



Infection Control in Optometric Practice

By David M. Krumholz, O.D.

Introduction

Nobody wants to get sick. But as health care professionals, we come into contact with patients on a daily basis, some of whom are sick with something contagious. Often, it is not apparent who might have an infectious disease and who might not, so we have to take precautions with everyone. Some of these precautions are simple common sense; others require more thought. By taking universal precautions and following infection control guidelines, we can minimize the chances of getting sick from contact with patients, other healthcare workers, and even bystanders. Failure to follow infection control guidelines puts everyone at risk.

Table 1 - Definitions

Pathogen or infectious agent	Any biological agent capable of causing disease, i.e.: bacteria, viruses, fungi, parasites.
Reservoir	Any place or thing where an infectious organism can live, so it can be transmitted to a susceptible host. May be animate or inanimate.
Transmission	Any mechanism by which a pathogen is spread to a susceptible host. May be direct person-to-person contact, or indirect via common vehicle, droplet, or a vector.
Common vehicle	Contaminated material that serves as an intermediary in the transmission of a pathogen to a susceptible host.
Susceptible host	Someone lacking effective resistance to a particular infectious agent.

Disease Transmission

In order for an infectious disease to be transmitted from one person to another, several conditions must be met. First, there must be a pathogenic organism infecting someone. If so,

that person may show signs of an active infection. These patients are usually easy to identify and avoid. A “carrier” is a patient who, while infected with a pathogen, does not show symptoms of infection. They are harder to identify (and avoid).

There must also be a way for the pathogen to make it out of the infected patient’s body into the environment, a “portal of exit.” These portals can include respiratory secretions (coughing, sneezing), draining lesions, diarrhea, and vomiting. Once in the environment the pathogen has to make its way to a susceptible host. This transmission may be direct or indirect by a contaminated intermediary object, which could be anything. However, once a pathogen comes into contact with another person it has to get inside in order to make them sick. There must be a “portal of entry” appropriate for that pathogen.

We are exposed to pathogens all the time in our daily lives, yet we do not get sick all the time. This is because we all have host defenses which consist of natural barriers (like our skin) and our immune system. The outcome of exposure to a pathogen depends not only on our host defenses but the virulence of the organism and the size of the inoculum, as well as the route and duration of exposure. In other words, a whole series of conditions have to be just right for an infectious disease to be passed from one person to another. This concept is called the Chain of Transmission and is outlined in Table 2. Infection control depends on breaking this chain, and concentrating on three main areas as outlined in Table 3.

Table 2 - Chain of Transmission.

- Virulent pathogen present
- Reservoir
- Portal of exit
- Mode of transmission
- Portal of entry
- Impaired host defenses.
- Appropriate size of inoculum
- Appropriate route and duration of exposure

Table 3 - Breaking the Chain.

- Reservoir recognition and control
- Control transmission opportunities
- Support and protect the host

Infection Control

Reservoir Recognition and Control

Finding and eliminating places for infectious organisms to live and grow is called “reservoir recognition and control”. Recognize that pathogens can live almost anywhere; this includes hand instruments, occluders, phoropters, slit lamps, etc. Also the equipment stand itself, the examination chair (especially the arms), table tops, pens, medication bottles, condensing lenses and doorknobs. Controlling these reservoirs mainly consists of cleaning; cleaning the environment, cleaning equipment, cleaning anything and everything that could harbor infectious organisms. Any surface, equipment, or furniture touched by a patient is a potential cross

contamination source and must be cleaned between patients. Non-disposable instruments must be “reprocessed” before being used on another patient. This reprocessing procedure is outlined in Table 4.

Table 4 - Reprocessing Methods.

