



Health care facilities, dental offices, veterinary clinics, schools, day care centers, and public buildings all use some form of disinfecting. Incorporating disinfection best management practices protects building occupants and the environment.

Disinfection best management practices

Disinfectants, are designed to be toxic, contain chemicals that are corrosive, irritants, and potentially carcinogenic. They are used to kill microbes and achieve an appropriate level of clean. Implementing best management practices will encourage the use of only the amount of disinfectant necessary to do the job, thereby reducing worker and environmental exposure. Ultimately, incorporating best management practices for use of disinfectants protects patients, employees, and the environment.

Right Level of Clean

Different levels of cleanliness are needed for different activities. Use the lowest cleaning level that meets your needs.

Surface Cleaning

General surface cleaning physically removes all visible dirt, organic matter, and bacteria. It is normally accomplished with water, mechanical action like scrubbing, and detergents. Surface cleaning should always precede disinfecting and sterilizing. If organic matter is not first removed it can inactivate disinfectants. In many cases, including the health care industry, general surface cleaning is the highest level of cleaning necessary.

Disinfecting

Disinfecting reduces the risk of infection from microbial contamination. It is done to reduce the chance of infecting patients and others. Disinfecting is necessary for surfaces or equipment that may contact broken skin or mucous membranes. High-level disinfection is required for semi-invasive medical procedures like endoscopy. Lower levels of disinfection are used on high touch surfaces in surgery wards and kennels.

Sterilizing

Sterilizing virtually eliminates or destroys bacteria and viruses. Objects are sterilized if they will enter a sterile area, such as a body

cavity. Sterilization is accomplished with hot steam and pressure, toxic gases such as ethylene oxide, or hydrogen peroxide plasma.

Read the Label

Review the labels of your current disinfectants. Do these solutions match the profile of the microbes you need to kill? The labels of concentrated disinfectants also state the proper level of dilution for maximum effectiveness.

Antibacterial Soaps

Increasingly antibacterial chemicals such as triclosan and triclocarban are added to soaps, cleaners, and other products. Limit the use of antibacterials. Non-foaming alcohol hand rubs are just as effective. Widespread use of antibacterials has created concern about increasing bacterial resistance and pollution of drinking water.

Disinfectant Wipes

Often disinfectant wipes dry before adequate contact time is achieved. They are also often used in applications where they are not needed adding expense and pollution. A re-usable cloth wet with the appropriate disinfectant applied for the recommended contact time is a less expensive, more efficacious option. If disinfectant wipes are not dry prior to disposal they may be considered hazardous waste.

Procedures

Health care facilities, dental offices, veterinary clinics, schools, day care centers, and public buildings all use some form of disinfecting. Often formal cleaning procedures are not in place; instead, unwritten procedures are passed on verbally or guessed at based on experience with other cleaning chemicals and potentially mistaken assumptions.

Many certification programs now require written procedures to ensure best management practices. Establish procedures based on current needs, equipment, and disinfectants.

Writing a Procedure

Procedures need to include information on why cleaning is done, what products and tools should be used, and how to use them. Consider the following information when writing a disinfection procedure.

Pre-clean

Conduct general surface cleaning to remove dirt and debris. This will remove many microorganisms and increase the effectiveness of the disinfectant.

Many products are one-step cleaner/disinfectants. These products are intended for use on relatively clean surfaces. If a surface only requires cleaning then use of cleaner/disinfectant is not necessary. General surface cleaners are often less costly than disinfectants and can be better for the environment. If a surface is visibly dirty it should be pre-cleaned before a disinfectant is used. When using other disinfectants always pre-clean, even if a surface looks clean.

Evaluate the Need to Disinfect

Determine if a lower level of clean is adequate. Does an item need to be disinfected or is surface cleaning sufficient? If the item only touches intact skin, then surface cleaning is appropriate.

Assess the Level of Disinfection

Know the target microbes you need to kill. Make a list of the specific targets like Mycobacterium or Parvo virus, and more-general targets like bacilli, spores, or viruses. Items used in a semi-sterile area require different levels of disinfecting than hard surfaces in public areas or patient rooms.

Select an Ideal Disinfectant

Choose a disinfectant that is highly effective and is the least toxic to employees and the environment. Disinfectants that act by oxidizing, such as hydrogen peroxide or peracetic acid, create fewer by-products than quaternary compounds or chlorine bleach. This means fewer toxins reach the sewer. Hydrogen peroxide and peracetic acid are also generally more effective against all types of microbes and are not easily inactivated by organic matter.

Ensure that the disinfectant used is compatible with the surface being cleaned. Improper use of chemicals and scrubbing can damage surfaces. For example, bleach can be corrosive to metal surfaces and scrubbing can remove some coatings. Floor finishes are sensitive to the pH of various chemicals. A cleaner or disinfectant with a pH that is too high or too low can strip the finish off the floor. Chemical damage is not reversible and can be costly to repair. In most cases floors do not need to be disinfected.

Ensure Proper Dispensing

To protect workers from concentrated solutions, determine what equipment is necessary to ensure proper dilutions and easy use. Do not mix different disinfectants together or mix

bleach with a disinfectant. Together they may create toxic gases, such as chlorine.

For employee protection use personal protective equipment like goggles and gloves. To reduce waste, use washable towels or applicators.

Calibrate Carefully

Calibrate dispensing equipment carefully and often—at least every time a new container of disinfectant is opened. When calibrating, check the equipment for leaks and malfunctions. Equipment can be calibrated with water instead of the chemical to prevent waste.

