

# Infection control guidelines for optometrists 2007

*Clin Exp Optom* 2007; 90: 6: 434–444

DOI:10.1111/j.1444-0938.2007.00192.x

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Submitted: 7 February 2007

Revised: 27 May 2007

Accepted for publication: 29 May 2007

Information from peer-reviewed articles, guidelines from professional societies and manufacturers' instructions were considered to determine the risk factors in optometric practice and to make recommendations for disinfection, sterilisation and reprocessing of instrumentation and other equipment used in practice and measures for personal protection.

Wherever possible, all practitioners should adopt measures to decrease the risk of transmission of infection, such as single use instruments/equipment, appropriate methods of reprocessing where items are reused, routine employment of standard infection control precautions and application of more rigorous procedures for infected or immuno-suppressed individuals.

Key words: disinfection, infection, infection control, sterilisation, vaccination

Optometrists have an obligation to take reasonable precautions to ensure that their patients and staff are not exposed to infection while attending or working at their practice. This paper presents infection control guidelines that aim to provide information to optometrists to assist them in minimising the risk of transmission of infection in their practices.

Infection control guidelines for optometric practice in Australia were developed in 1986<sup>1</sup> and revised in 1995.<sup>2</sup> Since then, the scope of optometric practice has expanded in a number of states in Australia, so that optometrists may now be involved in the therapeutic management of patients, some of whom may have infectious conditions such as conjunctivitis. Some of

the procedures that are used for these patients require more rigorous attention to infection control than was previously necessary.

In 1996, the National Health and Medical Research Council (NHMRC) and the Australian National Council on AIDS (ANCA) adopted the terms 'standard precautions' and 'additional precautions'

(based on modes of transmission of infectious agents) to define appropriate work practices with infection control for the care and treatment of all patients, regardless of their infectious status.<sup>3</sup> The precautions include work practices that aim to achieve a basic level of infection control, particularly in the handling of blood, other body fluids, secretions and excretions, non-intact skin and mucous membranes. Although there is no direct reference to optometric practice, the standard precautions have application in optometric practice because of the possibility of contact with mucus membranes, tears and blood. All optometrists need to be aware of the infection control procedures designed to minimise cross infection.

Additional precautions are recommended in health-care settings for patients known or suspected of being infected or colonised with disease agents that cause infections and which may not be contained with standard precautions alone. They should be applied when there is risk of airborne or droplet transmission of respiratory secretions or when there is inherent resistance to standard sterilisation procedures, for example, suspected variant Creutzfeldt-Jakob disease (vCJD).

There are no universal guidelines that apply to the decontamination of ophthalmic instruments used by optometrists and thus it is necessary to refer to the manufacturers' guidelines or other professions for information.

### **Risk factors in optometric practice**

In optometric practice, infection may be transmitted from patient to staff, staff to patients, patient to patient and staff to staff by direct contact, aerosol formation or contamination of equipment or instruments in the practice.

There are several instances in which optometrists may be exposed to blood, tears and mucous membranes or to infection:

1. removal of foreign bodies
2. assessment of patients with ocular trauma
3. assessment of patients with conjunctivitis

4. assessment of patients with microbial keratitis
5. lacrimal lavage, removal of eyelashes
6. expressions of glands and cysts
7. contact lens fitting
8. assessment of patients who are incontinent (this includes young children) or patients who vomit.

Some communicable diseases that could be encountered in optometric practice are human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS), hepatitis A, B and C, tuberculosis, measles, mumps, rubella, chicken pox, shingles, mononucleosis (glandular fever), herpes, influenza, impetigo, infectious conjunctivitis and keratoconjunctivitis, adenovirus 8 and CJD.

#### **HIV/AIDS**

HIV has been isolated from the tears, contact lenses and ocular tissues<sup>4-7</sup> but there is no evidence of transmission through these. Infection requires direct contact between blood/body fluids and mucous membranes or damaged skin for example, through sexual contact or sharing needles and/or syringes with an infected person, through transfusions of infected blood or blood clotting factors. Injuries from needles containing HIV-infected blood or infected blood entering an open cut or a mucous membrane have also been reported as causing HIV infection.<sup>8</sup>

#### **HEPATITIS A, B AND C**

Hepatitis B surface antigen may be present in the conjunctival fluid and there is a risk that it may be transferred to a tonometer or contact lenses.<sup>9,10</sup>

#### **CJD**

The number of cases of CJD in Australia is extremely low<sup>11</sup> and there is no evidence that it is a significant risk in optometric practice. Similarly, there is no evidence of CJD transmission by contact with intact skin. As there is lymphoid tissue in the cornea,<sup>12</sup> there is a theoretical possibility of transmission of vCJD and other forms of CJD between patients through ophthalmic devices that contact the eye, for example, trial contact lenses and tonometers. Such transmission is described as

'highly improbable'.<sup>12</sup> The NHMRC lists the cornea and anterior chamber as 'low infectivity sites' (sites that are demonstrated or predicted to be infectious but not consistently) and the conjunctiva as a semi-critical site.

