ARHAI Scotland

Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Standard Infection Control Precautions and Transmission Based Precautions Literature Review: Management of Care Equipment

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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	February 2021	SICPs Management of Care Equipment and TBPs Management of Care Equipment (and Environmental Decontamination) reviews were amalgamated and updated using a double reviewer methodology. The questions sets were reviewed and the following changes made: **TBPs Management of Care Equipment** Rephrased the previous objective “What measures are required for the management of patient care equipment when applying TBPs in addition to those outlined in SICPs?” to “What is the correct use of single-use and patient-dedicated equipment when applying TBPs?”

Approvals

This document requires the following approvals

Version	Date Approved	Name
1.0	February 2021	NPGO Steering Group

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Purpose:	To inform the Standard Infection Control Precautions (SICPs) and Transmission Based Precautions (TBPs) sections on the management of care equipment section of the National Infection Prevention and Control Manual in order to facilitate the prevention and control of healthcare associated infections in NHS Scotland.
Target audience:	All health and care staff involved in the prevention and control of infection in Scotland.
Circulation list:	Infection Control Managers, Infection Prevention and Control Teams, Public Health Teams
Description:	This literature review examines the available professional literature on care equipment in the health and care setting.
Update/review schedule:	Updated as new evidence emerges with changes made to recommendations as required.
Cross reference:	National Infection Prevention and Control Manual (NIPCM) http://www.nipcm.hps.scot.nhs.uk NIPCM Literature Review: Management of Blood and Body Fluid Spillages in health and care settings NIPCM Literature Review: Routine cleaning of the environment NIPCM Appendix 7 - Best Practice - Decontamination of reusable non-invasive care equipment
Update level:	Practice – *No significant change to practice* Research – *No significant change*

Contents

1 Objectives

The aim of this review is to examine the extant scientific literature regarding the management of care equipment to form evidence based recommendations for practice.

The specific objectives of the review in terms of SICPs are to determine:

- What is the risk of healthcare associated infection (HAI) from non-invasive reusable, communal care equipment?
- How should care equipment be categorised?
- What is the definition of decontamination?
- When should non-invasive, reusable communal care equipment be decontaminated?
- What are the recommended methods for decontaminating non-invasive, reusable, communal care equipment?
- What is the correct use of detergent in the decontamination of non-invasive, reusable, communal equipment?
- What is the correct use of disinfectant in the decontamination of non-invasive, reusable, communal care equipment?
- Where should non-invasive, reusable communal care equipment be decontaminated?
- Where should decontaminated non-invasive, reusable, communal care equipment be stored?
- Who has responsibility for decontaminating non-invasive, reusable, communal care equipment?

The specific objective of the review in terms of TBPs is to determine:

- What is the correct use of single-use and patient-dedicated equipment when applying TBPs?

Inclusion/exclusion criteria

This literature review considers medical devices and other equipment used in the care of persons in health and care settings under the broad heading of ‘care equipment’. Invasive, high-risk medical devices, single-use and single-patient use equipment are not within the remit of this review; however, they are discussed to inform the section on categorisation of care equipment.

The review concentrates on non-invasive, reusable, communal care equipment. Equipment which is not intended for single-use or single-patient use is defined as ‘communal equipment’. Examples of items which come into this category are: beds and mattresses, blood pressure

cuffs, commodes, drip stands, infusion pumps, lockers, sliding sheets, stethoscopes, trolleys, wheelchairs etc. This list is not exhaustive and is provided to illustrate examples of non-invasive, communal patient care equipment.

2 Methodology

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

3 Discussion

3.1 Implications for practice: SICPs

What is the risk of healthcare associated infection (HAI) from non-invasive, reusable, communal care equipment?

Medical devices and equipment may become contaminated with biological material and act as a vehicle and therefore present a healthcare associated infection (HAI) risk.[1, 2] A number of observational studies have identified non-invasive, reusable care equipment as reservoirs of contamination, for example, commodes,[3] blood pressure cuffs,[4-7] tourniquets,[8] breast pumps,[9] basins,[10] stethoscopes,[11-18] pulse oximeter sensors,[5] electrocardiographic (ECG) telemetry systems[19] and bed handsets.[20] In addition, two systematic reviews have identified evidence of high levels of contamination on non-invasive, reusable care equipment; a substantial proportion of which were also found to be positive for pathogenic or multidrug resistant organisms.[21, 22] One of the systematic reviews also identified evidence of transmission of microorganisms between equipment and patients.[21] For non-invasive reusable communal equipment the severity of this risk is defined in Table 1 as low or medium depending on the exposure rather than the level of contamination.

