

Safe Management of Linen Literature Review Executive Summary

Version 1.0

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Introduction

This literature review informs the 'management of linen' content in the National Infection Prevention and Control Manual (NIPCM) and the Care Home Infection Prevention and Control Manual (CHIPCM). See [section 1.7 'Safe Management of Linen'](#) in Chapter 1, [section 2.3 'Safe Management of the Care Environment'](#) in Chapter 2, section 7 ['Safe Management of Linen'](#) in the CHIPCM and [Appendix 8 'Management of Linen at care level'](#).

There are three documents to note:

1. [Literature review](#) which provides a comprehensive systematic review of the evidence
2. [Considered judgement forms](#) which outline the evidence base and expert opinion used to develop the recommendations and good practice points for each literature review research question. Also detailed are the benefits, potential harms, feasibility of implementation, value judgements, intentional vagueness, and exceptions associated with the recommendations and good practice points
3. [Evidence tables](#) which detail all the included studies and provide an assessment of the evidence for each research question of the literature review

Scope

Research Questions

There are 26 research questions (RQ) in this literature review. Seven new RQs were added in this update. Of note, RQ16 explores the risk of infection transmission associated with linen in health and care settings. The effectiveness of antimicrobial-impregnated linen in reducing healthcare-associated infection is assessed in RQ22. Evidence regarding post-laundry disinfection is explored for the first time in RQ23.

- RQs 1–4 cover general issues, including definitions, categories, mandatory requirements, and laundering effectiveness.

- RQs 5–14 cover management of clean and used linen, including uniforms.
- RQs 15–21 cover management of infectious linen and infection transmission risks in healthcare settings.
- RQs 22–23 cover innovative approaches to improve linen safety, such as antimicrobial-impregnated linen.
- RQs 24–25 cover processes for management and disposal of linen deemed unfit for reuse.
- RQ 26 covers handling and management of curtains.

Change to practice

There are no significant changes to practice expected as a result of this literature review update. Although there are new recommendations and good practice points, these are reflective of current practice.

New Good Practice Points (GPPs) and Recommendations

Linen handling and transport

- New GPPs on stock rotation ([GPP7.4](#)), bedmaking rounds ([GPP7.7](#)), pre-wash sorting of used/infectious linen ([GPP10.2](#), [GPP18.1](#)), storage bag fill volumes ([GPP12.2](#), [GPP21.4](#)), and provision of hand rubs and spill kits for drivers ([GPP8.4](#), [GPP13.3](#), [GPP21.3](#)).

Uniforms

- New GPPs advising best practice for uniform storage during transport to and from work for laundering ([GPP14.2](#), [GPP14.3](#)).

Outbreak Investigation

- A new good practice point was introduced advising that linen should be considered a potential source in outbreak investigations, especially when immunocompromised patients or neonates are involved ([GPP16.2](#)).

High-consequence infectious diseases (HCIDs)

- New GPPs on managing linen used for patients with haemorrhagic fevers ([GPP17.5](#), [GPP17.6](#)).

Disposal of unfit linen

- New GPPs and recommendations for identifying and handling linen unsuitable for reuse ([GPP24.1](#), [R24.1](#), [GPP25.1](#)).

Curtains

- New GPPs for putting up and taking down privacy curtains ([GPP26.1](#), [GPP26.2](#), [GPP26.3](#)).

Summary of Recommendations (R) and Good Practice Points (GPP)

Research question 1: What is the definition of linen in health and care settings?

This research question outlined how healthcare linen is currently described within the literature. It therefore does not have any associated recommendations or good practice points.

Research question 2: Are there any legislative/mandatory requirements or standards for the safe handling and processing of linen?

R2.1 The following legislation must be adhered to in the management of linen in Scottish health and social care settings:

- The Control of Substances Hazardous to Health (Amendment) Regulations 2004
- The Personal Protective Equipment at Work (Amendment) Regulations 2022 (PPER 2022)
- The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (also called the Carriage Regulations)

GPP2.1 Linen, linen products and processes used to manage linen should meet the relevant standards detailed in Appendix 3 of the literature review.

