Evaluation of Cleaners, Sanitizers, and Disinfectants for Surfaces

STATE OF MINNESOTA PURCHASING

An Evaluation of Cleaners, Sanitizers, and Disinfectants for Surfaces

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Introduction

The State of Minnesota will be negotiating new purchasing contracts within the next year. In order to help ensure that products available are optimal for performance but also protect human health and the environment, Minnesota Department of Health (MDH) has been asked to complete a brief evaluation of cleaners, sanitizers, and disinfectants. Sources consulted included Minnesota Statutes, Minnesota Rules, MDH staff from several programs, recently published scientific journal articles, and websites from the U.S. Centers for Disease Prevention and Control (CDC), U.S. Environmental Protection Agency (US EPA), Hennepin County Human Services and Public Health Department, and other authoritative sources (listed in the References section). This document summarizes the findings of this evaluation to date, and recommends additional contacts for discussion about best practices for cleaning, sanitizing, and disinfecting in various settings.

Summary

In general, it appears that Minnesota Statues and Minnesota Rules require use of sanitizers and disinfectants for some locations or activities. In some cases, legal restrictions may limit the choice of sanitizer or disinfectant that can be used in a particular setting. Examples of these settings include boarding care, child care, health care, nursing homes, hospice care, and food services, as well as animal meat production and inspection, barber shops, beauty salons, and tattoo parlors. In some statues or rules, selection of disinfectants or sanitizers, or even the dilution of the disinfectant, is prescribed. In other cases, the requirements are general or there is more latitude allowed in choice of products.

For some activities, such as cleaning of public restrooms, there do not appear to be any legal requirements or specifications, other than the area be kept “clean” or “sanitary.” For example, Minnesota Rules part 4717.8650, subpart 1, item B, for toilet facilities at a public swimming

pool states, “Toilet, shower, lavatory, and locker and other ancillary facilities must be maintained in a sanitary condition to preclude the possibility of spreading pathogens to the pool.” In many cases like this, the selection of cleaners, sanitizers, or disinfectants are not specified, which allows consideration of health and environmental risks, cost, ease of use, availability, and other factors in product selection.

Cleaning with a general purpose cleaner or soap and water is usually a good first step. In some situations, no additional disinfection or sanitization is will be needed. Understanding when sanitization or disinfection is needed is important. Further, careful selection of cleaners, sanitizers, and disinfectants will help to ensure the product is the best for the specific task.

Cleaning, Sanitizing, and Disinfecting Definitions

The terms “cleaning,” “sanitizing,” and “disinfecting” are sometimes used interchangeably when describing removing visible debris from an area. However, there are differences among these three terms, as described below.

Cleaning

Cleaning involves removing visible soil and nonvisible microbes (e.g., bacteria, viruses, and protozoa) from an area or object (University of California, 2013). Some of the microbes might be capable of causing disease in humans (called “pathogens”). Cleaning typically involves mechanical action (i.e., wiping or scrubbing) and use of a general cleaner such as soap and water.

Cleaning does not usually kill microbes, but instead reduces their presence by removing them. The amount of microbes removed from a surface is somewhat dependent on the type of material and product used to clean the area. Some cleaning cloths, for example, have “microfibers” that have been found to be more effective in removal of microbes than other types of materials (Koo et al., 2013). In addition, some general purpose cleaners have more ability to loosen and remove soil and microbes from a given surface than others (Olson, Vesley, Bode, Dubbel, and Bauer, 1994). The composition of materials to be cleaned, the available equipment, and product options, should be considered along with other factors like shelf stability and cost when making a cleaning product selection.

Sanitization

Sanitization involves killing microbes on a surface or object. The goal of sanitization is not to completely eliminate all microbes, but to reduce them to a level that will reduce the potential for an infection to occur. For example, a toy that is sanitized is not completely free of any microbes or germs, but the level is low enough that it is safer for a child to play with and potentially mouth the toy.

Surfaces and objects should be cleaned before being sanitized. If cleaning is not done prior to sanitizing, the sanitizer might not be as effective. This is because dirt, dust, and other material

can inhibit the sanitizer's contact with the object (University of California, 2013). Sanitizers must be in contact with a surface or object for a certain amount of time (called "dwell" time) in order to more effectively kill certain microbes. In general, sanitizers do not kill as many microbes as disinfectants, but sanitizers are safer for contact with skin and for mouthing.

Disinfection

Like sanitization, disinfection also involves killing microbes on a surface or object. While disinfectants generally kill more microbes than sanitizers, disinfectants do not completely eliminate all microbes from a surface or object. They reduce the amount of microbes so that it is safer for human contact. For disinfectants to work properly, the area should be cleaned first. This reduces inhibition of the disinfectant by soil or other organic material. As with sanitizers, the amount of time the disinfectant is in contact with the surface (i.e., "dwell" time) is important to be more effectively reduce microbes.

Requirements for cleaning, sanitization, and disinfection, by location type

A summary of the findings about legal requirements for cleaning, sanitization, and disinfection, by location type, is provided below. Additional information can be found in Appendix C.

Child care

Minnesota Rules define several types of child care. Two of the primary types of child care are child care centers and family day care. Examples of additional subcategories include infant care and sick child care. For each, there are slightly different requirements in rule governing what type of cleaning, sanitizing, and disinfecting practices and substances are permissible.

The Department of Human Services (DHS) has oversight for child care centers in Minnesota. A "child care center" is defined in Minnesota Rules part 9503.0005 subpart 5 as:

> "… a facility in which a child care program is operated when the facility is not excluded by Minnesota Statutes, section 245A.03, subdivision 2, and is not required to be licensed under parts 9502.0315 to 9502.0445 as a family or group family day care home."

DHS states on its website that child care centers, "include programs that provide child care, preschool/nursery programs, Head Start programs, night care, drop-in and sick care for fewer than 24 hours a day in a setting that is not a residence." (Department of Human Service (DHS), 2017).

