NHS National Services Scotland

Aprons and Gowns literature review

Considered Judgement Forms

Version 1.0

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Antimicrobial Resistance & Healthcare Associated Infection (ARHAI) Scotland
An NHS Scotland Assure Service

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
1.0	27 October 2025	New document

Approvals

Version	Date Approved	Group/Individual
1.0	September 2025	National Policy, Guidance and Evidence (NPGE) Working Group
		Care Home Infection Prevention and Control (CHIPC) Oversight and Advisory Group

Contents

Research Question 1: Are there any legislative requirements or standards (BS/EN/ISO) for the use of aprons/gowns as PPE for infection control purposes?

Part A: Quality of Evidence

1.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Ten pieces of evidence were included to answer this research question.[1-10] • Six pieces of legislation are graded as 'mandatory'.[1-6] • Four standards are graded SIGN 50 Level 4 expert opinion, due to a lack of evidence of a rigorous scientific development process.[7-10] Overall, this was considered sufficient volume and quality of research, as the question did not require primary studies, only relevant legislation, policies, and standard documents.	6 x SIGN50 Mandatory 4 x SIGN 50 Level 4

1.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments

The legislation and standards (BS/EN/ISO) included provide general guidance regarding the use of Personal Protective Equipment (PPE) for infection control purposes in Health and care settings.

Legislation

Four UK legislations [The Health and Safety at Work etc. Act 1974, The Control of Substances Hazardous to Health Regulations 2002 (as amended) and The Personal Protective Equipment at Work Regulations 1992 (and the 2022 amendment)], mandates employers to ensure the health, safety, and welfare of all employees at work.[1-3, 5] These include:

- provision of suitable PPE to adequately control of exposure to hazardous substances,[1-3, 5]
- maintaining the provided PPE to ensure it is in efficient working order,[2, 3]
- provision of adequate instruction and information on how to correctly use, clean, maintain, and store PPE.[2, 3]

Two UK Legislations (The Personal Protective Equipment at Work Regulations 1992 and The Control of Substances Hazardous to Health Regulations 2002) stipulates that employees have a responsibility to ensure that appropriate PPE is worn correctly for the task being carried out.[2, 3]

The Regulation (EU) 2016/425 mandates that all PPE placed on the UK market must have been manufactured to required standard, passed the appropriate tests for the PPE type and intended use/purpose, and be CE or UKCA (UK Conformity Assessed) marked,[6] while the Personal Protective Equipment (Enforcement) Regulations 2018 provide a system for enforcement of this regulation.[4, 6]

Although no specific legislation on wearing aprons and gowns was identified, mandatory legislations consistently mandate employers to provide adequate personal protective equipment for their employees where hazards of the workplace cannot be controlled by other means.[2, 3]

Comments
British Standards The four British standards included provides requirements that aprons and gowns used as PPE in health and care settings must fulfil.[7-10] These include: • performance requirements for surgical gowns,[7] • specification of ergonomic requirements to allow optimisation of the balance between protection and usability,[10] and • test methods for assessing a material's resistance to penetration of bacteria-carrying particles and liquids.[8, 9]

1.3 Is the evidence applicable to Scottish health and care settings

(See SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments
The country or countries in which the guidance applies are as follows: • United Kingdom (UK) (n=10)[1-10] The six legislation documents included are directly applicable to Scottish health and care settings.[1-6] However, UK legislation is generic to workplaces and not directly written for health and care settings, these must therefore be read in full then interpreted and implemented accordingly. The four British standards included are directly applicable to Scottish health and care settings.[7-10] However, standards should be read in full then interpreted and implemented accordingly.

1.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies found in relation to this research question, therefore, issues such as sample size and methods of sample selection are not relevant.

1.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Not applicable.

Part B: Evidence to decision

1.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
R1.1. Employers must provide PPE which affords adequate protection against the risks associated with the task being undertaken.	Recommendation
R1.2. Employers must provide adequate instruction and information on how to correctly use, clean, maintain, and store PPE.	Recommendation
R1.3. Employees (i.e., health and care workers) have a responsibility to comply by ensuring that suitable PPE is worn correctly for the task being carried out.	Recommendation
R1.4. PPE must fit appropriately and, if being worn with other pieces of PPE, the employer must make sure that the pieces are compatible with each other and in wearing them together, do not reduce the level of protection.	Recommendation
R1.5. Employers must ensure that PPE is maintained in good working order and in a clean condition.	Recommendation
R1.6. PPE should be either CE or UKCA marked and comply with the Personal Protective Equipment (Enforcement) Regulations 2018.	Recommendation
GPP1.1. Aprons and gowns intended for use as PPE in health and care settings should meet the relevant standards as detailed in Appendix 4 of the literature review.	Good practice point

1.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond infection prevention and control.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
R1.1. to R1.6. These will facilitate adherence to current legislation and regulations and compliance with associated corporate and social governance responsibilities, including the legal requirements of the applicable health and safety management policy. GPP1.1. This will ensure aprons and gowns used as PPE in health and care settings meets required standards, supporting user confidence.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
R1.1. to R1.6. and GPP1.1. No harms anticipated.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the individual service user, staff or visitor perspective, the societal perspective, or both. Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events (or vice versa).

Benefit-Harm assessment
R1.1. to R1.6. and GPP1.1. Only benefits were identified for employers, employees, and service users.

1.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

and any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
R1.1 and R1.6. There will be financial implications and human resource requirements for employers in terms of procurement of aprons and gowns. R1.2, R1.4 and R1.5. There will be a requirement for staff resource and education to ensure provision of adequate instruction and information on how to correctly use, clean, maintain, and store PPE. R1.3 and GPP1.1. None to note.

1.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
R1.1. to R1.6. Mandatory legislation was used to underpin these recommendations. No expert opinion to note.

Expert opinion
GPP1.1. Despite being graded SIGN 50 Level 4, expert opinion, British standards are considered best practices, therefore ARHAI Scotland and associated working groups support their use as relevant standards that aprons and gowns intended for use as PPE in health and care settings should meet.

1.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
R1.1 to R1.6 and GPP1.1 No value judgements to note.

1.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state “none”. Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality, anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
R1.1 to R1.6 and GPP1.1 No intentional vagueness to note.

1.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
R1.1 to R1.6 and GPP1.1 No exceptions to note.

1.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
There is no specific legislation for aprons and gowns worn in health and care settings. Expansion of current general legislation, to include the specific types and appropriate use of aprons and gowns as PPE for IPC within health and care settings would be a beneficial addition to the evidence base and provide clear and specific guidance.

Research Question 2: What type(s) of aprons/gowns should be used in health and care settings?

Part A: Quality of Evidence

2.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.2, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Twenty-four pieces of evidence that addressed the research question were included.[11-34] • Three guideline documents were graded AGREE II: 'Recommend with modifications' due to limitations regarding the systematic review methodology used to underpin the recommendations and failure to update guidance as planned.[11, 12, 20] The link between relevant recommendations and supporting evidence is unclear, and mostly based on limited low-quality primary studies and expert opinion. • Twenty-one were graded SIGN 50 Level 4, expert opinion guidance, mainly due to a lack of robust, evidence-based systematic review process to form recommendations. SIGN 50 level 4 expert opinion guidance has potential bias given little detail is provided regarding how recommendations were formulated, and it is not always clear where expert opinion has taken precedence over scientific evidence. It is therefore considered low quality evidence.[13-19, 21-34]	3 x AGREE II: Recommend with modifications. 21 x SIGN50 Level 4

2.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments

Five expert opinion guidance from Australia and the USA were consistent in recommending that the type of apron or gown required in health and care settings depends on the degree of risk, including the anticipated degree of exposure or contact with infectious material and the potential for blood and body substances to penetrate through to clothes or skin.[18, 21, 24, 27, 33]

Aprons

- Two UK guidelines, graded AGREE II 'recommend with modifications' and eight expert opinion guidance documents from the UK, the USA and Australia consistently recommend that plastic aprons worn in health and care settings should be single use or disposable and fluid repellent or impervious.[11-16, 22, 28, 29, 33]
- Two UK expert opinion guidance further recommend that disposable plastic aprons should be non-powdered vinyl/nitrile or latex-free and CE marked.[28, 29]

Gowns

Both reusable [20, 32] and disposable [20, 21, 32, 33] gowns are described in extant expert opinion guidance.

- Two WHO documents (a guideline document, graded AGREE II 'recommend with modifications', and an expert opinion guidance document) consistently propose that gowns worn in health and care settings could either be disposable, made of synthetic fibre, or reusable / washable cloth.[20],[32]

Comments

- Three guideline documents from the UK[11, 12] and WHO[20], all graded AGREE II 'recommend with modifications', and seven SIGN 50 Level 4 expert opinion guidance documents from the UK, Australia, and ECDC consistently recommend a full body, long sleeved, fluid-repellent gown for protection against extensive splashing of blood or body fluids.[11, 12, 14, 20, 22, 25, 30, 31, 33, 34]

- A WHO guideline document, graded AGREE II 'recommend with modifications', recommend wearing a waterproof apron over non-fluid resistant gown if fluid resistant gown is required but not available.[20] However, this might not be applicable to Scottish health and care settings as UK legislation mandates employers to ensure that appropriate PPE is always provided.

Sterile gowns

- Four expert opinion guidance from the UK, Australia, the USA, and India consistently recommend the use of a sterile gown for invasive procedures requiring aseptic technique.[14, 17, 23, 33]

- Two expert opinion guidance from the Association of periOperative Registered Nurses (AORN) suggest that sterile gowns must wrap around the body completely and cover the back.[24, 27] However, the gown should not be so large that the material can unintentionally come in contact with unsterile items, and the sleeves of the gown should cover the arms down to the wrist comfortably so the cuffs of the gown will not pull out of the gloves.[24]

- Another expert opinion guidance from AORN recommends that materials used for sterile gowns should be low-linting; resistant to tears, punctures, abrasions and penetration by blood and other body fluids; comfortable; and contribute to maintaining the wearer's desired body temperature.[26]

In summary, there is consistency in the evidence base that the type of aprons or gowns used in health and care settings should be selected based on the task

Comments
being undertaken and the anticipated levels of body fluid exposure. Most of the included evidence consistently recommend a plastic, fluid repellent, disposable apron for routine care where there is a risk of uniform contamination, while a full body, long sleeved, fluid-repellent gown, which could be either disposable or reusable, is recommended where extensive splashing is expected. A sterile gown is only required for invasive procedures that require a sterile technique.