The main risks for transmitting HAI via non-invasive, reusable, communal care equipment are through secondary transmission on contaminated hands; when equipment becomes intermediate risk through contact with non-intact skin or mucous membranes;[1] or to immunocompromised patients.[22]

How should care equipment be categorised?

Care equipment can be categorised into 4 broad groups:

- Single-use
- Single-patient use
- Reusable invasive equipment
- Reusable non-invasive equipment

This literature review will concentrate on non-invasive, reusable, communal care equipment. To provide context some information is given on the other categories before a fuller definition and discussion on non-invasive, reusable, communal care equipment.

Single-use

Equipment (including medical devices) intended for single-use should not be re-used. Anyone re-using equipment intended for single-use bears full responsibility for its safety and

effectiveness. Re-using equipment intended for single-use can compromise infection control and single-use equipment may be unsuitable for cleaning.[23]

Equipment intended for single-use are marked with the symbol: 

This means the item is intended to be used on an individual patient for a single-use and then discarded. It is not intended to be reprocessed and used again.[23] Equipment intended for single-use may require sterilisation before use and this will be indicated in the manufacturer's instructions. These items cannot be re-sterilised.[24, 25]

Note that equipment should also have CE marking to indicate compatibility with European Union health and safety requirements.[26] Following the United Kingdom's exit from the European Union, a new UK Product marking, the UKCA (UK Conformity Assessed) marking, will be used from 1 January 2021 for goods being placed on the market in Great Britain (England, Wales and Scotland) and covers most goods which previously required the CE marking. CE marked devices/equipment will continue to be accepted in Great Britain until 30 June 2023, refer to Medicines and Healthcare products Regulatory Agency (MHRA) Guidance: Regulating medical devices from 1 January 2020 for more information.[27]

Single-patient use

Single-patient use means equipment may be used more than once on one patient only and the device may undergo some reprocessing and decontamination between each use following the manufacturer's instructions.[23]

Reusable equipment – invasive/non-invasive

The Spaulding classification has been adapted by the Medicines and Healthcare products Regulatory Agency (MHRA),[28] World Health Organization (WHO),[29] Centers for Disease Control and Prevention (CDC)[1] and Health Facilities Scotland (HFS)[23] to categorise reusable medical devices and equipment according to the infection risk associated with their intended use and the subsequent level of decontamination required to render them safe for reuse. Reusable care equipment may be categorised as critical, semi-critical and noncritical and associated risks can be classified as high, medium/intermediate and low.[1, 23, 28, 29] Table 1 provides examples and the recommended level of decontamination.

Table 1: Classification of infection risk associated with the decontamination of medical devices.

Risk category	Application of item	Recommendation	Examples
High (Critical)	In close contact with a break in the skin or mucous membrane Introduced into sterile body areas	Cleaning followed by sterilisation	Needles, surgical instruments, implants
Medium/Intermediate (Semi-critical)	In contact with mucous membranes or body fluids Contaminated with particularly virulent or readily transmissible organisms Prior to use on immunocompromised patients	Cleaning followed by sterilisation or disinfection. Where sterilisation will damage equipment, cleaning followed by high level disinfection may be used as an alternative.	Flexible endoscopes, respiratory equipment, vaginal specula, bedpans, urine bottles
Low (noncritical)	In contact with healthy skin Not in contact with patient	Cleaning (and low level disinfection where necessary)	Blood pressure cuffs, electrocardiogram leads, stethoscopes, pulse oximetry probes

Medical devices are explicitly defined in UK[24] and EU[30] regulations and summarised by HFS[23] as being any instrument, apparatus, appliance, software, implant, reagent, material or other article, whether used alone or in combination, intended by the manufacturer to be used on human beings for the purpose of:

- Diagnosis, prevention, monitoring, treatment or alleviation of disease.
- Diagnosis, monitoring, treatment, alleviation of or compensation for an injury or disability.
- Investigation, replacement or modification of the anatomy or of a physiological or pathological process or state.
- Providing information by means of in vitro examination of specimens derived from the human body, including organ, blood and tissue donations.
- Devices for the control or support of conception.

