Health Protection Scotland

NHS National Services Scotland

Standard Infection Control Precautions Literature Review:
Personal Protective Equipment (PPE)
Eye/Face protection

Version: Version 2.0
Owner/Author: Infection Control Team
Review date: Financial year 2018/19

DOCUMENT CONTROL SHEET

Key Information:		
Title:	Standard Infection Control Precautions (SICPs) Literature Review: Personal Protective Equipment (PPE) – Eye/Face protection.	
Date Published/Issued:	October 2016	
Date Effective From:	October 2016	
Version/Issue Number:	2.0	
Document Type:	Literature Review	
Document status:	Final	
Author:	**Name:**	Adriana Zalewska
	Role:	Healthcare Scientist (Health Protection)
	Division:	HPS
Owner:	Infection Control	
Approver:	Lisa Ritchie	
Approved by and Date:	October 2016	
Contact	**Name:**	Infection Control Team
	Tel:	0141 300 1175
	Email:	nss.hpsinfectioncontrol@nhs.net

Version History:

This literature review will be updated in real time if any significant changes are found in the professional literature or from national guidance/policy.

Version	Date	Summary of changes	Changes marked
2.0	October 2016	**'How should eye/face protection be removed'** Addition of new recommendation: 'PPE should be removed in the following order to minimise the risk of cross/self-contamination: 1) Gloves 2) Apron 3) Eye/face protection 4) Mask/respirator.' **'How should reusable eye/face protection be decontaminated'** Addition of new recommendation: 'Reusable eye/face protection should be decontaminated between uses.'	
1.0	January 2012	Defined as final	

Approvals – this document requires the following approvals (in cases where signatures are required add an additional 'Signatures' column to this table)::

Version	Date Approved	Name	Job Title	Division
2.0	October 2016	National Policies, Guidance and Outbreaks Steering Group		
1.0	January 2012	Steering (Expert Advisory) Group for SICPs and TBPs		

HPS ICT Document Information Grid	
Purpose:	To inform the Standard Infection Control Precaution (SICP) Policy section on PPE (eye/face protection) in the National Infection Prevention and Control Manual in order to facilitate the prevention and control of healthcare associated infections in NHSScotland hospital settings.
Target audience:	All NHS staff involved in the prevention and control of infection in NHSScotland.
Circulation list:	Infection Control Managers, Infection Prevention and Control Teams, Public Health Teams
Description:	This literature review examines the available professional literature on PPE (Eye/Face Protection) in the hospital setting.
Update/review schedule:	Updated as new evidence emerges with changes made to recommendations as required.
Cross reference:	National Infection Prevention and Control Manual http://www.nipcm.hps.scot.nhs.uk
Update level:	Practice – No significant change to practice Research – No significant change

Contents

1. Objectives

The aim of this review is to examine the extant professional literature regarding the use of eye/face wear as Personal Protective Equipment (PPE) for standard infection control purposes. The specific objectives of the review are to determine:

- Are there any legislative requirements for the use of eye/face protection as PPE for infection control purposes?
- When/where should eye/face protection be used?
- What type(s) of eye/face protection should be used?
- When should eye/face protection be removed/changed?
- How should eye/face protection be removed?
- How should eye/face protection be reprocessed/disposed of?
- How should reusable eye/face protection be decontaminated?
- How should eye/face protection be stored?

N.B. Use of PPE as protection against either suspected or known specific infectious agents is considered as part of the Transmission Based Precautions (TBPs), and so is not within the scope of this review. Furthermore, this review did not assess the use of eye/face wear in non-clinical settings where there may be a health and safety requirement for their use, for example, in estates and facilities.

2. Methodology

This targeted literature review was produced using a defined methodology as described in the National Infection Prevention and Control Manual: Development Process.

3. Recommendations

This review makes the following recommendations based on an assessment of the extant professional literature on the use of eye/face protection as PPE for standard infection control purposes in the **clinical** care environment:

Are there any legislative requirements for the use of eye/face protection as PPE for infection control purposes?

