

**Literature Review and  
Practice  
Recommendations:  
Existing and emerging  
technologies used for  
decontamination of the  
healthcare environment**

**Wipes**

**Version 2.0**

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## Key Information

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## Document information

Document item	Description
<b>Description:</b>	This literature review aims to review the evidence base for using pre-prepared/ready-to-use wipes for decontamination of the health and care environment and reusable non-invasive patient care equipment
<b>Purpose:</b>	To inform the existing and emerging technologies used for decontamination of the health and care environment section on pre-prepared/ready-to use wipes.
<b>Target Audience:</b>	All staff involved in the prevention and control of infection in Scotland.
<b>Update/review schedule:</b>	Updated as new evidence emerges with changes made to recommendations as required.  Review will be formally updated every 3 years with next review in 2025.
<b>Cross reference:</b>	<a href="#"><u>National Infection Prevention and Control Manual</u></a> <a href="#"><u>Safe Management of the Care Environment literature review</u></a> <a href="#"><u>Management of Care Equipment literature review</u></a>
<b>Update level:</b>	Practice – No significant change to practice.  Research – This review calls for research into wipes with suitable comparisons and control methods, as well as studies assessing the efficacy and feasibility of different wipe formulations in clinical settings against a range of microorganisms.

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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
2.0	Dec 2022	<p>Update of evidence base using the two-person methodology as described in the <a href="#">National Infection Prevention and Control Manual (NIPCM) methodology</a>.</p> <p>Objectives added:</p> <ul style="list-style-type: none"> <li>• What is the current guidance or legislation regarding the use of wipes in health and care settings?</li> <li>• When should wipes be used in health and care settings?</li> </ul> <p>Objective rephrased:</p> <ul style="list-style-type: none"> <li>• What are the different types of wipes used in health and care settings and what is their actual or proposed mechanism of action?</li> <li>• Removal of objectives:</li> <li>• Are wipes currently in use in UK healthcare settings?</li> <li>• Have wipes been assessed by the Rapid Review Panel?</li> </ul> <p>New recommendations added.</p>
1.0	May 2017	Final for publication

## Approvals

Version	Date Approved	Name
2.0	Dec 2022	Infection Control in the Built Environment and Decontamination (ICBED) Working Group
1.0	May 2017	ICBED Working Group

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## 1. Objectives

The aim is to review the extant scientific literature regarding the use of 'pre-prepared' or 'ready-to-use wipes' for decontamination of the health and care environment and reusable [non-invasive/low-risk patient care equipment](#) (in contact with healthy skin/no patient contact) to inform evidence-based recommendations for practice.

'Pre-prepared wipes'/'ready-to-use wipes' will be referred to as 'wipes' for the purpose of this review.

This review does not cover patient cleansing wipes/personal hygiene wipes or wipes used for decontamination of reusable invasive/semi-invasive and high-risk equipment.

The specific objectives of the review are to determine:

- What are the different types of wipes used in health and care settings and what is their actual or proposed mechanism of action?
- What is the current guidance or legislation regarding the use of wipes in health and care settings?
- When should wipes be used in health and care settings?
- What is the scientific evidence for effectiveness of wipes for decontamination of the healthcare environment?
- What is the procedure for using wipes?
- Are there any safety considerations associated with using wipes in the health and care setting?
- Are there any practical or logistical considerations associated with using wipes in the health and care setting?
- What costs are associated with using wipes in the health and care setting?

## 2. Methodology

This targeted literature review was produced using a defined two-person systematic methodology as described in the National Infection Prevention and Control Manual (NIPCM): [Development Process](#).