The UK and EU legislations further define medical devices as not achieving its principal intended action in or on the human body by pharmacological, immunological or metabolic means although it can be assisted by these.[23, 24, 30]

Medical equipment is generally used in the direct or indirect care of patients and can include equipment that does not require CE marking as a medical device however there is no clear definition for the term and there is an overlap with medical devices.[23]

For the purpose of this review care equipment includes medical devices and medical equipment that are non-invasive, reusable and those not intended for single-use or single-patient use defined as 'communal equipment'.

What is the definition of decontamination?

Decontamination is a process which reduces, removes, inactivates or destroys contamination to ensure that infectious agents or other contaminants cannot reach a susceptible site in sufficient quantities to cause infection or any other harmful response.[31] Decontamination can involve cleaning, disinfection and/or sterilisation as required and according to the infection risk.

Cleaning is defined as 'a process which physically removes infectious agents and the organic matter on which they thrive but does not necessarily destroy infectious agents".[31]

Disinfection is defined as a process used to reduce the number of viable microorganisms but which may not necessarily inactivate some infectious agents.[31]

Sterilisation is defined as a process to make an object free from viable microorganisms. It is an absolute term denoting destruction of all microorganisms including spores[31] and is usually carried out in centralised facilities (e.g. Central Decontamination Units [CDU]) by physical or chemical methods.[1] The processes for sterilisation are specified in BS EN ISO 14937:2009.

When should non-invasive, reusable, communal care equipment be decontaminated?

The Healthcare Associated Infection (HAI) Standards[32] and the National Patient Safety Agency (NPSA)'s Revised Healthcare Cleaning Manual (henceforth NPSA cleaning manual)[33] recommend that all non-invasive, reusable, communal care equipment should be decontaminated using an appropriate method for the infection risk:

- as soon as practical after use (e.g. at the point of use)[1]
- between each patient use,
- after soiling,
- at regular intervals, whether in use or not,[32, 33]
- before being inspected,
- before being serviced,
- before being repaired,

- before being loaned out[23]
- before decommissioning, recycling and disposal.[23, 34]

Local schedules should be established that indicate the frequency of regular decontamination.[32, 33] Manufacturer's guidance on the frequency of decontamination should also be followed.[28]

Decontamination should be documented by the person who decontaminated the equipment and decontamination schedules should be audited.[28, 35] A record should be kept and equipment should be disposed of when effective decontamination can no longer be achieved.[23, 28]

What are the recommended methods for decontaminating non-invasive, reusable, communal healthcare equipment?

There is generally a lack of evidence to inform the method for decontaminating care equipment and most recommendations are based on expert opinion or have been extrapolated from evidence related to environmental decontamination. The NPSA cleaning manual[33] outlines procedures for decontaminating particular pieces of equipment. Generic advice from this guidance, the CDC[1] and other best practice statements[36] is to clean care equipment as soon as practical after use (e.g. at point of use), remove visible organic residue (e.g. residue of blood and tissue) and clean systematically from the top or furthest away point of the equipment ensuring at all times to follow any manufacturer instructions. For items such as blood pressure testing equipment and breast pumps the first area to be cleaned should be the area that connects with the patient.[33] Beds and mattresses should be adjusted to a convenient height and cleaned from top to bottom, working downwards to the base and wheels. Mattresses should be cleaned using an S-shaped motion including the underside and all the edges. It is recommended that commodes are cleaned in the sluice/dirty utility room and have their pan, seat and frame cleaned after each use with solutions specified in local protocols.[37]

It is highlighted that items need to be rinsed as residual detergent or disinfectant may be toxic, irritant or interfere with subsequent disinfection processes.[1, 38]

The NPSA cleaning manual[33] advocates that items are left to dry; Price and Ayliffe[38] recommend wiping or air drying and highlight that air drying is best achieved in areas with good ventilation. The importance of drying the item before storage or re-use relates to some microorganisms being able to thrive in moist conditions.[38]

The NPSA cleaning manual advocates the use of a cleaning trolley to hold the bucket and materials used for cleaning equipment, and that the cloth and cleaning solution should be changed when soiled.[33] The NIPCM literature review Routine cleaning of the environment states that cloths and cleaning solutions should be changed when dirty, every 15 minutes and prior to moving to a new location. These recommendations can be applied to the decontamination of patient care equipment but rather than changing cloths and solutions before moving to a new location these should be changed between items of equipment.