There is no direct legislative requirement to wear eye/face protection for the purposes of the prevention and control of infection; however the Health and Safety at Work Act (1974), Control of Substances Hazardous to Health (2002 as amended) regulations and Personal Protective Equipment at Work Regulations 1992 (as amended) legislate that employers (i.e. NHSScotland) must provide PPE which affords adequate protection against the risks associated with the task being undertaken. Employees (i.e. healthcare workers) have a responsibility to comply by ensuring that suitable PPE is worn correctly for the task being carried out.

Specific standards relating to the quality and performance of eye/face protection are outlined in **Appendix 1**.

When/where should eye/face protection be used?

Eye/face protection must be worn during activities/procedures where there is a risk of blood, body fluids, secretions or excretions splashing into the eyes/face.

(AGREE rating: Recommend)

(Grade D recommendation)

A face shield that fully covers the front and sides of the face or goggles (in addition to a fluid resistant surgical face mask), should be worn during aerosol generating procedures on patients who are not suspected of being infected with a respiratory pathogen.

(AGREE rating: Recommend)

In the theatre environment

Eye/face protection should be worn by all members of the surgical team during all surgical procedures.

(Grade D recommendation)

What type(s) of eye/face protection should be used?

Regular corrective spectacles are not appropriate eye/face protection.

(Grade D recommendation)

Select eye/face protection according to the need anticipated by the task to be performed and the risk associated with the procedure.

(AGREE rating: Recommend)

When should eye/face protection be removed/changed?

Eye/face protection must be removed or changed:

- in accordance with manufacturer's instructions;
- if contaminated with blood or body fluids;
- at the end of a clinical procedure/task;
- prior to leaving the dedicated clinical area.

(Good Practice Point (GPP))

How should eye/face protection be removed?

PPE should be removed in the following order to minimise the risk of cross/self-contamination: 1) Gloves 2) Apron 3) Eye/face protection 4) Mask/respirator.
(AGREE rating: Recommend)

Eye/face protection should only be removed by handling head band or ear pieces.
(AGREE rating: Recommend)
(Grade D recommendation)

See Appendix 6 (Putting On and Removing PPE) of the NIPCM for further information.

How should eye/face protection be reprocessed/disposed of?

After use, place reusable eye/face protection in a designated receptacle for reprocessing. Disposable eye/face protection should be disposed of as healthcare (including clinical) waste.

(AGREE rating: Recommend)

(Grade D recommendation)

How should reusable eye/face protection be decontaminated?

Reusable eye/face protection should be decontaminated between uses.

(Grade D recommendation)

Reusable eye/face protection should be decontaminated in accordance with the manufacturer's instructions.

(Good Practice Point (GPP))

How should eye/face protection be stored?

Eye/face protection should be stored away from direct sunlight, heat sources and liquids, including chemicals, in an area that is clean and protects eye/face protection from contamination.

(Good Practice Point (GPP))

4. Discussion

4.1 Implications for practice

Are there any legislative requirements for the use of eye/face protection as PPE for infection control purposes?

The wearing of PPE in the healthcare setting is covered by the Health and Safety at Work Act (1974)[1], Control of Substances Hazardous to Health (COSHH) Regulations (2002 as amended)[2] and the Personal Protective Equipment at Work Regulations (1992 as amended).[3] There are no specific legislative requirements regarding the use of eye/face protection as PPE for infection control purposes.

The Health and Safety at Work Act broadly covers the use of PPE, but is not healthcare specific. COSHH regulations provide details in relation to hazardous materials and the use of PPE. They may be viewed as a detailed schedule of the Health and Safety at Work Act, including information on potential pathogens encountered in the healthcare environment and the use of appropriate PPE. The Personal Protective Equipment at Work Regulations provide further general guidance on the use of PPE and relate to activities within the workplace which are not perceived to involve contact with hazardous materials.

All of the UK legislation and regulations outline the responsibilities of the employer and employee and also cover any unnecessary exposure to risk of service users, i.e. they cover NHSScotland, NHSScotland employees as well as NHSScotland patients.

Specific standards relating to eye/face protection in the healthcare setting are outlined in Appendix 1 of this document.