#### **ADENOVIRUSES**

Adenoviruses are highly contagious and can survive outside the host for long periods, even on dry surfaces.<sup>13</sup>

### **Disinfection, sterilisation and reprocessing**

Several terms are used to describe infection control procedures. Optometrists should be familiar with these.

'Cleaning' is the removal of foreign material using water and detergents or enzymatic products<sup>14</sup> and is the first stage recommended in reprocessing. Cleaning of instruments is an essential prerequisite, as organic material such as dried mucus, tears, skin or make-up may harbour infective organisms in dangerous concentrations and prevent adequate disinfection or sterilisation. Cleaning may require scrubbing of all surfaces of an instrument to remove debris. Insoluble deposits may require utilisation of isopropyl alcohol,<sup>2</sup> however, alcohol can damage some materials, so its use will depend on the type of material to be cleaned.

'Disinfection' is the term used for the inactivation of virtually all pathogenic micro-organisms but not necessarily all microbial forms, for example, bacterial endospores, fungi, protozoa. Disinfection is usually achieved using thermal (heat and water) or chemical means.

'Sterilisation' is the term used when all viable micro-organisms are eliminated, including bacterial spores. Sterilisation is usually achieved through autoclaving, which involves exposure of the item to high temperature and pressure.<sup>14</sup>

'Reprocessing' is the process of cleaning and disinfection and/or sterilisation of a device that is to be reused.

A 'hygienic' state is a state of cleanliness that offers little or no threat to health.<sup>2</sup>

'Sanitary conditions' are those that are physically clean and healthy.<sup>2</sup>

1. Remove jewellery.
2. Wet hands with water (to decrease the risk of dermatitis avoid using hot water).
3. Apply recommended amount of product to hands (use liquid hand-wash dispensers with disposable cartridges and disposable dispensing nozzles).
4. Rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers.
5. Rinse hands with water.
6. Dry thoroughly with disposable towel, patting hands dry to minimise chapping (do not use multiple-use cloth towels or hand-dryers).
7. Use disposable towel to turn off tap, if elbow or foot controls not available.

Additional recommendations

- Cover cuts and abrasions with water-resistant occlusive dressings or use surgical gloves.
- Keep fingernails clean and short; do not wear artificial nails.
- Use non-perfumed, hypoallergenic hand creams to avoid cracking of skin/dermatitis, e.g. sorbolene.

A poster demonstrating an appropriate hand-washing technique with soap and water is available on the World Health Organization's website.<sup>20</sup>

**Table 1. Recommended procedures for hand-washing<sup>18,19</sup>**

Information from peer-reviewed articles, guidelines from professional societies and manufacturers' instructions were considered in determining risk factors in optometric practice and recommendations on disinfection, sterilisation and reprocessing procedures for instrumentation and other equipment used in optometric practice.

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## RECOMMENDATIONS FOR OPTOMETRIC PRACTICE

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### Identification and management of staff and patients with infectious diseases

Optometrists may consider asking patients to provide information about their general health in a registration form, when they present at the practice. If their eye examination is not urgent, patients with short-term infectious illnesses should be asked to reschedule their appointment.

Optometrists and staff with infectious diseases need to be aware of the precautions to take to avoid the transmission of disease when dealing with patients and the conditions that should exclude them from attending work (examples include influenza and conjunctivitis).

If it is practice policy that some pretesting of patients is undertaken by other practice staff prior to the patient being

seen by the optometrist, staff should be advised to seek the advice of the optometrists for any patients presenting with a 'red eye' or ocular discharge before this testing is undertaken.

### Hand-washing

Hand-washing is considered to be the most important measure in preventing the spread of infection in the healthcare setting.<sup>15</sup> The prevalence of infection decreases as hand hygiene is improved.<sup>16,17</sup>

The aim of hand-washing is to remove transient flora that colonise the superficial layers of the skin, which are most frequently associated with health-care associated infections. Usually, resident flora are attached to deeper layers of the skin and are more resistant to removal but are less likely to cause infection.

Hand-washing must be performed before and after significant contact with any patient and after activities likely to cause contamination, for example, handling food, emptying waste paper baskets, going to the toilet, blowing one's nose. Hand-washing should also be performed after the removal of gloves. When seeing patients, optometrists must avoid touching their own face, nose, mouth and eyes.

Hand-basins should be fitted in all consulting rooms and locations where contact lenses may be inserted or removed and must be kept clean. Elbow or foot controls are recommended to regulate the flow of

water. Recommended hand washing procedures are presented in Table 1.