Minnesota Rules part 9502.0315 defines "family day care" as:

> "day care for no more than ten children at one time of which no more than six are under school age. The licensed capacity must include all children of any caregiver when the children are present in the residence."

In general, family day care providers provide child care in their own residence.

Providers of child care centers and family day care are required to follow certain requirements for sanitization and disinfection. The requirement that seems most definitive is listed in "Sanitization and Health" under Minnesota Rules part 9502.0435, subp. 13, where the use of a bleach and water to disinfect a diaper changing surface is required after every diaper change. The rule states,

> "If the surface is not disposable and is wet or soiled, it must be washed with soap and water to remove debris and then disinfected with a solution of at least two teaspoons of chlorine bleach to one quart of water. If the surface is not soiled with feces or urine, then it must be disinfected with the solution of chlorine bleach and water after each diapering." (Minnesota Rules, 9502.0435, subpart 13, item D).

Family child care providers appear to have more latitude in choosing a disinfectant. These providers may disinfect with a bleach solution or other surface disinfectants that meet the criteria in Minnesota Statutes, section 245A.148 (see Appendix C). In other areas of the rules, there appears to be more discretion allowed in choosing products for sanitizing and disinfecting. Often use of an EPA-registered sanitizer or disinfectant is allowed, though child care centers must always follow the decision of health consultants, as described below (also see Appendix C).

Sanitization and Disinfection in Child Care Centers

Under Minnesota Rules part 9503.0140, subpart 2, each child care center must have a health consultant review the center's health policies and practices, including the first aid and safety polices, the diapering procedures and practices, and the sanitation procedures for food preparation. The health consultant must certify that the policies are adequate to protect the health of the children at the center. The initial consultation must occur before the center is licensed, and the review must occur every year thereafter. For centers that care for infants, a monthly review is required.

The health consultant, according to a phone conversation with DHS and MDH staff, is able to specify how disinfection will be performed at child care center, within the scope of the law. Minnesota Rules part 9503.0005, subpart 11, provides the definition for "disinfected." The rule states,

> "'Disinfected' means treated to reduce microorganism contamination after an object has been cleaned. Disinfection must be done by rinsing or wiping with a solution of one-fourth cup chlorine bleach plus water to equal one gallon, or an equivalent product or process approved by the community health board as defined in Minnesota Statutes, section 145A.02, or its designee."

This definition names bleach as the appropriate disinfectant, and stipulates the dilution to use, though the rule also provides the community health board an opportunity to approve an "equivalent product." However, per conversations with a health consultant and information from health consultant websites such as Health Consultants for Child Care (2017), usually bleach or quaternary ammonium compounds are the disinfectant that the health consultant recommends. This choice is convenient because both are relatively inexpensive and have been proven effective. As with other disinfectants, however, there are some health and environmental risks related to the use of these chemicals.

In addition to selection of a disinfectant, cleaning practices and use of disinfectants in child care centers are also described in the Minnesota Rules. For a child care center, "clean" is defined in Minnesota Rules, part 9503.0005, subpart 9, which states, "'Clean' means free from dirt or other contaminants that can be detected by sight, smell, or touch." The method for cleaning after diapering, for example, must to be developed and approved "in consultation with a health consultant." In addition, cleaning and sanitation of an area used for preparing, handling, serving and washing food and utensils must "comply with the requirements for food and beverage establishments in chapter 4626," per Minnesota Rules, part 9503.0145, subpart 3. (See the Food Service section below for more information.)

See Appendix A for more information about recommended references for child care cleaning, sanitation, and disinfection practices.

Food Service

Note: The Minnesota Food Code is currently undergoing revision. Some of the requirements described below might change when the updated proposed rules have been adopted. See Minnesota Food Code Revision: http://www.health.state.mn.us/divs/eh/food/code/2009revision/index.html for updates:

The Minnesota Food Code, found in Minnesota Rules, chapter 4626, has very specific requirements for sanitization of food contact surfaces. The sanitizing agent must provide a five log reduction of microbes. Specifically, the requirements state:

> "'Sanitization' means the application of cumulative heat or chemicals on cleaned food-contact surfaces that, when evaluated for efficacy, yields a reduction of five logs, which is equal to a 99.999 percent reduction, of representative disease microorganisms of public health importance."

Sanitizer and disinfectant uses are specifically described in a few instances. For example, Minnesota Rules, parts 4626.0285 3-304.13 states that cloths used to wipe food spills must be

> "..moist and cleaned as specified in part 4626.0915, item D, stored in a chemical sanitizer as specified in part 4626.1620, and used for wiping spills from food-contact and non-food-contact surfaces of equipment."

The list of sanitizers specified in Minnesota Rules, part 4626.1620 refers to the Code of Federal Regulations, title 21, section 178.1010 (Federal Food Code), which provides an extensive list of sanitizers acceptable for use with food contact surfaces, including dishes and serving utensils. The sanitizing agent and the concentration allowed vary by intended use. The American Academy of Pediatrics, American Public Health Association, and the National Resource Center for Health and Safety in Child Care and Early Education also offered the option of immersing dishes and utensils in water at a temperature of 170 °F for 30 seconds, then allowing the materials to air dry.

Ambulances, Boarding Homes, Hospice, Hospitals, and Nursing Homes

Several passages of the Minnesota Statues and Minnesota Rules that pertain to ambulances, boarding homes, hospice, hospitals, and nursing homes require that surfaces and some reusable equipment be disinfected (Minnesota Statutes, section 144A.4796; Minnesota Rules, parts 4640.5800, 4658.0800, and 4664.0290). The laws do not specify the type of disinfectant

allowed, except that the disinfectant must be registered with the US EPA. There are sometimes specific laws about training and personnel in charge of infection control and disinfection. See Ambulances, Boarding Homes, Hospice, Hospitals, and Nursing Homes in Appendix C for more information.

