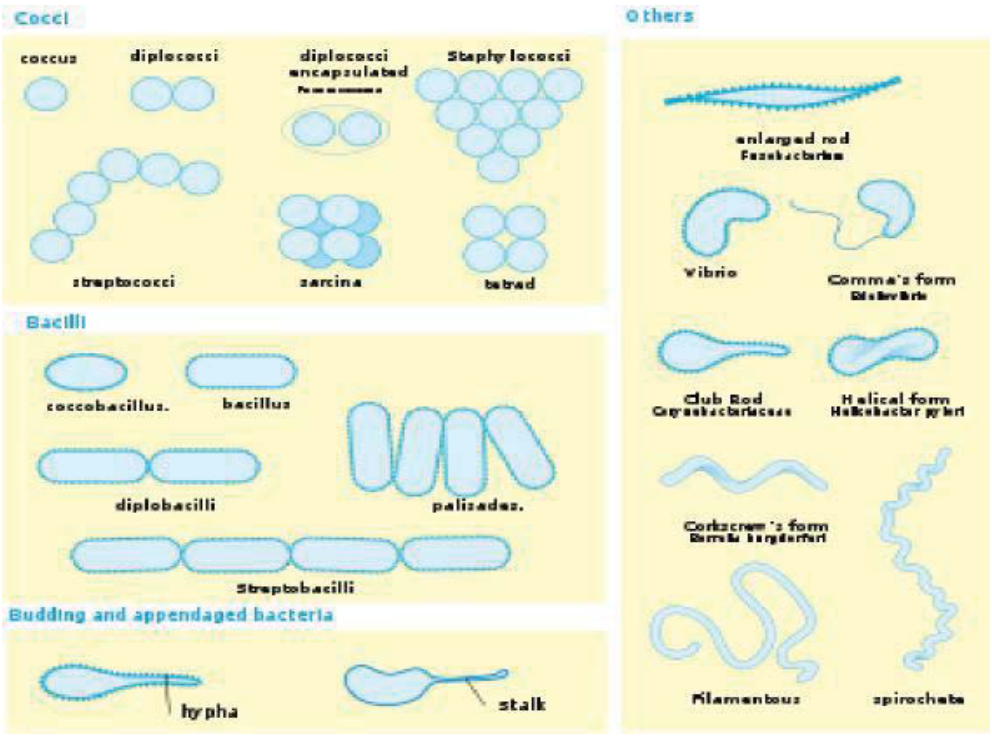
STERILIZATION AND BACTERIA

Due to the nature of our work, this material is very important; it has a direct effect on our own as well as the client's welfare. Given the many diseases which circulate through the public; it is common sense that all regulations prescribed by our regulatory agencies should be strictly practiced. Bacteria are real and they exist everywhere; particularly on the skin.

Remember that as small as they are (1,500 rod-shaped bacteria can span the point of a needle), they can cause serious illness, so they deserve our greatest respect.



Bacteria refers to a large, widely distributed group of typically one-celled micro-organisms which are chiefly parasitic or saprophytic.

Parasites lives at the expense of some other organism (their "host"). Fortunately, pathogenic (disease-causing) bacteria are in the minority of the micro-organic world; yet, they produce an ample share of disease in plant and animal tissue. These bacteria are parasites, requiring living material for their growth.

Saprophytes live on dead matter, causing it to decay. . The majority of bacteria are non-pathogenic (harmless). Many are, in fact, beneficial to our existence (i.e., penicillin).

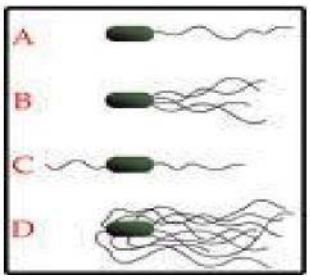
Pathogenic bacteria are classified into three main groups, according to their cell shapes:

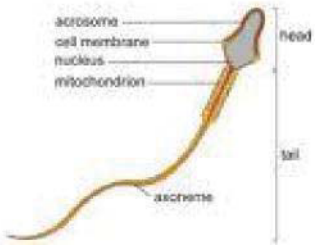
Cocci (coccus) are round and grow in groups or clusters. Common among the cocci are Staphylocci, the pus forming organisms present in abscesses, pustules and boils. Impetigo, an acute, inflammatory and highly contagious disease of the skin occurring especially among children, is due to the action of staphylococci. Streptococci occur in chains and are the pus forming organisms involved in blood poisoning and the "strep" sore throat. Diplocci grow in pairs causing pneumonia.

