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About Clinical Statements

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Infection Prevention in Eye Care Services and Operating Areas and Operating Rooms - 2012

AAO Quality of Care Secretariat, Hoskins Center for Quality Eye Care

Comprehensive Ophthalmology

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INFORMATION STATEMENT

**Infection Prevention in Eye Care Services and Operating Areas
August 2012**

TABLE OF CONTENTS

- I. Introduction
- II. Pathogen Risk and Overview
 - A. Bloodborne Pathogens (HIV, HBV, HCV)
 - B. Adenovirus
 - C. Multi-drug resistant organisms
 - D. MRSA
- III. Basic Infection Prevention Recommendations
 - A. Employee Health
 - 1. Immunizations
 - 2. Hepatitis B Vaccine
 - 3. Tuberculin Skin Test
 - 4. Employee Illness

5. Pregnant Employees

6. Sharp Injury or Body Fluid Exposure Follow-Up Management

IV. Standard Precautions for Patient Encounters and for Surgical Procedures

A. Hand Hygiene

B. Personal Protective Equipment

C. Respiratory Hygiene/Cough Etiquette

D. Sharps Safety

E. Biomedical Waste Management

F. Single Use Devices

G. Environmental Barriers

H. Supply Storage and Handling

I. Medication, Eye Drops & Solutions Use, Handling & Storage

V. Care of the Environment

A. Toys

B. Patient Care Equipment

C. Computer Equipment

D. Exam/procedure rooms

E. Waiting rooms and bathrooms

F. Laundry

G. Linen-clean storage

VI. Procedure set-up

VII. Instrument Storage and Handling

VIII. Cleaning, Disinfection & Sterilization Procedures (Reprocessing)

IX. Conclusion

X. References

I. Introduction

This document is intended to provide *minimum* infection prevention guidelines and practices to ophthalmologists and their staff about eliminating or minimizing transmission of microorganisms and infection in their offices and operating rooms. These basic infection prevention measures will protect eye care staff and patients from exposure to bloodborne pathogens, such as human

immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and other significant microorganisms that include, but are not limited to, methicillin-resistant *Staphylococcus aureus* (MRSA), adenovirus, and herpes simplex virus (HSV).

Some microorganisms live for days, weeks, or months on an uncleaned or improperly cleaned surface. MRSA, for example, can survive for longer periods when surfaces are good for bacterial growth. Factors like temperature, humidity, the amount of germs present, the availability of nutrients, and type of surface also affect a microorganism's lifespan.¹ Adenovirus can live for several days, and HBV can live for seven days in a dried state. With the pathogenicity and hardiness of many microorganisms, and with the ever increasing incidence of colonization of MRSA in the general population, it is very important that infection prevention measures are followed in a consistent manner for each patient, no matter what the diagnosis.

This document incorporates federal regulations, Centers for Disease Control and Prevention (CDC) guidelines, current research and literature, professional organization recommendations and standards, and equipment manufacturers' cleaning and disinfection instructions. These resources include, but are not limited, to the following:

Regulatory

[U.S. Department of Labor Occupational Safety and Health Administration \(OSHA\)](#)

[U.S. Department of Health and Human Services \(DHHS\)](#)

[Centers for Medicare & Medicaid Services \(CMS\)](#)

[Environmental Protection Agency \(EPA\)](#)

[Food and Drug Administration \(FDA\)](#)

Organizations

[Centers for Disease Control and Prevention \(CDC\)](#)

[Association for Professionals in Infection Control and Epidemiology \(APIC\)](#)

[Association for the Advancement of Medical Instrumentation \(AAMI\)](#)

[Association of Perioperative Registered Nurses \(AORN\)](#)

[United States Pharmacopoeia USP 797](#)

[National Patient Safety Goals](#)

[The Joint Commission \(JC\)](#)

[Institute of Healthcare Improvement \(IHI\)](#)

[National Institute of Occupational Safety and Health \(NIOSH\)](#)

Guidelines

- [Guidelines for Infection Control in Health Care Personnel, 1998](#)
- [Guideline For Prevention Of Surgical Site Infection, 1999](#)
- [Guideline For Hand Hygiene In Health-Care Settings, 2002](#)
- [Guidelines For Environmental Infection Control In Health-Care Facilities, 2003](#)

- Updated U.S. Public Health Service Guidelines for the Management for Occupational Exposures to HIV and Recommendations for Postexposure Prophylaxis, 2005
- Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006
- Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, 2007
- USP 797 - Guideline to Pharmaceutical Compounding - Sterile Preparations, 2008
- Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008
- Prevention of Herpes Zoster, 2008
- APIC Position Paper: Safe Injection, Infusion and Medication Vial Practices in Healthcare, 2009
- Guideline to the Elimination of Methicillin-Resistant Staphylococcus aureus (MRSA) Transmission in Hospital settings, 2nd Edition, 2010
- Sexually Transmitted Diseases Treatment Guidelines, 2010

Staying abreast of regulations, current research, guidelines and standards is a daunting task for the individual practitioner. This document strives to identify the key components to providing a safe practice and environment for the health care worker (HCW) and patient that meets, at a minimum, the current applicable regulations and infection prevention guidelines. When the research has not kept up with practice and evolving technologies, established principles of infection prevention will be used to provide a "best practice" recommendation.

Manufacturers of health care instruments and equipment may not provide adequate cleaning and disinfection instructions. This poses significant safety problems for the practitioner. Equipment and instruments must be thoroughly evaluated prior to purchase, not only for the technology, but for written cleaning and disinfection instructions that meet AAMI and infection prevention standards. Practitioners can put pressure on manufacturers to supply the cleaning and disinfection data, thus greatly impacting product safety.