2.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments
The country or countries in which the guidance applies are as follows: • UK (n=9)[11, 12, 14-16, 22, 28, 29, 34] • United States of America (USA) (n=7)[13, 18, 21, 23, 24, 26, 27] • Australia (n=2)[25, 33] • India (n=1)[17] • WHO (n=3)[19, 20, 32] • ECDC (n=2)[30, 31] The expert opinion guidance document published within the UK is directly applicable to Scottish health and care settings.[11, 12, 14-16, 22, 28, 29, 34] The expert opinion guidance documents published in Australia,[25, 33] and the USA[13, 18, 21, 23, 24, 26, 27] are specific to health and care settings within these countries but considered applicable to Scottish health and care settings because they are from internationally recognised organisations. The three pieces of evidence published by the WHO applies internationally and is considered applicable to Scottish health and care settings.[19, 20, 32]

Comments
Guidance published by the ECDC applies to the European Union (EU) / European Economic Area (EEA) and is directly applicable to Scottish health and care settings.[30, 31] The expert opinion guidance documents published in India[17] is specific to Indian health and care settings but considered applicable to Scottish health and care settings due to the nature of the research question which focus on general description of types of aprons and gowns.

2.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies included for this research question, therefore, issues such as sample size and methods of sample selection are not relevant.

2.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

2.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP2.1. Where an apron is required in health and care settings, it should be plastic, fluid-repellent, single-use and disposable. GPP2.2. Where a gown is required in health and care settings, it should be full-body, long-sleeved and fluid-repellent; it can be either disposable or reusable (launderable).	Good practice point Good practice point
GPP2.3. The type of aprons or gowns used in health and care settings should be selected based on the task being undertaken and the anticipated level of body fluid exposure.	Good practice point
GPP2.4. A sterile gown should be used for invasive procedures that require aseptic technique.	Good practice point

2.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP2.1 and GPP2.2. Ensuring aprons and gowns are single use for the task being undertaken helps reduce the risk of cross transmission of harmful pathogens. GPP2.2 Reusable gowns may lead to a reduction in single-use plastic and disposal costs. GPP2.3. Selecting aprons or gowns based on the risk associated with the task being undertaken will ensure that the appropriate level of protection is achieved. GPP2.4. A sterile gown will help adhere to aseptic technique which is required for invasive procedures.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP2.1, GPP2.3 and GPP2.4. No harms anticipated. GPP2.2. Reusable gowns that have not been reprocessed properly or with a defect may not provide optimal protection for the wearer.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP2.2. Although there are risks associated with the use of reusable gowns, this can be negated by having a process in place to monitor gown quality and reprocessing. GPP2.1, GPP2.3 and GPP2.4. Only benefits identified.

2.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP2.1, GPP2.2 and GPP2.4. There will be financial implications and human resource requirements for employers in terms of procurement of aprons and gowns. GPP2.2. Reusable gowns may lead to a reduction in procurement costs and decrease in single-use plastic disposal costs. However, local processes and procedures must be in place to ensure they are used only once and reprocessed appropriately prior to re-use. Therefore, there will be financial implications for laundering services, logistics and facility needs. GPP2.3. A team leader or designated person may be required to develop local resources or provide clear directives on types of aprons and gowns required for different situations specific to the health and care setting. There will be resource implications related to staff education and training to support appropriate selection of aprons and gowns.

2.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
ARHAI Scotland and associated working groups supports extant expert opinion used to underpin these recommendations and good practice points. GPP2.1. This good practice point is based on two guideline documents graded AGREE II ‘Recommend with modifications’,[11, 12] and eight SIGN 50 Level 4 expert opinion guidance documents that are consistent in advising that plastic aprons worn in health and care settings should be single use or disposable and fluid repellent or impervious.[13-16, 22, 28, 29, 33] This evidence was considered insufficient for a recommendation because the AGREE-graded guideline document’s

Expert opinion
recommendations were based on expert opinion, therefore a good practice point was developed. GPP2.2. This good practice point is based on three guideline documents graded AGREE II 'Recommend with modifications', [11, 12, 20] and 10 SIGN 50 Level 4 expert opinion guidance documents that are consistent in advising that gowns worn in health and care settings should be full body, long sleeved, fluid-repellent, disposable or reusable gowns . [14, 21, 22, 25, 27, 31, 32, 33, 34] This evidence was considered insufficient for a recommendation because of the limitations of the AGREE-graded guideline documents (i.e., recommendations were based on expert opinion), therefore a good practice point was developed. GPP2.3. This good practice point is based on five SIGN 50 Level 4 expert opinion guidance documents that consistently advise that the type of aprons or gowns used in health and care settings should be selected based on the task being undertaken and the anticipated levels of body fluid exposure.[18, 21, 24, 27, 33] GPP2.4. This good practice point is based on five SIGN 50 Level 4 expert opinion guidance documents that consistently advise that sterile gowns should be used for invasive procedures that require aseptic technique.[14, 17, 23, 33]

2.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP2.1, GPP2.2, GPP2.3 and GPP2.4. No value judgements to note.

2.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state "none". Recommendations or Good

Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP2.1., GPP2.2. and GPP2.4. The specific design features of the types of aprons or gowns listed have not been provided. This is due to a lack of evidence regarding design specifications associated with types of aprons or gowns. However, the legislative requirements and standards which they must conform to have been covered in RQ1 and Appendix 4. GPP2.3. No intentional vagueness to note.

2.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP2.1, GPP2.2, GPP2.3 and GPP2.4. No exceptions to note.

2.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
This literature review failed to identify rigorous evidence regarding the use of reusable aprons and gowns in health and care settings. Further primary studies and systematic reviews on the use of reusable aprons and gowns, and their

Recommendations for research
effectiveness, including cost benefits in comparison to disposable aprons and gowns will be beneficial in filling this evidence gap.

Research Question 3: When should aprons/gowns be worn in health and care settings?

Part A: Quality of Evidence

3.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Thirty-seven pieces of evidence that addressed the research question were included.[11-25, 28-49] • Three guidance documents were graded AGREE II: 'Recommend with modifications' as although they were evidence-based, there were limitations regarding the systematic review methodology used to underpin the recommendations and failure to update guidance as planned.[11, 12, 20] The link between relevant recommendations and supporting evidence is unclear, and mostly based on limited low-quality primary studies and expert opinion. • One observational study was graded SIGN 50 Level 3 due to some methodological limitations, including small sample size and confounding factors.[40] • Thirty-three were graded SIGN 50 Level 4, expert opinion guidance, mainly due to a lack of robust, evidence-based systematic review to form recommendations within the guidance. SIGN 50 level 4 expert opinion guidance has potential bias	3 x AGREE II: Recommend with modifications 1 x SIGN 50 Level 3 33 x SIGN 50 Level 4

Comments	Evidence level
given little detail is provided regarding how recommendations were formulated, and it is not always clear where expert opinion has taken precedence over scientific evidence. It is therefore considered low quality evidence.[13-25, 28-39, 41-49]	

3.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments
The included evidence are largely consistent in recommending that aprons or gowns should be worn in health and care settings when exposure to blood, body fluids, secretions or excretions, through close contact with patients or any activity or procedure, is anticipated.[11-16, 20, 21, 25, 28-31, 34-37, 47, 48] **Aprons** • Nine expert opinion guidance documents from the UK and Australia consistently recommend wearing a disposable plastic apron where a low risk of splashing or contamination with blood or bodily fluids is anticipated.[14-16, 28, 29, 33, 34, 47, 48] This includes when cleaning, handling used or infectious laundry, for contact with non-intact skin and mucous membranes, and for aerosol generating procedures (AGPs) on persons without a suspected or confirmed infection.[14-16, 28, 29, 33, 34, 47, 48] • Five evidence sources from the UK (Two guideline documents, graded AGREE II 'recommend with modifications', and three expert opinion guidance) consistently recommend wearing aprons when caring for individuals with a known or suspected infection, such as *Clostridioides difficile* infection (CDI) or acute respiratory infections (ARI), if risk

Comments
assessment indicates contamination of uniforms or clothing with blood, body fluids, chemicals, or cleaning products is likely.[11, 12, 15, 22, 47] • Three expert opinion guidance from Germany, Australia and the USA suggest wearing either 'aprons or gowns' as part of standard precautions for patient contact activities,[36] during procedures likely to generate splashes of blood or other body fluids,[13, 25] when entering the room of patients with *C. difficile* infection and for visitors assisting with patient care.[49] A COVID-19 specific ECDC expert opinion guidance, published in February 2021, suggest that aprons can be used instead of gowns when the risk of contact with body fluids is low.[30] • Expert opinion guidance from the Royal College of Nursing (RCN) recommends that aprons should not be worn routinely.[22] **Gowns** Risk assessment • Three WHO publications (a guideline document, graded AGREE II 'recommend with modifications', and two expert opinion guidance) consistently recommend that the decision of when to wear a gown should be based on an exposure risk assessment.[19, 20, 38] • RCN expert opinion guidance suggests that the decision of when to wear gowns may be based on local policy for certain settings or situations.[22] Exposure to splash or spray of blood or body fluids • Three guideline documents (Epic3 guidelines, NICE CG139, and a WHO guideline, published in 2014, 2012, and 2014 respectfully), all graded AGREE II 'recommend with modifications',[11, 12, 20] and fourteen expert opinion guidance [14, 17, 21, 22, 25, 29-31, 34, 35, 37, 46-48] consistently recommend that fluid repellent gowns should be worn instead of aprons, if there is an extensive risk of splashing or contamination with blood or body fluids.