Personal Protective Equipment (PPE) should be worn when carrying out cleaning, e.g. disposable apron or gown and gloves, and eye/face protection if splashing is likely to occur; this should be disposed of after use and hand hygiene should be performed.[1, 33]

Health Protection Scotland has produced an A-Z Template for Decontamination of Reusable Communal Patient Equipment to aid staff on the approach and methods of decontamination and can be used in conjunction with the NIPCM's Best Practice: Appendix 7 – Decontamination of reusable non-invasive care equipment. This template is designed to promote consistency of practice across healthcare settings; locally devised A-Zs and checklists already in place which improve compliance with care equipment decontamination can also be used.[39]

During the ongoing COVID-19 pandemic, guidance specific to COVID-19 has been developed for NHS Scotland and added to the National Infection Prevention and Control Manual (NIPCM). In the NIPCM's Scottish COVID-19 Infection Prevention and Control Addendum for Acute Settings, it is recommend that all care equipment should be decontaminated according to the 3 levels of COVID-19 pathway. The pathways are low risk (green) pathway, medium risk (amber) pathway and high-risk (red) pathway. For low-risk (green) pathway, a general purpose detergent should be used for routine cleaning of equipment. See Appendix 7 of the NIPCM for cleaning of equipment contaminated with blood or body fluids or it has been used on a patient with a known or suspected infectious pathogen. For medium (amber), high risk (red) pathways and equipment contaminated with blood/body fluids or been used on a patient with a known or suspected infectious pathogen, equipment should be cleaned with a combined detergent/disinfectant solution at a dilution of 1000 ppm av chlorine or general purpose neutral detergent in a solution of warm water followed by a disinfectant solution of 1000 ppm av chlorine.[40]

What is the correct use of detergent in the decontamination of non-invasive, reusable, communal care equipment?

Soil and organic material such as blood, body fluids, serum, faecal, lubricant material or skin cells present on care equipment can reduce the effectiveness of disinfectants; before disinfection or sterilisation, equipment should first be cleaned with water and a neutral detergent to remove any material that may inhibit disinfection.[1] The use of disinfectants is discussed in more detail below.

Detergent in tepid/warm water should be used to decontaminate equipment.[33] Detergents are effective against organic material but are not antimicrobial. The detergent should be a neutral or near-neutral pH solution.[1] Neutral detergent is recommended as these solutions provide the best material compatibility and are efficient at removing soiling.[1]

Detergent wipes are increasingly being used in health and care settings for cleaning of low risk/noncritical care equipment and it is advised that manufacturer's instructions are followed regarding their use including contact time.[33, 41] Where detergent wipes are used, this should follow the principle of one wipe, one surface and one direction. It is recommended that surfaces are wiped more than once (using multiple wipes) to increase the removal of microbial contamination.[41]

Only cleaning products supplied by employers should be used and the solution should be prepared according to the manufacturer's instructions and local policy.[33] Cleaning products are covered by Control of Substances Hazardous to Health (COSHH) Regulations and will be subject to a risk assessment before use.[33, 42]

What is the correct use of disinfectants in the decontamination of non-invasive, reusable, communal healthcare equipment?

Disinfection should take place if the item becomes an intermediate/medium risk. That is, it comes into contact with mucous membranes, is contaminated with particularly virulent or readily transmitted organisms or prior to use on immunocompromised patients.[28] Disinfection may also take place if the item is visibly soiled with blood or other body fluids[28] (see NIPCM literature review: Management of Blood and Body Fluid Spillages literature in health and care settings) or if there has been an outbreak.[2, 43] Items to be disinfected should be cleaned beforehand to remove soil and organic material.[1, 9, 44]

There is on-going debate in the literature on the routine use of disinfectants in healthcare settings; the decision is complex with both arguments having some merit.[1, 45-47] UK guidance from epic3 guidelines, NPSA cleaning manual and NIPCM recommend the use of disinfectants only in the presence of a recognised risk (e.g. equipment used on patient with known or suspected infection/colonisation, outbreaks) or contamination/spillage of blood and body fluids[2, 33, 48] while the CDC and literature from the USA advocate the routine use of disinfectants for decontaminating care equipment and the environment.[1, 45, 49, 50] Arguments against the routine use of disinfectants include: recolonisation of microorganisms happens too quickly to provide benefit, harmful to environment and may damage surfaces, alleged toxicity of disinfectants, may present an occupational hazard, cost, potential growth of tolerance and resistance among microorganisms to disinfectants and misapplication/misuse of disinfectants can lead to their contamination and present an outbreak risk.[47, 51]