Restrooms

Certain parts of Minnesota law require that restrooms be available and kept in "sanitary" condition. Some statues or rules note that restrooms should be cleaned or disinfected, but do not specify which substances to use when cleaning or disinfecting. One exception is for child care centers, for which Minnesota Rules, part 9503.0140, subpart 10, requires soiled toilets be washed with soap and water and disinfected:

> "The toilet rooms of the center must be cleaned daily. Toilet training chairs must be emptied, washed with soap and water, and disinfected after each use. Toilets and seats must be washed with soap and water and disinfected when soiled or at least daily."

(Note that this applies to childcare centers specifically, and does not suggest that a diaper-changing area in a public restroom requires this standard of cleaning or disinfection.)

No other specifications on cleaning agents to use in restroom facilities were found during a search of Minnesota Statutes or Minnesota Rules or during discussions with Minnesota Department of Health staff (see Appendix A).

Without specific requirements in law, the choice of methods to clean and disinfect a restroom appears to be the discretion of owners or staff of facilities housing the restroom. Some people hold a belief that a stronger disinfectant is better for cleaning a restroom, and that disinfectants should be used on most surfaces, even those that are not frequently touched. However, discussions with MDH staff and a search of available scientific literature points to the need for use of disinfectants only in certain circumstances in most restrooms. For most cleaning, a general all-purpose cleaner should be sufficient. Disinfectants or sanitizers can be used on items such as toilet bowls and seats, faucet handles, door knobs, entry panels, diapering areas, and areas affected by body fluid spills (Minnesota Department of Health, 2007).

A study has shown that bacteria in restrooms can be classified into three primary community and associated locations. These locations include 1) the floor, where non-pathogenic bacteria from the soil dominates, 2) surfaces routinely touched by hands, where human skin-associated bacteria are prevalent; and 3) the toilet, which is dominated by gut-associated bacteria (Flores, et al., 2011). In the Flores study, disease-causing bacteria (human pathogens) were not enumerated, but they were found to be present in each of these three areas. The authors state that these findings reinforces the importance of personal hygiene practice (i.e., handwashing) because the surfaces could allow transmission of pathogens (Flores, et al., 2011).

Choices of Sanitizers and Disinfectants

Numerous types of sanitizers and disinfectants are available for various sanitizing and disinfecting purposes. A market research company called Global Industry Analysts, Inc. predicts that the disinfectant industry will reach $8.0 billion in sales by the year 2024 (Global Industry Analysts, 2017). Disease outbreaks, such as those involving SARS, various strains of influenza,

and other pathogens may spur even more interest in disinfectants. At the same time, concern about resistant organisms and the effects of disinfectants on the environment are driving interest in more effective, yet "greener" disinfectants.

As described above, Minnesota law requires the use of certain disinfectants in some limited circumstances, such as the use of bleach for disinfecting diapering areas of child care centers (Minnesota Rules, part 9502.0435, subpart 13, item d). In most cases, however, the law allows some latitude in choice of disinfectants, as long as the disinfectant is registered with US EPA. A few of the common disinfectant active ingredient options are briefly described in Appendix B:

Discussion

Products and Practices

There are several product choices available for sanitizing and disinfecting in various settings. In most settings outside of healthcare, however, disinfectants that will kill all microorganisms except spores (also called "high-level disinfectants" (Rutala & Weber, 2008)) or make Healthcare Environmental Disinfecting Claims, are not required or prudent for everyday use. This is particularly true for surfaces with low contact, such as floors, mirrors, windows, some counters, and other general use locations. A general disinfection guideline for surfaces in settings outside of healthcare is to focus on areas where blood or body fluid spills have occurred, toilets, high-touch areas (e.g., handles on door and sinks), and food service areas. In these areas, removal of body fluids or soil and cleaning well with a general cleaner before using a sanitizer or disinfectant is important.

At the same time, attention to workers' and visitors' exposure to chemicals in the product selections, particularly respiratory and dermal irritants or asthmagens, is an important consideration. As one paper noted, "Cleaning and disinfecting are important parts of a comprehensive infection prevention strategy. While demand for more effective cleaning and disinfecting is growing, there is also increasing evidence that exposure to cleaning and disinfecting can result in acute and chronic health effects, particularly respiratory illness." (Quinn et al, 2015). Authors suggest more research is needed on how to weigh the type of cleaner used with the potential for occupational exposure with the type of cleaning and disinfection that is appropriate for a given area (Bello et al, 2009; Quinn et al, 2015). In addition, use of non-chemicals cleaners might be beneficial, though they cannot be used as a substitute for an EPA-registered disinfectant when one is required (Quinn, et al, 2015). Some ideas to reduce occupational exposure are modifications to cleaning schedules, appropriate product selection, and ventilation to reduce exposure. Use of personal protective equipment is also important (Weber et al, 2016).

The method of cleaning and disinfection is often as important as the product used. The choice of cleaning equipment and general cleaner, along with the amount of mechanical action (i.e., friction produced by wiping or scrubbing) will affect how greatly the microbial population is reduced. For example, some materials, such as cotton, may absorb disinfectants and reduce the effectiveness of the disinfectant application. Similarly, some types of cloth materials will be more effective at removing microbes from certain surfaces than from others. Some cloths might even transfer microbes back to surfaces after picking them up (Gibson, Crandall, & Ricke,

2012). Moreover, after repeated use, some materials might lose effectiveness more quickly than others (Diab-Elschahawi, et al., 2010). All of these factors should be considered when making a selection of cleaning supplies.

How the cleaning materials are used and cleaned between uses will impact where and how many microbes exist on a surface. For example, studies have found that hotel housekeeping staff can spread pathogens by using the same cleaning cloth in multiple rooms. Further, guests can also transfer pathogens from one location to another on their hands and belongings (Sifuentes et al., 2014; Love et al., 2002). Some authors suggest use of disposable cleaning products and donning new gloves when cleaning different areas during disease outbreaks to prevent spread of pathogens. Fortunately, personal hand hygiene was found to reduce the spread of the pathogens overall (Sifuentes et al., 2014). Therefore, attention to the use of appropriate cleaning methods in important, but good personal hand hygiene (i.e., washing hands or using hand sanitizers) is also important for everyone.