Reprocessing	Cleaning, disinfecting, or sterilizing an object so it is safe to use again
Cleaning	Removing foreign matter from an object
Decontamination	Removing infectious agents from an object so it is safe to handle
Disinfection	Elimination of pathogenic organisms with the exception of bacterial endospores
Sterilization	Eliminating all forms of microbial life

The handling between time of use and reprocessing is potentially hazardous, because the object is still contaminated and capable of transmitting disease. Items must be cleaned before being disinfected or sterilized, or the reprocessing may not make the object safe. The reprocessing method used is based on the material and its intended use. Not everything needs to be sterile and not everything can be heated. It is therefore important to use the proper reprocessing method to achieve the desired outcome and avoid damaging the item.

The potential for disease transmission exists if an item is not adequately reprocessed, or is reprocessed incorrectly. Disposable equipment eliminates this potential risk, but only if disposed of properly; there have been several reports in the news over recent years of patients contaminated by the improper re-use of disposable equipment.

Control Transmission Opportunities

Because a patient may not always show obvious signs or symptoms of infection, it is always best to use universal precautions. These universal precautions assume everybody has everything, even though in reality they may not. Therefore, by taking the appropriate precautions, you can protect yourself and those around you from unintended disease transmission.

By far, hand-washing is the single most important means of reducing the transmission of infectious organisms. However, if not done properly, our own hands can become a common vehicle and spread disease. Therefore it is important to wash your hands before and after each patient contact, after handling contaminated material, and of course after toilet use. Of course, you should also wash your hands whenever they are dirty.

Liquid soaps in pump dispensers are preferred, as a bar of soap can act as a common vehicle. Once the hands are wet and the soap applied, it is important to lather the soap well and rub the hands vigorously for at least 15 seconds. Make sure to include the palms, back of hand, between fingers, around the thumb and wrist, and under jewelry, such as rings. The hands should then be rinsed under running water with the fingertips pointed down so that the contaminated water runs off them into the sink. Disposable paper towels should be used for

drying, as a regular towel that is used again without laundering can act as a common vehicle. In fact, it is a good idea to use the paper towels to turn off the water faucet to avoid the possibility of contamination from it, just in case the faucet happens to be a common vehicle!

While soap and running water are preferred for hand-washing, they can dry and irritate the skin. Gels containing alcohol and glycerin are available that do not require water, and may be better tolerated. Note that they may leave a slight residue, which should be taken into account, especially when working in close proximity to a patient's eye or if handling contact lenses.

For those instances where contact with infectious material is likely or unavoidable, personal protective equipment (PPE) is available. PPE forms a barrier between you and the patient which prevents direct transmission of pathogens. Gloves are the most common example of PPE. There are many types of gloves, ranging from utility gloves (appropriate for cleaning up spills of contaminated material) to non-sterile examination gloves (most common - used for examination) to sterile surgical gloves (used for invasive procedures). Their purpose is not only to protect you, but to prevent contamination of the patient by microorganisms that may be on your hands. Infection control works both ways! Examination gloves are commonly made of latex rubber, but are also available in other materials; such as vinyl, to avoid latex allergy reactions. It is important to remove gloves properly by turning them inside out as they are being taken off, followed by immediate hand-washing, to prevent the gloves themselves from acting as a common vehicle.

Other barriers may not be so immediately obvious. The white lab coat worn in the office actually acts as a barrier to keep your street clothes from becoming contaminated and acting as a common vehicle. Masks can be used to reduce disease transmission by droplets, and eye protection can be worn to block contaminated material from using the mucous membranes of the eye as a portal of entry should the situation warrant it. This brings up an important point - that PPE should be chosen based on the anticipated interaction and contamination level. One does not need to don gloves, cover garb, a mask, and goggles to see a patient for a simple eye exam; that level of protection is more appropriate when invasive procedures are performed. However, if PPE of any sort is worn, it must be used correctly. That is, it should be of a level appropriate to the anticipated exposure, it should be monitored and replaced if it becomes compromised, and it must be removed promptly before leaving the area. Otherwise there is a risk of spreading pathogens around instead of containing them. And of course it goes without saying that immediately after removing and disposing of PPE you should wash your hands!