Comments

- Eleven expert opinion guidance from international organisations further advise that gowns should be worn for procedures and patient care activities where contact with blood, body fluids, secretions, or excretions is anticipated, including potentially contaminated environmental surfaces and when handling patient care equipment that is visibly soiled or may have been in contact with blood or body fluids.[18, 19, 21, 23, 33, 39, 42-46]
- An observational study, graded SIGN 50 level 3, evaluated the incidence of macroscopic blood contamination on gown surfaces of four dermatologists who performed at least 100 dermatological excisional procedures; visual blood contamination was seen on 42% (95% Confidence interval: 37.7–46.3) of the dermatologists' surgical gowns. There was no statistical significant difference between the splash incidence on the gowns (P-value = 0.9034) and the dermatologists were not aware of blood splashes at the time of contamination.[40] This study highlights that care procedures, in this case routine excisional dermatological procedures, can result in blood contamination, which may go unnoticed by the operator.
- Two WHO expert opinion guidance consistently recommend wearing gowns and coveralls with a zip flap for protection against splashes when handling and processing specimens (with infectious agents) and performing diagnostic testing in laboratories.[19, 32]

Acute respiratory infections (ARI)

- Four sources (a WHO guideline document, graded AGREE II 'recommend with modifications', an ECDC expert opinion guidance, RCN expert opinion guidance, and AANA expert opinion guidance) consistently recommend wearing long-sleeved gowns when providing care to patients with acute respiratory infection (ARI) syndromes such as respiratory syncytial virus (RSV) infection, influenza, pertussis, mumps, rubella, measles, varicella, and TB.[20, 22, 23, 31]

Comments
Aerosol generating procedures (AGPs) • Eleven expert opinion guidance from international organisations recommend that gowns should be worn as part of contact precautions during AGPs.[18, 19, 21, 23, 25, 30, 31, 39, 42-44] • A WHO guideline document (published in 2014), graded AGREE II 'recommend with modifications', recommends long-sleeved gowns during AGPs consistently associated with an increased risk of transmission of ARI.[20] • ECDC, in guidance published in 2023, advise that everyone present in a room when performing AGPs on patients with respiratory viral infection should wear an impervious long-sleeved gown.[31] Managing multidrug-resistant Organisms (MDROs) • Three expert opinion guidance documents [published by CDC, RCN and the Australian National Health and Medical Research Council (NHMRC)] consistently recommend wearing gowns when caring for patients colonised or infected with MDROs to prevent infection transmission through contact, droplet and airborne routes.[22, 33, 45] Source control • Seven expert opinion guidance documents advise the use of sterile gowns for source control to prevent contamination of a sterile field during invasive procedures or surgery.[14, 17, 23, 24, 33, 35, 41] • Three expert opinion guidance from the USA and India advise that every surgical team member should wear a sterile gown prior to surgical procedures.[17, 23, 24] However, expert opinion from the American Spine Intervention Society's Patient Safety Committee highlights that evidence on the infection control benefits of wearing a surgical gown for routine spine pain interventional procedures is inconclusive and suggest that gowning should only be considered for procedures with consistently higher infection rates which often require lengthy access to the epidural

Comments

space, such as spinal cord stimulation, intrathecal pump placement, or procedures that involve disc access such as discography.[41]

- Two expert opinion guidance from Germany and the USA were consistent in their advice regarding the routine use of gowns for source control; they advise that gowns should not be routinely donned by staff and visitors on entrance to high-risk units, including intensive care units (ICUs) and hematopoietic stem-cell transplantation (HSCT) units.[18, 36]
- Expert opinion guidance document from Germany advise that staff and relatives should wear a gown while in close contact with very severely immunocompromised patients in protective isolation.[36]

In summary, the evidence base, which largely consists of extant expert opinion guidance was consistent in advising that aprons/gowns should be worn in health and care settings when a risk of contamination or splashing with blood or bodily fluids is anticipated. Although a standard means of assessing risk is not provided in the literature, the included evidence advises that aprons should be worn when there is a low risk of contamination from infectious agents or blood and bodily fluids, while gowns are advised when there is extensive splashing of blood and bodily fluids or high risk of contamination from infectious agents such as MDROs and ARIs. An expert opinion guidance also advise that staff and relatives should wear a gown as source control when in close contact with immunocompromised patients. Sterile gowns are advised for invasive procedures which requires an aseptic field due to its additional source control property.

3.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments

The country or countries in which the guidance/research was conducted and/or applies to are as follows:

- UK (n=11)[11, 12, 14-16, 22, 28, 29, 34, 47, 48]
- USA (n=13)[13, 18, 21, 23, 24, 35, 37, 39-45]
- Australia (n=2)[25, 33]
- India (n=1)[17]
- WHO (n=4)[19, 20, 32]
- ECDC (n=2)[30, 31]

AGREE II-graded guideline and expert opinion guidance documents published within the UK is directly applicable to Scottish health and care settings.[11, 12, 14-16, 22, 28, 29, 34, 47, 48]

The expert opinion guidance documents published in Australia, [25, 33, 49] Canada,[46] Germany,[36] and the USA[13, 18, 21, 23, 24, 35, 37, 39-45] are specific to health and care settings within these countries but considered applicable to Scottish health and care settings because they are from internationally recognised organisations.

The four pieces of evidence (one AGREE II-graded guideline and three expert opinion guidance documents) published by the WHO applies internationally and is considered applicable to Scottish health and care settings.[19, 20, 32]

Guidance published by the ECDC applies to the European Union (EU) / European Economic Area (EEA) and is directly applicable to Scottish health and care settings.[30, 31]

The expert opinion guidance documents published in India[17] is specific to Indian health and care settings and may have limited applicability to Scottish health and care settings.

The observational study carried out in the USA, involved the use of “surgical gowns” which may not be of the same style/type/manufacturer as those used within the UK.[40]

3.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There was only one primary study included for this research question.[40] This study has limited generalisability because it involved a very small sample size (four dermatologists), convenience sampling, and focused on only two types of excision procedures in dermatological surgery settings.

3.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

3.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance

- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP3.1. Aprons or gowns should be worn only when exposure to blood, body fluids, secretions, or excretions through close contact with a patient or any activity or procedure is anticipated.	Good practice point
GPP3.2. A plastic, fluid repellent, single use, disposable apron should be worn, if risk assessment indicates contamination of uniforms or clothing with blood, body fluids, used or infectious laundry, and chemicals or cleaning products is likely.	Good practice point
GPP3.3. A full body, long sleeved, fluid-repellent gown should be worn instead of an apron, if there is a risk of extensive splashing or contamination with blood or body fluids.	Good practice point
GPP3.4. The decision to wear either an apron or gown should be based on an assessment of the anticipated level of body fluid exposure.	Good Practice Point
GPP3.5. Visitors assisting with patient care should consider wearing an apron or gown, as appropriate to the care activity being undertaken.	Good Practice Point
GPP3.6. A sterile gown should be worn to prevent contamination of a sterile field during invasive procedures requiring sterile techniques or surgery.	Good Practice Point
GPP3.7. All scrubbed members of the operating theatre surgical team should consider wearing sterile gowns.	Good Practice Point

Recommendation	Grading
GPP3.8. Gowns should not be routinely worn by staff and visitors on entrance to high-risk units, including intensive care units (ICUs) and hematopoietic stem-cell transplantation (HSCT) units, but should be considered as part of source control PPE when in close contact with or caring for a patient in protective isolation.	Good Practice Point

3.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors, and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP3.1. to GPP3.3. - These will help reduce the risk of uniform contamination and transmission of infectious agents. GPP3.4. An assessment of possible exposure to contamination or splash and spray will help ensure that appropriate level of protection is employed. GPP3.5. This will help reduce the risk of contamination of visitors clothing and transmission of infectious agents. GPP3.6. and GPP3.7. These will help in preventing contamination of a sterile field (source control), confer protection to surgical team members and reduce the risk of transmission of infectious agents. GPP3.8. When in close contact with immunocompromised patients or when caring for patients in protective isolation, gowns could help minimise contamination of the wider care environment and reduce the risk of transmission of infectious agents.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP3.5. Visitors assisting with patient care may not don or doff aprons and gowns correctly. This may also increase indirect transmission of infectious agents. GPP3.8. Wearing gowns routinely in high-risk units may lead to overuse and wastage, especially when there is no close contact with patients. This may also increase the risk of indirect transmission of infectious agents. GPP3.1. to GPP3.4, GPP3.6, and GPP3.7. • No harms anticipated.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP3.5. The benefits of visitors using aprons or gowns when there is a risk of contamination, if donned and doffed properly, outweighs the possible harms. GPP3.8. Wearing gowns for close contact care activities with immunocompromised patients in high-risk units, as opposed to routine use, will help reduce wastage and indirect transmission of infectious agents. Therefore, the benefit outweighs the harms. GPP3.1. to GPP3.4, GPP3.6, and GPP3.7.

Benefit-Harm assessment
• Only benefits identified.

3.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP3.1. to GPP3.3, GPP3.5. to GPP3.8. There are sustainability and financial implications associated with the use of aprons and gowns, including procurement, disposal or reprocessing, and education. Further costs, in addition to those incurred currently is not anticipated. A focus on appropriate use of resources should be considered to support the reduction of unnecessary use. GPP3.4. There will be resource implications related to staff education and training to support appropriate risk assessment and selection of aprons and gowns.

3.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion

GPP3.1. to GPP3.8. ARHAI Scotland and associated working groups supports extant expert opinion used to underpin these recommendations and good practice points.

GPP3.1. This good practice point is based on three guideline documents, graded AGREE II 'Recommend with modifications',[11, 12, 20] and 16 SIGN 50 Level 4 expert opinion guidance documents[13-16, 21, 25, 28-31, 34-37, 47, 48] that consistently advise that aprons or gowns should only be worn when exposure to blood, body fluids, secretions, or excretions is anticipated. This evidence was considered insufficient for a recommendation due to the AGREE-graded guideline limitation (i.e., recommendation was based on limited low-quality primary studies and expert opinion), and limitations of SIGN 50 Level 4 evidence, therefore a good practice point was developed.