## 3. Discussion

### 3.1 Implications for practice

**What are the different types of wipes used in health and care settings and what is their actual or proposed mechanism of action?**

The two main categories of wipes, as per the categorisation by the Royal College of Nursing- (RCN), that are commonly used for decontamination of the healthcare environment and reusable non-invasive/low risk patient care equipment are detergent and disinfectant wipes.<sup>1</sup>

#### **Detergent wipes**

Detergent wipes are formulated to remove contamination from surfaces.<sup>2</sup> The major ingredients of detergent wipes are surfactants, which are commonly combined with additional compounds including preservatives, enzymes, and perfume, they do not contain an active ingredient intended to kill microorganisms.<sup>3</sup> Inclusion of a disinfectant to detergent wipes may provide some antimicrobial activity, although this may be limited based on contact time, surface type and amount of contamination present. Microorganisms not removed by detergent wipes should remain inactivated but may still be transferred to other surfaces via inadequately wiped equipment or hands of staff.<sup>1</sup>

#### **Disinfectant wipes**

Disinfectant wipes contain a disinfectant agent (with an active ingredient) which provides antimicrobial activity, an additional detergent may or may not be added for cleaning purposes.<sup>1</sup> Disinfectant wipes without detergent properties have limited cleaning activity and use of a detergent cleaning agent/detergent wipe is therefore necessary prior to use of disinfectant wipes.<sup>1</sup> For disinfectant wipes with detergent additives, the relationship between detergent and

microbicidal composition needs to be exact, as the wrong formulation may lead to inefficient removal of the microbial bioburden from surfaces as well as the potential for pathogens to be transferred between surfaces during wiping.<sup>4</sup> There is no evidence to suggest that disinfectant wipes (impregnated with detergent additives) perform differently to disinfectant wipes hence no separate category has been made for them.

The mechanism of action of disinfectant wipes is largely dependent on the active ingredient/s within the formulation. Active ingredients within disinfectants have been discussed in SIGN level 4 guidance from the Royal College of Nursing<sup>1</sup> and the US Centers for Disease Control and Prevention (CDC)<sup>5</sup> guidelines on disinfection and sterilisation in healthcare facilities, although there is little agreement regarding the concentrations at which these are effective against a variety of microorganisms. The following active ingredients are commonly found within wipe formulations:

- Alcohols
- Quaternary Ammonium Compounds (QACs), Phenols and Biguanides

Note: QACs are not a commonly used disinfectant in Scottish health and care settings as they have limited sporicidal efficacy and minimal activity against non-enveloped viruses.<sup>1</sup>

- Chlorine and Chlorine Compounds such as hypochlorites which are the most widely used disinfectants in this category.<sup>5</sup>
- Hydrogen peroxide
- Peracetic acid

It was not within the remit of this review to perform a detailed analysis of each active ingredient used within wipe formulations.

## **What is the current guidance or legislation regarding the use of wipes in health and care settings?**

There is currently no mandatory UK standard or legislation to support the wide scale use, selection, and procurement of detergent and disinfectant wipes in health and care settings. In the absence of an accepted standard test for wipes, information on their effectiveness can only be gained from laboratory testing data and manufacturer's claims of effectiveness.<sup>1</sup> The



standards that are available are generic to liquid disinfectants which typically do not account for the physical wiping action of wipes or the application of practice relevant contact times.<sup>1</sup> Refer to [Appendix 1](#) for a list of the available standards. Details on laboratory testing methods have been covered in [Appendix 2](#).

SIGN level 4 expert guidance from the RCN recommends that decisions regarding the use of wipes for decontamination of non-critical/low-risk equipment (in contact with healthy skin/ no patient contact) and near-patient environment should reflect local infection prevention and control (IPC) policies and advice sought from IPC advisers.<sup>1</sup>

Under all circumstances, Control of Substances Hazardous to Health (COSHH) Regulations should be adhered to with regards to storage and usage of all products.<sup>6</sup> These regulations are mandatory.

