

**Standard Infection Control Precautions Literature Review:
Personal Protective Equipment (PPE)
Aprons/Gowns**

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| Author: | Name: | Laura Macdonald |
| | Role: | Healthcare Scientist (Health Protection) |
| | Division: | HPS |
| Owner: | Infection Control | |
| Approver: | Lisa Ritchie | |
| Approved by and Date: | August 2015 | |
| Contact | Name: | Infection Control Team |
| | Tel: | 0141 300 1175 |
| | Email: | nss.hpsinfectioncontrol@nhs.net |
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| Description: | This literature review examines the available professional literature on PPE (Aprons/Gowns) in health and social care settings. |
| Purpose: | To inform the Standard Infection Control Precautions (SICP) section on Personal Protective Equipment (PPE) Aprons and Gowns in the National Infection Prevention and Control Manual. |
| Target audience: | All NHS staff involved in the prevention and control of infection in NHS Scotland. |
| Circulation list: | Infection Control Managers, Infection Prevention and Control Teams, Public Health Teams |
| 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.hps.scot.nhs.uk/haic/ic/guidelinedetail.aspx?id=49785 |
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1. Objectives

The aim of this review is to examine the extant professional literature regarding the use of aprons/gowns as Personal Protective Equipment (PPE) for standard infection control purposes in health and social care settings.

The specific objectives of the review are to determine:

- Are there any legislative requirements for the use of aprons/gowns as PPE for infection control purposes?
- When/where should aprons/gowns be worn?
- What type(s) of aprons/gowns should be used?
- When are reusable aprons/gowns appropriate?
- When should aprons/gowns be removed/changed?
- How should aprons/gowns be removed?
- How should aprons/gowns be disposed of?
- How should aprons/gowns be stored?

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 aprons/gowns as PPE for standard infection control purposes:

Are there any legislative requirements for the use of aprons/gowns as PPE for infection control purposes?

There is no direct legislative requirement to wear an apron/gown for the purposes of the prevention and control of infection; however the [Health and Safety at Work etc Act \(1974\)](#)¹, [Control of Substances Hazardous to Health \(2002 as amended\) regulations](#)² and [Personal Protective Equipment at Work Regulations 1992 \(as amended\)](#)³ 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. health and social care 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 aprons and gowns are outlined in [Appendix 1](#).

When/where should aprons/gowns be worn?

Aprons/gowns should be worn when it is anticipated that there may be exposure to blood, body fluids, secretions or excretions through close contact with a patient or any activity/procedure.

(AGREE rating: recommend)

(Grade D recommendation)

Aprons/gowns should be worn during aerosol-generating procedures in patients who **are not** suspected of being infected with an agent for which respiratory protective equipment is otherwise recommended.

(AGREE rating: Recommend)

Full body gowns are not indicated for routine use in neonatal intensive care units.

(AGREE rating: recommend)

(Grade B recommendation)

What type(s) of aprons/gowns should be used?

Plastic aprons and/or fluid repellent gowns should be used in health and social care settings.

(AGREE rating: recommend)

(Grade D recommendation)

Full-body fluid repellent gowns must be used when there is a risk of extensive splashing of blood, body fluids, secretions or excretions.

(AGREE rating: recommend)

When are reusable aprons/gowns appropriate?

Reusable gowns are acceptable for use in the theatre environment and certain other non-theatre settings, for example, CSSD, clean rooms and minor surgery, provided that they are properly processed after use. Reusable aprons and gowns must not be used in any other hospital environment unless indicated by risk assessment.

(Good Practice Point (GPP))

The cuffs of gowns worn in the operating theatre environment should be fully covered by disposable gloves.

(Good Practice Point (GPP))

When should aprons/gowns be removed/changed?

Aprons/gowns should be worn as single-use items and should be removed/changed after every task/procedure or episode of patient care. They should not be reused even for repeated contacts with the same patient.

(AGREE rating: recommend)

(Grade D recommendation)

Aprons/gowns should be removed before leaving the patient's environment, for example, a patient's room or a ward area.

(AGREE rating: recommend)

How should aprons/gowns be removed?

Aprons/gowns should be removed using the ties at the back and contact with the sleeves or front should be avoided.

To remove an apron:

- Break the ties at the neck/back.
- Pull the apron away from the neck and shoulders, taking care to only touch the inside surface, i.e. ensuring the apron is dirty side to dirty side.
- The apron should then be folded or rolled into a ball and placed in the appropriate waste stream.