GPP3.2. This good practice point is based on two guideline documents, graded AGREE II 'Recommend with modifications',[11, 12] and 10 SIGN 50 Level 4 expert opinion guidance documents[14-16, 28, 29, 33, 34, 47, 48] that consistently advise that plastic, fluid repellent, single use, disposable apron should be worn, if risk assessment indicates contamination of uniforms or clothing with blood, body fluids, used or infectious laundry, and chemicals or cleaning products is likely. This evidence was considered insufficient for a recommendation due to the AGREE-graded guideline limitation (i.e., recommendation was based on limited low-quality primary studies and expert opinion), and limitations of SIGN 50 Level 4 evidence, therefore a good practice point was developed.

GPP3.3. This good practice point is based on three guideline documents, graded AGREE II 'Recommend with modifications',[11, 12, 20] along with 23 SIGN 50 Level 4 expert opinion guidance documents[14, 17-19, 21-23, 25, 29-31, 33-35, 37, 39, 42-48] that consistently advise wearing full body, long sleeved, fluid-repellent gowns instead of aprons, if there is a risk of extensive splashing or contamination with blood or bodily fluids. This evidence was considered insufficient for a recommendation due to the AGREE-graded guideline limitation (i.e., recommendation was based on limited low-quality primary studies and expert opinion), and limitations of SIGN 50 Level 4 evidence, therefore a good practice point was developed.

Expert opinion

GPP3.4. This good practice point is based on a guideline document graded AGREE II 'Recommend with modifications',[20] and two SIGN 50 Level 4 expert opinion guidance documents[19, 38] that consistently advise that the decision to wear either aprons or gowns should be based on an assessment of the anticipated levels of body fluid exposure. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific), recommendations being formed by expert opinion and limitations of SIGN 50 Level 4 evidence, therefore a good practice point was developed.

GPP3.5. This good practice point is based on Australasian college of infection prevention and control (ACIPC) expert opinion that visitors assisting with patient care should consider wearing an apron or gown, as appropriate to the care activity.[49]

GPP3.6. This good practice point is based on seven SIGN 50 Level 4 expert opinion guidance documents that consistently advise that sterile gown should be worn to prevent contamination of a sterile field during invasive procedures requiring sterile techniques or surgery.[14, 17, 23, 24, 33, 35, 41]

GPP3.7. This good practice point is based on three SIGN 50 Level 4 expert opinion guidance documents that consistently advise that all scrubbed members of the operating theatre surgical team should consider wearing sterile gowns.[17, 23, 24]

GPP3.8. This good practice point is based on two SIGN 50 Level 4 expert opinion guidance documents that consistently advise that gowns should not be routinely worn by staff and visitors on entrance to high-risk units, but should be considered as part of source control PPE when in close contact with immunocompromised patient in protective isolation.[18, 36]

3.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves value judgements, which include guiding principles, ethical

considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP3.1 to GPP3.8. No value judgement to note.

3.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state “none”. Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP3.1 to GPP3.8. No intentional vagueness to note.

3.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP3.1 to GPP3.8. No exceptions to note.

3.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research

There is limited high quality evidence for this research question. Majority of the evidence are SIGN 50 level 4 expert opinion which is insufficient for making recommendations. Therefore, more high-quality primary studies, systematic reviews and metanalysis that demonstrate the effectiveness of aprons and gowns in preventing spread of infective material through body fluids in different situations in healthcare settings will be beneficial to fill this evidence gap.

Research Question 4: How and where should aprons/gowns be donned (put on)?

Part A: Quality of Evidence

4.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Fifteen pieces of evidence that addressed the research question were included.[18-21, 23, 25-27, 33, 39, 42, 43, 45, 49, 50] • One guideline document was graded AGREE II: 'Recommend with modifications' due to limitations regarding the systematic review methodology used to underpin the recommendations and failure to update guidance within the stated timeline.[20] This guideline is ARI specific and the link between relevant recommendations and supporting evidence is unclear, it is mostly based on limited low-quality primary studies and expert opinion. • Fourteen were graded SIGN 50 Level 4, expert opinion guidance, mainly due to a lack of a robust, evidence-based systematic review process to form recommendations. SIGN 50 level 4 expert opinion guidance has potential bias given little detail is provided regarding how recommendations were formulated, and it is not always clear where expert opinion has taken	1 x AGREE II: Recommend with modification 14 x SIGN 50 Level 4

Comments	Evidence level
precedence over scientific evidence. It is therefore considered low quality evidence.[18, 19, 21, 23, 25-27, 33, 39, 42, 43, 45, 49, 50]	

4.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments
How to don **Hand hygiene** • Eight evidence sources (a WHO guideline, graded AGREE II 'recommend with modification',[20] and six expert opinion guidance from the UK,[50] USA,[21, 27, 42] and Australia[25, 33]) were consistent in recommending that hand hygiene should be performed before donning aprons or gowns.[20, 21, 25, 27, 33, 42, 50] • AORN expert opinion guidance recommends that surgical hand antisepsis should be performed before donning a sterile gown.[27] **Sequence of donning** • Three sources (two expert opinion guidance and a WHO guideline, graded AGREE II 'recommend with modifications') were consistent in recommending that gowns should be donned first before other PPE.[18, 20, 42] • A WHO guideline, graded AGREE II 'recommend with modifications' advise that donning should be done in an order that ensures adequate placement of PPE items and prevents self-contamination and self-inoculation.[20] • An Australian expert opinion guidance on caring for patients with influenza-like illnesses recommends that in high aerosol-risk settings, a gown should be donned following other PPE items in the sequence; particulate mask, eye protection, impervious long-sleeved gown, then gloves.[25]

Comments

- AORN expert opinion recommends that when donning a reprocessed gown, the materials should be visually inspected to determine their integrity before use.[26]

Method of donning

- A DHSC expert opinion guidance recommends that following hand hygiene, aprons should be put on and tied at the waist.[50]

There was no consistency regarding the techniques for donning gowns as four expert opinion guidance propose different techniques.[19, 23, 42]

- AANA recommend that both sterile and non-sterile gowns should be secured at the back of the neck and waist,[23] while CDC recommend that the gown should be secured at the back alone.[42]
- A WHO expert opinion guidance for public health emergencies recommends that gown should be donned in such a way that it fully covers the torso from neck to knees, arms to end of wrists and wrap around the back, then fastened at back of neck and waist, and secured with duct tape.[19]

AORN expert opinion guidance recommends that sterile technique must be employed when donning a sterile gown and a team member assistance is required.[27] They further suggest that healthcare workers should don a sterile gown with the gown cuffs remaining at or beyond the fingertips, then insert hands into gloves held open by a scrubbed team member, with the gown cuff touching only inside of the gloves.[27]

Where to don

- Seven evidence sources (a WHO guideline document graded AGREE II 'recommend with modifications' and six expert opinion guidance documents) were consistent in advising that that aprons and gowns should be donned before entry [23, 33, 45, 49] or on entry to the room, cubicle or patient care area.[18, 20, 23, 43]

Comments
In summary, there is consistency in the evidence base that hand hygiene should be performed prior to donning an apron or gown in health and care settings. Seven sources are consistent in recommending that aprons and gowns should be donned "before" or "upon" room entry.[18, 20, 23, 33, 43, 45, 49] Three sources are consistent in advising that gowns should be donned first before other PPE.[18, 20, 42] There were inconsistencies in the evidence base on how to secure a gown at the back. This may be due to the nature of the expert opinion guidance which are focused on pandemic or high-risk infections, and variations in gown design.

4.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments
The country or countries in which the guidance applies are as follows: • UK (n=1)[50] • USA (n=9)[18, 21, 23, 26, 27, 39, 42, 43, 45] • Australia (n=3)[25, 33, 49] • WHO (n=2)[19, 20] The expert opinion guidance document published within the UK is directly applicable to Scottish health and care settings.[50] The expert opinion guidance documents published in Australia,[25, 33, 49] and the USA[18, 21, 23, 26, 27, 39, 42, 43, 45] are specific to health and care settings within these countries but considered applicable to Scottish health and care settings because they are from internationally recognised organisations. The two pieces of evidence (one AGREE II-graded guideline and one expert opinion guidance documents) published by the WHO applies internationally and is considered applicable to Scottish health and care settings.[19, 20]

4.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies included for this research question, therefore, issues such as sample size and methods of sample selection are not relevant.

4.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

4.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present

- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP4.1. Hand hygiene should be performed before donning an apron or gown and surgical hand antisepsis should be performed before donning a sterile gown.	Good practice point
GPP4.2. Aprons or gowns should be donned first, followed by other PPE items.	Good practice point
GPP4.3. Aprons or gowns should be donned before entry to the room, cubicle, or patient care area.	Good practice point
GPP4.4. Reusable gowns should be visually inspected for integrity before donning.	Good practice point
GPP4.5. When donning an apron, it should cover as much of the front of the body as possible and be secured at the back by ties. To don an apron: • Remove apron from the roll or dispenser. • Open it outwards ensuring the inner surface (when stored) faces the patient to prevent any contamination on its outer surface (based on storage) coming into contact with the patient • Place the neck loop over your head • Position the apron to cover as much of the front of your body as possible • Fix the apron in place by tying the waist straps behind your back	Good practice point
GPP4.6. When donning a gown: • Gowns should be secured at the back of the neck and waist.	Good practice point

Recommendation	Grading
• They should fully cover torso from neck to knees, arms to end of wrists, and wrap around the back.	
GPP4.7. When donning a sterile gown for an aseptic procedure: • Aseptic technique should be followed, and team member assistance may be required.	Good practice point

4.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP4.1. Appropriate hand hygiene will minimise the risk of adventitious contamination of the apron or gown. GPP4.3. Donning aprons and gowns before entry to the patient area will minimise the risk of adventitious contamination of uniform or clothing and help avoid contamination of apron or gown before use. GPP4.4. Visual inspection of gowns will help in ensuring that reusable gowns are fit for purpose before use. GPP4.2., GPP4.5. to GPP4.7. This order and method of donning will reduce risk of contamination of the apron or gown, staff uniform and minimise the risk of transmission of infectious agents.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP4.1 to GPP4.7. No risks or harm to note.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP4.1 to GPP4.7. Only benefits identified.