### PRODUCTS FOR HAND HYGIENE

It is difficult to compare studies of suitability of products for hand hygiene due to differences in methodology and study design. Hand hygiene products in order from most to least effective are alcohol formulations, chlorhexidine, iodophors, triclosan, plain soap.<sup>18</sup> Other factors influence the suitability of products, for example, the drying effects of alcohol-based soaps limit frequent use.

#### Plain soap

Plain (non-antimicrobial) soap is not recommended for use by health-care workers, as it has minimal antimicrobial activity (although it can remove loosely adherent transient bacteria)<sup>21</sup> and it can become contaminated with gram-negative bacteria.<sup>18,22</sup>

#### Alcohol-based antiseptics

Alcohol-based hand antiseptics contain isopropanol, ethanol, n-propanol or a combination of two agents; they denature proteins and are effective against gram-positive and gram-negative bacteria, mycobacteria, fungi, enveloped viruses (HSV, HIV, influenza), hepatitis B (less susceptible) and hepatitis C. They are not effective against bacterial spores, protozoan cysts (for example, *Acanthamoeba*), certain non-

enveloped viruses and CJD. They are more effective for hand-washing than soap or antimicrobial soaps but are not effective when hands are visibly dirty or contaminated with proteinaceous materials such as blood.<sup>18</sup>

#### Chlorhexidine

Preparations that use 4% chlorhexidine are most effective. Chlorhexidine has residual activity on the skin<sup>23</sup> but allergic reactions are uncommon. Infection rates have been reported as being lower after antiseptic hand-washing using chlorhexidine than after hand-washing with plain soap or alcohol-based hand rinse.<sup>19</sup> Chlorhexidine-based hand-wash is commonly accepted as the most suitable hand hygiene product, with 4% w/v chlorhexidine widely used as a bacterial skin cleaner for hygienic and surgical handwashing.<sup>15</sup>

#### Other products

Iodine and iodophors have good bactericidal activity but cause more irritant contact dermatitis. Quaternary ammonium compounds for example, benzalkonium chloride, are only bacteriostatic and fungistatic and are affected by organic material. Triclosan (found in antibacterial hand-wash for home use) is often only bacteriostatic and has poor activity against gram-negative bacteria.<sup>18</sup>

#### Water versus waterless hand-cleaning

Alcohol-based hand rubs/gels<sup>15,18</sup> are more effective at encouraging health-care workers to clean their hands between patients despite being poorer antimicrobials.<sup>24</sup> Care must be taken to remove visible soil before use. Dry skin and irritation are common. Hand rubs/gels should only be used when:

1. there are emergency situations where there is insufficient time/facilities
2. there are inadequate hand-washing facilities
3. staff members have allergies.

#### • Suitability of hand-rubs

Although hand-rubs are used in some hospital and medical situations, where there is restricted access to hand-washing facilities, they are unsuitable for use in contact

lens practice because the residual debris and bacterial toxins on the hands, and chemicals from the hand-rub, may be transferred to the lens prior to insertion in the patient's eye. All optometrists fitting contact lenses should ensure that they have access to proper hand-washing facilities.

#### Personal protective equipment

Powder-free surgical gloves should be available for use in all practices. Gloves should be worn when there is a possibility of contamination with blood or body fluid (for example, where either the patient or the optometrist has open wounds) or when optometrists or their staff are in contact with high-risk patients (for example, those with serious communicable diseases, such as hepatitis B, active herpetic lesions).<sup>18</sup> Optometrists should frequently check their hands for cuts or abrasions. Gloves do not replace hand-washing; hands should be washed before and after using gloves. Although broken skin may be detected through stinging when the hands are wiped with an alcohol swab, there is the possibility of contact dermatitis developing from alcohol swab use.<sup>25</sup>

Latex gloves are not suitable for all optometrists and patients, and latex-free nitrile gloves are available as an alternative. Latex allergy has been reported to occur in 4.3 per cent of health-care workers and in 1.4 per cent of the population.<sup>26</sup> Optometrists intending to wear latex gloves during a patient examination must ask the patient if they are allergic to latex prior to conducting any procedures involving direct contact.

Safety glasses, face shields and masks should be used during procedures where there is potential for splashing/splattering or spraying of blood or body fluids or the potential for airborne infection.<sup>15</sup> Surgical masks should be used, if either the optometrist or the patient has a cold or influenza. Enclosed footwear should be worn to protect from injury/contact with sharps, such as needles used for foreign body removal.

Gloves are also recommended when contact with cleaning solutions such as

glutaraldehyde or sodium hypochlorite cannot be avoided.

