

**Transmission Based Precautions Literature Review:  
Environmental Decontamination  
and Terminal Cleaning**

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<b>HPS ICT Document Information Grid</b>	
<b>Title:</b>	Transmission Based Precautions Literature Review: Environmental decontamination and terminal cleaning.
<b>Purpose:</b>	To inform the Transmission Based Precautions chapter in the National Infection Prevention and Control Manual on environmental decontamination and terminal cleaning in order to facilitate the prevention and control of HAIs in NHSScotland hospital settings.
<b>Target audience:</b>	All NHS Scotland staff involved in the prevention and control of infection in the hospital setting.
<b>Circulation list:</b>	Infection Control Managers, Infection Prevention and Control Teams, Public Health Teams
<b>Description:</b>	<p>This literature review examines the available professional literature on environmental decontamination and terminal cleaning.</p> <p>For the purposes of this review the hospital setting is deemed to include: all services, clinics, or departments in the primary, secondary and tertiary hospital settings – for example, Specialised Centres, District General, Ambulatory Care, Day, Community, Children's.</p> <p>The review did not examine primary care settings, for example, Health Centres, GP surgeries, General Dental Practices, or patient's own homes.</p>
<b>Update/review schedule:</b>	HPS TBP's are updated in real time with changes made to recommendations as required.
<b>Cross reference:</b>	<p>Standard Infection Control Precautions (SICP) Literature Review: Routine cleaning of the environment in the hospital setting <a href="http://www.hps.scot.nhs.uk/haic/ic/publicationsdetail.aspx?id=50113">http://www.hps.scot.nhs.uk/haic/ic/publicationsdetail.aspx?id=50113</a></p> <p>Standard Infection Control Precautions (SICP) Literature Review: Management of blood and body fluid spillages in the hospital setting <a href="http://www.hps.scot.nhs.uk/haic/ic/publicationsdetail.aspx?id=50110">http://www.hps.scot.nhs.uk/haic/ic/publicationsdetail.aspx?id=50110</a></p>
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## 1. Objectives

The aim is to review the extant scientific literature regarding environmental decontamination and terminal cleaning in isolation rooms/cohort areas to form evidence based recommendations for practice. The specific objectives of the review are to determine:

- How should an isolation room/cohort area be decontaminated?
- When should an isolation room/cohort area be decontaminated?
- What is a terminal clean and why is it required?
- When should terminal cleaning be carried out?
- What additional steps are required for a terminal clean?

**Note:**

**Transmission Based Precautions (TBPs) are measures that may be required in addition to Standard Infection Control Precautions (SICPs). It is assumed, for the purpose of this literature review, that all SICPs are adhered to, and therefore are not the focus of this literature review and the associated recommendations.**

## 2. Recommendations

This review makes the following recommendations based on an assessment of the extant scientific literature on environmental decontamination of an isolation/cohort area;

### **How should an isolation room/cohort area be decontaminated?**

The NHSScotland National Cleaning Services Specification should be followed with respect to the decontamination of the isolation room/cohort areas.

**(Mandatory Requirement therefore no grade of recommendation can be made)**

Isolation rooms/cohort areas should be decontaminated by starting from the highest to the lowest point and from the least contaminated to the most contaminated, changing cleaning equipment/solutions when they become soiled.

**(Good practice point (GPP))**

Neutral detergent followed by a disinfectant containing 1000 parts per million (ppm) available chlorine (av cl) (or a combined detergent/disinfectant (1000ppm av cl)) should be used for decontamination of isolation rooms/cohort areas.

**(AGREE rating: Recommend)**

Manufacturer instructions should be followed with regards to the preparation of disinfectants and contact time required for effective disinfection.

**(Good Practice Point (GPP))**

Only cleaning products supplied by employers should be used. Cleaning products should be used in accordance with Control of Substances Hazardous to Health (COSHH) Regulations and manufacturer instructions.

**(Mandatory Requirement therefore no grade of recommendation can be made)**

Environmental decontamination should be thorough and include all frequently touched surfaces.