To remove a gown:

- Untie the ties at the back.
- Using a peeling motion the gown should be pulled down from each shoulder so that the gown is turned inside out.
- Taking care to avoid contact with the body, the gown should be rolled into a ball and placed in either the appropriate laundry or waste stream.

(Good Practice Point (GPP))

Hand hygiene should be performed after removal of aprons/gowns.

(AGREE rating: recommend)

(Grade D recommendation)

How should aprons/gowns be disposed of?

Used disposable aprons/gowns should be disposed of as healthcare (including clinical) waste. Non-disposable protective clothing should be placed in the appropriate laundry stream and sent for laundering.

(AGREE rating: recommend)

How should aprons/gowns be stored?

Aprons/gowns should be stored away from direct sunlight, heat sources and liquids, including chemicals, in an area that is clean and protects them from contamination.

(Good Practice Point (GPP))

4. Discussion

4.1 Implications for practice

Legislative requirements for the use of aprons/gowns as PPE for infection control purposes

There are no specific legislative requirements regarding the use of aprons/gowns as PPE for standard infection control purposes, although the use of PPE in health and social care settings is covered by the [Health and Safety at Work etc Act \(1974\)](#)¹, [Control of Substances Hazardous to Health \(2002 as amended\) regulations](#)², and the [Personal Protective Equipment at Work Regulations 1992 \(as amended\)](#)³.

The Health and Safety at Work etc Act is the generic health and safety legislation for the UK and broadly covers the use of PPE and risk, but is not healthcare specific. Control of Substances Hazardous to Health (COSHH) is more specific and provides details in relation to hazardous materials and the use of PPE; and can almost be viewed as a detailed schedule of the Health and Safety at Work etc Act, which would include pathogens in health and social care settings, and the use of appropriate PPE – for example the use of gloves to protect against blood borne viruses during venepuncture. If an activity does not involve or is perceived not to involve contact with a hazardous material then the Personal Protective Equipment at Work Regulations 1992 provide general guidance on the use of PPE; in health and social care settings this could be the use of gloves to protect against glass fragments when cleaning up broken glass; however if the glass contained a laboratory sample then the activity would be covered by COSHH.

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

Specific standards relating to gowns and aprons in the healthcare setting are outlined in [Appendix 1](#) of this document.

When/where should aprons/gowns be worn?

There is consensus in the literature that aprons/gowns should be worn in health and social care settings when it is anticipated that there may be exposure to blood, body fluids, secretions or excretions through close contact with patients or any activity/procedure.⁴⁻¹⁸

(AGREE rating: recommend)

(Grade D recommendation)

It has been recommended that aprons/gowns should be worn, in addition to other PPE elements, during aerosol generating procedures (AGPs) in patients who are not suspected of being infected with an agent for which respiratory protective equipment is otherwise recommended.⁹

(AGREE rating: recommend)

A systematic review into the routine use of full body gowns in neonatal nurseries/intensive care units concluded that there is no evidence to demonstrate that their use is effective in reducing risk of death or infection in neonates.¹⁹

Guidance from the Centers for Disease Control and Prevention states that routine use of gowns upon entering neonatal intensive care units is not indicated.⁹

(AGREE rating: recommend)

(Grade B recommendation)

A randomised controlled trial was identified that compared routine use of gloves and gowns (intervention) in adult surgical and medical ICUs, with usual care i.e. use of gloves and gowns only for patients known to be infected or colonised with multi-drug resistant organisms, or where indicated as part of standard precautions (control).²⁰ The results of the study demonstrate that the routine use of gloves and gowns did not result in any significant difference in acquisition of MRSA or VRE among patients.²⁰ There was a lower risk of MRSA acquisition alone, however this was a secondary outcome and the study authors stated that the finding requires replication before definitive conclusions can be made.²⁰ In addition, it is not possible to determine the relative contribution of gowns to the findings of the study.

A cross-sectional study nested in the intervention arm of the randomised controlled trial described above revealed a lower acquisition of common pathogenic bacteria on the clothing of healthcare workers when universal gowning and gloving was implemented compared to usual care.²¹ However, no recommendation on routine gowning in ICUs can be made on the basis of this single study.

What type(s) of aprons/gowns should be used?