Measure Accurately and Use Proper Dilution

Measure concentrates before adding them to the dilution tank. All disinfectants have a concentration that maximizes their ability to disinfect. Adding extra does not help. Using higher dilutions does not necessarily react more quickly or effectively. In fact, it can increase the likelihood of injury, damage to equipment, contaminating drinking water sources, and they increase material cost. Follow manufacturer directions for the lowest concentration of disinfectant to achieve the highest level of antimicrobial activity.

Reduce Volume

Use the smallest possible amount of disinfectant to obtain the desired level of microbial control. This practice reduces waste, minimizes spills, and exposure. Mix only the amount needed, do not mix a gallon if you only need a quart.

Label Containers

Once the concentrate is diluted to the proper level label the container with the name, date, and initials of who diluted the solution to track its expiration/outdate. Check the manufacturer's instructions for an outdate.

Allow Time for Disinfectants to React

Follow label directions carefully. They provide information on proper dilution ratios, time required on the surface to be cleaned and application methods.

Staff Training

Train staff and clearly post the procedure for disinfectant use at the dispensing station. Ensure staff have access to, and use adequate personal protective equipment. Check the material safety data sheet (MSDS) for the suggested personal protective equipment.

Storage

Keep containers closed when not in use. Store disinfectants in original containers, on low shelves. Check containers regularly for breaks, leaks, rust or other corrosion. If a break or leak occurs, transfer the product into another container with the same labeling.

Waste

Avoid Spills, Clean Up Spills

Store disinfectants in compatible containers. Use drip pans under spouts to catch and contain drips. Minimize transfer of disinfectants from container to container. Use pumps and spigots instead of pouring to decrease the likelihood of spills or skin contact. When spills occur, clean them up immediately. Ensure that spilled residues are managed properly, they may be considered hazardous waste. Refer to the product's MSDS for spill cleanup information.

Inventory Tips

Maintain appropriate inventory. Order and stock only what is needed. This will help avoid unnecessary disposal of excess or outdated disinfectant.

Dispose of Waste Properly

Unused disinfectant concentrates may be considered hazardous waste. Check with the Minnesota Pollution Control Agency (MPCA) or your county to see if the concentrate waste is hazardous and how to properly dispose of it.

Success Stories

Olmsted Medical Center (OMC)

OMC found it was using seven different disinfectants in its hospital and clinic. In addition to numerous disinfectants, OMC realized its disinfectant contact time was inadequate and staff technique and knowledge was erroneous.

A MnTAP intern reviewed OMC's cleaning and disinfecting procedures. She compared OMC's disinfection practices against Centers for Disease Control and Prevention (CDC) guidance. She found that of the 112 surfaces being disinfected in patient care and waiting areas, only 64 were needed. She also observed that the antimicrobial wipes dried in less than 30 seconds, half the time needed for adequate disinfection, and that a hydrogen peroxide disinfectant could be substituted.

As a result of the project, OMC has eliminated all seven of the previously used disinfectants and the wipes resulting in a savings over \$10,000 annually. Additionally, written procedures have been put in place for cleaning and disinfecting and staff have been trained on them. Use of the hydrogen peroxide disinfectant has been well received by the staff and no hospital-acquired infections have been identified.

For more information on the OMC intern project visit the online intern summary at <www.mntap.umn.edu>.

University of Minnesota Veterinary Clinic

The Small Animal Hospital at the University of Minnesota, providing care mainly for cats and dogs, was concerned about its disinfection procedure. Chemical disinfection at the small animal hospital is critical because bacteria-carrying particles on the cages, floor, kennels and surgical tables could reach an animal's open wound and cause infection. Veterinary facilities disinfect and sterilize for the same reasons as human health care facilities—to minimize infection and transmission of germs.

In one year, the hospital received 23,342 cases and performed 4,587 surgeries. The number of cases they treat increases every year. The increase in cases results in more disinfectant use and waste. The hospital wanted to reduce its use of disinfectants while maintaining strict disease control.

A MnTAP intern reviewed the hospital's procedures and evaluated its disinfection by sampling microorganisms. She worked with the hospital staff and identified the following improvement opportunities:

- More training. Proper disinfection procedures were not well understood because staff were not adequately trained.
- Post instructions. No written instructions were posted for proper procedures. Staff used their own judgment.
- Proper disinfectant use. Staff sometimes used the wrong dilution and selected less than ideal disinfectants.
- Understanding disinfection. Staff mistakenly believed that using a higher concentration results in more-effective cleaning.

The lack of procedures led to excess disinfectant use, costing over \$5,000 a year. The clinic was not achieving its desired level of disinfection and had increased chemical loss to wastewater creating additional pollution.

As a result of the intern's research, the veterinary hospital developed and posted a written procedure, and trained its staff. The hospital also instituted pre-cleaning and using the appropriate dilution. No increase in infections was found.

For More Information

The Association for Professionals in Infection Control and Epidemiology Inc. (APIC) has developed guidelines for selecting and using disinfectants. These guidelines are available through the online version of this fact sheet available at <www.mntap.umn.edu>.

Centers for Disease Control and Prevention: Guidelines for Environmental Infection Control in Health-Care Facilities <<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm>>.



For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution, increase energy efficiency, and reduce costs. Our information resources are available online at <mntap.umn.edu>. For personal assistance call MnTAP at 612.624.1300 or 800.247.0015