**(Grade D recommendation)**

Any new products/technologies for decontamination of isolation rooms/cohort areas should be formally assessed (including cost, benefit, potential hazards and user safety) before they are adopted for application in NHSScotland (e.g. via the [Health Innovation Procurement Portal](#) or HAI Commodities Group).

**(Good Practice Point (GPP))**

### **When should an isolation room/cohort area be decontaminated?**

The NHSScotland cleaning specification should be followed with regards to cleaning frequency of isolation rooms within NHSScotland i.e. at least once a day.

**(Mandatory Requirement therefore no grade of recommendation can be made)**

Cleaning frequency should be increased at times of potentially high environmental and equipment contamination, and should be particularly targeted at frequently touched surfaces.

**(Good Practice Point (GPP))**

### **What is a terminal clean and why is it required?**

A terminal clean is defined as: “a procedure required to ensure that an area has been cleaned/decontaminated following discharge of a patient with an infection (i.e. alert organism or communicable disease) in order to ensure a safe environment for the next patient.”

**(Mandatory Requirement therefore no grade of recommendation can be made)**

### **When should terminal cleaning be carried out?**

Terminal cleaning should be carried out after a patient with an alert organism or communicable disease has been discharged (or transferred), in order to ensure a safe environment for the next patient.

**(Mandatory requirement therefore no grade of recommendation can be made)**

**What additional steps are required for a terminal clean?**

The NHSScotland National Cleaning Services Specification should be followed with respect to terminal cleaning.

**(Mandatory Requirement therefore no grade of recommendation can be made)**

Bed screens, curtains and bedding should be removed prior to the room/area being decontaminated.

**(Good practice point (GPP))**



### 3. Discussion

#### How should an isolation room/cohort area be decontaminated?

The NHSScotland National Cleaning Services Specification outlines the tasks required for decontamination of isolation room/cohort area (see [Appendix 1](#)).<sup>1</sup>

**The NHSScotland National Cleaning Services Specification should be followed with respect to the decontamination of isolation rooms/cohort areas.**

**(Mandatory Requirement therefore no grade of recommendation can be made)**

The room should be decontaminated from the highest to the lowest point (e.g. curtain rails to floors) and from the least contaminated to the most contaminated (i.e. from infrequently touched surfaces to surfaces such as shower and toilet areas), changing cleaning equipment/solutions when they become soiled.<sup>2</sup>

**Isolation rooms/cohort areas should be decontaminated by starting from the highest to the lowest point, and from the least contaminated to the most contaminated, changing cleaning equipment/solutions when they become soiled.**

**(Good practice point (GPP))**

When the environment is potentially contaminated, disinfectants such as sodium hypochlorite must be used.<sup>1-8</sup> For disinfectants to work effectively, the surface being decontaminated must be free from organic soil. A neutral detergent solution should be used to clean the environment prior to disinfection or a combined detergent /disinfectant may be used.<sup>9-12</sup>

There is substantial evidence to support the effectiveness of hypochlorite solutions (1000ppm) and sodium dichloroisocynaurate (NaDCC) for the disinfection of surfaces contaminated with norovirus or *C. difficile*.<sup>5;6;8-10;13-16</sup> The effectiveness of disinfectants as part of control measures during outbreaks of other pathogens has also been widely reported.<sup>6;11;15;17-25</sup>

**Neutral detergent followed by a disinfectant containing 1000 parts per million (ppm) available chlorine (av cl) (or a combined detergent/disinfectant (1000ppm av cl)) should be used for decontamination of the isolation room/cohort area**

**(AGREE rating: Recommend)**

Only cleaning products supplied by employers should be used and the solution should be prepared in accordance to manufacturer instructions and local policy. Cleaning products are covered by Control of Substances Hazardous to Health (COSHH) Regulations and are subject to risk assessment before use.<sup>26</sup>

**Manufacturer instructions should be followed with regards to the preparation of disinfectants and contact time required for effective disinfection.**

**(Good Practice Point (GPP))**

**Only cleaning products supplied by employers should be used. Cleaning products should be used in accordance with Control of Substances Hazardous to Health (COSHH) Regulations and manufacturer instructions.**