Bacilli (bacillus) are short and rod-shaped in structure, varying greatly in diameter. These are the most common of all bacteria producing such diseases as tetanus (lockjaw) and the most common bacteria, tuberculosis.

Spirilla are characteristic of spiral and corkscrew shape. Syphilis, a sexual transmitted disease, is an example of the spirillum.

Bacteria propel themselves with fine hair-like projections called **flagella and cilia** which extend from the bacteria's body wall and propel the organism through its fluid environment. They allow the bacteria to stick to objects or repel away from them.





Bacteria can convert human tissue into their own protoplasm. This nourishes the bacteria until it reaches a larger size, whereupon it divides into two smaller cells. When these get big enough, they divide again. The process of **cell division is called mitosis**.

Under harmful environmental conditions, the protoplasm of the bacilli becomes condensed into a protective spherical or **oval spore,** much like the shell of an egg. When the human antibodies are incapable of limiting the spread of bacterial growth, infections result. The infection may be **localized**, in the form of pus made of bacteria, blood cells, decayed tissue, and other waste matter, or it may be carried through the bloodstream causing a **general infection** to the body or blood poisoning. Infection resulting from treatment will usually occur within 12 hours after treatment.

Fungi are classified as plant or vegetable parasites. Fungi are multicellular microorganisms. Having no chlorophyll with which to photosynthesize their own food, they are either parasitic or saprophytic. One major difference is that fungal cells have cell walls that contain chitin, unlike the cell walls of plants, which contain cellulose. Molds, mildews, and yeasts are non-pathogenic examples of this group. Ringworm and athlete's foot are typical diseases caused by this fungus.

Viruses are subcellular forms of life without nuclei, cytoplasm, or cell membranes. A virus is 50 times smaller than a bacterium. Viruses cannot live or reproduce on their own; they are parasitic and must acquire hosts. Once acquiring living cells as hosts, viruses begin to multiply in vast numbers, causing damage, if not death, to the invaded cells.

Although small, simple, and fragile, viruses can wreak havoc on tissue. A virus consists simply of an outer coat of protein and, on the inside, DNA or RNA. Viruses are difficult to treat or control, because no known antibiotics destroy them. Usually the symptoms the virus has caused are treated, not the virus itself. Other viruses include the common cold, influenza, measles, chicken pox, mumps, genital herpes, herpes simplex (cold sores), mononucleosis, and HIV. Respiratory viruses like colds and flu are spread through hand-to-hand contact. Others require the direct contact of blood or body fluids of an infected person to another person.

Infection is combated through the action of **white corpuscles (leukocytes) and antibodies**. They maintain the immune system and fight infection by attacking and destroying bacteria. These cells form part of the body's defense against invading germs. The outer layer of the leukocytes help attract, trap, and destroy

bacteria.

Direct Contact. This mode of transmission allows infectious micro-organisms to enter the body through the mouth, nose, and eyes and come into contact with mucous membranes. Another avenue of direct contact transmission is through breaks or cracks (wounds) in the skin.

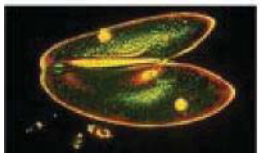
Indirect Contact. Infection occurs by contact between inanimate objects in the environment. Contact can be airborne (by coughing, sneezing, nasal discharge), vehicle (through contaminated water, food, from fecal matter, or by vector (an insect bite).

Immunity – is the resistance to disease.

Natural immunity – a person is born with natural antibodies to destroy invading bacteria.

Acquired immunity – by antibodies formed by body or by injection. The body starts producing antibodies to fight "invasion" of bacterial growth. When the body does not produce enough antibodies, an infection will result.

Protozoa are one-celled animals which have distinct nuclei; the nucleus is a capsule of genetic material and special substance within the protoplasm of the animal.



Sanitation and Sterilization

State health boards vary from one another in their specific regulations concerning sterilization and sanitation, but all such regulations have a common goal – the elimination of any possibility of transmitting infection or disease as the result of contaminated instruments or careless practices. You should therefore acquaint yourself with the laws of your state concerning your legal obligations to maintain sterilization and sanitation standards.

1. **Sanitation** is the term for cleaning using soap, water, and in some cases 70% alcohol for cleaning surfaces (i.e,: tables, treatment beds, etc), thereby reducing the number of pathogens on a surface. It is not the total elimination of pathogens. Some will remain on the surface.
2. **Disinfection** is the term for the reduction of microorganisms on a surface. However, not all spores will be destroyed. Disinfectants are used for killing bacteria and certain viruses on nonporous surface areas and tools. They are not suitable for use on human tissue since the chemicals are too strong for use on the skin.
3. **Sterilization** is the process in which all bacteria and viruses are destroyed. Sterilization process effectively kills or eliminates transmissible agents (such as **fungi, bacteria, viruses spore** forms, etc.) from a surface, equipment, article of food or medication, or biological culture medium.