Research Question 3: How should linen be categorised?

GPP3.1 Linen which has been processed and is ready for use should be categorised as clean linen.

GPP3.2 Linen that has been used for non-infectious service users, with no visible soiling or contamination by blood or body fluids should be categorised as used linen.

GPP3.3 Linen categorised as used linen should be stored and transported to the laundry in white bags or hampers.

R3.1 Linen used for service users with confirmed or suspected infections, or linen soiled with blood or body fluids (for example, faeces) should be categorised as infectious linen.

GPP3.4 Linen categorised as infectious linen should be stored and transported to the laundry in red bags or hampers.

R3.2 Uniforms visibly contaminated with blood or body fluids should be categorised as infectious linen

GPP3.5 Linen that will be damaged by thermal disinfection should be categorised as heat-labile linen (including used and infectious).

GPP3.6 Shared heat-labile linen should not be used in health and care settings.

GPP3.7 Linen categorised as heat-labile linen should be stored and transported to the laundry in blue bags or hampers. If infectious, the heat-labile linen should be placed in an alginate/water-soluble bag before putting them in the blue bags or hampers.

Research Question 4: What is the available evidence on products or methods for effective laundering of linen?

GPP4.1 The washing process should have a disinfection phase in which the load temperature is maintained at 65°C for at least 10 minutes or at 71°C for 3 minutes or more (thermal disinfection).

R4.1 Heavily soiled items should be processed with an extra pre-wash or sluice cycle.

R4.2 Adequate concentrations of disinfecting agents (according to manufacturer's instructions) should be added when linen is laundered at low temperatures (chemothermal/chemical disinfection).

Research Question 5: How should beds be stripped/made to minimise risk of infection?

GPP5.1 Appropriate PPE should be worn when removing bed linen:

- Infectious linen (soiled with blood or body fluids): single-use disposable non-sterile gloves and single-use disposable aprons (and masks when there is a risk of splashing or spraying)
- Unsoiled infectious linen: single-use disposable aprons (other items of PPE may be used depending on risk assessment)
- Used linen: single-use disposable aprons (other items of PPE may be used depending on risk assessment)

GPP5.2 Gross soiling (e.g. lump of faeces) should be removed before bed linen removal.

GPP5.3 Bed linen should be removed carefully from beds so that the heaviest soil is contained in the centre of the bundle, and unnecessary shaking is avoided to prevent the dispersal of particles.

R5.1 Hand hygiene should be performed as per [NIPCM](#) after changing bed linen.

Research Question 6: How should clean linen be handled?

GPP6.1 Hand hygiene should be performed as per [NIPCM](#) before handling clean linen.

Research Question 7: How should clean linen be stored?

GPP7.1 Clean linen should be stored in a dedicated clean, dry area or a dedicated bay, separate from used or infectious linen.

GPP7.2 The clean linen storage facility (including cupboards, trolleys, pods or similar systems) should be such that linen is protected from dust, vermin, moisture, and unintended or unnecessary handling.

GPP7.3 Clean linen should be stored above floor level, away from water and direct sunlight and in a way that allows free air movement.

GPP7.4 Clean linen should be stored in a way that allows rotation of stock.

GPP7.5 Clean linen storage areas and/or systems should be easily cleanable and have a regular cleaning schedule.

GPP7.6 Hand hygiene facilities should be provided near the bay or space where clean linen is stored.

GPP7.7 Only the appropriate quantity of clean linen required should be taken out for bedmaking rounds. Once taken out on such rounds, they should not be returned to clean linen storage (including sleep-knit storage trolleys or similar systems).

Research Question 8: How should clean linen be transported?

GPP8.1 Clean linen should be protected from contamination during transportation.

GPP8.2 Clean linen should not be transported together with used or infectious linen unless separated by a suitable physical barrier.

GPP8.3 Transport vehicles including trolleys and carts used to transport clean linen must be cleaned daily, whenever they appear soiled and between trips if used to transport used or infectious linen.