When/where should eye/face protection be used?

Numerous guidance documents recommend that eye/face protection must be worn during any activities/procedures where there is a risk of blood, body fluids, secretions or excretions splashing into the eyes.[4-11]

(AGREE rating: Recommend)

(Grade D recommendation)

Several studies have been published which investigate the risk of splashing of blood or body fluids into the eyes of healthcare workers involved in different procedures, including general surgery[12], burn surgery[13], skin lesion surgery[14;15], tonsillectomy surgery[16], oculofacial plastic surgery[17] and treatment for epistaxis.[18] Given that the risk of blood/body fluid splashing into the eyes was consistently demonstrated across all studies, it is reasonable to expect that it may be a risk in all types of surgical procedure. A number of the studies also demonstrated that various members of the surgical team were affected by blood or body fluid splashing, independent of their role.[12;13;17]

It is therefore recommended that eye/face protection should be worn by all members of the surgical team during all surgical procedures.

(Grade D recommendation)

It has also been recommended that a face shield that fully covers the front and sides of the face or goggles (in addition to a fluid resistant surgical face mask), should be worn during aerosol generating procedures on patients who are not suspected of being infected with a pathogen. (Otherwise appropriate respiratory protection is recommended).[6]

(AGREE rating: Recommend)

What type(s) of eye/face protection should be used?

Regular corrective spectacles are not considered adequate protection from splashes of blood or body fluids, and as such their use alone as eye/face protection is not recommended.[19-21]

(Grade D recommendation)

A variety of different types of eye/face protection are advocated in the literature, including; goggles[4;8;13;21], face shields[4;21], visors[8;13;22], wrap-around glasses[12] and glasses with side shields.[4] Given the wide variation in design and quality, it is not possible to be prescriptive regarding the type(s) of eye/face protection that should be used. Eye/face protection should be selected according to the need anticipated by the task to be performed and the anticipated risk associated with the procedure.[6;11]

(AGREE rating: Recommend)

(Grade D recommendation)

When should eye/face protection be removed/changed?

There is a lack of evidence regarding when eye/face protection should be removed/changed. It has been recommended that eye/face protection used in surgery is removed/changed when it becomes contaminated[4], however, this evidence is not sufficient to make a graded recommendation.

It is recommended that eye/face protection should be removed or changed:

- in accordance with manufacturer's instructions;
- if contaminated with blood or body fluids;[11]
- at the end of a clinical procedure/task;[11]
- prior to leaving the dedicated clinical area.

(Good Practice Point (GPP))

How should eye/face protection be removed?

PPE should be removed in the following order to minimise the risk of cross/self-contamination: 1) Gloves 2) Apron 3) Eye/face protection 4) Mask/respirator.[10]

(AGREE rating: Recommend)

Eye/face protection should be removed by handling only the headband or ear pieces as these parts are considered the least likely to be contaminated with splashes of blood or body fluids.[6;21;23-25]

(AGREE rating: Recommend)
(Grade D recommendation)

See Appendix 6 (Putting On and Removing PPE) of the NIPCM for further information.

How should eye/face protection be reprocessed/disposed of?

It has been recommended that after use, reusable eye/face protection is placed in a designated receptacle for reprocessing and that disposable eye/face protection should be disposed of as healthcare (including clinical) waste.[6;21;23;25]

(AGREE rating: Recommend)
(Grade D recommendation)

How should reusable eye/face protection be decontaminated?

One laboratory based study assessing bacterial contamination of eyewear used during orthopaedic surgery found that in all instances these were found to be contaminated with common skin bacteria. The authors concluded that eyewear should be disinfected, although no information on the type or frequency of disinfection was provided.[26] A further laboratory based study assessing microbial contamination of both disposable and reusable eyewear used during surgery also found that both types of eyewear were frequently contaminated with common skin bacteria, despite disinfection of reusable eyewear.[27]

National guidance has stated that use of reusable eye/face protection may be appropriate only if it is adequately decontaminated between uses.[11] Further guidance has also suggested that reusable eye/face protection should be physically cleaned with a detergent, disinfected with a hospital designated disinfectant, rinsed and allowed to air dry.[21]

It is therefore recommended that reusable eye/face protection should be decontaminated between uses.