#### Immunisation for optometrists

Optometrists should consider being immunised against influenza (yearly), hepatitis A (when seeing institutionalised patients, including nursing homes) and hepatitis B. There is currently no vaccination against hepatitis C available. In addition, optometrists should consider whether they have been immunised against measles/mumps/rubella.

#### Instrumentation in optometric practice

Single-use instruments and equipment should be used whenever possible in optometric practice but there are several items in optometric practice that are reused. All reusable instruments need to be cleaned immediately and then disinfected or sterilised, depending on intended use. Guidelines for disinfection or sterilisation of devices, instruments and equipment are discussed below and summarised in the Appendix.

#### REPROCESSING OF OPHTHALMIC DEVICES

Device classifications help guide practitioners to select the appropriate method of reprocessing for devices. The Centers for Disease Control and Prevention (CDC),<sup>27</sup> US Food and Drug Administration (FDA)<sup>28</sup> and the Australia Government Department of Health and Ageing<sup>29</sup> describe different levels of risks for reusable devices: critical, semi-critical and non-critical. Examples of devices used in optometric practice are shown in Table 2.

#### CONTACT LENSES

Ideally trial contact lenses should be used only once. If it is necessary to use trial lenses on a number of patients, in-practice disinfection procedures must be effective against bacteria, viruses (adenovirus, hepatitis, HIV), fungi and *Acanthamoeba*. Although there is a theoretical risk of transmission of HIV via trial contact lenses, there have been no reported cases.

All trial contact lenses used in patients who are carriers of infectious diseases

Level of risk	Application	Process	Example
Critical	Entry/penetration into sterile tissue, cavity or bloodstream	All items must be sterile e.g. steam under pressure	Needles, scalpels <sup>14</sup>
Semi-critical	Contact with intact mucosa or non-intact skin	Items should be sterile or there must be a minimum of high-level disinfection—preferably steam sterilisation or thermal disinfection (or high level chemical if heat not tolerated)	Tonometer probes, contact lenses, gonioscopy lenses, lacrimal cannulae <sup>14</sup>
Non-critical	Contact with intact skin	Items must be clean or undergo low/intermediate level disinfection	Blood pressure cuffs, stethoscopes, head and chin rests, phoropters, epilation forceps

**Table 2. Levels of reprocessing of medical devices**

(for example, CJD, HSV, hepatitis, HIV or adenovirus) must be disposed of immediately. All multiuse contact lenses should be cleaned and rinsed just prior to and immediately after use and patients should be warned of the risks of reused lenses prior to fitting. Note: soft contact lenses that cannot be heat-treated are not suitable for use as trial lenses unless they are discarded after use.

**Soft contact lenses cleaning procedures**

The following procedures are based on the International Organization for Standardization (ISO) instructions for cleaning soft contact lenses:<sup>30</sup>

1. Clean contact lens with a hydrogel lens cleaner via digital cleaning (20 seconds per side).
2. Rinse with sterile preserved/aerosol saline.
3. Fill glass vial with sterile saline.
4. Label with lens parameters and date of heating.
5. Sterilise in autoclave at 134 degrees C for at least three minutes or 121 degrees C for at least 10 minutes.
6. Alternative: thermal disinfection unit 78 to 90 degrees C for 20 to 60 minutes.<sup>31-33</sup>
7. Optometrists could consider asking a local dentist or general medical practitioner to autoclave contact lenses, if they do not want to purchase their own bench-top unit.

Additional notes:

- Despite its efficacy, 3% hydrogen peroxide is not recommended, as contact lens parameter changes may occur with prolonged storage in peroxide.<sup>34</sup> In addition, lenses cannot be stored for longer than 24 hours in the neutralised peroxide solution<sup>35</sup> and transfer to a new storage solution carries the risk of recontamination.
- Chemically preserved disinfectants are not suitable, as they have unknown efficacy against viruses and are questionable at limiting biofilm formation and fungal growth.
- Practitioners should take care to avoid cutting themselves when removing metal seals on contact lens containers.

**Gas permeable contact lenses cleaning procedures<sup>30</sup>**

1. Clean contact lens with approved gas permeable (GP) cleaner via digital cleaning (20 seconds per side).
2. Rinse with sterile preserved/aerosol saline.
3. Soak in 3% hydrogen peroxide for a minimum of three hours.
4. Rinse with sterile preserved/aerosol saline.
5. Dry GP lens with a clean tissue and store in a dry container. There is significantly less risk of contamination during dry storage compared to long-term storage in conditioning solutions.<sup>36,37</sup>
6. GP lenses must be thoroughly surface cleaned and rinsed prior to reuse.