4.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP4.1. Hand hygiene facilities need to be available near where donning is happening. GPP4.1, GPP4.2, GPP4.3, and GPP4.5 to GPP4.7. Staff education or training will be required for all steps of donning and doffing methods. GPP4.4. Human factors and time needed to inspect reusable gown' quality, need to be factored in alongside clinical pressure. Therefore, standardised quality control of reprocessed gowns will be needed to eliminate human error in assessment of reusable gowns.

4.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
GPP4.1. to GPP4.7. ARHAI Scotland and associated working groups support extant expert opinion used to underpin these recommendations and good practice points. GPP4.1. This good practice point is based on one guideline, graded AGREE II 'Recommend with modifications',[20] and seven SIGN 50 Level 4 expert opinion guidance documents [20, 21, 25, 27, 33, 42, 50] that consistently advise that hand hygiene should be performed before donning an apron or gown, and surgical hand antisepsis should be performed before donning a sterile gown. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

Expert opinion

GPP4.2. This good practice point is based on one guideline, graded AGREE II 'Recommend with modifications',[20] and two SIGN 50 Level 4 expert opinion guidance documents[18, 42] that consistently advise that aprons or gowns should be donned first, followed by other PPE items. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

GPP4.3. This good practice point is based on one guideline, graded AGREE II 'Recommend with modifications',[20] and six SIGN 50 Level 4 expert opinion guidance documents[18, 23, 33, 43, 45, 49] that consistently advise that aprons or gowns should be donned before entry to the room, cubicle, or patient care area. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

GPP4.4. This good practice point is based on one SIGN 50 Level 4 expert opinion guidance document that advise visually inspecting reusable gowns for integrity before donning.[26]

GPP4.5. This good practice point is based on one SIGN 50 Level 4 expert opinion guidance documents[50] that consistently advise that following hand hygiene, aprons should be put on and tied at the waist. ARHAI expert opinion was used to develop the detailed steps for donning an apron.

GPP4.6. This good practice point is based on three SIGN 50 Level 4 expert opinion guidance documents that consistently advise that gowns should be donned to fully cover torso from neck to knees, arms to end of wrists, wrap around the back and secured at the back of the neck and waist.[19, 23, 42]

GPP4.7. This good practice point is based on one SIGN 50 Level 4 expert opinion guidance document[27] that advise that sterile technique must be employed when

Expert opinion
donning a sterile gown, and team member assistance is required to help with donning process.

4.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP4.1 to GPP4.7. No value judgements to note.

4.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state “none”. Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP4.3. There may be confusion in what is considered a patient care area in the context of where to don aprons or gowns. This should be assessed in the local context of where the patient is located and what task is being undertaken.

Intentional vagueness
GPP4.1, GPP4.2, and GPP4.4 to GPP4.7. No intentional vagueness to note.

4.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP4.1 to GPP4.7. No exceptions to note.

4.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
None to note.

Research Question 5: When should aprons/gowns be removed/changed?

Part A: Quality of Evidence

5.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Twenty-two pieces of evidence were included.[12, 14, 15, 17-20, 22, 23, 27-31, 33, 34, 37-39, 42, 45, 49] • Two guideline documents were graded AGREE II: 'Recommend with modifications' due to limitations regarding the systematic review methodology used to underpin the recommendations and failure to update guidance as planned.[12, 20] The link between relevant recommendations and supporting evidence is unclear, and mostly based on limited low-quality primary studies and expert opinion. • Twenty were graded SIGN 50 Level 4, expert opinion guidance, mainly due to a lack of robust, evidence-based systematic review process to form recommendations. SIGN 50 level 4 expert opinion guidance has potential bias given little detail is provided regarding how recommendations were formulated, and it is not always clear where expert opinion has taken precedence over scientific evidence. It is	2 x AGREE II: Recommend with modifications 20 x SIGN 50 Level 4

Comments	Evidence level
therefore considered low quality evidence.[14, 15, 17-19, 22, 23, 27-31, 33, 34, 37-39, 42, 45, 49]	

5.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments
Removal after use • Thirteen evidence sources (two guideline documents, graded AGREE II 'recommend with modifications', and 11 expert opinion guidance documents) were consistent in advising that aprons or gowns should be worn for only one procedure or episode of patient care, and changed or discarded when contaminated, after completion of care activity and between care for different patients.[12, 15, 20, 22, 23, 28-30, 33, 34, 39, 43, 45] • Three SIGN 50 level 4 guidance documents advise that gowns should not be reused, even for repeated contacts with the same patient.[18, 21, 42] **Change during care activity or procedure** • Six evidence sources (a WHO guideline, graded AGREE II 'recommend with modifications', and five expert opinion guidance documents) were consistent in recommending that soiled gowns should be removed, with care, as soon as possible.[14, 17, 19, 20, 27, 37] • AORN expert opinion guidance for operating room settings suggests using clinical judgement to determine whether a sterile sleeve should be worn to cover contaminated areas of a gown sleeve or if the gown should be removed, and a new sterile gown donned.[27] **Sessional use** • A WHO guideline for epidemic and pandemic prone acute respiratory infections (ARIs), graded AGREE II 'recommend with modification', suggest

Comments

that if a gown does not come into direct contact with any patient, then it can be worn during the care of more than one patient in a single cohort area.[20]

In summary, the evidence base was consistent in advising that aprons and gowns should be worn for one procedure or one episode of care and changed when contaminated, after the completion of the care activity, and between care of different people. Sessional use of gowns, where the same gown is worn during the care of more than one patient, was described by one guideline for care of patients with epidemic and pandemic prone ARIs.

5.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments

The country or countries in which the guidance applies are as follows:

- UK (n=7)[12, 14, 15, 22, 28, 29, 34]
- USA (n=7)[18, 23, 27, 37, 39, 42, 45]
- Australia (n=2)[33, 49]
- India (n=1) [17]
- WHO (n=3)[19, 20, 38]
- ECDC (n=2)[30, 31]

The seven guidance documents published within the UK are directly applicable to Scottish health and care settings.[12, 14, 15, 22, 28, 29, 34]

The expert opinion guidance documents published in Australia,[33, 49] and the USA[18, 23, 27, 37, 39, 42, 45] are specific to health and care settings within these countries but considered applicable to Scottish health and care settings because they are from internationally recognised organisations.

Comments
The three pieces of evidence (one AGREE II-graded guideline and two expert opinion guidance documents) published by the WHO applies internationally and is considered applicable to Scottish health and care settings.[19, 20, 38] Guidance published by the ECDC applies to the European Union (EU) / European Economic Area (EEA) and is directly applicable to Scottish health and care settings.[30, 31] The expert opinion guidance documents published in India[17] is specific to Indian health and care settings and may have limited applicability to Scottish health and care settings.

5.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies included in relation to this research question therefore issues such as sample size and methods of sample selection are not relevant.

5.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

5.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP5.1. Aprons or gowns should be worn for only one task, procedure, or episode of patient care, and doffed when contaminated, after completion of task, procedure, or episode of patient care and between care for different patients.	Good practice point
GPP5.2. Soiled aprons or gowns should be removed as soon as possible.	Good practice point
GPP5.3. Sessional use of gowns should only be considered as part of a pandemic response plan.	Good practice point

5.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP5.1. Wearing an apron or gown for only one task, procedure, or episode of patient care, and doffed when contaminated, after completion of task, procedure, or episode of patient care and between care for different patients, is anticipated to prevent cross contamination and reduce the risk of transmission of infectious agents. GPP5.2. Removing soiled aprons or gowns as soon as possible will prevent cross contamination and reduce the risk of transmission of infectious agents. GPP5.3. Using sessional gowns as part of a pandemic response may help save time (reduced donning and doffing time) and resources (reuse of same gown) while caring for patients infected with the same infectious agent within a cohort area during a pandemic.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP5.3 The sessional use of gowns may result in unintended consequences, such as reduction in hand hygiene compliance or inadvertent transmission of infectious agents between patients, particularly via the forearms of gowns. There is also a risk of contamination of gowns if hand washing is performed while the gown is donned. GPP5.1 and GPP5.2. No risk anticipated.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP 5.3. Sessional use of gowns as part of a pandemic response could help save time and resources, which is crucial during a pandemic. However, there is associated risk of reduction in hand hygiene compliance and inadvertent transmission of infectious agents. This should only be considered in exceptional circumstances as part of a pandemic response. The benefits are considered to outweigh the risks if other IPC measures are followed. GPP5.1 and GPP5.2. Only benefits identified.

5.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP5.1 and G5.2. There are associated costs in terms of procurement, disposal, and training on appropriate use of aprons and gowns. There is also an associated increase of single-use plastics. However, reducing inappropriate use should minimise these costs and sustainability issues. GPP5.3. Human factors will need to be considered when developing clear parameters for sessional use of gowns, there will also be a need for education and training for staff to reduce the risk of unintended harms (reduction in hand hygiene compliance and transmission of HAI).

5.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
GPP5.1, GPP5.2 and GPP5.3. ARHAI Scotland and associated working groups support the expert opinions used to underpin this GPP.[14, 17, 12, 15, 18, 20-23, 28-30, 33, 34, 39, 42, 43, 45] GPP5.1. This recommendation is based on two guideline documents, graded AGREE II ‘recommend with modifications’, and 14 expert opinion guidance documents that were consistent in advising that aprons or gowns should be worn for only one procedure or episode of patient care, and changed or discarded when contaminated, after completion of care activity and between care for different patients.[12, 15, 18, 20-23, 28-30, 33, 34, 39, 42, 43, 45] This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and the recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

Expert opinion

GPP5.2. This recommendation is based on a WHO guideline, graded AGREE II 'recommend with modifications', and five expert opinion guidance documents that were consistent in recommending that soiled gowns should be removed, with care, as soon as possible.[14, 17, 19, 20, 27, 37] This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and the recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

GPP5.3. This good practice point is based on a guideline, graded AGREE II 'recommend with modification', that advise that if a gown does not come into direct contact with any patient, then it can be worn during the care of more than one patient in a single cohort area.[20] This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., epidemic and pandemic ARI-specific), therefore a good practice point was developed.