(Grade D recommendation)

Manufacturer's instructions should be consulted and followed for specific types/brands of eye/face protection.

(Good Practice Point (GPP))

How should eye/face protection be stored?

Insufficient evidence for discussion was identified by this review regarding the storage of eye/face protection.

Eye/face protection should be stored away from direct sunlight, heat sources and liquids, including chemicals, in an area that is clean and protects it from contamination.

(Good Practice Point (GPP))

4.2 Implications for research

Consensus on the use of specific eye/face protection for clinical procedures is required to ensure that healthcare workers/facilities comply with best infection prevention and control practice. Furthermore, there may be a need to clarify or expand legislation relating to the use of appropriate PPE in the healthcare setting. At present much of the legislation relates to the handling and management of dangerous substances and/or chemicals, and is generally not relevant to infection prevention within a clinical environment.

5. References

(1) Her Majesty's Stationery Office. Health and safety at work act. London: Her Majesty's Stationery Office; 1974.

(2) Health and Safety Executive. The control of substances hazardous to health regulations 2002 (as amended). Approved practice and guidance. London: Health and Safety Executive; 2010.

(3) Health and Saftey Executive. Personal protective equipment at work regulations 1992 (as amended). London: Health and Safety Executive; 2005.

(4) AORN Recommended Practices Committee. Recommended practices for surgical attire. AORN Journal 2005 Feb;81(2):413-20.

(5) Infection Control & Epidemiology: PPE^2 Personal Protective Equipment Education. 2005. Association for Professionals in Infection Control and Epidemiology (APIC).

(6) Siegel JD, Rhinehart E, Jackson M, Chiarello L. CDC 2007 guideline for isolation precautions: preventing transmission of infectious agents in health care settings. AM J INFECT CONTROL 2007 Dec 2;35(10):S65-164.

(7) American Academy of Pediatrics Committee on Infectious Diseases. Infection prevention and control in pediatric ambulatory settings. Pediatrics 2007 Sep;120(3):650-65.

(8) Standard Precautions in Healthcare Aide-Memoire. 2007. Geneva, Switzerland, World Health Organization.

(9) Chalmers C, Straub M. Standard principles for preventing and controlling infection. 2006 Jan;(23):-65.

(10) Loveday HP, Wilson JA, Pratt RJ, Golsorkhi M, Tingle A, Bak A, et al. epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. J HOSP INFECT 2014 Jan;86:Suppl-70.

(11) Coia JE, Ritchie L, Adisesh A, Makison C. Guidance on the use of respiratory and facial protection equipment. J HOSP INFECT 2013;(85):170-82.

(12) Davies CG, Khan MN, Ghauri AS, Ranaboldo CJ. Blood and body fluid splashes during surgery--the need for eye protection and masks. Annals of the Royal College of Surgeons of England 2007 Nov;89(8):770-2.

(13) Tehrani H, Juma A, Lambe G, James MI. The risk of eye splash in burn surgery. Burns (03054179) 2009 Jun;35(4):587-9.

(14) McNamara IR, Tehrani H, Sassoon EM. Ocular contamination during lesional surgery-a hazard for the plastic surgeon. Journal of Plastic, Reconstructive & Aesthetic Surgery: JPRAS 2006;59(3):263-5.

(15) Pollard RL, Banwell P, Critchley P. Eye protection for plastic surgeons. British Journal of Plastic Surgery 2005 Jun;58(4):579-80.

(16) Keogh IJ, Hone SW, Colreavey M, Walsh M. Blood splash and tonsillectomy: an underestimated hazard to the otolaryngologist. J LARYNGOL OTOL 2001 Jun;115(6):455-6.

(17) Stacey AW, Czyz AN, Kondapalli SA, Hill RH, Everman KR, Cahill KV, et al. Risk of ocular blood splatter during oculofacial plastic surgery. Opthalmic plastic and reconstructive surgery 2015;31(182):186.