The use of a solution of sodium hypochlorite containing 20,000 ppm of available chlorine has been declared important for decontamination procedures for the reuse of rigid trial set contact lenses and ophthalmic devices in England because of vCJD.<sup>38</sup>

**Recording of contact lens use and processing<sup>30</sup>**

Optometrists should maintain a record of processing of contact lenses that logs:

1. the patient reference
2. the date of use
3. the date and method of hygienic management
4. contact lens details
5. a note to indicate when it is time to disinfect trial lenses again (this should occur monthly).

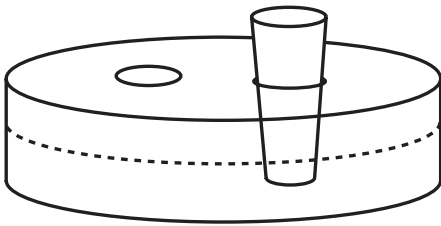
**TONOMETERS**

As tonometer probes are the most common item in the consulting room to regularly come into contact with mucous membranes and tears of patients, optometrists must ensure that they are cleaned and maintained appropriately. They should be cleaned before and after use.

In the literature,<sup>33,39</sup> there is some controversy about the most suitable method to disinfect tonometers. Common practice is to wash the tonometer prism, wipe with an alcohol swab and allow to air dry. The hepatitis C virus is removed only with a five-minute soak in 3% hydrogen peroxide or 70% alcohol, followed by wash in cold

- Clean tonometer prism by rubbing with a mild (neutral pH) soap or a non-abrasive contact lens cleaner before debris has dried.
- Rinse off the soap or contact lens cleaner with sterile water/saline before disinfecting.
- Soak the tonometer prism on its side for five minutes fully immersed in 3% H<sub>2</sub>O<sub>2</sub>, 70% isopropyl alcohol or 1:10 dilution of bleach.<sup>33,39</sup> Alternatively, a set-up that allows the 2 to 3 mm area adjacent to the tonometer tip to be immersed in solution without the tip resting on the bottom of the container may be suitable (Figure 1).
- Rinse with sterile water/saline and air dry.
- Have at least two prisms available for use so that one can be soaking while the other is being used.
- If you have had to remove the tonometer prism by putting your fingers into the solution, the solution needs to be changed each time. If you are able to remove the tonometer tip without contaminating the solution, the solution should be changed twice a day. Any device used for soaking tonometer tips must be cleaned with soap and water each day.

**Table 3. Recommended procedure for disinfection of tonometers**



**Figure 1. Device that can be used for soaking tonometer prisms.<sup>47</sup> Holes are drilled in the top of a petri dish to allow the prism surface and surrounding 2 to 3 mm to be soaked in the disinfectant. Similar devices are commercially available through US manufacturers.**

water,<sup>40</sup> while the hepatitis B virus is not removed with alcohol wipes, so this must be followed by rinsing with soap and water.<sup>41</sup> HIV is totally eliminated with a 70% alcohol wipe or a five-minute soak in 3% hydrogen peroxide, 70% alcohol or 1:10 bleach<sup>42</sup> and Adenovirus 8 (a common cause of epidemic keratoconjunctivitis)<sup>43</sup> is removed with alcohol, iodophor or hydrogen peroxide wipe or a five-minute soak in these disinfectants or bleach.<sup>44</sup> Alcohol swabbing and long-term (four days) continuous soaking with alcohol have been reported to cause damage to tonometer prisms, such as surface scratching and dissolving of the glue holding the tonometer prism together.<sup>45,46</sup> The recommended method to disinfect tonometer prisms is shown in Table 3.

Although CJD and vCJD are not major risks in Australia, optometrists should be aware that infectious prions are highly resistant to inactivation by many current disinfection techniques such as alcohol and chlorhexidine (for CJD and vCJD) and autoclaving (for vCJD).<sup>48</sup> If the optometrist believes that there is a possibility that a patient is at risk of having CJD, non-contact tonometry or disposable tonometer tips/shields/prisms/probes should be used and disposed of immediately.

**ADDITIONAL RECOMMENDATIONS**

1. Use a disposable tonometer tip/shield/prism/probe or non-contact tonometry in cases of infection or if the patient has HIV. Note: non-contact tonometry may result in splash-back and as the tonometer could contact the eye, it is necessary to wipe it with an alcohol swab between patients.
2. If tonometry is not performed, record the reason and whether the patient has been referred to another eye-care practitioner to have it performed.
3. It is useful to have two tonometer prisms available for use.
4. The instructions from the manufacturers of Haag-Streit tonometer (Goldmann)<sup>49</sup> recommend not exposing the prism to alcohol. They advise:
  - Remove prism and clean with mild soap and cold water. (Because of the potential for *Acanthamoeba* contamination of water supplies, we are cautious in recommending the use of

tap water for rinsing and suggest the use of sterile water/saline.)