ARHAI Scotland expert opinion informed this GPP, with the caveat that in Scotland, this should only be considered as part of a pandemic response. During the COVID-19 pandemic, staff working in Critical Care were challenged in this clinically high risk setting to fully doff and don new gowns between all patients and this contributed to clinical risk by introducing a time delay when going between patients to deliver interventions; use of sessional gowns was introduced to reduce this risk. However, this must be balanced against the unintended consequences. This GPP will be included as part of IPC considerations for managing a pandemic but not contained within the main NIPCM as part of routine practice.

5.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP5.1 to GPP5.3. None to note.

5.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state “none”. Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP5.1 to GPP5.3. No intentional vagueness to note.

5.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP5.3 This GPP is reserved for consideration during a pandemic alone and should not be applied in normal day to day activities in health and care settings. GPP5.1 and GPP5.2. No exceptions to note.

5.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research

This literature review failed to identify rigorous evidence regarding sessional use of aprons and gowns in health and care settings. There are uncertainties about the effectiveness and risks associated with sessional use of gowns. A study by Meda et al. (2020) reported on the unintended consequences of long-sleeved gowns in a critical care setting during the COVID-19 pandemic, switching long sleeve gowns to short sleeved gowns for sessional use resulted in a reduction of the risk of cross contamination and increase hand hygiene compliance.[51] However, this study used a bundle of interventions and does not meet the criteria for inclusion in this literature review. Future primary research (for example, cohort studies) on sessional use of gowns will be beneficial to provide evidence of effectiveness of sessional use, understanding the potential risk of cross contamination, and how this risk can be mitigated.

Research Question 6. How and where should aprons/gowns be doffed (taken off)?

Part A: Quality of Evidence

6.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Thirteen pieces of evidence were included.[18-21, 23, 25, 32, 33, 42, 43, 45, 46, 50] • One guideline document was graded AGREE II: 'Recommend with modifications' due to limitations regarding the systematic review methodology used to underpin the recommendations and failure to update guidance as planned.[20] This guideline is ARI-specific and the link between relevant recommendations and supporting evidence is unclear, it is mostly based on limited low-quality primary studies and expert opinion. • Twelve were graded SIGN 50 Level 4, expert opinion guidance, mainly due to a lack of a robust, evidence-based systematic review process to form recommendations. SIGN 50 level 4 expert opinion guidance has potential bias given little detail is provided regarding how recommendations were formulated, and it is not always clear where expert opinion has taken precedence over scientific evidence. It is	1 x AGREE II: Recommend with modifications 12 x SIGN 50 Level 4

Comments	Evidence level
therefore considered low quality evidence.[18, 19, 21, 23, 25, 32, 33, 42, 43, 45, 46, 50]	

6.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments
How to doff/remove • Seven sources (six SIGN 50 level 4 expert opinion guidance and one AGREE II 'recommend with modifications' guideline) consistently advise that aprons and gowns should be removed in such a way as to avoid contact with the contaminated outer surface and therefore self-contamination.[18-20, 25, 33, 42, 50] • A WHO expert opinion guidance advise that disposable apron should be removed following the sequence; "untie or break the fastening at the neck and roll the apron down to contain the contaminated front of apron, untie or break the fastening at the back of the waist, and roll the apron further without contaminating the hands".[32] • Six expert opinion guidance (published by AANA, CDC, HICPAC, NHMRC, and WHO) were consistent in advising the following steps for gown removal: unfasten ties in back of neck and waist; pull away from neck and shoulders to avoid touching the outer 'contaminated' side of the gown; turn gown inside out; and fold or roll into a bundle, then discard into appropriate receptacle.[18, 19, 23, 32, 33, 42] Hand hygiene during PPE ensemble removal • Seven evidence sources (a WHO guideline document graded AGREE II 'Recommend with modifications', and six expert opinion guidance documents) were consistent in recommending that hand hygiene should be

Comments

performed before [20, 25, 50] and after removal [18, 20, 21, 33, 42, 50] of aprons and gowns.

Where to doff/remove

- Seven expert opinion guidance were consistent in advising that aprons or gowns should be removed before leaving the patient room or care area to prevent possible contamination of the environment outside the patient's room.[18, 21, 33, 42, 43, 45, 46]
- A WHO guideline document recommend that PPE should be removed in the anteroom, if available.[20]

In summary, the evidence base, which largely consists of extant expert opinion guidance, was consistent in advising hand hygiene prior to and after removing aprons or gowns, and removal where the care episode took place, before leaving the patient care area or room. During removal, contact with the contaminated front area of aprons or gowns should be avoided to prevent self-contamination or spread of infectious agents.

6.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments

The country or countries in which the guidance applies are as follows:

- UK (n=1)[50]
- USA (n=6)[18, 21, 23, 42, 43, 45]
- Australia (n=1)[33]
- Canada (n=1)[46]
- WHO (n=3)[19, 20, 32]

Comments
The expert opinion guidance document published within the UK is directly applicable to Scottish health and care settings.[50] The expert opinion guidance documents published in Australia,[33] Canada[46] and the USA[18, 21, 23, 42, 43, 45] are specific to health and care settings within these countries but considered applicable to Scottish health and care settings because they are from internationally recognised organisations. The three pieces of evidence (one AGREE II-graded guideline and two expert opinion guidance documents) published by the WHO applies internationally and is considered applicable to Scottish health and care settings.[19, 20, 32]

6.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies included in relation to this research question therefore issues such as sample size and methods of sample selection are not relevant.

6.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

6.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP6.1. Aprons and gowns should be removed in a manner that avoids contact with the contaminated outer surface and therefore self-contamination.	Good practice point
GPP6.2. Hand hygiene should be performed after removal of aprons and gowns and before removal of eye protection and/or surgical mask/respirator.	Good practice point
GPP6.3. In regard to a PPE ensemble, gloves should be removed first, followed by aprons or gowns, eye protection and mask.	Good practice point
GPP6.4. To remove an apron: • Untie or break the fastening at the neck. • 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.	Good practice point

Recommendation	Grading
• Untie or break the fastening at the back of the waist. • The apron should then be folded or rolled into a ball and placed in the appropriate waste stream. • Perform hand hygiene.	
GPP6.5. To remove a gown: • Unfasten the ties at the back of neck and waist. • pull away from neck and shoulders to avoid touching the outer 'contaminated' side of the gown. • 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. • Perform hand hygiene.	Good practice point
GPP6.6. Aprons or gowns should be removed before leaving the patient room or care area, or in the anteroom if one is available.	Good practice point

6.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP6.1. to GPP6.6. Removing aprons or gowns in the appropriate location and using the described technique will minimise the risk of self-contamination, contamination of the environment and other members of staff, and transmission of infectious agents. GPP6.2. Performing hand hygiene after removal of aprons and gowns will minimise the risk of self-contamination and transmission of infectious agents.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP6.1 to GPP6.6. None identified.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP6.1 to GPP6.6. Only benefits identified.

6.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP6.1 to GPP6.6. Staff education and training will be required to ensure implementation of these doffing methods. GPP6.2. Hand hygiene facilities need to be available in patients' room or care area. GPP6.4 and GPP6.5. Waste receptables need to be available in patients' room or care are for prompt disposal of aprons and gowns following removal.

6.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
GPP6.1 to GPP6.6. ARHAI Scotland and associated working groups supports extant expert opinion used to underpin these good practice points.

Expert opinion

GPP6.1. This good practice point is based on one guideline graded AGREE II 'Recommend with modifications', [20] and six SIGN 50 Level 4 expert opinion guidance documents [18, 19, 25, 33, 42, 50] that consistently advise that aprons and gowns should be removed in in a manner that avoids contact with the contaminated outer surface and therefore self-contamination. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

GPP6.2. This good practice point is based on one guideline graded AGREE II, 'Recommend with modifications', [20] and six SIGN 50 Level 4 expert opinion guidance documents [18, 21, 33, 42, 50] that advise that hand hygiene should be performed before and after removal of aprons and gowns. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed. Although extant guidance suggests before and after removal, ARHAI Scotland expert opinion considers the hand hygiene before removal step as not feasible as this will take more time, manpower and resources for limited benefits.

GPP6.3. This good practice point is based on one SIGN 50 Level 4 expert opinion guidance document [50] and expert opinion from the previous version of this literature review that advised that aprons or gowns should be removed after glove removal, and before eye protection and mask, whilst avoiding self-contamination.

GPP6.4 This good practice point is based on one WHO SIGN 50 Level 4 expert opinion guidance document that advises that disposable aprons should be removed following the sequence: "untie or break the fastening at the neck and roll the apron down to contain the contaminated front of apron, untie or break the fastening at the back of the waist, and roll the apron further without contaminating the hands".[32]

GPP6.5 This good practice point is based on six expert opinion guidance documents that consistently advise that the steps for gown removal should

Expert opinion
following the sequence: unfasten ties in back of neck and waist; pull away from neck and shoulders to avoid touching the outer 'contaminated' side of the gown; turn gown inside out; and fold or roll into a bundle, then discard into appropriate receptacle.[18, 19, 23, 32, 33, 42] GPP6.6. This good practice point is based on one guideline graded AGREE II 'Recommend with modifications', [20] and six SIGN 50 Level 4 expert opinion guidance documents [18, 21, 33, 42, 43, 45, 46] that consistently advise that aprons or gowns should be removed before leaving a patient room or care area, or in the anteroom if one is available. This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

6.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP6.1 to GPP6.6. No value judgement to note.