The emergence and evolution of multi-drug resistant organisms (MDROs) has required a more stringent approach to infection prevention and has resulted in legislative action in many states. "One" health care-associated infection (HAI) is now considered too many and there is a national initiative from IHI that states' health care organizations are required to have "zero tolerance" for health care-associated infections. Zero tolerance means the health care organization must implement measures that prevent all health care-associated infections to an irreducible level. The goal is zero health care-associated infections. Whether in the ambulatory or hospital setting, understanding the need for infection prevention and implementing the basic measures discussed in this document will provide safety for the HCW and patient.

II. PATHOGEN RISK AND OVERVIEW

Pathogen transmission can occur in three ways: airborne (e.g., tuberculosis [TB], measles, varicella, disseminated herpes zoster); droplet (e.g., strep throat, pertussis, common cold, influenza, mumps, some pneumonias); and contact (e.g., adenovirus, HSV, common cold, influenza, MRSA, vancomycin-resistant enterococci [VRE], herpes zoster, HIV, HBV, HCV).

This document provides guidance for all three modes of transmission; however, this will primarily focus on those pathogens that are transmitted via contact.

A. Bloodborne Pathogens

Bloodborne pathogens may be present in blood, blood-contaminated products, or other bodily fluids, especially if contaminated with or mixed with blood. Percutaneous injuries (e.g., needlestick or cut from a sharp object) represent the greatest risk of transmission of bloodborne pathogens to HCWs. Tears, unless they contain visible blood, are usually not a source of bloodborne pathogens. However, tears may be a source of HSV, MRSA, adenovirus, or other pathogens. The use of precautions, including hand hygiene and barriers, reduces contact with blood and bodily fluids, thus reducing exposure of HCWs to bloodborne pathogens. The use of safety devices and techniques to reduce handling of sharp instruments also reduces the number of percutaneous injuries.

Bloodborne pathogen guidelines reduce the unlikely risk of contamination of the ophthalmic medical personnel and patient alike. Human tears are not considered to contain significant amounts of bloodborne pathogens and thus require standard precautions, such as handwashing after contact with the tears. According to the CDC, the likelihood of transmission through contact with tears is extremely remote.² However, contact with tears contaminated with blood, such as in minor surgery, requires the use of standard and transmission-based procedures in order to comply with OSHA requirements.

Human Immunodeficiency Virus (HIV) infection prevalence continues to increase throughout the United States. Some of these patients will be known to be infected with HIV, but in many, it will be unrecognized. All health care personnel engaged in delivering ophthalmic care to such patients might, in the course of their normal duties, be exposed to the blood of individuals who may be shedding the virus. Although the risk of infection in these circumstances appears to be extremely remote, measures taken by health care employers and employees are recommended by OSHA and the CDC.

HIV exposure in health care settings has been of major concern. As of June 2000, the CDC received reports of 56 U.S. health care personnel with HIV transmission associated with occupational exposure, and another 138 reports of possible transmission to date.³ For health care personnel exposed through percutaneous means to HIV-infected blood, the estimated risk for HIV infection is 0.3%.³ Risks associated with a mucous membrane exposure are estimated to be 0.09%.² Risks for HIV seroconversion after a percutaneous exposure have been found higher for those exposed to a larger quantity of blood (i.e., a device visibly contaminated with blood, a needle being placed directly in a vein or artery, or a deep injury), or when the source patient was terminally ill with AIDS.³

Hepatitis B Virus (HBV) transmission poses a risk to HCWs. In 1994, approximately 1,000 HCWs were infected with HBV from occupational exposure.³ Since implementation of routine preexposure vaccination of health care personnel and procedures to prevent exposure to blood, there has been a significant decrease in HBV infection among health care personnel.³ HBV is transmitted by mucosal or percutaneous exposure to blood and serum-derived body fluids from persons with acute or chronic infection. The risk of developing clinical hepatitis from exposure to the blood that was both hepatitis B surface antigen (HbsAg) and hepatitis E antigen (HbeAg) positive was 22% to 31%.³ Any person who is seropositive for HbsAg can be infectious. The CDC recommends that health care personnel who have routine contact with

blood and bodily fluids be vaccinated.³ For applicable settings, the OSHA standard requires that HBV vaccine be made available to personnel with occupational exposure to blood, at the employer's expense.⁴

Hepatitis C Virus (HCV) is the cause of most parenterally transmitted cases of non-A, non-B hepatitis in the U.S. There is no vaccine currently available and postexposure prophylaxis has not appeared effective in preventing infection. HCV is thought to be transmitted relatively rarely through occupational exposure to blood.³ The incidence of seroconversion after percutaneous exposure to an HCV-positive source is estimated to be 1.8%.³ HCV has been isolated in tears and aqueous humor.

B. Adenovirus

Adenovirus has been the main cause of nosocomial outbreaks of conjunctivitis. These outbreaks have mostly occurred in eye clinics or offices, but have also occurred in nursing homes and child care centers. The key transmission occurs from person to person through ophthalmic instruments, medical personnel, or contaminated ophthalmic solutions.⁵ Adenovirus can survive for long periods on environmental surfaces and ophthalmic instruments can become contaminated and transmit infection.⁶ Handwashing, glove use and disinfection of instruments can all help to prevent or limit the transmission of adenovirus. Infected personnel shed virus for up to two weeks after onset of symptoms. Because adenoviruses are particularly difficult to eliminate from skin, fomites, and environmental surfaces, assiduous adherence to hand hygiene and use of disposable gloves when caring for infected patients are recommended.