- Soak in 3% H<sub>2</sub>O<sub>2</sub> for 10 minutes.
- Rinse thoroughly with cold water, dry with tissue.
- Store in a clean, dry container. Alternative solutions are listed on the Haag-Streit website.<sup>49</sup>

**GONIOSCOPY LENSES**

Disinfection of gonioscopy lenses should follow tonometry guidelines but also consider the manufacturer's instructions, for example, the manufacturers of the Volk Gonioscopy lens recommend:<sup>50</sup>

1. Clean the entire lens using a mild cleaning solution (diluted dishwashing liquid) and a clean soft cotton cloth.
2. Disinfect with either 2% aqueous glutaraldehyde or 1:10 dilution of sodium hypochlorite/household bleach, using fresh solution each time. Position the lens on its side, then immerse the entire lens in the selected solution for 25 minutes. Remove the lens from the solution and rinse thoroughly with room temperature water, then dry with a soft, lint-free cloth.
3. Clean both sides of the anterior glass element and the inside of the ring with Volk Precision Optical Lens Cleaner (POLC) or a Volk LensPen. Following disinfection, store the gonioscopy lens in a closed case or container. Any device used for soaking gonioscopy lenses must be cleaned with soap and water before and after use.<sup>50</sup>

### FUNDUS LENSES

Fundus lenses should be cleaned with mild detergent and water, and air dried or dried with a lint-free cloth. If infection is suspected, the lenses should be disinfected, according to manufacturer's instructions, for example, the manufacturers of Volk Fundus lenses recommend:<sup>50</sup>

1. Clean with a mild cleaning solution (disinfectant soap) and a clean soft cotton cloth or swab.
2. Disinfect with either 2% aqueous glutaraldehyde or 1:10 dilution of sodium hypochlorite/household bleach. Position the lens on its side, then immerse the entire lens in the selected solution for 25 minutes. Remove the lens from the solution and thoroughly rinse with room temperature water, then dry with a soft, lint-free cloth.
3. Clean the anterior glass element and the inside of the ring with Volk POLC.
4. Store in a closed case or container.

### EYE-DROP BOTTLES

External rims of bottles (for example, anaesthetic, mydriatic, Fluress, in-practice contact lens solutions and saline bottles) may become contaminated. Optometrists should:<sup>51,52</sup>

1. Check that the product has not reached its expiry date.
2. Store the product within the temperature range recommended by the manufacturer.
3. Mark the opening date on the bottle.
4. While using the bottle ensure that the bottle cap is held in the hand.
5. Ensure the bottle tip never touches the patient's eyes or the optometrist's hands.
6. Replace the bottle cap immediately after use.
7. Refrigerate if appropriate (note: not all eye-drops can be refrigerated after opening; it is recommended that food is not kept in refrigerators where drugs are kept).
8. Store the product for the time after opening recommended by the manufacturer. Discard at the end of this time (usually one month after opening) or by the product's expiry date if this is earlier.

9. Use minims whenever possible and if the eyes are infected use only minims. If it is not possible to use a minim on an infected eye, discard the bottle after use.<sup>51</sup> Alternatively, use a sterile glass rod or disposable dropper to administer the drops. The glass rod may be disinfected by autoclaving.

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### OTHER CONSIDERATIONS

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Control of infection includes effective and regular cleaning of the practice premises, insertion of plastic liners in waste baskets, disposal of waste and elimination of insects within the premises. There should be regular cleaning of all surfaces and fittings. Isopropyl alcohol tissues, 30% alcohol solution or sodium hypochlorite solution (1% solution can be obtained by a 1:5 dilution of 5% household bleach) may be used for large surface swabbing, although some surfaces may be damaged by alcohol. The practice should have a well-equipped first aid kit and cardiopulmonary resuscitation (CPR) masks.

### Waste disposal

Infectious material must be disposed of as biohazardous waste.<sup>53</sup> Material is to be placed in yellow containers or plastic bags, which are marked with black biological hazard symbols. To avoid needlestick injury, needles should not be resheathed or removed from disposable syringes. 'Sharps' must be discarded in clearly labelled, puncture-proof containers.<sup>53</sup> Collection of 'sharps' and potentially infectious waste can be organised through a collection service or arrangements made with a local general medical practitioner or pharmacist.

### Daily consulting room hygiene

1. Clean bench tops with a regular household detergent and water.
2. Clean the sink with household detergent and water, then dry with a disposable towel.
3. Put covers on equipment (for example, slitlamp).
4. Remove all visible soil and dirt from floors and walls (damp mopping is recommended where possible).

5. As computers in health-care settings may become contaminated with potentially harmful micro-organisms,<sup>54</sup> wipe computer keyboards with alcohol each day, if clinical information is entered via computer in the consulting room.