CDC guidelines[1] advocate the routine use of disinfectants for decontaminating care equipment arguing that medical equipment surfaces (e.g. blood pressure cuffs, stethoscopes) can become contaminated with infectious agents and contribute to the spread of healthcare associated infections therefore they should be disinfected with Environmental Protection Agency (EPA)-registered disinfectants. The use of disinfectants will ‘‘provide anti-microbial activity that is likely to be achieved with minimal additional cost or work’.[1] The CDC differentiates between low, intermediate, general (and high) level disinfectants. Low-level and intermediate level disinfectants destroy all vegetative bacteria (except tubercle bacilli), lipid viruses, some non-lipid viruses, and fungi, but not bacterial spores (e.g. alcohol). General disinfectants are effective against both Gram-negative and Gram-positive bacteria. High-level disinfectants are capable of killing bacterial spores when used in sufficient concentration under suitable conditions. The use of low or intermediate level disinfectants are recommended by the CDC guidelines for routine cleaning of care equipment.[1] Manufacturer’s instructions on disinfectant concentration, dilution and contact times should be followed.[1, 52]

The NPSA cleaning manual advises using alcohol wipes after cleaning on the following equipment: audiometer headphones, baby changing mat, bath hoist, disposable bedpan carrier, blood pressure testing equipment, examination couch, infant incubator, mattress, pillow, toys, mechanical ventilators, walking aids, wheelchairs and bedside entertainment system.[33] There are several observational and evaluation studies indicating the effectiveness of alcohol wipes to clean specific types of care equipment, particularly stethoscopes and blood pressure cuffs.[2, 4, 5, 12, 16, 18, 22, 53, 54]

The CDC guidelines highlight that alcohols have 'generally underrated germicidal characteristics'; when used at an optimum concentration (60-90% (v/v) in water) ethyl- and isopropyl alcohol are tuberculocidal, virucidal, fungicidal and rapidly bactericidal against vegetative bacteria.[1] However, alcohols are not sporicidal and can damage some equipment (shellac, rubber and plastics), particularly with prolonged use.[1]

The epic3 guideline states that shared patient equipment should be cleaned and decontaminated after use with the product recommended by the manufacturer however the use of chlorine releasing agents and detergent should be considered for some outbreaks situations.[2]

Sporicidal disinfectant solutions or wipes are recommended for routine cleaning of commodes,[1, 33, 37, 52] although other studies only recommend disinfectant if the commode is visibly contaminated or used by a patient with an enteric infection.[43, 55] Contaminated commodes have been implicated in *Clostridioides difficile* infection (CDI) outbreaks,[56] however there is little literature specifically discussing cleaning or disinfecting commodes as a preventative measure rather than in response to an outbreak. The NIPCM literature review Routine Cleaning of the Environment recommends the use of chlorine releasing agents at 1000 parts per million (ppm) available chlorine (av.cl.) for the routine cleaning of sanitary fixtures such as toilets, however, commodes were not considered as part of that review, however, typically any reusable care equipment that becomes contaminated with blood or body fluids should be disinfected.[57]

As with cleaning products, only disinfectants supplied by employers should be used and products should be prepared in accordance with manufacturer's instructions and local policy.[33] Disinfectants are covered by COSHH Regulations and will be subject to a risk assessment before use.[42]

Where should non-invasive, reusable, communal healthcare equipment be decontaminated?

CDC guidelines recommend that in contrast to critical and semi-critical equipment, most noncritical reusable equipment such as bedpans, blood pressure cuffs, crutches, etc. may be decontaminated where they are used and do not need to be transported to a central processing area however further details were not provided.[1] For non-invasive, reusable, communal healthcare equipment the NPSA cleaning manual advises identifying a "suitable location for cleaning"[33] however this was undefined in the document. A best practice statement from the Department of Health states that equipment that has been used on a non-infected patient in a non-contaminated area should be decontaminated in a designated area and away from clean items.[36] Again though, the designated area is left undefined.

For equipment that has been used in a contaminated area or by/on a patient with a suspected or confirmed HAI the equipment should be decontaminated prior to its removal from that area.[36] Decontamination will include cleaning and disinfection as required by the infection risk as discussed above.

Health Facilities Scotland (HFS)[58] advises that decontamination of care equipment can be carried out in ancillary areas, which may include rooms built to function as dirty utility, clean

utility, domestic services rooms (DSRs), decontamination facility/disposal room, etc. A dirty utility room should include facilities for:

- cleaning items of equipment;
- decontamination of commodes;[37]
- temporarily holding items requiring reprocessing;
- disposal of body fluids;
- hand hygiene.