C. Multi-Drug Resistant Organisms (MDRO)

MDRO transmission is most frequently documented in acute care facilities, but all health care settings are affected by the emergence and transmission of antimicrobial-resistant microbes. The prevention and control of MDROs is a national priority.^{7,8} For epidemiologic purposes, MDROs are defined as microorganisms, predominantly bacteria, that are resistant to one or more classes of antimicrobial agents. Although the names of certain MDROs describe resistance to only one agent (e.g., MRSA, VRE), these pathogens are frequently resistant to most available antimicrobial agents. These highly resistant organisms deserve special attention in health care facilities. In addition to MRSA and VRE, certain gram-negative bacilli (GNB), including those producing extended spectrum beta-lactamases (ESBLs) and others that are resistant to multiple classes of antimicrobial agents, are of particular concern. In addition to *Escherichia coli* and *Klebsiella pneumoniae*, these include strains of *Acinetobacter baumannii* resistant to all antimicrobial agents, or all except imipenem, and organisms such as *Stenotrophomonas maltophilia*, *Burkholderia cepacia*, and *Ralstonia pickettii* that are intrinsically resistant to the broadest-spectrum antimicrobial agents.

In most instances, MDRO infections have clinical manifestations that are similar to infections caused by susceptible pathogens. However, options for treating patients with these infections are often extremely limited.

D. MRSA

MRSA incidence has increased both in the health care community and in the general population over the past two decades. Community-associated MRSA (CA-MRSA) has dramatically increased over the past 10 years and primarily affects skin and soft tissue but can also cause bacteremias, sepsis, conjunctivitis, ocular infections, and pneumonia.⁹ When patients with MRSA have been compared to patients with methicillin-susceptible *S. aureus* (MSSA), MRSA-colonized patients more frequently develop symptomatic infections. Furthermore, higher case fatality rates have been observed for certain MRSA infections, including bacteremia, post-sternotomy mediastinitis, and surgical site infections. MRSA can cause temporary, intermittent, or long-term colonization with recurrent infections. HCWs can become colonized and be a source of nosocomial transmission via their hands. MRSA has been documented to survive on contaminated surfaces and sterile packaging for 38 weeks.¹ Hand hygiene and environmental cleaning/disinfection are critical in preventing contamination of MRSA on sterile supplies, equipment, and surfaces.

III. BASIC INFECTION PREVENTION RECOMMENDATIONS

Employee Health

OSHA requires that employers provide certain safety measures for employees and the CDC provides guidelines for the protection of the HCW and the employer. In many states, the Department of Health requires implementation of the CDC guidelines. Employee health requirements provide safety for the employee and ophthalmologist. It also provides protection for the patient because employee health can directly affect the health and safety of the patient.

1. Immunizations

Adults, especially HCWs, may be exposed in the community or in the workplace to influenza, measles, mumps, rubella, varicella, hepatitis B, hepatitis A in some populations, diphtheria, and tetanus. Vaccination for vaccine-preventable diseases helps to prevent work absence and illness and prevents transmission to others.^{10,11}

2. Hepatitis B Vaccine

OSHA requires employers to offer free Hepatitis B vaccine at the time of hire to health care workers who have a job risk of body substance exposure.⁴

3. Tuberculin Skin Test (TST)

OSHA requires new employee hires to have a two-step TST using the Mantoux method or the QuantiFERON-TB TB blood test.⁴

4. Employee Illness

Health care workers should not work when ill (e.g., constitutional symptoms, fever, cough, rash) or have nonintact skin (e.g., eczema, draining uncovered wound, exposed herpetic lesion). The CDC Guideline for Infection Control in Health Care Personnel provides specific recommendations regarding what conditions/illnesses will require ill personnel to be off work and for what duration.¹¹

Health care workers who have exudative lesions or weeping dermatitis should refrain from all direct patient care and from handling patient-care equipment until the condition resolves.

Avoiding contact with others is important for HCWs with adenoviral conjunctivitis. While the exact length of the period of infectivity is variable, many consider 7 days from the onset of symptoms as the contagious period because the recovery of virus from infected cases drops off after 7 days of infection.¹² However, other studies have suggested that patients should be considered potentially contagious for at least 10 to 14 days.¹² The CDC recommends that an infected HCW should not provide patient care for the duration of symptoms after onset of epidemic keratoconjunctivitis or purulent conjunctivitis caused by other pathogens.¹¹

5. Pregnant Employees

Pregnant HCWs are not known to be at greater risk of contracting particular infectious diseases (e.g., Cytomegalovirus, hepatitis, herpes simplex, HIV, parvovirus, rubella) than HCWs who are not pregnant; however, if a HCW develops an infection during pregnancy, the infant is at risk of infection resulting from perinatal transmission. Because of this risk, pregnant HCWs should be provided information on standard and transmission-based precautions appropriate for each infection.¹¹

6. Sharp Injury or Body Fluid Exposure and Follow-Up Management

These recommendations are based on the U.S. Public Health Service Guidelines, updated in 2005.¹³ Occupational exposures are considered urgent medical concerns so that timely management can be administered.

It is recommended that health care organizations have systems in place for prompt reporting, evaluation, counseling, treatment and follow-up of occupational exposures to bloodborne pathogens. Arrangements for medical care should be made for HCWs or patients who sustain a body fluid exposure within the eye care setting.

Health care workers should be educated to report occupational exposures immediately after they occur, because treatment can be most effective if administered as soon as possible after the exposure.

