In units with high rates of endemic *Clostridium difficile* infection or in an outbreak setting, use dilute solutions of 5.25%-6.15% sodium hypochlorite (e.g., 1:10 dilution of household bleach) for routine environmental disinfection. Currently, no products are EPA-registered specifically for inactivating *C. difficile* spores.  

If chlorine solution is not prepared fresh daily, it can be stored at room temperature for up to 30 days in a capped, opaque plastic bottle with a 50% reduction in chlorine concentration after 30 days of storage (e.g., 1000 ppm chlorine [approximately a 1:50 dilution] at day 0 decreases to 500 ppm chlorine by day 30).  

An EPA-registered sodium hypochlorite product is preferred, but if such products are not available, generic versions of sodium hypochlorite solutions (e.g., household chlorine bleach) can be used.  

6. **Disinfectant Fogging**  
   a. Do not perform disinfectant fogging for routine purposes in patient-care areas.  

7. **High-Level Disinfection of Endoscopes**  
   a. To detect damaged endoscopes, test each flexible endoscope for leaks as part of each reprocessing cycle. Remove from clinical use any instrument that fails the leak test, and repair this instrument.  
   
   b. Immediately after use, meticulously clean the endoscope with an enzymatic cleaner that is compatible with the endoscope. Cleaning is necessary before both automated and manual disinfection.  
   
   c. Disconnect and disassemble endoscopic components (e.g., suction valves) as completely as possible and completely immerse all components in the enzymatic cleaner. Steam sterilize these components if they are heat stable.  
   
   d. Flush and brush all accessible channels to remove all organic (e.g., blood, tissue) and other residue. Clean the external surfaces and accessories of the devices by using a soft cloth or sponge or brushes. Continue brushing until no debris appears on the brush.  
   
   e. Use cleaning brushes appropriate for the size of the endoscope channel or port (e.g., bristles should contact surfaces). Cleaning items (e.g., brushes, cloth) should be disposable or, if they are not disposable, they should be thoroughly cleaned and either high-level disinfected or sterilized after each use.  
   
   f. Discard enzymatic cleaners (or detergents) after each use because they are not microbicidal and, therefore, will not retard microbial growth.  
   
   g. Process endoscopes (e.g., arthoscopes, cystoscope, laparoscopes) that pass through normally sterile tissues using a sterilization procedure before each use; if this is not feasible, provide at least high-level disinfection. High-level disinfection of arthoscopes, laparoscopes, and cystoscopes should be followed by a sterile water rinse.  
   
   h. Phase out endoscopes that are critical items (e.g., arthoscopes, laparoscopes) but cannot be steam sterilized. Replace these endoscopes with steam sterilizable instruments when feasible.  
   
   i. Mechanically clean reusable accessories inserted into endoscopes (e.g., biopsy forceps or other cutting instruments) that break the mucosal barrier (e.g., ultrasonically clean biopsy forceps) and then sterilize these items between each patient.  
   
   j. Use ultrasonic cleaning of reusable endoscopic accessories to remove soil and organic material from hard-to-clean areas.  
   
   k. Process endoscopes and accessories that contact mucous membranes as semicritical items, and use at least high-level disinfection after use on each patient.  
   
   l. Use an FDA-cleared sterilant or high-level disinfectant for sterilization or high-level disinfection (Table 1).  
   
   m. After cleaning, use formulations containing glutaraldehyde, glutaraldehyde with phenol/phenate,
ortho-phthalaldehyde, hydrogen peroxide, and both hydrogen peroxide and peracetic acid to achieve high-level disinfection followed by rinsing and drying (see Table 1 for recommended concentrations). Category IB.

n. Extend exposure times beyond the minimum effective time for disinfecting semicritical patient-care equipment cautiously and conservatively because extended exposure to a high-level disinfectant is more likely to damage delicate and intricate instruments such as flexible endoscopes. The exposure times vary among the Food and Drug Administration (FDA)-cleared high-level disinfectants (Table 2). Category IB.

o. Federal regulations are to follow the FDA-cleared label claim for high-level disinfectants. The FDA-cleared labels for high-level disinfection with >2% glutaraldehyde at 25°C range from 20-90 minutes, depending upon the product based on three tier testing which includes AOAC sporicidal tests, simulated use testing with mycobacterial and in-use testing. Category IC.

p. Several scientific studies and professional organizations support the efficacy of >2% glutaraldehyde for 20 minutes at 20°C; that efficacy assumes adequate cleaning prior to disinfection, whereas the FDA-cleared label claim incorporates an added margin of safety to accommodate possible lapses in cleaning practices. Facilities that have chosen to apply the 20 minute duration at 20°C have done so based on the IA recommendation in the July 2003 SHEA position paper, *“Multi-society Guideline for Reprocessing Flexible Gastrointestinal Endoscopes*.