Toys and surfaces in child care settings that are mouthed should be sanitized or disinfected according to current law or best practice recommendations. Likewise, places where food is served, such as child care settings, boarding or nursing care facilities, or restaurants should follow all applicable laws for cleaning, sanitization and disinfection. Diapering areas and some restrooms might also have legal requirements related to disinfection.

When blood and body fluid spills occur, there should be protocols in place for appropriate cleaning, following by disinfection. Federal Occupational Safety and Health (OSHA) Bloodborne Pathogens standard (29 CFR 1910.1030) laws provide instructions for clean up and disinfection.

Pathogen resistance

Pathogen resistance to antibiotics and antimicrobials is a concern that has prompted an interest in developing new technologies to sanitize and disinfect surfaces. At the same time, there is interest in using products that will have less impact on the environment, and lower likelihood of development of new strains of resistant pathogens.

Products used in settings where there is high likelihood of antimicrobial-resistant populations already present, such as hospitals and other health-care venues, will require careful selection and use of disinfectant products. For these locations, high efficacy and wise use of the disinfectant is paramount. For other settings, such as public buildings (including restrooms), child care facilities, schools, and other public venues, products will not usually require a high level disinfectant. In fact, unless a blood or body fluid spill has occurred, the use of a sanitizer or disinfectant might not be necessary in some locations, and focusing on good cleaning protocol may be more important. These practices may be key in reducing the number of resistant organisms that can develop in the general indoor environment.

Conclusion

Selection of effective sanitizers and disinfectants to offer on the State of Minnesota purchasing contracts that will be effective while still having a reduced impact on human health the environment involves consideration of a few factors, such as:

- The use of the setting to be cleaned and disinfected
- Microbial populations and pathogens encountered in the setting under consideration
- Employee and visitor exposure to pathogens
- Employee and visitor exposure to disinfectants (e.g., respiratory and eye irritants)
- Likelihood of creating microbial resistance
- Current requirements under state and federal law
- Efficacy of the product
- Cost of the product
- Shelf life of the product and ease of preparing more product
- Ease of use of the product

In summary, in order to ensure that cleaning, sanitization, and disinfection are done appropriately, an analysis of the specific task and options available should be considered. This is important to ensure maximized protection of human health, while also ensuring the environmental impact and development of resistant pathogens are kept to a minimum.

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Appendix A

Contacts and Resources

Contacts interviewed

Below is a list of contact interviewed for this project:

Name	Position	Work Unit	Organization	email
Julia Dady	Toxicologist	Health Risk Assessment	Minnesota Department of Health	(retired as of November 3, 2017)
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Suggested resources

A health consultant at MDH recommended the following resources:

- *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs.* Third Edition, 2015. By American Academy of Pediatrics, American Public Health Association, and the National Resource Center for Health and Safety in Child Care and Early Education. Available as of September 14, 2017 from http://cfoc.nrckids.org/; and
- *Infectious Diseases in Childcare Settings and Schools.* Hennepin County Human Services and Public Health Department. Available as of September 14, 2017 from http://www.hennepin.us/childcaremanual

Appendix J in *Caring for Our Children* is titled "Selecting an Appropriate Sanitizer or Disinfectant." This appendix describes differences between sanitizing and disinfecting, as well as providing information about selection of a sanitizer or disinfectant. Chlorine bleach is recommended, but the guidelines note that other substances can be used if they are EPA-registered and the product is used according to the manufacturer's recommendations.

Likewise, in *Infectious Diseases in Childcare Settings and Schools,* Section 2, called "Guidelines: environment" discusses similar concepts. This website states that bleach is an option for use a sanitizer or disinfectant, but also suggests other options as long as the product is EPA-registered. This source also discusses "green" products for cleaning, sanitizing, and disinfecting. For cleaning, "green" products are encouraged. For sanitizing and disinfection, the recommendation is to ensure that the product is registered with the EPA.

Appendix B

Choices of Sanitizers and Disinfectants

Disinfectant	Advantages*	Disadvantages*	Other notes
Bleach (Sodium hypochlorite)	• Relatively low cost • Effective against many pathogens, including bloodborne pathogens • Effective against bacterial spores and mycobacteria, but concentrations must be high • Fast acting • Removes biofilms • Does not produce toxic residues	• Will stain or damage some surfaces • Inactivated by organic material • Can be a respiratory, eye, or skin irritation • Can react with other substances, particularly other household cleaners, causing release of gases or fire • Solution must be made fresh daily for effect concentration	• Dwell time is 1 - 10 minutes • Important to note the concentration on the bottle. Some manufactures have increased the concentrations available at retail in recent years. • Use is sometimes required by law. For example, see Minnesota Rules part 9503.0005.
Hydrogen peroxide and mixtures (such as peracetic acid or silver ions)	• Effective against many pathogens, including bacterial spores and mycobacteria (especially when mixed with peracetic acid) • Stable product (mixtures) • No odor • Decomposes to water and oxygen	• Can stain or damage some materials • High concentrations might be needed for good disinfection • Higher cost (than bleach) • Can be relatively unstable alone	• Several different types of formulations available. • Improved hydrogen peroxide and accelerated hydrogen peroxide are options of updated products • With silver ions, found to be more effective than bleach (Mosci, et al., 2017