## **When should wipes be used in health and care settings?**

The evidence identified in this section and assessed as per SIGN 50 methodology comprised of two Level 1 controlled trials,<sup>7,8</sup> nine Level 3 studies which included four experimental studies,<sup>3, 9-11</sup> two before and after studies<sup>12, 13</sup> and three clinical studies.<sup>14-16</sup> In addition, 10 Level 4 expert guidance documents were also included.<sup>2, 5, 17-22 23, 24</sup>

Based on the identified evidence, wipes are broadly used in the following categories in health and care settings:

- routine general cleaning of surfaces (physical removal of contamination, not disinfection of infectious agents);<sup>2, 3, 17, 18, 23, 24</sup>
- disinfection (inactivation or destruction of microorganisms) and/or decontamination (removal of contamination and destruction of infectious agents) of low risk/non-critical patient equipment and/or environmental surfaces<sup>5, 8-11, 13-17, 19-22</sup>
- terminal cleaning.<sup>7 12</sup>

## Detergent wipes

In the United Kingdom, detergent wipes are commonly used in health and care settings to clean surfaces.<sup>3</sup>

### Routine general cleaning of surfaces

SIGN level 4 evidence from the UK National Patient Safety Agency (NPSA) Revised Healthcare Cleaning Manual<sup>17</sup>, Royal College of Nursing expert guidance<sup>2</sup> and local policy from UK trusts<sup>18</sup> all refer to the use of detergent wipes mainly for the purpose of dirt/contamination removal from surfaces. The NPSA healthcare cleaning manual also refers to the use of detergent wipes specifically for routine vehicle interior cleaning.<sup>17</sup> SIGN level 4 expert guidance for augmented units from the Department of Health (Health Technical Memorandum 04-01 part C ) recommends the use of single-use detergent wipes for cleaning incubators and explicitly states that where a combined disinfectant agent is used within the wipe formulation, it should not cause damage to the material of the incubator and should never be used while incubators are occupied.<sup>23, 24</sup>

## Disinfectant Wipes

SIGN level 4 guidance from the RCN advises that disinfectant wipes may be used in health and care settings for disinfecting environmental surfaces as well as many types of non-critical/low-risk patient equipment.<sup>2</sup> In addition, SIGN level 4 guidance from a UK trust and the RCN clearly state that disinfectant wipes are not required for routine cleaning and should only be used if those receiving care have a known/suspected infection or if the care equipment is contaminated with blood or body fluids, and in accordance with local policy and guidelines.<sup>1, 18</sup> In addition, it is essential that cleaning be carried out before the process of disinfection, otherwise it will not be effective due to the presence of organic matter.<sup>18</sup>

### Disinfection of low-risk care equipment and decontamination of environmental surfaces

Eight studies<sup>9 10 15, 16 8 11 13, 14</sup> including one SIGN level 1 randomised controlled trial (RCT) and seven SIGN level 3 studies evaluated the use of wipes for disinfection of low-risk patient care equipment (for example anaesthesia machines, re-useable oxygen tubing connectors, electronic devices) and decontamination of environmental surfaces in the near patient environment (for example high-touch surfaces such as bed rails, lockers, patient chair, door handle, toilet seat, toilet flush handle, commode top, call button, tray table, bed controls, toilet grab handle).

SIGN level 4 expert opinion from Canada recommends that disinfectant wipes may be used for point-of-care disinfection and disinfection of non-critical patient medical devices, specifically those that cannot tolerate soaking, although no specific wipe types were mentioned in the guidance documents.<sup>21, 22</sup> Another expert guidance document by the Medical and Healthcare Products Regulatory Agency (MHRA) assessed as level 4 by SIGN 50 methodology on the topic of sterilisation, disinfection and cleaning of medical equipment is in agreement with Canadian guidance and recommends the use of alcohol wipes for manual cleaning of care equipment that cannot tolerate soaking, specifically those with electrical contacts/elements (for instance switches and buttons).<sup>20</sup> The guidance further states that non-immersion, manual cleaning is not considered a disinfection process, but where an alcohol wipe is used, it may have a disinfecting effect.<sup>20</sup>