6.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state "none". Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality

- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP6.1 to GPP6.6. No intentional vagueness to note

6.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP6.1 to GPP6.6. No exception to note.

6.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
None to note.

Research Question 7. How should reusable aprons/gowns be reprocessed?

Part A: Quality of Evidence

7.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
A very low amount of evidence was identified for this research question. • One guideline document (Epic3) was graded AGREE II: 'recommend with modifications', due to limitations regarding the systematic review methodology and failure to update guidance as planned.[11] The link between relevant recommendations and supporting evidence is unclear, and mostly based on limited low-quality primary studies and expert opinion. • One guidance document published by the Association of perioperative Registered Nurses (AORN) was graded SIGN 50 Level 4, expert opinion, due to a lack of a high-quality systematic review process to support its recommendations.[26]	1 x AGREE II: Recommend with modifications 1 x SIGN 50 Level 4

7.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments
Consistency could not be assessed because only two pieces of evidence were included for this research question, no primary research studies was included. The evidence can be summarised as follows: • The Epic3 guidelines document, graded AGREE II: 'recommend with modifications', advise that non-disposable protective clothing should be sent for laundering after use.[11] • An expert opinion guidance document from the USA recommends that reprocessing instructions, including the suggested number of processing and useful life of barrier materials, which should be provided by the manufacturer must be followed.[26] In summary, the evidence base did not describe a detailed reprocessing method but advise that reusable aprons or gowns sent should for laundering after use and reprocessed according to manufacturer instructions.

7.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments
The country or countries in which the guidance applies are as follows: • UK (n=1)[11] • USA (n=1)[26]

Comments
The guideline document published within the UK is directly applicable to Scottish health and care settings.[11] The expert opinion guidance document published in the USA[26] is specific to health and care settings within this country but considered applicable to Scottish health and care settings because it is from an internationally recognised organisation.

7.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies identified for this research question, therefore issues such as sample size and methods of sample selection are not relevant.

7.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
A formal assessment of publication bias was not conducted due to the nature of the evidence base. However, lack of primary research in this area may have impacted the lack of recommendations in extant guidance.

Part B: Evidence to Decision

7.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP7.1. Reusable gowns should be used for one task or care episode and then be sent for laundering or reprocessing.	Good practice point
GPP7.2. Reusable gowns should be reprocessed according to the manufacturer's instructions.	Good practice point
GPP7.3. A process should be in place for monitoring/tracking the number of reprocessing cycles and the integrity of reusable gowns to detect any defects.	Good practice point

7.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP7.1 and GPP7.2. Laundering after every use prevents cross contamination and reduces risk of infection transmission. This will ensure gowns are effectively decontaminated and be fit for purpose. GPP7.3. Having a process in place for monitoring reusable gown wash cycles and quality will ensure that the required number of processing cycles is not exceeded. This will reduce the risk of the gown deteriorating and losing its protective effect.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP7.1 and GPP7.2. From a sustainability perspective, there may be creation of microplastics from water resistant coatings as a by-product of reprocessing GPP7.3. No harms anticipated.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP7.1 and GPP7.2. There are some IPC benefits in laundering a reusable gown after use. However, it is not currently possible to determine the risk of microplastics from laundering of reusable gowns. Local teams may wish to undertake an

Benefit-Harm assessment
assessment to determine the local sustainability and cost implications to support decision making where reusable gowns are being considered for use. GPP7.3. Only benefits identified for monitoring the number of cycles, and no harms to note.

7.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP7.1 and GPP7.2. There will be additional resource required to reprocess gowns in terms of equipment, staff, and training. The costs associated with laundering may vary, depending on setting. GPP7.3. The development of a process for reprocessing gowns will require human resources and provision of associated training resources and materials. Boards would be required to have considered all the above prior to the introduction of reusable gowns.

7.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
ARHAI Scotland and associated working groups support the expert opinion used to develop GPP7.1 to GPP7.3.[26] GPP7.1. This recommendation is based on the Epic3 guidelines document, graded AGREE II: ‘recommend with modifications’, that advises that non-disposable protective clothing should be sent for laundering after use.[11] This evidence was considered insufficient for a recommendation due to the limitations of the AGREE-graded guideline (i.e., recommendation was based on limited low-quality primary studies and expert opinion), therefore a good practice point was developed. Although there is very limited evidence, ARHAI Scotland expert opinion believes it is important to emphasise that reusable gowns should only be used for one task or care episode and reprocessed. GPP7.2. This good practice point is based on one SIGN 50 Level 4 expert opinion guidance document that advises that reprocessing instructions provided by the manufacturer must be followed.[26] GPP7.3. This good practice point is based on ARHAI Scotland expert opinion that having a process in place for monitoring reusable gown wash cycles and quality will help ensure that the required number of processing cycles specified by the manufacturer is not exceeded to reduce the risk of the gown deteriorating and losing its protective effect.

7.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves value judgements, which include guiding principles, ethical

considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP7.1 to GPP7.3. No value judgement to note.

7.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state “none”. Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP7.3. A universal process for reprocessing reusable gowns cannot be developed by ARHAI Scotland due to potential variation in manufacturer’s instructions. GPP7.1 and GPP7.2. No intentional vagueness to note.

7.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP7.1 to GPP7.3. No exceptions to note.

7.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
None to note.

Research Question 8. How should aprons/gowns be disposed of?

Part A: Quality of Evidence

8.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Eight pieces of evidence were included.[11, 15, 18-20, 22, 23, 35] • Two guideline documents were graded AGREE II: 'Recommend with modifications' due to limitations regarding the systematic review methodology used to underpin the recommendations and failure to update guidance as planned.[11, 20] The link between relevant recommendations and supporting evidence is unclear, and mostly based on limited low-quality primary studies and expert opinion. • Six were graded SIGN50 Level 4, expert opinion guidance, mainly due to a lack of a robust, evidence-based systematic review process to form recommendations. SIGN50 level 4 expert opinion guidance has potential bias given little detail is provided regarding how recommendations were formulated, and it is not always clear where expert opinion has taken precedence over scientific evidence. It is	2 x AGREE II: Recommend with modifications 6 x SIGN 50 Level 4

Comments	Evidence level
therefore considered low quality evidence.[15, 18, 19, 22, 23, 35]	

8.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments

- Eight evidence sources (Epic3 and a WHO guideline along with six expert opinion guidance) were consistent in recommending that disposable aprons and gowns should be disposed of immediately after use, into an appropriate waste stream in accordance with local waste policies.[11, 15, 18-20, 22, 23, 35]
- A WHO guideline document, graded AGREE II: 'Recommend with modifications', advise that hand hygiene should be performed following disposal of PPE.[20]

In summary, included evidence was consistent in advising that disposable aprons and gowns be disposed in a designated healthcare waste receptable, in accordance with local waste policies.

8.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments

The country or countries in which the guidance applies are as follows:

- UK (n=3)[11, 15, 22]
- USA (n=3)[18, 23, 35]

Comments
• WHO (n=2)[19, 20] The expert opinion guidance documents published within the UK are directly applicable to Scottish health and care settings.[11, 15, 22] The expert opinion guidance documents published in the USA[18, 23, 35] are specific to health and care settings within these countries but considered applicable to Scottish health and care settings because they are from internationally recognised organisations. The two pieces of evidence (one AGREE II-graded guideline and one expert opinion guidance documents) published by the WHO applies internationally and is considered applicable to Scottish health and care settings.[19, 20]

8.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies included in relation to this research question therefore issues such as sample size and methods of sample selection are not relevant.

8.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to

Comments
ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

8.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
GPP8.1. Aprons and single-use gowns should be disposed of into the appropriate waste stream in accordance with local policies for waste management.	Good practice point
GPP8.2. Hand hygiene should be performed following apron or gown disposal.	Good practice point
GPP8.3. Reusable gowns should be placed in a designated container or laundry bag(s) in accordance with NHS Scotland or organisation's linen policy.	Good practice point

8.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
GPP8.1. Ensures adherence to waste disposal regulations, and minimises the risk of inadvertent contamination and transmission of infection. GPP8.2. Minimises the possibility of transmission of infectious agents following removal of the apron or gown. GPP8.3. Ensures proper management of reusable gowns and facilitates proper reprocessing.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
GPP8.1 to GPP8.3. None identified.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
GPP8.1 to GPP8.3. Only benefits identified.

8.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
GPP8.1. There are financial costs associated with the disposal of aprons and gowns within the healthcare waste stream. Fines may be imposed by regulatory bodies if the incorrect waste streams are used, therefore staff education and training is required to ensure the correct waste streams are used. There are existing and recurring costs associated with the management of waste and infrastructure required to manage it. GPP8.2. There is a requirement for staff training and education to support compliance with hand hygiene following apron and gown disposal. Settings will need to provide hand hygiene facilities and resources to enable hand hygiene. GPP8.3. There is a requirement for staff training and education, and provision of receptacles and laundry bags to support the placement of reusable gowns in a

Feasibility
designated container or laundry bag(s) in accordance with NHSScotland or organisation's linen policy.

8.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
GPP8.1 to GPP8.3. ARHAI Scotland and associated working groups support extant expert opinion used to underpin these good practice points. GPP8.1. This recommendation is based on two guidelines, graded AGREE II 'Recommend with modifications',[11, 20] and six SIGN 50 Level 4 expert opinion guidance document that were consistent in recommending that disposable aprons and gowns should be disposed of immediately after use, into an appropriate waste stream in accordance with local waste policies.[15, 18, 19, 22, 23, 35] This evidence was considered insufficient for a recommendation due to the limitation of the AGREE-graded guideline documents (i.e., recommendation was based on limited low-quality primary studies and expert opinion), therefore a good practice point was developed. GPP8.2. This good practice point is based on a WHO guideline document, graded AGREE II 'Recommend with modifications', that advises that hand hygiene should be performed following disposal of PPE.[20] This evidence was considered insufficient for a recommendation due to the narrow scope of the WHO AGREE-graded guideline (i.e., ARI-specific) and recommendation was based on limited low-quality primary studies and expert opinion, therefore a good practice point was developed.