Space and facilities are required for holding, reprocessing or disposal of bedpans, urinals and emesis (vomit) bowls. Where commodes are to be used, there should be sufficient space to allow for their decontamination and storage of a working stock. Large dedicated deep utility sinks should be available for the disposal of contaminated waste water and for decontaminating materials (cloths, buckets etc.) used in the decontamination of equipment.[58]

Where should decontaminated non-invasive, reusable, communal healthcare equipment be stored?

Decontaminated equipment should be stored separately from used equipment and away from areas where cleaning is taking place.[36]

HFS advise that all healthcare premises should have a storage area for large items of equipment, such as beds, mattresses, hoists, wheelchairs and trolleys which are clean but not in use.[58]

Who has responsibility for decontaminating non-invasive, reusable, communal healthcare equipment?

HDL(2005)07 establishes that Senior Charge Nurses are responsible for all aspects of environmental cleanliness within their clinical area. This includes the authority to require local cleaning services to act on any problems identified.[59]

The NHSScotland Code of Practice for the Local Management of Hygiene and Healthcare Associated Infection refers to a lack of clarity about who is responsible for decontaminating particular items.[17] Additionally, a Health Protection Scotland review[60] found that there was substantial confusion regarding roles and responsibilities for cleaning particular care equipment (e.g. intravenous pumps, equipment carts) and there was unclear designation of cleaning responsibilities between nursing and cleaning staff. There may also be an overlap of cleaning responsibilities which can create confusion leading to missed cleaning opportunities of some items.[60]

In general, local policy should be in place to determine which groups of staff are responsible for the decontamination of care equipment, how often and where this should be undertaken. All staff should be clear on their specific responsibilities for decontaminating equipment and should

receive appropriate training in decontamination protocols including manufacturer's instructions.[28, 34, 44, 60]

The NPSA cleaning manual has generic advice on work schedules for cleaning and nursing staff.[33] As a generalisation, cleaning staff are responsible for the built environment and fixtures and fittings and nursing staff are responsible for care equipment. The nursing staff responsibilities include regular cleaning, after patient use cleaning and cleaning after contamination. The NPSA cleaning manual emphasises that this is general advice and that local policies should be in place and are not bound by its recommendations.[33]

3.2 Implications for practice: TBPs

What is the correct use of single-use and patient-dedicated equipment when applying TBPs?

Single-use disposable care equipment should be used for patients known or suspected to be infected with microorganisms spread by airborne (aerosol), droplet, or contact routes.[52, 61]

The use of dedicated non-critical care equipment (e.g. stethoscopes, blood pressure cuffs, electronic thermometer) for patients infected with microorganisms spread by the airborne (aerosol), droplet, or contact routes has been shown to be effective in preventing cross transmission of infection.[52] Where the use of single-use disposable equipment is not available or practical, dedicated care equipment should be used for patients suspected or known to be infected with microorganisms spread by airborne (aerosol), droplet or contact routes.[52] This equipment must be cleaned and disinfected prior to use on another patient.[44, 52, 61] Appropriate PPE should be used (e.g. disposable gloves, apron) according to the level of anticipated contamination, when handling patient care equipment and devices that are visibly soiled or may have been in contact with blood or body fluids.[52] Hand hygiene should be performed after touching blood, body fluids, secretions, excretions, contaminated/soiled patient care equipment, between patient contacts, after handling soiled patient care equipment, and immediately after removing all PPE.[33, 52]

4 Implications for research

There is a general lack of primary research and evidence-based guidance around cleaning of non-invasive reusable communal equipment with most literature focusing on reprocessing of high-risk critical equipment involving high-level disinfection and sterilisation. There is a larger evidence base on the management of medical devices, control of the environment and management of outbreaks but this cannot always be extrapolated to the routine management of care equipment. The debate continues on the value of using disinfectants on non-critical, low-risk surfaces and equipment. The CDC and US literature are in favour of using disinfectants for routine decontamination of equipment while the UK and some European countries support the use of cleaning rather than disinfection unless there is a presence of a recognised risk. Large studies are needed to provide more substantial evidence on the effectiveness of various

cleaning methods and detergent/disinfectant use. There is a plethora of emerging technology and novel approaches to improve cleaning and decontamination including “no touch” methods for decontamination, ultraviolet (UV) light, self-disinfection surfaces e.g. copper and novel/modified/’green’ disinfectants, etc. however guidance for decontamination have not kept pace with these new technologies in part due to inconsistent or inconclusive evidence regarding efficacy and their ability to reduce healthcare associated infections. Large and high quality studies would be beneficial to confirm their value especially in the context of emerging novel pathogens such as SARS-CoV-2.

