- Healthy, unbroken skin—the body's first line of defense.
- Body secretions, such as perspiration and digestive juices.
- White blood cells within the blood that destroy bacteria.
- Antitoxins that counteract the **toxins** (TAHK-sin), any of various poisonous substances produced by some microorganisms (bacteria and viruses).

Parasites

Parasites are organisms that grow, feed, and shelter on or in another organism while contributing nothing to the survival of that organism (referred to as a host). They must have a host to survive. Parasites can live on or inside of humans and animals. They also can be found in food, on plants and trees, and in water.

Scabies (SKAY-beez) is a contagious skin parasitic disease that is caused by the itch mite, which burrows under the skin (**Figure 5-12**). Contagious diseases and conditions caused by parasites should only be treated by a doctor. Contaminated countertops, tools, and equipment should be thoroughly cleaned and then disinfected with an EPA-registered disinfectant used as directed or 10 percent bleach solution for 10 minutes.

Courtesy of Geoffrey F. Mills, DPM, Sacramento, CA



▲ Figure 5-11 Nail fungus.

Did You Know?

All toxins are produced by living things, so all toxins are naturally derived.

Nature is filled with many naturally occurring poisons, carcinogens, and toxins. Don't be fooled into thinking that anything natural must be safe. "Natural" simply means that the substance occurs in nature and many harmful substances are all natural.

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Photography by Joseph Schuyler.



▲ Figure 5-12 Scabies.

Immunity

Immunity is the ability of the body to destroy and resist infection. Immunity against disease can be either natural or acquired and is a sign of good health.

Natural immunity is partly inherited and partly developed through healthy living. **Acquired immunity** is immunity that the body develops after overcoming a disease or through inoculation (such as flu vaccinations), or through exposure to natural allergens, such as pollen, cat dander, and ragweed.

■ PRINCIPLES OF PREVENTION

Proper infection control can prevent the spread of disease caused by exposure to potentially infectious materials on an item's surface. Infection control also will prevent exposure to blood and visible debris or residue such as dust, hair, and skin. Proper infection control requires two steps: cleaning and then disinfecting with an appropriate EPA-registered disinfectant. When these two steps are followed correctly, virtually all pathogens of concern in the salon can be effectively eliminated. **Sterilization**, which is the process that destroys all microbial life, is a method that can be incorporated but is very rarely mandated. Effective sterilization typically requires the use of an autoclave to complete: this piece of equipment incorporates heat and pressure. For sterilization to be effective, items must be small enough to fit into the autoclave chamber, pre-cleaned beforehand and the autoclave must be tested and maintained per the manufacturer's specifications. The Centers for Disease Control and Prevention (CDC) requires that autoclaves be tested weekly to ensure they are properly sterilizing implements. The accepted method is called a spore test. Sealed packages containing test organisms are subjected to a typical sterilization cycle and then sent to a contract laboratory that specializes in autoclave performance testing.

Cleaning

The first step of any infection control method is to **clean**; that is, a mechanical process (scrubbing) using soap and water or detergent and water to remove all visible dirt, debris, and many disease-causing germs from tools, implements, and equipment. Proper cleaning also removes invisible debris that interferes with disinfection. Nail technicians are required to clean before they disinfect. When a surface is properly cleaned, the number of contaminants on the surface is greatly reduced, as is the risk of infection. The vast majority of contaminants and pathogens can be washed from the surfaces of tools and implements through proper cleaning. A surface must be properly cleaned before it can be properly disinfected: This is why cleaning is an important part of disinfecting nail tools and equipment. Using a disinfectant without cleaning first is like using mouthwash without brushing your teeth—it just does not work properly!

Cleaned surfaces can still harbor small amounts of pathogens, but the fewer there are, the less likely they can spread infections. Putting antiseptics on your skin will drastically lower the number of pathogens on your hands, but it will not clean your hands nor remove residual contaminants, such

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as monomer or UV gel. The proper cleaning of the hands requires liquid soap, running water, a nail brush, and a clean towel. Do not underestimate the importance of proper cleaning and hand washing. They are the most powerful and important ways to prevent the spread of infection. Some common methods of cleaning in a salon include:

- Washing with soap and water and scrubbing with a clean and properly disinfected brush.
- Using an ultrasonic unit.
- Using a cleaning solvent (i.e., on metal bits for electric files).

Disinfecting

The second step of infection control is disinfecting. Disinfection is the chemical process that uses specific products to destroy organisms on nonporous surfaces. This process requires the use of an EPA-registered disinfectant prepared and applied following the manufacturer's instructions. All surfaces must be cleaned prior to disinfection.

The disinfecting process is not effective against bacterial spores, which is much more of an issue for hospitals where surgical procedures are performed. In the salon setting, disinfection is extremely effective and is considered to be the EPA-approved method for controlling microorganisms on surfaces such as shears, nippers, and other multiuse tools and equipment and nonporous surfaces.