Employers subject to OSHA regulations are required to establish exposure control plans that include post-exposure follow-up and to comply with incident reporting requirements.⁴

Exposure management must be offered to those who sustain the following:

- Needlestick with a contaminated needle
- Sharp instrument injury from a contaminated instrument, including those that have been cleaned but not sterilized
- Blood or body fluid with visible blood to non-intact skin (freshly shaved, acne, eczema, paper cut, chewed cuticles, dry/cracked skin)
- Blood or body fluid exposure to mucous membranes (eyes, nose, mouth)
- Human bite that breaks the skin

Immediate actions to take after exposure include:^{3,13-15}

- Provide immediate care to the exposure site
 - Wash wounds and skin with soap and water

- Flush mucous membranes with water
- Determine risk associated with exposure by:
 - Type of fluid (e.g., blood, visibly bloody fluid, other potentially infectious fluid or tissue, concentrated virus) and
 - Type of exposure (e.g., percutaneous injury, mucous membrane or non-intact skin exposure, bites resulting in blood exposure)
- Evaluate exposure source 
 - Assess the risk of infection using available information
 - Test known sources for HBsAg, anti-HCV, and HIV antibody (consider using rapid testing).
 - For unknown sources, assess risk of exposure to HBV, HCV, or HIV infection
 - Do not test discarded needles or syringes for virus contamination
- Evaluate the exposed person
 - Assess immune status for HBV infection (i.e., by history of hepatitis B vaccination and vaccine response).

IV. STANDARD PRECAUTIONS FOR PATIENT ENCOUNTERS AND FOR SURGICAL PROCEDURES

The Healthcare Infection Control Practices Advisory Committee's ¹⁶ This document reaffirms Standard Precautions as the foundation for preventing transmission during patient care in all health care settings, reaffirms the importance of implementing transmission-based precautions (airborne, droplet, contact) based on the clinical presentation or syndrome and likely pathogens until the infectious etiology has been determined, and provides evidence-based recommendations whenever possible.

Standard Precautions are used for all patient contact, regardless of suspected or confirmed infection status, in any setting in which health care is delivered. Health care personnel should assume that every person is potentially infected or colonized with an organism that could be transmitted in the health care setting and apply the following infection control practices during the delivery of health care. Standard Precautions are also intended to protect the HCW and patient from picking up infectious agents from each other and from the environment and equipment used during patient care. Education and training on the principles and rationale for recommended practices are critical elements of Standard Precautions because they facilitate appropriate decision-making and promote adherence when HCWs are faced with new circumstances.

Standard Precautions include at a minimum the following practices: hand hygiene, personal protective equipment, barriers, sharp device safety, respiratory etiquette and hygiene, medication and solution handling and storage, single use devices, supply storage and handling, environmental cleaning, instrument handling and storage, and instrument reprocessing.

A. Hand Hygiene

The 2002 CDC Hand Hygiene Guideline defines the appropriate use of handwashing, antiseptic handwash, alcohol based hand sanitizers, and surgical hand antisepsis.¹⁷

1. Handwashing with Soap and Water

When hands are visibly dirty, contaminated with proteinaceous material, or visibly soiled with blood or body fluids, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water.

Handwashing with soap and water uses friction to remove soil, body substances and reduce the transient microorganism count on the skin. Soap and water handwashing reduces the microorganism load on the skin but does not kill the microorganisms and is dependent on the thoroughness of the friction used and the hand surfaces rubbed.

The CDC recommends that ophthalmic medical personnel performing eye examinations or other procedures involving contact with tears, mucous membranes, other body substances, or contact lenses should wash their hands immediately after a procedure and between patients.¹⁷ Handwashing should be encouraged when there is any doubt about the necessity for doing so. When hands are visibly dirty, handwashing is strongly recommended. For routine handwashing, a vigorous rubbing together of all surfaces of the lathered hands is recommended for at least 15 seconds, followed by a thorough rinsing under a stream of water and thorough drying with disposable towel.¹⁷ Plain soap (not bar soap) can be used for handwashing for most routine activities. Water faucets can be turned off with a paper towel instead of freshly washed hands and doors opened with paper towel help prevent recontamination.

2. Antiseptic Soap and Water (chlorhexidine preferred)

Antimicrobial soap and water removes soil and kills the transient microbes but is dependent on the thoroughness of the friction.

If adenoviral contamination is suspected, the 2006 Rutala et al. study recommends hand antisepsis using antimicrobial soap and water.⁵ Chlorhexidine gluconate is the preferred antimicrobial soap. Anytime a patient has a suspected infectious process, antimicrobial soap should be used immediately after patient contact. If antimicrobial soap is unavailable, hands can be washed with regular soap followed by an alcohol-based hand sanitizer.

3. Hand Sanitizer (alcohol-based hand sanitizer-at least 62% ethyl alcohol)

Alcohol-based hand sanitizers are used when there is no visible soil or contact with body substances. The preferred method of hand decontamination/sanitization is with an alcohol-based hand rub. Alternatively, hands may be washed with an antimicrobial soap and water.

Apply enough sanitizer to palm of hand so that all surfaces of the hands and fingers are saturated while rubbing hands together, covering all surfaces of hands and fingers, until they are dry. Hand sanitizers kill the microbes on the hands within 15-30 seconds of application. It very effectively kills MRSA and VRE on contact with the skin.

Hand sanitizing is recommended prior to having direct contact with patients, before donning gloves, after contact with inanimate objects near the patient, after removing gloves, between the dirty and clean steps of a procedure, and prior to accessing clean supplies.

4. Surgical Hand Antisepsis

Antiseptic handwash or antiseptic hand rub performed preoperatively by surgical personnel to eliminate transient and reduce resident hand flora. Antiseptic detergent preparations often have persistent antimicrobial activity. These reduce antimicrobial loads, listed in order of effectiveness: (1) alcohol rubs, (2) chlorhexidine, (3) betadine, (4) chlorophenol (PCMX), and (5) triclosan. Follow the manufacturer's use instructions.