Support and Protect the Host

The goal of this strategy is to prevent health care workers (that's us) from transmitting infectious disease, and to protect health care workers from contracting infectious diseases. Proactively this consists of a pre-employment health screening, periodic health assessments, and immunization programs. For instance, many facilities require immunizations for rubeola, varicella, hepatitis b, and influenza, as well as periodic screening for tuberculosis.

Also, signs and symptoms of health care workers consistent with infection should be promptly evaluated. Many large clinics and hospitals have an employee health service for this purpose. Institutions also have procedures in place for post-exposure management should someone come into contact with potentially infectious fluids or secretions from a patient without the proper protections in place, or if their PPE has been compromised. These procedures may include determining the immune status of source patient and the health care worker, as well as offering

prophylactic therapy.

Summary

Proper infection control practices protect yourself and those around you. By knowing how pathogens may be transmitted, it is possible to limit your exposure to pathogens and how to interfere with their transmission. Use of the proper PPE can help, but the single best way to limit the spread of infectious disease on the job or in your daily life is to wash your hands!

About our Author

Dr. Krunholz is an associate professor at the SUNY State College of Optometry, where he teaches in the didactic program, performs research, and is an attending clinician in the college's teaching clinics. In 2001, he was awarded the State University of New York Chancellor's Award for Excellence in Teaching. He is a Fellow of the American Academy of Optometry and has authored or co-authored over 70 scientific papers, presentations, and textbook chapters, as well as having served as a peer reviewer for several journals in the field.

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Infection Control in Optometric Practice Quiz

To receive **one** hour of continuing education credit, those taking the quiz must be AOA Associate members and answer 7 of the 10 questions correctly. This exam consists of multiple-choice questions designed to measure the level of understanding of the material covered in the continuing education article "Infection Control in Optometric Practice."

If you are renewing a CPO, CPOA or CPOT certification this year, proof of 18 earned credits and your \$95 renewal payment will be due to the CPC by November 1. All quizzes submitted by October 1 will be graded and CE verification forms will be emailed to the paraoptometric by October 15 so that the November 1 renewal deadline can be met. **Please note that quizzes submitted after October 1 will not be processed in time for you to meet the November 1 deadline.**

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Select the option that best answers the question.

1. Which one of the following best describes the term “biological agent capable of causing disease”?
 - A. Common vehicle
 - B. Pathogen
 - C. Reservoir
 - D. Susceptible host

2. Which one of the following terms best describes a patient who, while infected with a pathogen, does not show symptoms of infection?
 - A. Carrier
 - B. Pathogenic
 - C. Reservoir
 - D. Susceptible host

3. Which one of the following is NOT considered to be a portal of exit for infectious disease?
 - A. Draining lesions
 - B. Intact skin
 - C. Respiratory secretions
 - D. Vomiting

4. Which one of the following is NOT considered to be part of the chain of transmission?
 - A. Portal of entry
 - B. Portal of exit
 - C. Reprocessing
 - D. Size of inoculum

5. Breaking the chain of transmission generally concentrates on three main areas, which include all of the following EXCEPT:
 - A. Controlling transmission opportunities
 - B. Reservoir recognition and control
 - C. Route and duration of exposure
 - D. Supporting and protecting the host

6. Which one of the following eliminates all forms of microbial life, including bacterial endospores?
 - A. Cleaning
 - B. Decontamination
 - C. Disinfection
 - D. Sterilization

7. Which one of the following is the single most important means of reducing opportunities for the transmission of infectious organisms?
 - A. Hand washing
 - B. Intact host defenses
 - C. Personal protective equipment
 - D. Prophylactic therapy

8. Which one of the following is NOT considered to be personal protective equipment?
 - A. Eye protection
 - B. Gloves
 - C. Intact skin
 - D. Masks

9. If not disposed of properly, gloves that have been used may actually act as which one of the following?
 - A. Barrier
 - B. Common vehicle
 - C. Compromised personal protective equipment
 - D. Portal of entry

10. Failure to follow proper infection control guidelines can put which one of the following groups at risk?
 - A. Bystanders
 - B. Everyone
 - C. Healthcare workers
 - D. Patients

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