			• Dwell time is about 10 minutes, but varies by products
Hypochlorous acid ("Superoxidized water")	• minimum residues • demonstrated high efficacy against human pathogens on surfaces (Gunaydin et al., 2014; Landa-Solis, et al., 2005; Robinson, et al. 2010).	• Cost varies (purchase of on-site generator could be a few thousand dollars, but ingredients are relatively inexpensive) • Could irritate human skin in some concentrations	• Hypochlorus acid is created when a saline solution is electrolyzed. • Can be generated on site with special equipment. • Newer, but some products are registered with EPA • Efficacy dependent on free chlorine • Research is continuing
Improved hydrogen peroxide	• More effective than standard hydrogen peroxide against many pathogens, including bacterial spores and mycobacteria (Rutala, Gergen, & Weber, 2012) • Stable product • No odor • Decomposes to water and oxygen	• Higher cost (than bleach) • Potentially some material incompatibility concerns	• Improved hydrogen peroxide found be more effective than quaternary ammonium compounds (Boyce et al., 2017). • Dwell time 1- 10 mintues • Relatively new, still being tested.
Quaternary Ammonium Compounds (QACs)	• Effective against many human pathogens • Low toxicity • Safe for most human contact • Available in a wide range of products and concentrations	• Not effective against mycobacteria or spores • Effectiveness of QACs are diminished when they contact certain organic materials, such as cotton or cellulose-based materials	• Comprised of many different types of compounds. • One of the most frequently used active ingredient is alkyl dimethyl benzyl ammonium chloride (ADBAC), which is sometimes found in

		• Certain microorganisms (gram-negative) may survive within solution (Quinn, et al., 2011) • Have been reported to cause occupational asthma • Can leave a residue that must be rinsed. • Detrimental to the aquatic species	combination with dialkyl dimethyl ammonium chloride (DDAC) or other quaternary compounds • Recent reports of birth defects in mice after exposure need further review before fully accepting results (personal communication, MDH toxicologist)

* Highlights only, not a comprehensive list

Appendix C

Minnesota Statutes and Rules

Ambulances, Boarding Care, Hospice, Hospital, and Nursing Homes

Source	Synopsis and Comment	Quote
Minnesota Statutes 144A.4796 Nursing Homes and Home Care Required annual training. Subd. 6, item 3	Synopsis: Staff in nursing homes must be trained on disinfection practices. Comment: The type of disinfectant to use is not specified.	(a) All staff that perform direct home care services must complete at least eight hours of annual training for each 12 months of employment. The training may be obtained from the home care provider or another source and must include topics relevant to the provision of home care services. The annual training must include: (1) training on reporting of maltreatment of minors under section 626.556 and maltreatment of vulnerable adults under section 626.557, whichever is applicable to the services provided; (2) review of the home care bill of rights in section 144A.44; (3) review of infection control techniques used in the home and implementation of infection control standards including a review of hand-washing techniques; the need for and use of protective gloves, gowns, and masks;

Source	Synopsis and Comment	Quote
		appropriate disposal of contaminated materials and equipment, such as dressings, needles, syringes, and razor blades; disinfecting reusable equipment; disinfecting environmental surfaces; and reporting of communicable diseases; and (4) review of the provider's policies and procedures relating to the provision of home care services and how to implement those policies and procedures. (b) In addition to the topics listed in paragraph (a), annual training may also contain training on providing services to clients with hearing loss. Any training on hearing loss provided under this subdivision must be high quality and research-based, may include online training, and must include training on one or more of the following topics: (1) an explanation of age-related hearing loss and how it manifests itself, its prevalence, and challenges it poses to communication; (2) health impacts related to untreated age-related hearing loss, such as increased incidence of dementia, falls, hospitalizations, isolation, and depression; or (3) information about strategies and technology that may enhance communication and involvement, including communication strategies, assistive listening devices, hearing aids, visual and tactile alerting devices, communication access in real time, and closed captions.
Minnesota Rules, part 4640.5800 Sanitation	Hospital patients' dishes must be disinfected	Subpart 1. Patients' dishes. Patients' dishes shall be washed, rinsed, disinfected, and stored separately from those used by employees.
Minnesota Rules, part 4658.0800 Infection Control (Nursing homes)	Nursing home infection control program. Must review and evaluate disinfection products	Subpart 1. Infection control program. A nursing home must establish and maintain an infection control program designed to provide a safe and sanitary environment. Subp. 2. Direction of program. A nursing home must assign one person, either a registered nurse or a physician, the responsibility of directing infection control activities in the nursing home. Subp. 3. Staff assistance with infection control. Personnel must be assigned to assist with the infection control program, based on the needs of the residents and nursing home, to implement the policies and procedures of the infection control program.

Source	Synopsis and Comment	Quote
		Subp. 4. Policies and procedures. The infection control program must include policies and procedures which provide for the following: A. surveillance based on systematic data collection to identify nosocomial infections in residents; B. a system for detection, investigation, and control of outbreaks of infectious diseases; C. isolation and precautions systems to reduce risk of transmission of infectious agents; D. in-service education in infection prevention and control; E. a resident health program including an immunization program, a tuberculosis program as defined in part 4658.0810, and policies and procedures of resident care practices to assist in the prevention and treatment of infections; F. the development and implementation of employee health policies and infection control practices, including a tuberculosis program as defined in part 4658.0815; G. a system for reviewing antibiotic use; H. a system for review and evaluation of products which affect infection control, such as disinfectants, antiseptics, gloves, and incontinence products; and I. methods for maintaining awareness of current standards of practice in infection control.
Minnesota Rules, part 4664.0290 Infection Control (Hospice Care)	Synopsis: Hospice worker training on disinfecting surfaces Comment: The type of disinfectant is not specified here	Subp. 7. Training. A hospice provider must ensure that, for each 12 months of association with the hospice provider, all employees, contractors, and volunteers of the hospice provider who have contact with hospice patients in their residences, and their supervisors, complete in-service training about infection control techniques. The training must include information on: A. hand washing techniques; B. the need for and appropriate use of protective gloves, gowns, and masks; C. disposal of contaminated materials and equipment, such as dressings, needles, syringes, and razor blades; D. disinfecting reusable equipment; and E. disinfecting environmental surfaces
Minnesota Rules, part 4690.1800 Maintenance and Sanitation of Ambulances	Synopsis: Requirements for cleaning an ambulance with disinfectant if a patient with an	4690.1800 MAINTENANCE AND SANITATION OF AMBULANCES. Maintenance and sanitation:

Source	Synopsis and Comment	Quote
	infectious disease was transported. Comment: The rule does not specific the type of disinfectant to be used	A. Each ambulance must be maintained in full operating condition and in good repair and documentation of maintenance must be kept in the licensee's file. B. The interior of the ambulance, including all storage areas, must be kept clean so as to be free from dirt, grease, and other offensive matter. C. If an ambulance has been used to transport a patient who is known or should be known by the attendant or driver to have a transmissible infection or contagious disease, other than a common cold, liable to be transmitted from person to person through exposure or contact, surfaces in the interior of the ambulance and surfaces of equipment and materials that come in contact with such patient must, immediately after each use, be cleaned so as to be free from dirt, grease, and other offensive matter and be disinfected or disposed in a secure container so as to prevent the presence of a level of microbiologic agents injurious to health. D. Smoking in any portion of the ambulance is prohibited
Minnesota Rules, part 6950.1010 Definitions	Synopsis: Definitions for use for Health Boards. Includes Decontamination, “High level Disinfection”, Sterilization Comment: Seems to have a focus on HIV and HBV (blood-borne pathogens)	Subpart 1. Scope. The terms used in parts 6950.1000 to 6950.1080 have the meanings given in this part and Minnesota Statutes, section 214.18. Subp. 2. Clinical practice location. "Clinical practice location" means a site at which a regulated person practices. Subp. 3. Contaminated. "Contaminated" means the presence or the reasonably anticipated presence of potentially infectious materials on an item or surface. Subp. 4. Decontamination. "Decontamination" means the removal, inactivation, or destruction of HBV and HIV on a surface or item to the point where HBV and/or HIV are no longer capable of causing infection and the surface or item is rendered safe for barehanded touching, use, or disposal. Subp. 5. Exposure incident. "Exposure incident" means that a person has eye, mucous membrane, nonintact skin, or parenteral contact with potentially infectious materials at a clinical practice location. Subp. 6. High-level disinfection . "High-level Previous disinfection" means the elimination of viability of all microorganisms except bacterial spores. Subp. 7. Infection control requirements.

Source	Synopsis and Comment	Quote
		"Infection control requirements" means the requirements of parts 6950.1000 to 6950.1080 and Minnesota Statutes, sections 214.17 to 214.25. Subp. 8. Parenteral. "Parenteral" means taken into the body in a manner other than through the digestive canal. Subp. 9. Patient. "Patient" means a person who receives health care services from a regulated person. For the purposes of part 6950.1040, patient includes the parent or guardian of a patient who is a minor, the guardian of a patient who is incompetent, and a person legally authorized by the patient to act on the patient's behalf when the patient is temporarily unable to act on the patient's own behalf. Subp. 10. Personal protective equipment. "Personal protective equipment" means any equipment or overclothes that reduce the risk of a person's clothing, skin, eyes, mouth, or other mucous membranes coming into contact with potentially infectious materials at a clinical practice location. Personal protective equipment includes, but is not limited to, aprons, clinic jackets, eyeglasses with shields, face shields, foot and leg coverings, gloves, gowns, lab coats, and masks. Subp. 11. Potentially infectious materials. "Potentially infectious materials" means: A. human blood, human blood components, and products made from human blood; B. semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; C. any unfixed tissue or organ (other than intact skin) from a human (living or dead); and D. HIV-containing cell, tissue, or organ cultures, HIV- or HBV-containing culture media or other solutions, and blood, organs, or other tissues from experimental animals infected with HIV or HBV. Subp. 12. Sharps. "Sharps" means objects that can penetrate the skin. Sharps include, but are not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires. Subp. 13. Sterilization. "Sterilization" means the destruction of all microbial life, including bacterial spores.

Child Care

Source	Synopsis and Comment	Quote
Minnesota Statutes, Chapter 119B, Child Care Programs	Synopsis: Provides definitions for child care in Minnesota. Assigns authority for developing standards for child care centers run by counties to Minnesota Department of Human Services (DHS). DHS is allowed to make rules for certain aspects county child care. Funding of child care is a focus of this Chapter. Comment: More specific descriptions and requirements are provided in Minnesota	
Minnesota Statutes, Chapter 245A Human Services Licensing	Synopsis: Provide DHS with the authority to adopt rules to govern the operation, maintenance, and licensure of child care programs.	The commissioner shall adopt rules under chapter 14 to govern the operation, maintenance, and licensure of programs subject to licensure under this chapter. The commissioner shall not adopt any rules that are inconsistent with or duplicative of existing state or federal regulations. Nothing in this subdivision shall be construed to prohibit the commissioner from incorporating existing state or federal regulations or accreditation standards by reference.
Minnesota Statutes, Chapter 245A.148 Family Child Care Diapering Area Disinfection	Synopsis: A family child care provider *may* disinfect a diaper changing surface with "chlorine bleach" or a surface disinfectant that the disinfectant meets the requirements shown in the statute. One of these requirements is that the alternative is registered with the U.S. EPA. Comment: Use of the word "may" makes it unclear if a disinfectant is actually required.	Notwithstanding Minnesota Rules, part 9502.0435, a family child care provider may disinfect the diaper changing surface with chlorine bleach in a manner consistent with label directions for disinfection or with a surface disinfectant that meets the following criteria: (1) the manufacturer's label or instructions state that the product is registered with the United States Environmental Protection Agency; (2) the manufacturer's label or instructions state that the disinfectant is effective against Staphylococcus aureus, Salmonella enterica, and Pseudomonas aeruginosa; (3) the manufacturer's label or instructions state that the disinfectant is effective with a ten minute or less contact time; (4) the disinfectant is clearly labeled by the manufacturer with directions for mixing and use; (5) the disinfectant is used only in accordance with the manufacturer's directions; and (6) the product does not include triclosan or derivatives of triclosan.