5. Hand Care

Maintaining the integrity of the skin is critical in preventing skin breakdown due to frequent use of hand hygiene. Many of the alcohol hand sanitizers contain emollients and moisturizers that prevent breakdown or irritation. Lotion soaps are less irritating to the skin as compared to the antiseptic soaps.

Hand lotions are also helpful but it is important to confirm that the antiseptic soap is compatible with the lotion. Some lotion ingredients reduce or inactivate the efficacy of the antiseptic agent. Lotions should be chlorhexidine compatible.

Jewelry should be minimized or eliminated on the hands and wrists because it is difficult to clean thoroughly between patients and prior to procedures. Hand contamination with potential pathogens is increased with ring-wearing. Dangling or ornate settings should be removed from wrists and fingers. Watch bands may become odorous and should be periodically cleaned.

Non-natural nails (artificial/gels/extendors/acrylic/fiberglass) have been identified with bacterial and fungal contamination and can be a source of microorganism transmission. Artificial nails should be discouraged and should not be worn by staff performing procedures or applying contact lenses.

B. Personal Protective Equipment (PPE)

PPE is required during surgical procedures in the office or ambulatory surgery center, during aerosolizing procedures, and when patient has an infectious process. Wear PPE appropriate to the situation, procedure, organism present or potential exposure.

Prevent contamination of clothing and skin during the process of removing PPE and always perform hand hygiene prior to donning PPE and immediately after removal of PPE. Before leaving the patient's room or cubicle, remove and discard PPE.

PPE protects the HCW from the patient and environment and protects the patient from the HCW and the healthcare environment.

1. Gloves

Disposable gloves should be readily available for all ophthalmic medical personnel and they should be instructed regarding the rationale for wearing gloves and their appropriate usage. It should be noted particularly that gloves:

- Are not a substitute for hand hygiene, and
- Are for single use only, and should be discarded after each patient encounter

Perform hand hygiene prior to donning gloves and again immediately after glove removal. Gloves may have microscopic flaws which will allow hand contamination to occur.

Wear disposable exam gloves when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes, non-intact skin, or potentially contaminated intact skin (e.g., eye drainage, mucous membranes of eyes, of a patient incontinent of stool or urine) could occur.

Gloves should be worn for touching blood and blood-contaminated fluids (moist or in a dried state), for handling items or surfaces soiled with such fluids and for performing venipuncture and other vascular access procedures.

Wear gloves with fit and durability appropriate to the task. Nonlatex is preferred due to increasing incidence of patients and HCWs with latex allergies.

Wear disposable medical examination gloves for cleaning the environment or medical equipment.

Remove gloves after contact with a patient and/or the surrounding environment (including medical equipment), using proper technique to prevent hand contamination.

Do not wear the same pair of gloves for the care of more than one patient or different procedures on the same patient.

Do not wash gloves for the purpose of reuse since this practice has been associated with transmission of pathogens.

Change gloves during patient care if the hands will move from a contaminated body site (e.g., infected eye to a non-infected eye), or between the dirty and clean steps of a procedure.

2. Gowns

Gowns serve a dual purpose because they protect the wearer from the patient and patient environment and they protect the patient from whatever contamination the HCW may have on their clothing.

White professional coats are not considered PPE and should be changed frequently due to contamination.

Perform hand hygiene prior to donning a gown and after gown removal before leaving the patient environment.

Wear a gown, that is appropriate to the task, to protect skin and prevent soiling or contamination of clothing from the patient, environment, or during procedures and patient-care activities when contact with blood, body fluids, secretions, or excretions, or aerosolization/spray is anticipated (e.g., cleaning instruments in a sink, incision and drainage procedures, surgical procedures, eye irrigation).

Wear a gown for direct patient contact if the patient has uncontained secretions or excretions.

Do not reuse gowns, even for repeated contacts with the same patient.

3. Mouth, nose, and eye protection

Face protection performs dual functions: it protects the wearer from patient respiratory droplets and fluid generating procedures and it protects the patient from the respiratory droplets of the HCW.

Use full face protection (a face shield that fully covers the front and sides of the face, a mask with attached shield, or a mask and goggles), in addition to gloves and gown, to protect the mucous membranes of the eyes, nose, and mouth during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions, and with unmasked coughing patients (e.g., cleaning instruments in a sink, incision and drainage procedures, surgical procedures, eye irrigation, etc.).

A HCW should wear a mask for close patient contact (when within 3-6 feet of patient) when they are exhibiting cold or cough symptoms.

Offer patients with cough or cold symptoms a mask during close patient contact (within 3-6 feet of patient).

Select masks, goggles, face shields, and combinations of each according to the need anticipated by the task performed. Protective eyeglasses and goggles must have side protectors.

Personal eyeglasses and contacts are not considered protective by OSHA.

4. Caps and Shoe Covers

Caps and shoe covers are not usually necessary in an ambulatory eye care setting unless in an ambulatory surgery center environment. Hair sheds bacteria, and hair covering caps prevent shedding into the surgical procedure site. Shoe covers protect the shoes from body substance exposure, which rarely occurs in the ophthalmologic setting.

C. Respiratory Hygiene/Cough Etiquette

The strategy is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections, and applies to any person with signs of illness including cough, congestion, rhinorrhea, or increased production of respiratory secretions when entering a health care facility. Patients who have asthma, allergic rhinitis, or chronic obstructive lung disease also may be coughing and sneezing. While these patients often are not infectious, cough etiquette measures are prudent and recommended by the CDC. The absence of fever does not always exclude a respiratory infection. Health care personnel are advised to observe Droplet Precautions (i.e., wear a mask with eye protection) and hand hygiene when examining and caring for patients with signs and symptoms of a respiratory infection. Individuals with influenza are contagious 1-2 days before onset of symptoms.