It has been consistently recommended that aprons for use in health and social care settings should be made from plastic and gowns (including those for use in theatres) should be made from fluid repellent material.^{4;5;7;8;10;11;14;16-18;22-25} Cotton/cloth surgical gowns are absorbent. While this property may help to prevent liquid contaminants from being dispersed into the environment, fluid repellent gowns provide better barrier protection.²⁶

(AGREE rating: recommend)

(Grade D recommendation)

Full-body fluid repellent gowns are indicated for use in situations where there is the risk of extensive splashing of blood, body fluids, secretions or excretions, for example when assisting with childbirth or theatre procedures.^{8;16-18}

(AGREE rating: recommend)

When are reusable aprons/gowns appropriate?

Extremely limited evidence was identified on this topic. The authors of one article state that the superiority of single-use gowns over reusable gowns, in relation to the prevention of infection, has not been demonstrated.²⁴ Re-usable cotton/cloth gowns may have inferior fluid repellence properties to disposable plastic gowns, and as such may not provide comparable barrier protection.²⁶ Another study demonstrated higher rates of contamination on the sleeves of surgeons who wore re-usable cloth gowns compared to surgeons who wore disposable synthetic spunlace paper gowns.²⁵ There is an insufficient body of evidence on this topic from which to draw a graded recommendation.

When should aprons/gowns be removed/changed?

It is recommended that aprons/gowns should be worn as single-use items, and should be removed/changed after every procedure/task or episode of patient care.^{9;12-14;16-18} They should not be reused even for repeated contacts with the same patient.

(AGREE rating: recommend)

(Grade D recommendation)

It has also been recommended that aprons/gowns should be removed before leaving the patient's environment.^{9;12}

(AGREE rating: recommend)

How should aprons/gowns be removed?

The results of one study identified demonstrated that when healthcare workers used the CDC recommended process to remove an artificially contaminated apron/gown, this resulted in significantly lower contamination of the surrounding environment and of the body than if they used their own usual method.²⁶ However, there is insufficient evidence in the literature regarding the process for removal of aprons/gowns to allow a graded recommendation to be made.

It is, however, consistently recommended that hand hygiene should be performed following the removal of aprons/gowns.^{4;7;9;10;12;16;27}

(AGREE rating: recommend)

(Grade D recommendation)

How should aprons/gowns be disposed of?

It has been recommended that used disposable aprons/gowns should be disposed of into the appropriate waste stream in accordance with local policy (i.e. healthcare (including clinical) waste), while non-disposable protective clothing should be sent for laundering.^{7;14;16;18}

(AGREE rating: recommend)

(Grade D recommendation)

How should aprons/gowns be stored?

Only one piece of guidance identified offered any advice on storage of aprons or gowns, which is insufficient to allow a graded recommendation to be made. The guidance states that aprons should be stored so that they do not accumulate dust, which may act as a reservoir for microorganisms.¹⁴ Although this recommendation is made in the context of care home settings, it can be generalised to other health and social care settings.

4.2 Implications for research

There is limited scientific evidence on the use of aprons and gowns in health and social care, particularly in the context of social care settings. However there is, for the most part, consensus in the professional guidance. Further research on the impact of the routine use of gowns in ICU settings would make a useful contribution to the evidence base.

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Appendix 1 Specific standards relating to the quality and performance of aprons and gowns

| Standard | Title | Description | Publication date |
|---------------------------------|--|--|------------------|
| BS EN 13795:2011+A1:2013 | Surgical drapes, gowns and clean air suits, used as medical devices, for patients, clinical staff and equipment. General requirements for manufacturers, processors and products, test methods, performance requirements and performance levels. | This standard sets out the general requirements and tests for disposable and reusable surgical drapes, gowns and clean air suits, including water-resistance tests, microbiological resistance tests, burst tests and tensile tests. | March 2011 |
| BS EN ISO 22610:2006 | Surgical drapes, gowns and clean air suits, used as medical devices, for patients, clinical staff and equipment. Test method to determine the resistance to wet bacterial penetration. | This standard sets out the test method to determine the resistance of surgical drapes, gowns and clean air suits to wet bacterial penetration. | January 2007. |
| BS EN ISO 22612:2005 | Clothing for protection against infectious agents. Test method for resistance to dry microbial penetration. | This standard describes a test method, with the associated equipment, that may be used to determine a material's resistance to dry penetration of bacteria on particles in the size range most typical for human skin scales. | March 2005. |
| 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. |

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| <p>Statutory Instrument 2002 No. 1144</p> | <p>Health and Safety – Personal Protective Equipment Regulations 2002</p> | <p>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.</p> | <p>May 2002.</p> |
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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; BS EN; 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.