Expert opinion
GPP8.3. This good practice point is based on ARHAI Scotland expert opinion that reusable gowns should be placed in a designated container or laundry bag(s) in accordance with NHS Scotland or organisation's linen policy.

8.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state "none". Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
GPP8.1 to GPP8.3. No value judgements to note.

8.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state "none". Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
GPP8.1 to GPP8.3. No intentional vagueness to note.

8.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
GPP8.1 to GPP8.3. No exceptions to note.

8.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
None to note.

Research Question 9. How should aprons/gowns be stored?

Part A: Quality of Evidence

9.1 How reliable is the body of evidence?

(see SIGN 50, section 5.3.1, 5.3.4)

Comment here on the quantity of evidence available on this topic and its methodological quality. Please include citations and evidence levels.

If there is no available evidence to answer the key question, go to section B.

Comments	Evidence level
Four pieces of evidence that addressed the research question were included.[2, 3, 15, 52] • Two guidance were graded SIGN 50 Level 4 expert opinion, mainly due to a lack of robust, evidence-based systematic review to form recommendations.[15, 52] • Two mandatory legislations were also included for this research question.[2, 3] Overall, a low volume and quality of evidence was identified for this research question.	2 x SIGN 50 Level 4 2 x Mandatory.

9.2 Is the evidence consistent in its conclusions?

(see SIGN 50, section 5.3.2)

Comment here on the degree of consistency demonstrated by the evidence. Where there are conflicting results, indicate how the judgement was formed as to the overall direction of the evidence.

Comments
• The Control of Substances Hazardous to Health Regulations 2002 and the Personal Protective Equipment at Work Regulations 1992 mandates the employer to ensure that PPE, including protective clothing, is properly

Comments

stored in a well-defined place.[2, 3] Regulation (EU) 2016/425 (as incorporated into UK law) states that PPE sold on the market must be supplied with relevant storage information.[52]

- Expert opinion guidance published in 2013 by the DoH and HPA recommends that aprons should be stored in a manner that ensures that they do not accumulate dust, which may act as a reservoir for micro-organisms.[15]
- Expert opinion guidance published by the Health and Safety Executive (HSE) advise that employers should provide suitable accommodation for PPE, which should "prevent damage from chemicals, sunlight, high humidity, heat and accidental knocks; prevent contamination from dirt and harmful substances; reduce the possibility of losing the PPE; and enable the sufficient drying of PPE to ensure its effectiveness is maintained".[52]

In summary, the evidence was consistent in recommending that that employers must make provision to store PPE in such a way that prevents damage and exposure to contaminants. However, only limited evidence was available for this research question, and three out of four included evidence is focused on PPE in general rather than being specific to storage of aprons and gowns.

9.3 Is the evidence applicable to Scottish health and care settings?

(see SIGN 50, section 5.3.3)

For example, do the studies include interventions, comparators or outcomes that are common to Scottish health and care settings?

Comments

The country or countries in which the guidance applies are as follows:

- UK (n=4) [2, 3, 15, 52]

The two legislations included are directly applicable to Scottish health and care settings.[2, 3] However, UK legislation is generic to workplaces and not directly

Comments
written for health and care settings – these must therefore be read in full then interpreted and implemented accordingly. The two expert opinion guidance documents published within the UK are directly applicable to Scottish health and care settings.[15, 52]

9.4 Are the studies generalisable to the target population?

Comment here on sample size and methods of sample selection. Is the sample representative of the specific population/group of interest? Generalisability is only relevant to primary research studies.

Comments
There were no primary studies included in relation to this research question therefore issues such as sample size and methods of sample selection are not relevant.

9.5 Are there concerns about publication bias?

(see SIGN 50, section 5.3.5)

Comment here on whether there is a risk in the evidence base that studies have been selectively published based on their results (and thus a risk that results from published studies are systematically different from unpublished evidence).

Comments
Due to the nature of the evidence identified for this research question, which primarily consists of expert opinion guidance documents, it is not possible to ascertain publication bias. A formal assessment of publication bias was not conducted due to the nature of the evidence base.

Part B: Evidence to Decision

9.6 Recommendations

What Recommendations or Good Practice Points are appropriate based on this evidence?

Note the following terminology:

- **"must"** implies that the health and care setting must implement the recommended approach and is used where a recommendation has been directly lifted from legislation or mandatory guidance
- **"should"** implies that the health and care setting "should" implement the recommended approach unless a clear and compelling rationale for an alternative approach is present
- **"should consider"** implies that the health and care setting should consider implementing the recommended approach

Recommendation	Grading
R9.1. Aprons and gowns must be properly stored in a designated area, following the manufacturer's instructions.	Recommendation
GPP9.1. Aprons and 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

9.7 Balancing benefits and harms

Comment here on the potential impact of the Recommendation or Good Practice Point on service users, visitors and staff. Benefits and harms include considerations beyond IPC.

Benefits

List the favourable changes in outcome that would likely occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about benefits.

Benefits
R9.1 and GPP9.1. Appropriate storage will prevent contamination of aprons or gowns and ensure they remain fit for purpose.

Risks and harms

List the adverse events or other unfavourable outcomes that may occur if the Recommendation or Good Practice Point were followed correctly. Be explicit and clear about risks and harms.

Risks and harms
R9.1 and GPP9.1. None anticipated.

Benefit-Harm assessment

Classify as “benefit outweighs harm” (or vice versa) or a “balance of benefit and harm.” Description of this balance can be from the:

- individual service user, staff or visitor perspective
- the societal perspective
- or both of the above

Recommendations or Good Practice Points are possible when clear benefit is not offset by important harms, costs or adverse events or vice versa.

Benefit-Harm assessment
R9.1 and GPP9.1. Only benefits identified.

9.8 Feasibility

Is the Recommendation or Good Practice Point implementable in the Scottish context?

Describe (if applicable):

- financial implications
- opportunity costs
- material or human resource requirements
- facility needs
- sustainability issues
- human factors

or any other issues that may be associated with following a Recommendation or Good Practice Point. State clearly if information on feasibility is lacking.

Feasibility
R9.1 and GPP9.1. Designated appropriate space will be required for storage within each facility. This may be challenging due to local restrictions on space or location. This should form part of a local review. There will also be associated staff resource required to keep the storage area clean, and staff training will be required to ensure compliance with safe storage of aprons and gowns.

9.9 Expert opinion

Summarise the expert opinion used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves expert opinion where evidence is insufficient. Clearly outlining that expert opinion helps users understand their influence on interpreting objective evidence. Expert opinion may also be required where there is no evidence available.

Expert opinion
ARHAI Scotland and associated working groups support the expert opinion use to underpin R9.1 and GPP9.1. R9.1. This recommendation is based on two legislation (The Control of Substances Hazardous to Health Regulations 2002 and the Personal Protective Equipment at Work Regulations 1992) [2, 3] that mandates employers to ensure that PPE is properly stored in a well-defined place,[2, 3] and a SIGN 50 Level 4 expert opinion guidance document that advice following storage instructions provided by manufacturer.[52] GPP9.1. This good practice point is based on two SIGN 50 Level 4 expert opinion guidance documents that advise that aprons and 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.[15, 52]

9.10 Value judgements

Summarise value judgements used in creating the Recommendation or Good Practice Point. If none were involved, state “none”. Translating evidence into action often involves value judgements, which include guiding principles, ethical considerations, or other beliefs and priorities. Clearly outlining value judgements helps users understand their influence on interpreting objective evidence.

Value judgements
R9.1 and GPP9.1. No value judgement to note.

9.11 Intentional vagueness

State reasons for any intentional vagueness in the Recommendation or Good Practice Point. If none was intended, state “none”. Recommendations or Good Practice Points should be clear and specific, but if there is a decision to be vague, acknowledging the reasoning clearly promotes transparency. Reasons for vagueness may include:

- inadequate evidence
- inability to achieve consensus regarding evidence quality
- anticipated benefits or harms, or interpretation of evidence
- legal considerations
- economic reasons
- ethical or religious reasons

Intentional vagueness
R9.1 and GPP9.1. No Intentional vagueness to note.

9.12 Exceptions

List situations or circumstances in which the Recommendation or Good Practice Point should not be applied.

Exceptions
R9.1 and GPP9.1. No exceptions to note.

9.13 Recommendations for research

List any aspects of the question that require further research.

Recommendations for research
None to note.

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Appendix 1 – Guidance documents

The considered judgement form and recommendation system are adapted from the following three guidance documents.

- Update to the Centers for Disease Control and Prevention and the Healthcare Infection Control Practices Advisory Committee Recommendation Categorization Scheme for Infection Control and Prevention Guideline Recommendations. (2019)
- Scottish Intercollegiate Guidelines Network (SIGN). A guideline developer's handbook. (2019)
- Grading of Recommendations, Assessment, Development and Evaluation (GRADE) Handbook. (2013)

Appendix 2 – Definitions

Term used	Description	Evidence
Recommendation	In general, 'Recommendations' should be supported by high- to moderate-quality evidence. In some circumstances, however, 'Recommendations' may be made based on lower quality evidence when high-quality evidence is impossible to obtain, and the anticipated benefits strongly outweigh the harms or when the Recommendation is required by Legislation or Mandatory Guidance.	Sufficient evidence (SIGN 50 level 1++, 1+, 2++, 2+, 3, 4* AGREE Recommend AGREE Recommend (with Modifications)) Legislation, or mandatory guidance
Good Practice Point	Insufficient evidence or a lack of evidence to make a recommendation but identified best practice based on the clinical/technical experience (expert opinion) of the Working Group, with a clear balance between benefits and harms.	Insufficient evidence + Working Group expert opinion OR No evidence + Working Group expert opinion
No Recommendation	Both a lack of pertinent evidence and an unclear balance between benefits and harms.	No evidence

* A Recommendation cannot be developed when there is only SIGN 50 level 4 evidence available.