Autoclave (steam under high pressure). The autoclave is a self-contained heating unit that can turn water into vapor for sterilization.

Unpackaged instruments 15 PSI @ 121 C (250 F) for 15 minutes

Packaged instruments 15 PSI @ 121 C (250 F) for 30 minutes

Dry heat (forced air oven). Dry heat has the advantage that it can be used on powders and other heat-stable items that are adversely affected by steam. It does not cause rusting of steel objects, Temperatures are set at 340ºF (170º C) for 1 hour or 320ºF (160ºC) for 2 hours.

Boiling (moist heat). Instruments are submerged in a vat of boiling water at 212ºF for a minimum of 2 minutes.

These methods of sterilization are all designed to kill spores, endospores, and viruses that antiseptics and disinfectants cannot kill.

Glass bead sterilizer. Glass bead sterilizers are no longer approved by the Centers for Disease Control, and must not be used to sterilize instruments.

Equipment must be checked weekly to ensure that it is reaching the required temperature. Absolute (undiluted) alcohol is less effective than 70% alcohol because it coagulates the outer membrane of the bacterial cell, forming a shell-like protective barrier to further germicidal action.

Universal Precautions refers to the practice, in medicine, of avoiding contact with patients' bodily fluids, by means of the wearing of nonporous articles such as medical gloves, goggles, and face shields. Under universal precautions all patients are considered to be possible carriers of blood-borne pathogens.

The guideline recommends wearing gloves when collecting or handling blood and body fluids contaminated with blood and wearing face shields when there is danger of blood splashing on mucous membranes and when disposing of all needles and sharp objects in puncture-resistant containers.

Universal precautions are recommended for doctors, nurses, patients, and health care support workers who are required to come into contact with patients or bodily fluids. This includes staff and others who may not come into direct contact with patients.

Universal precautions are recommendations issued by CDC for minimizing the risk of transmission of blood pathogens by healthcare and public safety workers. It refers to the practice in medicine of avoiding contact with patient's bodily fluids, by means of wearing nonporous articles such as medical gloves, goggles, and face shields. Also, universal precautions are good hygiene habits, such as hand washing and the use of gloves and other barriers, correct sharps handling, and aseptic technique. The Ideas of Universal Precautions include:

- Consider all clients as potentially infectious;
- Adhere infection control to minimize the risk of blood or bodily fluids from all clients and practitioners;
- Reduce the risk of transmission of infections and disease from clients to clients, from clients to practitioners, and vice versa;

Infection control standards include:

1. Hand and body hygiene
2. Cleaning, disinfection and sterilization
3. Environmental control and housekeeping
4. Personal protective equipment
5. Vaccination of health care workers
6. Potential hazards

Typical Rules and Regulations:

- An adequate and readily available supply of hot and cold running water shall be provided in the work place.
- Each person in an establishment shall thoroughly wash his or her hands before and after serving each patron.
- Used towels shall be laundered either by regular commercial laundering or by a noncommercial laundering process which includes: immersion of the clean and thoroughly rinsed towels in an aqueous solution containing 100 p.p.pm of available chlorine for not less than one minute.
- All clean towels are to be stored in a closed cabinet.
- Instruments, materials, and supplies may be disinfected by either immersion in boiling water for at least 2 minutes or immersion for at least 2 minutes in a solution containing not less than 500 parts per million of sodium or calcium hypochlorite.
- All creams, lotions, and other cosmetics used on patrons must be kept in clean closed containers.
- All powder used on patrons must be kept in a clean shaker.
- Creams and other semi-solid substances must be removed from the container with a sanitized spatula.
- Lotions or fluids shall be poured into a sanitized glass or other container and shall be applied to the patron by means of cotton or other sanitized applicator. Any excess product must never be returned to the original container but be discarded.

Summary

Be aware of the rules which your regulatory agency imposes on your practice. Each state has its own set of rules and regulations for sanitation and sterilization. A copy of the Rules and Regulations may be obtained by contacting the proper agency in your locale. The person or persons whose name appears on the establishment may be held responsible for maintaining rules. A copy of sanitary rules shall be posted in a place conspicuous to the public. Rules governing sterilization of instruments and disinfecting the treatment area must be followed in the most conservative manner.