Control measures for patients include:

Covering the mouth/nose with a tissue when coughing and prompt disposal of used tissues and/or offering a surgical mask to the coughing person when tolerated.

Rescheduling the coughing patient unless presenting symptoms indicate medical necessity.

Control measures for HCWs include:

Wearing a mask with eye protection when within 3-6 feet of the patient when the coughing patient is unable to cover mouth and nose with tissue or mask.

Respiratory etiquette also includes preventing the HCW's respiratory droplets from infecting the patient. It is courtesy and good practice for the HCW to wear a mask if the following personal conditions exist while working: sore/scratchy throat, cough, runny nose, halitosis, cold symptoms. Wearing the mask prevents the patient from breathing the droplets of the HCW and prevents potential exposure. Healthcare workers who have a respiratory infection are advised to avoid direct patient contact, especially with high-risk patients.

D. Sharp Safety Devices

OSHA requires sharp safety devices be used for all procedures unless a safety device is not available on the market. This means that scalpel blade/handles, needles/syringes must have a safety feature and must be activated immediately after use.

Activated sharps must be disposed of in a sharps container and disposed of according to the state and local ordinances.

Non safety sharps must not be "used up" before implementing safety devices.

No recapping of contaminated needles with hands. If recapping is necessary, use a recapping device that prevents hand contact with the cap or the needle.

Safe Injection Practices

Safe injection practices apply to the use of needles, cannulas that replace needles, and, where applicable intravenous delivery systems. The CDC recommends the following for injection safety:

Use aseptic technique to avoid contamination of sterile injection equipment.

Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannulae, and syringes are sterile, single-use items; they should not be reused for another patient or to access a medication or solution that might be used for a subsequent patient.

Use fluid infusion and administration sets (i.e., intravenous bags, tubing, and connectors) for one patient only and dispose appropriately after use. Consider a syringe or needle/cannula contaminated once it has been used to enter or connect to a patient's intravenous infusion bag or administration set.

Use single-dose vials for parenteral medications whenever possible.

Do not administer medications from single-dose vials or ampules to multiple patients or combine leftover contents for later use.

If multidose vials must be used, both the needle or cannula and syringe used to access the multidose vial must be sterile.

Do not keep multidose vials in the immediate patient treatment area, and store in accordance with the manufacturer's recommendations; discard if sterility is compromised or questionable.

Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients.

E. Biomedical Waste Management

Consult the state and local county for biomedical waste management regulations.

Sharps disposal containers are to be replaced when two-thirds full.

Sharp disposal container lids are to be secured and sealed prior to disposal transport.

Red bags should be available for blood-soaked dressings.

Blood and other liquid body fluids may be disposed of in the sewer. Use PPE (gown, gloves, face protection) when disposing down hopper or toilet.

Prevent placement of sharps containers over trash containers.

Biomedical waste includes:

- Liquid or semi-liquid blood or other potentially infectious material that cannot be disposed of in the sanitary sewer system without danger of spraying or splashing
- Contaminated items which would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed
- Items caked with dried blood or other potentially infectious materials which are capable of releasing these materials during handling
- Contaminated objects capable of penetrating the skin (needles, syringes, scalpels, lancets, slides, razors, ampules, broken glass, capillary tubes, glass pipettes, other sharp instruments)

F. Single Use Devices

The FDA regulates Single Use Devices and has specific requirements for use. Supplies, medications, devices, and instruments that have the words "single use only" or "single patient use" must be discarded immediately after use on the patient. Single use items may not be cleaned and disinfected and used on other patients.

G. Environmental Barriers

Environmental barriers help protect the environment from contamination from body substances. For example, a disposable chux (blue pad) can be used to collect irrigation fluid or placed under an arm during an IV start, or used to establish a clean area for a procedure set-up. Barriers are discarded between patients.

H. Supply Storage and Handling

Perform hand hygiene prior to accessing clean and sterile supplies.

Check all supplies for expiration dates and discoloration.

Rotate stock so items that expire soon are in front of those with a later expiration date.

Store supplies away from sinks, under the sink cabinets, and other water sources to avoid contamination. Items with water spotting must be discarded and not used.

Store supplies in a clean and covered manner. Prevent dust contamination.

Use individually wrapped items instead of loose in glass or metal jars or drawers. Loose unwrapped items become contaminated rapidly from handling and improper storage. Examples include cotton applicators, tongue blades, cotton pads/balls, and gauze pads. If loose items are used, store in small amounts in plastic baggies, in freshly cleaned containers, or in original packaging. Do not store loose in a drawer due to cross contamination potential. Throw plastic baggies away when empty.

Avoid "topping off" jars or containers of antiseptics, creams, solutions, etc. The best practice is to discard the used container and open a new one to prevent cross contamination. Topping off means refilling a partially filled container and has been identified with outbreaks due to container contamination.

Never store supplies in cardboard packing boxes. Bugs and dust cause contamination of supplies. Remove from packing box in a designated dirty area and then transport supplies in a clean manner to where they will be stored.

Keep drawers and cupboards and closets clean and dust free.

I. Medication, Eye Drops and Solutions Use, Handling and Storage

Perform hand hygiene prior to accessing medications and solutions and immediately before drawing up or administering the medication.

Check expiration dates prior to administration.

Eyedrops: The bottle tip should not come into direct contact with the patient's tears or conjunctiva. If the tip does touch the patient, the bottle must be discarded. Discard the bottle when used on patient with an infectious eye process.