(18) Wallace HC, Harries PG. Epistaxis and conjunctival contamination--are our ENT trainees at risk? Annals of the Royal College of Surgeons of England 2002 Sep;84(5):302-3.

(19) Chong SJ, Smith C, Bialostocki A, McEwan CN. Do modern spectacles endanger surgeons? The Waikato Eye Protection Study. Annals of Surgery 2007 Mar;245(3):495-501.

(20) Mansour AA, III, Even JL, Phillips S, Halpern JL. Eye protection in orthopaedic surgery. An in vitro study of various forms of eye protection and their effectiveness. Journal of Bone & Joint Surgery, American Volume 2009 May;91(5):1050-4.

(21) Eye protection for infection control. 2004. Atlanta, G.A., National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC).

(22) Loveridge JM, Gozzard C, Bannister GC. The effectiveness of a visor as a surgical barrier: an inverted position is better. J HOSP INFECT 2006 Feb;62(2):251-3.

(23) Sequence for donning and removing personal protective equipment (PPE). 2004. Atlanta, G.A., Division of Healthcare Quality Promotion, National Center for Preparedness, Detection, and Control of Infectious Diseases, Center for Disease Control and Prevention (CDC).

(24) Rushing J. Wearing personal protective gear. Nursing 2006 Oct;36(10):56-7.

(25) American Association of Nurse Anesthetists (AANA). Infection Prevention and Control Guidelines for Anesthesia Care. 2015.

(26) Butt U, Saleem U, Yousuf K, El-Bouni T, Chambler A, Eid AS. Infection risk from surgeons' eyeglasses. Journal of orthopaedic surgery (Hong Kong) 2012;20(1):Apr.

(27) Lange VR. Eyewear contamination levels in the operating room: Infection risk. AM J INFECT CONTROL 2014 Apr;42(4):446-7.

Appendix 1

Standards pertaining to eye/face protection as PPE			
Standard	**Title**	**Description**	**Publication date**
BS 7028:1999	Eye protection for industrial and other uses. Guidance on selection, use and maintenance.	This standard outlines the Selection, Maintenance of Face shields, Filters (eye protectors), in relation to Industrial, Hazards, Chemical hazards, Radiation hazards, Electromagnetic radiation, and also covers Goggles (safety), Safety spectacles, Welding, Lasers, and the Marking, Inspection, Cleaning, Storage, Repair, Education in terms of eye protection.	November 1999.
BS EN 166:2002	Personal eye protection. Specifications.	This standard outlines the specifications of Eye protectors, Optical instruments, Goggles (safety), Optics, Spectacles (eyeglasses), Accident prevention, Designations, Marking.	January 2002.
BS EN 168:2002	Personal eye-protection. Non-optical test methods.	This standard outlines Mechanical testing, Performance testing for Eye protectors, Face shields, Goggles (safety), Safety spectacles.	January 2002.
BS EN 13921:2007	Personal protective equipment. Ergonomic principles.	This standard provides guidance on the generic ergonomic characteristics related to personal protective equipment (PPE) – it does not however cover the requirements which relate to specific hazards that PPE may be designed.	September 2007.
Statutory Instrument 2002 No. 1144	Health and Safety – Personal Protective Equipment Regulations 2002	This instrument sets out the standards for PPE in the UK. Schedule 4 sets out the standards for conformity across the UK (and the EU) and requires that **all** PPE is **CE marked**. CE marking demonstrates that an item has been manufactured to a particular standard and passed the appropriate tests for the PPE type and intended use/purpose.	May 2002.

Legend:

BS = British Standards produced by the British Standard Institution (www.bsigroup.co.uk)

EN = European Standards (European Norm) produced by the European Committee for Standardisation (www.cen.eu)

ISO = International Standards produced by the International Standards Organization (www.iso.org)

EN standards are gradually being replaced by ISO standards – when these are adopted in the UK they are prefixed with BS (e.g. BS EN … or BS EN … or BS EN ISO …). This is usually to accommodate UK legislative or technical differences or to allow for the inclusion of a UK annex or foreword.