5 Recommendations

5.1 Recommendations for standard infection control precautions (SICPs)

What is the risk of healthcare associated infection from non-invasive, reusable, communal care equipment?

The risk of equipment contamination is high but the risk of healthcare associated infection (HAI) to the patient depends on the exposure to non-intact skin or mucous membranes, or on whether the patient is immunocompromised. There is also a risk of secondary contact transmission through hand contamination via contaminated equipment.
(Category B recommendation)

How should care equipment be categorised?

Care equipment can be classified single-use, single-patient use and reusable. It can also be classified according to the infection risk (low, medium/intermediate or high) and as invasive and non-invasive.
(Mandatory)

This review is concerned with non-invasive, reusable, communal care equipment.

What is the definition of decontamination?

Decontamination is a process which reduces, removes, inactivates or destroys contamination to ensure that infectious agents or other contaminants cannot reach a susceptible site in sufficient quantities to cause infection or any other harmful response. Decontamination can involve cleaning, disinfection and/or sterilisation as required and according to the infection risk.
(Category B recommendation)

When should non-invasive, reusable, communal care equipment be decontaminated?

Decontamination should take place:

- between each patient use;
- after blood/body fluid contamination;
- before inspection, servicing or repair;
- before being loaned out;
- before decommissioning, recycling and disposal;
- at regular, pre-defined intervals as part of an equipment cleaning schedule.

(Mandatory)

- as soon as practical e.g. at the point of use
- after visible soiling or contamination

(Category B recommendation)

Non-invasive, reusable, communal care equipment that requires disinfection should first be cleaned with a neutral detergent.
(Category B recommendation)

Disinfection of non-invasive, reusable, communal care equipment should be considered when the equipment has been in a contaminated area e.g. isolation room, or there is an increased risk of a healthcare associated infection.

An increased risk would occur when the item:

- has been in contact with mucous membranes;
- has been contaminated with blood or other body fluids;
- is contaminated with particularly virulent or readily transmissible organisms;
- is to be used on or by immunocompromised patients.

(Category B recommendation)

Regular equipment decontamination should follow local schedules which should be subject to audit and decontamination results being documented.
(Mandatory)

A condition record should be kept and equipment should be disposed of when effective decontamination can no longer be achieved.
(Mandatory)

What are the recommended methods for decontaminating non-invasive, reusable, communal care equipment?

Non-invasive reusable, communal care equipment should be decontaminated following manufacturer instructions. Care equipment should be cleaned with water and detergent prior to disinfection ensuring soil and organic matter are removed.
(Category B recommendation)

General guidance is that items should be decontaminated in a systematic manner from the top or furthest away point of the equipment. For items such as blood pressure testing equipment and breast pumps the first area to be decontaminated should be the area that connects with the patient. Commodes should be cleaned in the sluice/dirty utility room, work from the outside in, from top to bottom and from clean to dirty.

Following decontamination equipment should be rinsed to remove residual detergent or disinfectant and dried (wiping or air drying).
(Category C recommendation)

All materials required (cloths, buckets etc.) should be assembled before commencing decontamination of equipment e.g. on a dedicated trolley. The cloth and cleaning solution should be changed when dirty, at least every 15 minutes and between items of equipment.
(Category C recommendation)

Personal Protective Equipment (PPE) must be worn when carrying out decontamination, e.g. disposable apron or gown and gloves, and eye/face protection if splashing is likely to occur; these must be disposed of after use.
(Mandatory)

Hand hygiene should be performed after disposing PPE.
(Category B recommendation)

What is the correct use of detergents in the decontamination of non-invasive, reusable, communal care equipment?

A neutral detergent in warm/tepid water or detergent wipes should be used to decontaminate non-invasive, reusable, communal care equipment.
(Category B recommendation)

Where detergent wipes are used, an approach of one wipe, one surface and one direction is recommended. Surfaces may be wiped more than once (using multiple wipes) to increase the removal of microbial contamination.
(Category C recommendation)

Only products recommended by the manufacturer and supplied by employers should be used. Products should be used in accordance with Control of Substances Hazardous to Health (COSHH) Regulations and manufacturers' instructions.
(Mandatory)

What is the correct use of disinfectants in the decontamination of non-invasive, reusable, communal care equipment?