The United States Pharmacopoeia (USP) 797 policy (governing pharmacies that prepare compounded sterile preparations) states the following:

Multiple-dose containers (e.g., vials) are formulated for removal of portions on multiple occasions because they contain antimicrobial preservatives. The beyond-use date after initially entering or opening (e.g., needle-punctured) multiple-dose containers is 28 days (see Antimicrobial Effectiveness Testing <51>), unless otherwise specified by the manufacturer. If the vial is labeled as a multidose vial or container then the dating should not exceed 28 days UNLESS the manufacturer has data to support longer dating. Discard open vials of medication every 28 days as per USP 797.

Spike IV or irrigation bags/containers no sooner than one hour prior to initiation of administration as per USP 797.

Discard vials or solutions labeled with "single patient use" or "single use" or "preservative free" after use on single patient.

Use aseptic technique to avoid contamination of sterile injection equipment.

Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannulae and syringes are sterile, single-use items; they should not be reused for another patient or to access a medication or solution that might be used for a subsequent patient.

Use fluid infusion and administration sets (i.e., IV bags, tubing and connectors) for one patient only and dispose appropriately after use. Consider a syringe or needle/cannula contaminated once it has been used to enter or connect to a patient's IV infusion bag or administration set.

Use single-dose vials for parenteral medications whenever possible.

Do not administer medications from single-dose vials or ampules to multiple patients or combine leftover contents for later use.

If multidose vials must be used, both the needle or cannula and syringe used to access the multidose vial must be sterile.

Do not keep multidose vials in the immediate patient treatment area, store in accordance with the manufacturer's recommendations, and discard if sterility is compromised or questionable.

Do not use bags or bottles of IV solution as a common source of supply for multiple patients.

Draw up medication just prior to the procedure. Do not draw up for multiple patients.

Many eye ointments and eye drops are now available in single dose or smaller-sized containers.

Never store or carry medications in personal clothing or pockets.

V. CARE OF THE ENVIRONMENT

A. Environmental Surfaces

In patient-care areas, Environmental Protection Agency (EPA)-registered disinfectants, if available, should be used in accordance with the manufacturer's instructions. High-level disinfectants for noncritical devices or environmental surfaces should not be used. For noncritical medical equipment surfaces, these should be cleaned with a detergent/disinfectant. This can then be followed by use of an EPA-registered disinfectant.¹⁸

The 2006 Rutala et al. study recommended that for prevention of epidemic keratoconjunctivitis, environmental surfaces should be cleaned with effective products such as ~1,900 ppm chlorine, 65% ethanol with 0.63% quaternary ammonium compound, or 79% ethanol with 0.1% quaternary ammonium compound.⁵

The above disinfectants are also effective on surfaces contaminated with blood or other body fluids. The surface must be cleaned of visible contamination, then re-wiped with the disinfectant and allowed to air dry. Items contaminated with blood or body fluids may be cleaned with an EPA-registered disinfectant. Bleach (dilute 1 part bleach to 9 parts water) may also be used to disinfect environmental surfaces. Bleach can stain clothing and carpeting. Bleach is not a cleaner and is used after cleaning has occurred in order to be effective.

Microorganisms can live in the environment on an uncleaned surface for hours to months depending on the organism and contamination present. Moisture does not have to be present for some microorganisms to live.

Establish policies and procedures for routine and targeted cleaning of environmental surfaces as indicated by the level of patient contact and degree of soiling.

Use EPA-registered disinfectants that have microbiocidal (i.e., killing) activity against the pathogens most likely to contaminate the patient-care environment. Use in accordance with manufacturer's instructions.

Review the efficacy of in-use disinfectants when evidence of continuing transmission of an infectious agent (e.g., rotavirus, *C. difficile*, norovirus) may indicate resistance to the in-use product and change to a more effective disinfectant as indicated.

Wear disposable gloves whenever using disinfectants. Gowns may be required if gross environmental contamination is present.

If an item has been used but does not have visible contamination, wipe with a cleaner/disinfectant using friction and let air dry for at least 30-60 seconds.⁵

If an item has visible contamination, clean first with a disinfectant wipe, discard wipe, then re-clean again and let air dry. The surface must be visibly clean in order for disinfection to occur.

Clean cleaning buckets and equipment after use.

If cleaner/disinfectant requires dilution, dilute according to manufacturer's instructions. Too much cleaner/disinfectant will cause dirt and organisms to adhere to the surface. Using too little cleaner/disinfectant will affect efficacy.

B. Toys

In facilities that provide health care to pediatric patients or have waiting areas with child play toys, establish policies and procedures for cleaning and disinfecting toys at regular intervals. Use the following principles in developing this policy and procedures:

- Select play toys that can be easily cleaned and disinfected
- Do not permit use of stuffed furry toys if they will be shared
- Clean and disinfect large stationary toys (e.g., climbing equipment) at least weekly and whenever visibly soiled
- If toys are likely to be mouthed, rinse with water after disinfection; alternatively, wash in a dishwasher
- When a toy requires cleaning and disinfection, do so immediately or store in a designated, labeled container separate from toys that are clean and ready for use.

C. Patient Care Equipment

Clean and disinfect all equipment used during patient care and prior to use on another patient.

Use an EPA-approved cleaner/disinfectant on equipment.

D. Computers and Computer Equipment

Wipe keyboards and mice between patients or cases with disinfectant.

E. Exam or Procedure Room Cleaning

Clean and disinfect surfaces that have been used or touched during the course of patient care by the HCW or the patient; this includes rooms that have MRSA or body fluid contamination.

Clean and disinfect touched surfaces after each patient.