### Documented policies and procedures

Each practice should have a manual of infection control procedures and a method to report and deal with 'sharps' injuries. The manual should include policies and procedures addressing the following:

1. hygiene and hand-washing procedures
2. handling and disposal of infectious waste and sharps
3. cleaning and decontamination procedures for all surfaces and equipment
4. tracking procedures
5. validating and calibrating sterilisers and sterilisation processes
6. use of protective clothing and equipment
7. needlestick injury protocol (a protocol can be found at the North East Valley Division of General Practice website<sup>55</sup>)

### Additional precautions in the event of a pandemic

The human influenza virus can be spread through droplets, contact or air-borne particles. The infectious period can last up to seven days from the onset of symptoms.<sup>56</sup> Optometrists should ask patients with symptoms suggestive of influenza to reschedule their appointment. If this is not possible the patient should be asked to sit as far as possible from other patients and to wear a surgical mask. They should be provided with tissues and asked to use them to cover the nose and mouth when coughing or sneezing and dispose of them immediately into a hands-free waste receptacle. They should be asked to wash their hands after contact with respiratory secretions and contaminated objects or materials.

The use of P2 (N95) masks, which cover the nose and mouth and can filter up to 95 per cent of airborne particles with an aerodynamic diameter of 0.3 microns or larger, are recommended for health-care

workers in close (less than one metre) contact with an infectious patient to reduce the risk of infection through small particle aerosol transmission.<sup>57</sup>

## CONCLUSIONS

All practitioners should adopt measures to decrease the risk of transmission of infection. Single use instruments and equipment should be used whenever possible but when reuse is required, appropriate methods of reprocessing should be applied based on the intended use of the device. Practitioners should balance the potential risks of transmission with the resources available to achieve disinfection or decontamination. As a minimum, standard precautions should be employed routinely and more rigorous procedures should be applied for infected or immunosuppressed individuals.

## ACKNOWLEDGEMENTS

We would like to thank Dr Erica Fletcher, Dr James Wolffsohn and Mr Mitchell Anjou for their contribution to an earlier draft of the guidelines.

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**APPENDIX**

Recommended cleaning and disinfection procedures (NA is not applicable) (adapted from Cockburn and Lindsay<sup>2</sup>)

Item	Storage	Before each use	After each use
Alger brush burr	Store in clean, closed case	NA	Clean in ultrasonic cleaner or discard burr or place in 2% glutaraldehyde for 30 seconds, then in isopropyl alcohol (99%) for 15 seconds.
<b>CONTACT LENSES</b>			
RGP contact lenses	Dry storage	Inspect visually for defects. Thoroughly clean the surface and rinse prior to re-use. Avoid contact with patient's lids.	Clean contact lens with approved RGP cleaner via digital cleaning (20 seconds per side). Rinse with sterile preserved/aerosol saline. Soak in 3% H <sub>2</sub> O <sub>2</sub> for a minimum of 3 hours. Rinse with sterile preserved/aerosol saline. Dry RGP lens with a clean tissue and store in a dry container.
Soft contact lenses	Store disinfected lenses in saline in tightly sealed vials.	Inspect visually for defects. Insert directly from vial. Avoid contact with patient's lids.	Clean contact lens with a hydrogel lens cleaner via digital cleaning (20 seconds per side). Rinse with sterile preserved/aerosol saline. Fill glass vial with sterile saline. Label with lens parameters and date of heating. Sterilise in autoclave at 134°C for at least 3 minutes or 121°C for at least 10 minutes. Alternative: thermal disinfection unit 78°C to 90°C for 20–60 mins.
Trial disposable contact lenses	Manufacturer packaging	Inspect visually for defects. Insert directly from blister pack. Do not use if packaging is damaged. Avoid contact with patient's lids.	Discard lenses
Contact lens trial set cases			Clean thoroughly and either disinfect with H <sub>2</sub> O <sub>2</sub> or autoclave if the product can tolerate heat. Clean thoroughly with cleaner and scrubbing brush and boil/autoclave.
Contact lens cases for use in practice/stainless steel bowls (Note: glass vials are recommended for placing contact lenses in while the patient is at the practice)			
Dropper bottles	Store product in temperature range recommended by manufacturer. Refrigerate if appropriate. Mark opening date on bottle. Discard by due date or 1 month after opening, whichever is earlier. Discard if used on infected eye. Consider minims.	Avoid contact of tip with hands, patient's lashes, eye or lid. If infection suspected use minims or a disposable dropper or glass rod to apply.	Replace cap without hand touching dropper tip.
Dyes (fluorescein, phenol red, rose bengal and lissamine green) and Schirmer strips	Use only if from a sterile pack	Wet dyes before use with unpreserved sterile saline	Discard after use
Foreign body needle	Keep single use, sterile packed 27 gauge hypodermic needles and STERILE cotton buds	Prevent needle contact with hands or any surface before use	Discard in sharps container. Avoid needle stick injury.
Foreign body spud	Store in clean, closed case	MUST be autoclaved between patients	Clean thoroughly with soap and running water and MUST autoclave after use.
Fundus contact lens	Store in clean, closed container	Use current date contact solution from clean dropper or minim	Remove any bio-material with soap and running water, rinse. Swab contact surface with isopropyl alcohol if infection is suspected. Air dry in clean area. Disinfect if infection suspected. Consider manufacturer's instructions: Disinfect with either 2% aqueous glutaraldehyde or 1:10 dilution of sodium hypochlorite/household bleach. Position the lens on its side, then immerse the entire lens in the selected solution for 25 minutes. Remove the lens from the solution and thoroughly rinse with room temperature water, then dry with a soft, lint-free cloth.