GPP8.4 Drivers transporting clean linen should have access to hand rubs and spill kits.

Research Question 9: How should 'used' linen be safely handled?

GPP9.1 Used linen should be handled carefully with minimum agitation.

GPP9.2 Used linen should be placed directly into appropriate bags at the point of use with care taken to check for and remove extraneous items including personal property, loss of which could be distressing for service users and other objects which may cause contamination or injury

GPP9.3 Used linen should not be placed on the floor or other surfaces within the healthcare environment.

GPP9.4 Single-use disposable plastic aprons should be used when handling used linen (other items of PPE may be used depending on risk assessment).

GPP9.5 Wet linen, not assessed as not being infectious (not contaminated by blood or body fluids), should be placed in a leak-proof (or clear plastic) bag before they are placed in the linen hamper.

R9.1 Hand hygiene should be performed as per [NIPCM](#) after handling used linen.

Research Question 10: How should 'used' linen be sorted?

GPP10.1 Linen should be segregated at the point of use (e.g. at the bedside) and bagged appropriately for each category after removing extraneous items including service user personal property and any other items or medical devices.

GPP10.2 Pre-wash sorting should be avoided wherever possible. However, when required, appropriate PPE should be used following risk assessment such as puncture-resistant gloves and single-use disposable plastic aprons.

Research Question 11: How should used linen be labelled?

GPP11.1 The labelling requirements specified in the [National Guidance for safe management of linen in NHSScotland](#) should be followed for labelling used linen and should include information such as hospital, ward/department, and date.

Research Question 12: How should 'used' linen be stored?

GPP12.1 Used linen should be stored in a designated secure area functionally separate from areas where clean linen is stored and inaccessible to the public.

GPP12.2 Bags used to store, or transport used linen should be securely tied and not over three-quarters full.

Research Question 13: How should 'used' linen be transported?

GPP13.1 Used linen should not be transported in the same vehicle as clean linen unless separated by a suitable physical barrier.

GPP13.2 Transport vehicles including trolleys and carts used to transport used linen must be cleaned daily, whenever they appear soiled and between trips if used to transport 'clean linen'.

GPP13.3 Provisions should be made for hand rubs and spill kits for staff involved in the transportation of used linen.

Research Question 14: Is there any specific evidence on the effective laundering of uniforms/scrubs?

R14.1 Uniforms should be washed at 60°C or the highest temperature that can be tolerated by the fabric.

- GPP14.1** Tumble drying and ironing should be carried out according to the uniform care label.
- GPP14.2** Laundered uniforms should be taken to work in a clean bag.
- GPP14.3** Used uniforms should be taken home in a clean bag (This bag should not be reused for taking clean uniforms to work unless it can and has been laundered).
- GPP14.4** Domestic washing machines and tumble driers used for the laundering of uniforms/scrubs should be regularly cleaned and maintained.
- R14.2** Uniforms or scrubs that meet the definition of infectious linen must not be taken home for laundering. They must be laundered in the hospital/facility laundry.
- R14.3** Bleach should not be added to the wash process or used to whiten uniforms.
- R14.4** Detergents suitable for the wearer's skin type should be used in the laundering process.
- R14.5** Hand hygiene should be performed as per the [NIPCM](#) before handling clean uniforms and after handling used or infectious uniforms.

Research Question 15: Is there any evidence regarding washing used/infectious personal clothing at home?

- GPP15.1** Items of service user clothing laundered at home should be washed at the hottest temperature appropriate to the fabric.
- GPP15.2** Service users and their carers should be given [laundry advice leaflets](#) when taking home used or infectious linen.
- GPP15.3** If clothing is heavily soiled or infectious, staff may recommend that clothing be washed in the hospital or care home's laundry

service if available otherwise the item should be disposed of in the appropriate healthcare waste stream following discussion with the service user or their relative(s).

Research Question 16: What is the risk of infection transmission associated with linen in health and care settings?