Chlorine releasing agents should be used for the disinfection of non-invasive reusable, communal care equipment, as standard. If the item cannot withstand chlorine releasing agents consult the manufacturer's instructions for a suitable alternative e.g. alcohol.
(Category C recommendation)

Disinfectants may be used routinely to decontaminate specific items of non-invasive, reusable, communal care equipment if recommended by the manufacturer e.g. alcohol on stethoscopes.
(Category C recommendation)

Only products recommended by the manufacturer and supplied by employers should be used. Products should be used in accordance with Control of Substances Hazardous to Health (COSHH) Regulations and manufacturers' instructions.
(Mandatory)

Where should non-invasive, reusable, communal care equipment be decontaminated?

Some care equipment (e.g. blood pressure cuffs, stethoscopes) can be decontaminated where they are used.
(Category B recommendation)

Equipment that has been used in a contaminated area or by, or on, a patient with a suspected or confirmed infection should be decontaminated prior to its removal from that area.
(Category C recommendation)

Equipment that has been used on a non-infected patient in a non-contaminated area should be decontaminated in a designated area and away from clean items.
(Category C recommendation)

Decontamination of some care equipment can be carried out in dedicated dirty utility rooms/sluice which should include facilities for:

- cleaning items of equipment;
- decontamination of commodes;
- temporarily holding items requiring reprocessing;
- disposal of body fluids;
- hand hygiene.

Large dedicated sinks should be available for the disposal of contaminated waste water and for decontaminating materials (cloths, buckets etc.) used in the decontamination of equipment. Hand wash sinks must not be used for the decontamination of equipment.
(Category C recommendation)

Where should decontaminated non-invasive, reusable, communal care equipment be stored?

Decontaminated equipment that is not in use should be stored separately from used equipment and away from areas where decontamination is taking place.
(Category C recommendation)

Health Facilities Scotland advise that all healthcare premises should have a storage area for large items of equipment, such as beds, mattresses, hoists, wheelchairs and trolleys which are clean but not in use.
(Category C recommendation)

Who has responsibility for decontaminating non-invasive, reusable, communal care equipment?

A named person or persons e.g. charge nurses should be responsible for all aspects of environmental cleanliness within their care area. This includes the cleanliness of non-invasive, reusable, communal healthcare equipment.
(Mandatory)

A local decontamination policy should be in place to determine which groups of staff are responsible for the regular decontamination of care equipment and all staff should be clear on their specific responsibilities for decontaminating equipment and trained accordingly.
(Category C recommendation)

5.2 Recommendations for transmission based precautions (TBPs)

What is the correct use of single-use and patient-dedicated equipment when applying TBPs?

Single-use disposable care equipment should be used for patients known or suspected to be infected with microorganisms spread by airborne (aerosol), droplet, or contact routes.
(Category B recommendation)

Where the use of single-use disposable equipment is not available or practical, dedicated care equipment should be used for patients suspected or known to be infected with microorganisms spread by airborne (aerosol), droplet or contact routes. This equipment must be cleaned and disinfected prior to use on another patient.
(Category B recommendation)

Appropriate PPE should be worn (e.g. disposable non-sterile gloves, gowns or aprons) according to anticipated level of contamination, when handling patient care equipment that is visibly soiled or may have been in contact with blood or body fluids.
(Category B recommendation)

Hand hygiene should be performed after removing and disposing of PPE.
(Category B recommendation)

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Appendix 1: Grades of Recommendation

Final recommendations are given a grade to highlight the strength of evidence underpinning them, the NIPCM grades of recommendations are as follows:

Grade	Descriptor	Levels of evidence
Mandatory	Recommendations' that are directives from government policy, regulations or legislation	N/A
Category A	Based on high to moderate quality evidence	SIGN level 1++, 1+, 2++, 2+, AGREE strongly recommend
Category B	Based on low to moderate quality of evidence which suggest net clinical benefits over harm	SIGN level 2+, 3, 4, AGREE recommend
Category C	Expert opinion, these may be formed by the NIPC groups when there is no robust professional or scientific literature available to inform guidance.	SIGN level 4, or opinion of NICP group
No recommendation	Insufficient evidence to recommend one way or another	N/A