Disinfectants are EPA-registered products used on nonporous surfaces that destroy organisms such as bacteria, viruses, and fungi when used according to the disinfectant label instructions. *Disinfectants are not for use on human skin, hair, or nails.* Never use disinfectants as hand cleaners since they can cause skin irritation and/or allergy. All disinfectants clearly state on the label to avoid skin contact. This means avoid contact with your skin as well as the client's. Do not put your fingers directly into any disinfecting solution. These are pathogen pesticides that can be harmful to the skin if not properly used. If you mix a disinfectant in a container that is not labeled by the manufacturer, it must be properly labeled with the contents and the date mixed.

Sterilization

A second method of infection control is cleaning and then sterilizing. The word "sterilize" is often used incorrectly. **Sterilization** is the process that completely destroys all microbial life, including spores. The most effective methods of sterilization use high-pressure steam autoclaves. Simply exposing instruments to steam is not enough. To be effective against spores and certain disease-causing pathogens, the steam must be pressurized in an autoclave. Dry heat forms of sterilization are less efficient and require longer times at higher temperatures but still can be used in the salon.

Sterilization is not useful for many items in the salon setting (e.g., pedicure basins, countertops, door knobs or anything else that won't fit inside the relatively small autoclave); therefore, it can never replace disinfection in salons. Training for the use of autoclaves can be found by searching the internet and from the manufacturers of autoclaves. For example, dirty implements cannot



Did You Know?

While some clients who have impaired immune systems will share that information with you, many will not: either they do not know it is important or they do not know that they have a compromised immune system. These people are at very high risk of infection if they come into contact with pathogens in the salon. Keeping in mind that you won't always know who these people are, it is important to practice proper infection control before every client! One example is a diabetic whose immune system does not work effectively and who also has impaired healing. Most diabetics are diabetic for 7 years prior to being diagnosed, which means that even if you ask, they will say "no" because they have not yet been diagnosed! Another example is clients who are on medication for things like asthma, rheumatoid arthritis, and fibromyalgia: these medications are designed to dull the immune system, and as such make these clients particularly susceptible to infection. Remember, you don't know everyone who sits in your chair. Treat everyone as though they deserve the best in disinfection!

be properly sterilized without pre-cleaning. Autoclaves need regular maintenance and testing to ensure they are in good working order and performing properly. Color indicator strips on autoclave bags can provide false readings, so you should never rely solely on these to ensure proper sterility. Autoclaves offer complete destruction of all microorganisms, which is an advantage over liquid disinfectants.

The Centers for Disease Control and Prevention (CDC) requires that autoclaves be tested weekly to ensure that they are properly sterilizing implements. The accepted method is called a spore test. Sealed packages containing test organisms are subjected to a typical sterilization cycle and then sent to a contract laboratory that specializes in autoclave performance testing. You can find laboratories to perform this type of test by simply doing an Internet search for *autoclave spore testing*. Nail techs can obtain self-spore testing vials or mail-in spore testing kits. Other regular maintenance is also required to ensure that the autoclave reaches the proper temperature and pressure.

Salons should always follow the manufacturer's recommended schedule for cleaning, changing the water, service visits, replacement parts, etc. Be sure to keep a logbook of all usage, testing, and maintenance for the state board to inspect. Showing your logbook to clients can provide them with peace of mind and confidence in your ability to protect them from infection. Salons that are not prepared to meet each of these requirements should not invest in or utilize an autoclave. Those salons should instead rely on the proper use of a salon disinfectant.  **LO4**

Read Labels Carefully!

Manufacturers take great care to develop highly effective disinfection systems. However, disinfectants can be potentially harmful and/or rendered ineffective when used improperly. If you do not follow proper guidelines and instructions, any professional salon product can be potentially dangerous. Like all products, disinfectants must always be used exactly as the label dictates. If used improperly, disinfectants cannot be expected to perform properly and will not protect you or your clients.

Choosing a Disinfectant

To use a disinfectant properly, you must read and follow the manufacturer's instructions. Mixing ratios (dilution) and contact time are very important. Not all disinfectants are mixed to the same concentration, so be sure to mix the correct amount according to the instructions on the label. If the label does not have the word "concentrated" on it, the product is already premixed and must be used as is. All EPA-registered disinfectants, even those sprayed on large surfaces, will specify a contact time in their directions for use. (Contact time is the amount of time the surface must remain wet with disinfectant in order for the disinfectant to be effective.)

Disinfectants must have **efficacy** claims on the label. Efficacy is the ability to produce an effect. As applied to disinfectant claims, efficacy is the effectiveness with which a disinfecting solution kills specific organisms when used according to the label instructions. Salons pose a much lower infection risk when compared to hospitals. Cleaning and disinfection standards are much stricter in hospitals than in salons, and for good reason. Some types of disinfectants are much too dangerous for use in the salon environment, especially since the risk of caus-