q. When using FDA-cleared high-level disinfectants, use manufacturers’ recommended exposure conditions. Certain products may require a shorter exposure time (e.g., 0.55% ortho-phthalaldehyde for 12 minutes at 20°C, 7.35% hydrogen peroxide plus 0.23% peracetic acid for 15 minutes at 20°C) than glutaraldehyde at room temperature because of their rapid inactivation of mycobacteria or reduced exposure time because of increased mycobactericidal activity at elevated temperature (e.g., 2.5% glutaraldehyde at 5 minutes at 35°C). Category IB.

r. Select a disinfectant or chemical sterilant that is compatible with the device that is being reprocessed. Avoid using reprocessing chemicals on an endoscope if the endoscope manufacturer warns against using these chemicals because of functional damage (with or without cosmetic damage). Category IB.

s. Completely immerse the endoscope in the high-level disinfectant, and ensure all channels are perfused. As soon as is feasible, phase out nonimmersible endoscopes. Category IB.

t. After high-level disinfection, rinse endoscopes and flush channels with sterile water, filtered water, or tapwater to prevent adverse effects on patients associated with disinfectant retained in the endoscope (e.g., disinfectant induced colitis). Follow this water rinse with a rinse with 70%-90% ethyl or isopropyl alcohol. Category IB.

u. After flushing all channels with alcohol, purge the channels using forced air to reduce the likelihood of contamination of the endoscope by waterborne pathogens and to facilitate drying. Category IB.

v. Hang endoscopes in a vertical position to facilitate drying. Category II.

w. Store endoscopes in a manner that will protect them from damage or contamination. Category II.

x. Sterilize or high-level disinfect both the water bottle used to provide intraprocedural flush solution and its connecting tube at least once daily. After sterilizing or high-level disinfecting the water bottle, fill it with sterile water. Category IB.

y. Maintain a log for each procedure and record the following: patient’s name and medical record number (if available), procedure, date, endoscopist, system used to reprocess the endoscope (if more than one system could be used in the reprocessing area), and serial number or other identifier of the endoscope used. Category II.

z. Design facilities where endoscopes are used and disinfected to provide a safe environment for healthcare workers and patients. Use air-exchange equipment (e.g., the ventilation system, out-exhaust ducts) to minimize exposure of all persons to potentially toxic vapors (e.g.,
glutaraldehyde vapor). Do not exceed the allowable limits of the vapor concentration of the chemical sterilant or high-level disinfectant (e.g., those of ACGIH and OSHA). *Category IB, IC.*

aa. Routinely test the liquid sterilant/high-level disinfectant to ensure minimal effective concentration of the active ingredient. Check the solution each day of use (or more frequently) using the appropriate chemical indicator (e.g., glutaraldehyde chemical indicator to test minimal effective concentration of glutaraldehyde) and document the results of this testing. Discard the solution if the chemical indicator shows the concentration is less than the minimum effective concentration. Do not use the liquid sterilant/high-level disinfectant beyond the reuse-life recommended by the manufacturer (e.g., 14 days for ortho-phthalaldehyde). *Category IA.*

bb. Provide personnel assigned to reprocess endoscopes with device-specific reprocessing instructions to ensure proper cleaning and high-level disinfection or sterilization. Require competency testing on a regular basis (e.g., beginning of employment, annually) of all personnel who reprocess endoscopes. *Category IA.*

c. Educate all personnel who use chemicals about the possible biologic, chemical, and environmental hazards of performing procedures that require disinfectants. *Category IB, IC.*

dd. Make PPE (e.g., gloves, gowns, eyewear, face mask or shields, respiratory protection devices) available and use these items appropriately to protect workers from exposure to both chemicals and microorganisms (e.g., HBV). *Category IB, IC.*

ee. If using an automated endoscope reprocessor (AER), place the endoscope in the reprocessor and attach all channel connectors according to the AER manufacturer’s instructions to ensure exposure of all internal surfaces to the high-level disinfectant/chemical sterilant. *Category IB.*

ff. If using an AER, ensure the endoscope can be effectively reprocessed in the AER. Also, ensure any required manual cleaning/disinfecting steps are performed (e.g., elevator wire channel of duodenoscopes might not be effectively disinfected by most AERs). *Category IB.*

gg. Review the FDA advisories and the scientific literature for reports of deficiencies that can lead to infection because design flaws and improper operation and practices have compromised the effectiveness of AERs. *Category II.*

hh. Develop protocols to ensure that users can readily identify an endoscope that has been properly processed and is ready for patient use. *Category II.*

ii. Do not use the carrying case designed to transport clean and reprocessed endoscopes outside of the healthcare environment to store an endoscope or to transport the instrument within the healthcare environment. *Category II.*

jj. No recommendation is made about routinely performing microbiologic testing of either endoscopes or rinse water for quality assurance purposes. *Unresolved Issue.*

kk. If environmental microbiologic testing is conducted, use standard microbiologic techniques. *Category II.*

ll. If a cluster of endoscopy-related infections occurs, investigate potential routes of transmission (e.g., person-to-person, common source) and reservoirs. *Category IA.*

mm. Report outbreaks of endoscopy-related infections to persons responsible for institutional infection control and risk management and to FDA. *Category IB.* Notify the local and the state health departments, CDC, and the manufacturer(s). *Category II.*

nn. No recommendation is made regarding the reprocessing of an endoscope again immediately before use if that endoscope has been processed after use according to the recommendations in this guideline. *Unresolved issue.*

oo. Compare the reprocessing instructions provided by both the endoscope’s and the AER’s manufacturer’s instructions and resolve any conflicting recommendations. *Category IB.*