**(Mandatory Requirement therefore no grade of recommendation can be made)**

Several studies indicate that cleaners may miss or fail to adequately clean certain frequently touched objects in the patient environment such as door handles, toilet handles and light switches.<sup>27-31</sup> This is thought to reflect a ritualistic rather than a risk based approach to cleaning.<sup>32</sup> The risks of HAI resulting from inadequate cleaning have been widely discussed.<sup>4;11;15;17;24;25;33-42</sup> It can therefore be concluded that adequate cleaning procedures must be in place. It is important to ensure that environmental decontamination is thorough and includes all frequently touched surfaces to reduce the risk of acquiring infections from the environment.

**Environmental decontamination should be thorough and include all frequently touched surfaces.**

**(Grade D recommendation)**

A variety of novel disinfection methods have been described in the literature including; hydrogen peroxide vapour (HPV)/mist<sup>43-56</sup>, microfibre cloths<sup>57-61</sup>, ultraviolet (UV) disinfection<sup>62-64</sup>, steam cleaning<sup>65</sup>, novel disinfectants<sup>66;67</sup>, disinfectant/sporicidal wipes<sup>68;69</sup>, and bactericidal surface coatings<sup>70;71</sup>. However, a recent study comparing eight different methods of terminal disinfection including microfibre, steam, HPV and chlorine releasing agents concluded that use of chlorine releasing agents was as effective as more expensive methods such as HPV.<sup>72</sup> There are also several practical and health and safety issues associated with the use of novel disinfection

methods such as time required; requirement for rooms to be cleaned with detergent prior to use of the novel methods; and in the case of hazardous cleaning methods, the requirement for rooms to be vacant during the decontamination process. While some novel technologies are currently being used within the NHS (e.g. microfibre and steam cleaning)<sup>1</sup>, further research is required to adequately assess these in terms of efficacy, cost, potential hazards, and user safety. It is therefore concluded that there is currently insufficient evidence to formulate recommendations on the use of novel decontamination methods. Any new products/technologies should be formally assessed (e.g. cost, benefit, potential hazards and user safety) before they are adopted for application in NHSScotland (e.g. via the [Health Innovation Procurement Portal](#) or HAI Commodities Group).

**Any new products/technologies for decontamination of isolation rooms/cohort areas should be formally assessed (including cost, benefit, potential hazards and user safety) before they are adopted for application in NHSScotland (e.g. via the [Health Innovation Procurement Portal](#) or HAI Commodities Group).**

**(Good Practice Point (GPP))**

### **When should isolation room/cohort areas be decontaminated?**

The NHSScotland cleaning specification<sup>1</sup> outlines the frequency required for decontamination of isolation rooms in NHSScotland hospitals.

**The NHSScotland cleaning specification should be followed with regards to cleaning frequency of isolation rooms within NHSScotland i.e. at least once a day**

**(Mandatory Requirement therefore no grade of recommendation can be made)**

The underpinning scientific evidence is limited, however there is consensus that decontamination should take place regularly (at least once per day) and following patient discharge.<sup>8;73-75</sup> There is clearly a potential for recontamination of frequently touched surfaces during the periods between decontamination. One microbiological study monitored the recontamination of a number of sample sites and found an increase over a seven hour surveillance period<sup>74</sup>, while another study showed recontamination of bed rails occurred 2.5 – 6.5 hours following cleaning and disinfection.<sup>76</sup> This indicates that areas deemed at high risk of contamination may require more frequent cleaning to control specific pathogens.<sup>4</sup> Cleaning

frequency should therefore be increased at times of potentially high environmental and equipment contamination, and should be particularly targeted at frequently touched surfaces e.g. bed rails, door handles, toilets used by patients with gastrointestinal symptoms.