GPP16.1: Laundries (including in-house laundering within health and care settings) should adhere to “National Guidance for Safe Management of Linen in NHSScotland Health and Care Environments. For laundry services/distribution. v2.2” to reduce the risk of laundry-related infection incidents.

GPP16.2 Linen should be considered as a potential source in outbreak investigation especially when immunocompromised patients or neonates are involved.

Research Question 17: How should infectious linen be safely handled?

GPP17.1 Infectious linen should be handled as follows:

- **Linen soiled with blood or body fluids:** Single-use disposable non-sterile gloves, single-use disposable plastic aprons and following risk assessment, other appropriate PPE as per NIPCM.
- **Unsoiled infectious linen:** Single-use disposable plastic aprons and, following risk assessment, other appropriate PPE as per NIPCM.

GPP17.2 Infectious linen should be handled carefully with minimum agitation

GPP17.3 Infectious linen should be appropriately bagged (as described in GPP17.2) immediately at the point of generation and held away from the body during carriage.

GPP17.4 Infectious linen should be placed in red alginate/water-soluble bags that should then be placed in a leakproof bag and then into the red laundry bag or fabric hampers.

GPP17.5 Linen used by patients with confirmed Ebola virus disease or other haemorrhagic fevers should not be returned to the laundry but disposed of as Category A waste and the laundry should be informed.

GPP17.6 Linen from patients with suspected VHF should be separated and stored safely pending PCR results. (If this is not practicable, they should be treated as Category A waste.) If the PCR test is negative, the linen should be treated as Category B.

R17.1 Hand hygiene should be performed as per [NIPCM](#) after handling infectious linen.

Research Question 18: How should infectious linen be sorted?

GPP18.1 Sorting of bagged infectious linen should be avoided.

Research Question 19: How should infectious linen be labelled?

GPP19.1 Laundry bags or hampers containing infectious linen should be labelled and include information such as hospital, ward/department, and date.

R19.1 Infectious linen used for the care of suspected or confirmed VHF patients that is to be disposed of as waste should be marked and labelled as provided in [SHTN 03-01](#).

Research Question 20: How should infectious linen be stored?

GPP20.1 Infectious linen should be stored in a secure designated area, inaccessible to the public and separate from clean non-infectious linen.

Research Question 21: How should infectious linen be transported?

- GPP21.1** Infectious linen should not be transported in the same vehicle as clean linen unless separated by a suitable physical barrier.
- GPP21.2** Transport vehicles including trolleys and carts used to transport infectious linen must be cleaned daily, whenever they appear soiled and between trips if used to transport 'clean linen'.
- GPP21.3** Provisions should be made for hand rubs and spill kits for those involved in transporting infectious linen.
- GPP21.4** Bags used to store or transport infectious linen should be leak-proof, be securely tied and not be over three-quarters full.

Research Question 22: What is the available evidence for the effectiveness of antimicrobial-impregnated linen in reducing the risk of microorganism transmission?

No recommendations or good practice points.

Research Question 23: What is the available evidence on post-laundry disinfection for linen in healthcare?

No recommendations or good practice points.

Research Question 24: When is linen deemed unfit for reuse?

- GPP24.1** Linen should be deemed unfit for reuse if it contains unremovable staining, is discoloured or shows signs of thermal or physical damage.
- R24.1** Laundries should consider deeming linen unfit for reuse after laundering if it is heavily contaminated with blood and/or body fluids

Research Question 25: How should linen deemed unfit for reuse be safely disposed?

GPP25.1 Damaged linen should be returned via the appropriate stream to the laundry for disposal.

Research Question 26: How should curtains be put up and taken down to minimise transmission of infection?

GPP26.1 When privacy curtains are taken down, they should be unloaded directly into a container at the end of the bed furthest from the patient's head.

GPP26.2 In addition to GPP26.1 the standard operating procedure for curtain changing within the NHSScotland National Cleaning Services Specification should be followed (including provisions on PPE use).

GPP26.3 Hand hygiene should be performed as per NIPCM prior to hanging curtains and after curtains are taken down.