Source	Synopsis and Comment	Quote
Minnesota Statutes 245H.01 Certified License-Exempt Child Care Centers Subd. 6 Definitions		"Disinfecting" means the use of a product capable of destroying or inactivating harmful germs, except bacterial spores, consistent with label directions on environmental surfaces including bathroom toilets and floors, diaper-changing surfaces, and surfaces exposed to blood or other bodily fluids.
Minnesota Statutes 245H.13 Certified License-Exempt Child Care Centers Subd. 5 Definitions		Subd. 5.Building and physical premises; free of hazards. (a) The certified center must document compliance with the State Fire Code by providing documentation of a fire marshal inspection completed within the previous three years by a state fire marshal or a local fire code inspector trained by the state fire marshal. (b) The certified center must designate a primary indoor and outdoor space used for child care on a facility site floor plan. (c) The certified center must ensure the areas used by a child are clean and in good repair, with structurally sound and functional furniture and equipment that is appropriate to the age and size of a child who uses the area. (d) The certified center must ensure hazardous items including but not limited to sharp objects, medicines, cleaning supplies, poisonous plants, and chemicals are out of reach of a child. (e) The certified center must safely handle and dispose of bodily fluids and other potentially infectious fluids by using gloves, disinfecting surfaces that come in contact with potentially infectious bodily fluids, and disposing of bodily fluid in a securely sealed plastic bag.
Minnesota Rules, part 9502.0435, subp. 1	Defines sanitation and cleanliness for an in-home daycare.	The residence must be free from accumulations of dirt, rubbish, or peeling paint.
Minnesota Rules, part 9502.0435, subpart 13, item D	Synopsis: Describes requirements for a diaper changing area, including requirements for washing with soap and water and disinfection with chlorine bleach. Specifies the concentration of the bleach as two teaspoons to one quart of water.	Diapering must not take place in a food preparation area. The diaper changing area must be covered with a smooth, nonabsorbent surface. If the surface is not disposable and is wet or soiled, it must be washed with soap and water to remove debris and then disinfected with a solution of at least two teaspoons of chlorine bleach to one quart of water. If the surface is not soiled with feces or urine, then it must be disinfected with the solution of chlorine bleach and water after each diapering.

Source	Synopsis and Comment	Quote
	Requires disinfection aster each diapering. Comment: Does not discuss dwell time or offer options of alternatives in this rule.	
Minnesota Rules, part 9503.0005, subpart 9	Provides a definition of “clean” in a license child care setting.	"Clean" means free from dirt or other contaminants that can be detected by sight, smell, or touch.
Minnesota Rules, part 9503.0005, subpart 11	Synopsis: Provides a definition for “disinfected” for child care centers. Comment: In this part of the rule, bleach and a corresponding concentration is mentioned, but the option of using an “equivalent product or process” approved by the “community health board” or its designee.	"Disinfected" means treated to reduce microorganism contamination after an object has been cleaned. Disinfection must be done by rinsing or wiping with a solution of one-fourth cup chlorine bleach plus water to equal one gallon, or an equivalent product or process approved by the community health board as defined in Minnesota Statutes, section 145A.02, or its designee.
Minnesota Rules, part 9503.0005, subpart 14	Synopsis: Provides a definition of a health consultant. Comment: All licensed child care centers must be advised by a health consultant. The health consultant has authority to determine what type of cleaning and disinfection is completed.	"Health consultant" means a physician licensed to practice medicine under Minnesota Statutes, chapter 147; a public health nurse or registered nurse licensed under Minnesota Statutes, section 148.171; or the community health board as defined in Minnesota Statutes, section 145A.02, or its designee.
Minnesota Rules, part 9503.0085, subpart 14	Synopsis: Requires disinfection of areas where care to sick children has been provided.	Walls and floors in rooms where sick care is provided and all linens, furnishings, objects, and equipment used by sick children must be cleaned and disinfected at least daily and as needed.

Source	Synopsis and Comment	Quote
	Comment: It appears that requirements for disinfectants under Part 9503.0005 would apply here.	
Minnesota Rules, part 9503.0140, subpart 2	Synopsis: Provides information about the role of the health consultant for a licensed day care center.	The center must have a health consultant who must review the center's health policies and practices specified in items A to C and certify that they are adequate to protect the health of children in care. The review must be done before initial licensure, submitted with the application for initial licensure and repeated every year after the date of initial licensure. For programs serving infants, this review must be done initially and monthly thereafter. Additionally, the license holder must request a review by the health consultant of the center's health policies and practices if there is a proposed change in the center's health policies or practices or an outbreak of contagious reportable illness as specified in part 4605.7040. A copy of the consultant's findings must be placed in the center's administrative record. The consultant must review: A. The first aid and safety policies and procedures required by part 9503.0110, subpart 3, items A, B, and C. B. The diapering procedures and practices specified in subpart 12. C. The sanitation procedures and practices for food not prepared by or provided by the license holder as specified in part 9503.0145, subpart 3, and for infants as specified in part 9503.0145, subpart 7.