**Cleaning frequency should be increased at times of potentially high environmental and equipment contamination, and should be particularly targeted at frequently touched surfaces.**

**(Good Practice Point (GPP))**

### **What is a terminal clean and why is it required?**

Terminal cleaning is defined in the Health Facilities Scotland's 2009 NHSScotland National Cleaning Services Specification which is applicable throughout Scotland wherever healthcare is delivered (i.e. NHS as well as private independent and voluntary sectors).<sup>1</sup>

A terminal clean is defined as: "a procedure required to ensure that an area has been cleaned/decontaminated following discharge of a patient with an infection (i.e. alert organism or communicable disease) in order to ensure a safe environment for the next patient."<sup>1</sup>

**A terminal clean is defined as: "a procedure required to ensure that an area has been cleaned/decontaminated following discharge of a patient with an infection (i.e. alert organism or communicable disease) in order to ensure a safe environment for the next patient."**

**(Mandatory requirement therefore no grade of recommendation can be made)**

### **When should terminal cleaning be carried out?**

NHSScotland National Cleaning Services Specification states that a terminal clean is required "following discharge of a patient with an infection (i.e. alert organism or communicable disease), in order to ensure a safe environment for the next patient".<sup>1</sup>

**Terminal cleaning should be carried out after a patient with an alert organism or communicable disease has been discharged (or transferred), in order to ensure a safe environment for the next patient.**

**(Mandatory requirement therefore no grade of recommendation can be made)**

**What additional steps are required for a terminal clean?**

The NHSScotland National Cleaning Services Specification outlines the tasks required as part of a terminal clean (see [Appendix 1](#)).<sup>1</sup>

**The NHSScotland National Cleaning Services Specification should be followed with respect to terminal cleaning.**

**(Mandatory requirement therefore no grade of recommendation can be made)**

The National Patient Safety Agency (NPSA) Revised Healthcare Cleaning Manual states that items such as bed screens, curtains and bedding should be removed prior to the room being decontaminated.<sup>2</sup>

**Bed screens, curtains and bedding should be removed prior to the room/area being decontaminated.**

**(Good practice point (GPP))**

### 3.1 Implications for research

A review of scientific evidence on environmental decontamination should inform a revision of the NHSScotland cleaning specification to ensure it is evidence based.

Studies to investigate recontamination of the healthcare environment would inform recommendations on required frequency of decontamination.

Numerous novel technologies are marketed for the decontamination of the healthcare environment. However, the evidence base to support their use is limited. In order for NHSScotland to make informed decisions on use of novel technologies, robust experimental studies are required to assess microbiocidal effectiveness. Other factors such as cost benefit, potential hazards and user safety must also be considered.

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## Appendix 1: Tasks required for daily clean isolation room clean (adapted from NHS Scotland National Cleaning Services Specification).

Accommodation Category	Task groups (surface/categories to be cleaned)	Tasks (mandatory)	Frequency	Tasks (local requirement)
Daily clean isolation room	Hard floor	➤ Remove debris	Monday – Sunday	➤ Steam Clean
		➤ Suction clean		
		➤ Damp mop	1 full	
		➤ Manual Scrub		
		➤ Suction dry		
	Soft floor			➤ Steam Clean
	Sanitary fittings	➤ Clean	7 full/14 check	➤ Steam Clean
	Furnishings	➤ Remove debris	Monday – Sunday	➤ Steam Clean
		➤ Damp clean		
		➤ Periodic clean according to type		
		➤ Clean all wheels and castors	1 full	
	Low level surfaces	➤ Damp clean	Monday – Sunday	➤ Steam Clean
	High level surfaces	➤ Clean ledges, pipes, direction signs	Monday – Sunday	➤ Steam Clean
	Telephones	➤ Damp clean	Monday – Sunday	
	Paintwork – walls and doors	➤ Remove marks	Monday – Sunday	➤ Steam Clean
Glass partitions and panels and ceramic walls	➤ Clean	Monday – Sunday	➤ Steam Clean	
Curtains/screens			➤ Steam Clean	
Window blinds			➤ Steam Clean	
Soap and towels	➤ Replenish supplies	7 full/14 check		
Refuse	➤ Collect and dispose	7 full/14 check	➤ Steam Clean	
	➤ Clean holders/containers			
	➤ Replace disposable liners/containers			
Cleaning equipment	➤ Clean and dry	21 full		