Surfaces must be cleanable: vinyl, plastic and other non-porous surfaces are cleanable. Cloth, carpeting, and wood are not able to be cleaned between patients and should be eliminated or minimized in the health care environment.

F. Waiting Areas and Bathrooms

Clean and disinfect horizontal surfaces once daily and as needed when soiled. These surfaces include door knobs, elevator buttons, light switches, and other frequently touched surfaces.

G. Laundry

Handle used textiles and fabrics with minimum agitation to avoid contamination of air, surfaces, and persons.

Wear gloves and other appropriate PPE if laundry is soiled or body substances are present.

Contain laundry in a leak-proof bag and fill only two-thirds full to prevent overflow.

Use disposable gowns, sheets, etc., if possible.

H. Linen - Clean Storage

Store linens in a dry, clean, covered manner.

Perform hand hygiene when accessing linens.

VI. PROCEDURE SET UP

Perform hand hygiene prior to accessing supplies and doing set up.

Set up just prior to the procedure.

Discard any item that has come in direct contact with the patient.

Tear tape at time of procedure set up or after sanitizing hands.

Discard or reprocess items left on the procedure tray at the end of the procedure. Do not put unused dressings or instruments back in the drawer or cupboard.

VII. INSTRUMENT STORAGE AND HANDLING

Never store or carry instruments in personal clothing or pockets.

Store in a covered, clean, and dry manner. Never store under a sink or next to a sink or other water source.

Single use disposable instruments are discarded in biohazardous waste at the end of use. Discard open unused disposable instruments.

VIII. CLEANING, DISINFECTION, STERILIZATION OF INSTRUMENTS (Reprocessing)

a. General Guidelines

Establish policies and procedures for containing, transporting, and handling patient-care equipment and instruments/devices that may be contaminated with blood or body fluids.

Remove organic material from critical and semi-critical instrument/devices, using recommended cleaning agents before high-level disinfection and sterilization to enable effective disinfection and sterilization processes.

Wear PPE (e.g., gloves, gown), according to the level of anticipated contamination, when handling patient-care equipment and instruments/devices that is visibly soiled or may have been in contact with blood or body fluids.

Follow manufacturer's cleaning, disinfection, and sterilization instructions. If instructions are lacking, contact the manufacturer for written instructions. If instructions do not meet established standards, follow the best practice as recommended by AAMI and other infection prevention organizations.

b. Cleaning

The purpose of cleaning is to remove soil and debris physically through friction, and to reduce the presence of microorganisms. Cleaning does not kill microorganisms.

Any instrument must be thoroughly cleaned prior to disinfection or sterilization.

Wear appropriate PPE when cleaning instruments. Gloves are required as a minimum. Gown and full face protection is recommended when cleaning in a sink due to the potential of splash.

Instruments must be submerged in the cleaning solution in the full open position to allow proper cleaning of the hinges. Sharp ends should be pointing in the same direction to minimize sharp injury. Minimal hand contact is required by OSHA. Use of wire or plastic baskets is useful.

Instruments may be cleaned in an ultrasonic. Consult the manufacturer for appropriate use. Solution must be changed between batches of instruments.

When cleaning instruments in a sink or basin of water and cleaning solution, change water and solution after each batch of instruments. Water and chemicals can become saturated with soil. There is a point of soilage and microorganism saturation that causes re-adherence to the instrument, negating the effect of the cleaning.

All cleaned instruments must be thoroughly rinsed and dried prior to disinfection and sterilization.

c. Disinfection Procedures

Disinfection is a process to eliminate most or all pathogenic microorganisms (except for bacterial spores) from inanimate objects, such as medical devices or equipment. This is usually performed using chemicals known as germicides or disinfectants. High-level disinfection kills all organisms and is performed using a germicide which is regulated by the FDA. The CDC recommends that if there are questions about high-level disinfectants or how to disinfect a particular medical device, the office should contact the manufacturer of the product.

For semi-critical items, which contact mucous membranes or non-intact skin, cleaning followed by high-level disinfection should eliminate enough microorganisms to prevent infection spread. The CDC suggests that tonometer tips be wiped clean and then disinfected by immersing for 5-10 minutes in either 5000 ppm chlorine or 70% ethyl alcohol. Then, after disinfection, the tonometer should be thoroughly rinsed in tap water and air dried before use.¹⁸

d. **Sterilization**

Sterilization is the process of eliminating all organisms, including spores, and is carried out in health care settings by physical or chemical methods. Major methods include steam under pressure, dry heat, ethylene oxide gas, hydrogen peroxide gas plasma, and liquid chemicals. Critical items, such as surgical instruments and implants, should be sterilized because they carry a higher risk for infection if contaminated.

IX. CONCLUSION

These OSHA and CDC guidelines are intended to help protect the public and ophthalmic medical personnel, and minimize transmission of bloodborne pathogens and surface infectious agents. This is a complex and evolving area and ongoing attention to the current infection control guidelines as well as manufacturer cleaning and disinfection recommendations is needed.

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Navigate This Guideline

INFORMATION STATEMENT

I. Introduction

II. PATHOGEN RISK AND OVERVIEW

III. BASIC INFECTION PREVENTION RECOMMENDATIONS

IV. STANDARD PRECAUTIONS FOR PATIENT ENCOUNTERS AND FOR SURGICAL PROCEDURES

V. CARE OF THE ENVIRONMENT

VI. PROCEDURE SET UP

VII. INSTRUMENT STORAGE AND HANDLING

VIII. CLEANING, DISINFECTION, STERILIZATION OF INSTRUMENTS (Reprocessing)

IX. CONCLUSION

X. REFERENCES

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