Food code

Source	Synopsis and Comment	Quote
Minnesota Rules, part 4626.0020, subpart 75	Synopsis: About sanitization.	Sanitization. "Sanitization" means the application of cumulative heat or chemicals on cleaned food-contact surfaces that, when evaluated for efficacy, yields a reduction of five logs, which is equal to a 99.999 percent reduction, of representative disease microorganisms of public health importance
Minnesota Rules, part 4626.0085 2-301.16	Synopsis: Information about hand sanitizers in food service settings	A. A hand sanitizer or hand sanitizing solution shall be used: (1) according to the rules adopted under Minnesota Statutes, section 31.101; or (2) if consisting of or made up of a chemical formulation that is not generally recognized as safe under Code of Federal Regulations, title 21, parts 182 and 184, or that is not listed for use as a hand sanitizer under Code of Federal Regulations, title 21, section 178.1010, only if: (a) followed by thorough hand rinsing in clean water or the use of gloves; or (b) used where there is no direct contact with food by the hands. B. A chemical hand sanitizing solution used as a hand dip shall be maintained clean and at a strength equivalent to 100 mg/L chlorine or above
Minnesota Rules, part 4626.0285 3-304.13	Synopsis: Requirements for cloths used in food service area cleaning.	A. Cloths that are in use for wiping food spills shall be used for no other purpose. B. Cloths used for wiping food spills shall be: (1) dry and used for wiping food spills from tableware and carry-out containers; or (2) moist and cleaned as specified in part 4626.0915, item D, stored in a chemical sanitizer as specified in part 4626.1620, and used for wiping spills from food-contact and non-food-contact surfaces of equipment. C. Dry or moist cloths that are used with raw animal foods shall be kept separate from cloths used for other purposes. Moist cloths used with raw animal foods shall be kept in a separate sanitizing solution.
Minnesota Rules, part 4626.0475 4-101.16		Sponges shall not be used in contact with cleaned and sanitized or in-use food-contact surfaces.
Minnesota Rules, part 4626.0805 4-501.114 Manual and mechanical warewashing equipment;	Synopsis: Provides information on sanitizing food service equipment	A. A chemical sanitizer used in a sanitizing solution for a manual or mechanical operation at the exposure times specified in part 4626.0905, item C, shall be listed in Code of Federal Regulations, title 21, section 178.1010, or in Minnesota Statutes, chapter 31. The sanitizer shall be used according to this part and the manufacturer's label approved by the federal Environmental Protection Agency.

Source	Synopsis and Comment	Quote
chemical sanitization, temperature, pH, concentration, and hardness		B. The sanitizer shall not exceed the amount specified on the manufacturer's label approved by the federal Environmental Protection Agency. C. If a sanitizer is used in an amount less than the maximum amount specified on the label in item B, the sanitizer shall be used as specified in this item. (1) Unless the product label specifies otherwise, a chlorine solution shall have a minimum concentration of 50 ppm and: (a) a minimum temperature of 24 degrees C (75 degrees F) for water with a pH of eight or less; or (b) a minimum temperature of 38 degrees C (100 degrees F) for water with a pH of 8.1 to 10. (2) An iodine solution shall have: (a) a minimum temperature of 24 degrees C (75 degrees F); (b) a pH of 5.0 or less, unless the manufacturer's use directions included in the labeling specify a higher pH limit of effectiveness; and (c) a concentration between 12.5 mg/L and 25 mg/L. (3) A quaternary ammonium compound solution shall: (a) have a minimum temperature of 24 degrees C (75 degrees F); (b) have a concentration specified in part 4626.1620 and as indicated by the manufacturer's use directions included in the labeling; and (c) be used only in water with 500 mg/L hardness or less or in water having a hardness no greater than specified by the manufacturer's label. D. Mechanical warewashing equipment shall be equipped with a visual or audible warning device to permit the operator to easily verify when the sanitizing agent is depleted. E. Other chemical sanitizers may be used if they are applied according to the manufacturer's use directions included in the labeling.
Minnesota Rules, part 4626.0810 4-501.115 Manual Warewashing Equipment; Chemical Sanitization Using Detergent-Sanitizers.	Synopsis: Provides information on manually sanitizing food service items.	If a detergent-sanitizer is used to sanitize in a cleaning and sanitizing procedure where there is no distinct water rinse between the washing and sanitizing steps, the agent applied in the cleaning step shall be the same detergent-sanitizer.

Source	Synopsis and Comment	Quote
Minnesota Rules, part 4626.0905 4-703.11 Hot Water And Chemical	Synopsis: Sanitizing food contact surfaces and utensils	After being cleaned, equipment food-contact surfaces and utensils shall be sanitized in: A. hot water manual operations by immersion for at least 30 seconds as specified in part 4626.0790; B. hot water mechanical operations by being cycled through equipment that is set up as specified in parts 4626.0755, 4626.0795, and 4626.0800 and achieving a utensil surface temperature of 71 degrees C (160 degrees F) as measured by an irreversible registering temperature indicator; or C. chemical manual or mechanical operations, including the application of sanitizing chemicals by immersion, manual swabbing, brushing, or pressure spraying methods, using a solution specified in part 4626.0805 by providing: (1) an exposure time of at least ten seconds for a chlorine solution; (2) an exposure time of at least 30 seconds for other chemical sanitizer solutions; or (3) an exposure time used in relationship with a combination of temperature, concentration, and pH that, when evaluated for efficacy, yields sanitization as defined in part 4626.0020, subpart 75.
Minnesota Rules, part 4626.1620 7-204.11	Synopsis: Chemical sanitizers and antimicrobials for food contact surfaces	Chemical sanitizers and other chemical antimicrobials applied to food-contact surfaces shall meet the requirements specified in Code of Federal Regulations, title 21, section 178.1010.
Minnesota Rules, part 4640.2900	Synopsis: Instructions about disinfecting dishware	Subpart 1. Methods. Either of the following methods may be employed in dishwashing. Subp. 2. Manual. A three-compartment sink or equivalent of a size adequate to permit the introduction of long-handled wire baskets of dishes shall be provided. There shall be a sufficient number of baskets to hold the dishes used during the peak load for a period sufficient to permit complete air drying. Water-heating equipment capable of maintaining the temperature of the water in the disinfection Next compartment at 170 degrees Fahrenheit shall be provided. Drain boards shall be part of the three-compartment sink and adequate space shall be available for drainage. The dishes shall be washed in the first compartment of the sink with warm water containing a suitable detergent; rinsed in clear water in the second compartment; and Previous disinfected by complete immersion in the third compartment for at least two minutes in water at a temperature not lower than 170 degrees Fahrenheit. Temperature readings shall be determined by a thermometer. Dishes and utensils shall be air-dried.