APPENDIX Continued

Item	Storage	Before each use	After each use
Gloves (must be powder-free)	Store in box	If gloves are worn, use new gloves for every patient	Dispose of immediately after use. Wash hands before and after use.
Gonioscopy lenses	Store in clean, closed case	Use current date contact solution from clean dropper or minim	As for Goldmann/Perkins tonometer prism. Consider manufacturer's instructions.
Hands	Keep fingernails clean and a reasonable length. Keep powder-free surgical gloves for use if hands or patient have exposed lesions.	Wash hands with soap and water before examination commences	Wash hands after all examinations. Wash hands after removal of gloves. Remove jewellery. Wet hands with water. Apply recommended amount of product to hands. Rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water. Dry with disposable towel.
Head rests, chin rests and brow bar	NA	Wipe with isopropyl alcohol swab	Wipe with isopropyl alcohol swab
Lacrimal lavage probe (punctal dilator)	Store in clean, closed case	Swab with isopropyl alcohol swab	Wash with soap and running water, swab with alcohol and air dry. Alternatively clean with 3% H <sub>2</sub> O <sub>2</sub> and heat disinfect or autoclave. Return to covered container.
Lacrimal lavage needle (cannula)	Use disposable modified single use syringe and needles. If using reusable needles, store in sealed container.	Use saline from freshly opened container (20 ml disposable unit dose)	Dispose of syringe in sharps container. If using reusable needles, autoclave before reuse (sterilise for at least 3 minutes at 134°C or for at least 10 minutes at 121°C). Alternatively flush with 3% H <sub>2</sub> O <sub>2</sub> and boil for 10 minutes. Return to sealed container.
Occluders/eye patch	Store in clean, closed container	Use paper tissue between occluder/eye patch and eyelids	Discard tissue. Replace patches regularly. Alcohol swab plastic patches after use.
Ophthalmoscopes (direct, MIO, BIO)	Store in clean, closed case	Alcohol swab surfaces that may contact face, lashes etc	Alcohol swab if infection suspected.
Phoropter/refractor head	Cover with dust-cover overnight	Alcohol swab area that may contact patient's face	Alcohol swab if infection suspected.
Schiötz tonometer	Store in clean, covered case	NA	Disassemble. Wash in running water. Swab footplate with alcohol.
Scleral depressors, lid evertors, specula, forceps	If metal instruments are used, store in clean, closed case. Cotton buds may be used as evertors and depressors.	Wash in soap and water or alcohol swab and air dry.	Discard any cotton buds used. Wash metal instruments in soap and running water, alcohol swab or autoclave if infection suspected.
Spectacle frames	Ensure frame display area is cleaned regularly	NA	If infection suspected, swab with isopropyl alcohol.
Stethoscope	Ensure storage case/bracket is clean	Swab bell and diaphragm with isopropyl alcohol. Clean ear pieces if sharing with other practitioners.	If infection suspected, swab with isopropyl alcohol.
Thermometer	Store in clean, closed case	Wash with soap and water	Wash with soap and water. Swab with isopropyl alcohol
Tonometer probe (Perkins or Goldmann)	Have 2 prisms so that one can be soaking while the other is being used. Store in clean, closed container when not in use.	Air dry	Clean tonometer prism with soap and water before debris has dried. Soak prism for 5 minutes in 3% H <sub>2</sub> O <sub>2</sub> , 70% isopropyl alcohol or 1:10 dilution of bleach. Rinse with sterile water/saline and air dry
Trial frame	Store in clean, covered container	Alcohol swab area that may contact patient's face.	Alcohol swab if infection suspected.
Tweezers (plastic for contact lenses)	Store in clean, covered container		Clean manually with a contact lens daily surfactant cleaner, rinse with saline, dry with a tissue. If possible, disinfect in a thermal disinfection unit 78°C to 90°C for 20–60 minutes.