8. **Management of Equipment and Surfaces in Dentistry**

a. Dental instruments that penetrate soft tissue or bone (e.g., extraction forceps, scalpel blades, bone chisels, periodontal scalers, and surgical burs) are classified as critical and should be
sterilized after each use or discarded. In addition, after each use, sterilize dental instruments that
are not intended to penetrate oral soft tissue or bone (e.g., amalgam condensers, air-water
syringes) but that might contact oral tissues and are heat-tolerant, although classified as
semicritical. Clean and, at a minimum, high-level disinfect heat-sensitive semicritical items.
Category IA. 43, 209-211

b. Noncritical clinical contact surfaces, such as uncovered operatory surfaces (e.g., countertops,
switches, light handles), should be barrier-protected or disinfected between patients with an
intermediate-disinfectant (i.e., EPA-registered hospital disinfectant with a tuberculocidal claim) or
low-level disinfectant (i.e., EPA-registered hospital disinfectant with HIV and HBV claim).
Category IB. 43, 209-211

c. Barrier protective coverings can be used for noncritical clinical contact surfaces that are touched
frequently with gloved hands during the delivery of patient care, that are likely to become
contaminated with blood or body substances, or that are difficult to clean. Change these
coverings when they are visibly soiled, when they become damaged, and on a routine basis (e.g.,
between patients). Disinfect protected surfaces at the end of the day or if visibly soiled. Category
II. 43, 210

9. Processing Patient-Care Equipment Contaminated with Bloodborne Pathogens (HBV,
Hepatitis C Virus, HIV), Antibiotic-Resistant Bacteria (e.g., Vancomycin-Resistant Enterococci,
Methicillin-Resistant Staphylococcus aureus, Multidrug Resistant Tuberculosis), or Emerging
Pathogens (e.g., Cryptosporidium, Helicobacter pylori, Escherichia coli O157:H7, Clostridium
difficile, Mycobacterium tuberculosis, Severe Acute Respiratory Syndrome Coronavirus), or
Bioterrorist Agents

a. Use standard sterilization and disinfection procedures for patient-care equipment (as
recommended in this guideline), because these procedures are adequate to sterilize or disinfect
instruments or devices contaminated with blood or other body fluids from persons infected with
bloodborne pathogens or emerging pathogens, with the exception of prions. No changes in these
procedures for cleaning, disinfecting, or sterilizing are necessary for removing bloodborne and
emerging pathogens other than prions. Category IA. 22, 53, 60-62, 73, 79-81, 105, 118-121, 125, 126, 221, 224-234, 236,
244, 265, 266, 271-273, 279, 282, 283, 354-357, 666

10. Disinfection Strategies for Other Semicritical Devices

a. Even if probe covers have been used, clean and high-level disinfect other semicritical devices
such as rectal probes, vaginal probes, and cryosurgical probes with a product that is not toxic to
staff, patients, probes, and retrieved germ cells (if applicable). Use a high-level disinfectant at the
FDA-cleared exposure time. (See Recommendations 70 and 11e for exceptions.) Category IB. 6-8,
17, 69

b. When probe covers are available, use a probe cover or condom to reduce the level of microbial
contamination. Category II. 197-201 Do not use a lower category of disinfection or cease to follow
the appropriate disinfectant recommendations when using probe covers because these sheaths
and condoms can fail. Category IB 197-201

c. After high-level disinfection, rinse all items. Use sterile water, filtered water or tapwater followed
by an alcohol rinse for semicritical equipment that will have contact with mucous membranes of
the upper respiratory tract (e.g., nose, pharynx, esophagus). Category II. 10, 31-35, 1017

d. There is no recommendation to use sterile or filtered water rather than tapwater for rinsing
semicritical equipment that contact the mucous membranes of the rectum (e.g., rectal probes,
anoscope) or vagina (e.g., vaginal probes). Unresolved issue. 11

e. Wipe clean tonometer tips and then disinfect them by immersing for 5-10 minutes in either 5000
ppm chlorine or 70% ethyl alcohol. None of these listed disinfectant products are FDA-cleared
high-level disinfectants. Category II. 49, 95, 185, 188, 293

11. Disinfection by Healthcare Personnel in Ambulatory Care and Home Care

a. Follow the same classification scheme described above (i.e., that critical devices require
sterilization, semicritical devices require high-level disinfection, and noncritical equipment