The UK NPSA Revised Healthcare Cleaning Manual mentions the use of sporicidal disinfectant wipes for disinfecting commodes and alcohol wipes for disinfecting audiometer headphones, baby changing mats, bath hoists, carriers for disposable bedpans, bedpan storage racks, blood pressure testing equipment, examination couches, infant incubators, mattresses, impermeable pillow covers, toys and play equipment, mechanical ventilators, walking aids, wheelchairs, and bedside entertainment systems.<sup>17</sup> Of note, the alcohol wipes recommended should be used after manual cleaning of the equipment with general purpose detergent therefore, the wipes may have a disinfecting effect provided that manufacturer's instructions are followed.<sup>17</sup> SIGN level 4 expert opinion within the guideline for Disinfection and Sterilization in Healthcare Facilities from the CDC also states that alcohol wipes are commonly used to disinfect small surfaces such as rubber stoppers of medication vials/vaccine bottles.<sup>5</sup> In addition, the CDC guideline also refers to the use of a QAC based wipe (also containing 70% isopropyl alcohol, phenol and a chlorine agent) for efficient removal of contaminants from computer keyboards.<sup>5</sup>

SIGN level 4 COVID-19-specific interim guidance from the World Health Organization mentions the use of alcohol or chlorine wipes for disinfection of the following complementary medical equipment; infrared thermometers, digital thermometers and portable electrocardiographs in medical wards.<sup>19</sup>

**Terminal cleaning:**

Two studies including one cluster controlled trial<sup>7</sup> and one SIGN level 3 before and after study<sup>12</sup> evaluated the use of wipes for daily and terminal cleaning of medical wards for *Clostridioides difficile* infection (CDI), Vancomycin-resistant *Enterococcus* (VRE), and Methicillin-resistant *Staphylococcus aureus* (MRSA).

In summary, detergent wipes are commonly used in health and care settings for routine cleaning of surfaces, whereas disinfectant wipes are used for disinfection of environmental surfaces and non-critical/low-risk patient care equipment and for terminal cleaning.

## **What is the scientific evidence for effectiveness of wipes for decontamination of the healthcare environment?**

Although various efficacy tests are used to infer disinfectant wipe effectiveness, there is currently no mandatory UK standard.<sup>1</sup> The standards available are generic to liquid disinfectants and rely on proxy test methods such as non-standard wipe tests, surface tests and suspension tests which typically do not account for physical wiping action or the application of practice relevant contact times.<sup>1</sup> Refer to [Appendix 2](#) for a brief explanation of each proxy test method as described in UK and EU SIGN level 4 expert guidance.<sup>1,25</sup> Another piece of guidance from the RCN assessed as SIGN level 4 has stated that manufacturers should provide test data on the efficacy of any wipe active ingredients using short contact times (for example 30 seconds) used in clinical settings and in the presence of realistic levels of organic matter.<sup>1</sup>

The majority of the included evidence on wipes effectiveness related to disinfectant wipes, with the exception of only two studies which examined detergent wipes.<sup>3, 26</sup> The most common organisms under study were *C. difficile*, MRSA, VRE, *Acinetobacter baumannii*, surrogate viruses as well as other Gram-negative bacteria. The evidence identified included one SIGN level 1 randomised controlled trial,<sup>8</sup> 13 SIGN level 3 experimental studies<sup>3, 4, 26-37</sup> and eight SIGN level 3 clinical studies<sup>9-16</sup> (further details of each study type discussed within each individual section).

### **Detergent wipes**

Detergent wipes are not considered to exhibit 'bactericidal' properties and therefore do not conform to the above standards. Only two SIGN level 3 studies<sup>3, 26</sup> examined the efficacy of detergent wipes, both using in-vitro laboratory testing with the 3-step protocol by Williams

et al.<sup>27</sup> The three-step method (ASTM Standard E2967-15) by Williams et al., is more specific for testing wipe effectiveness, in comparison to the BS EN Standards. The method is designed to reproducibly test the efficacy of wipes in a manner which reflects use in practice. This method has since been adopted in a number of studies<sup>3, 4, 26, 36</sup> and assesses wipe removal of microorganisms from surfaces, the transfer of microorganisms from wipes to surfaces and the direct antimicrobial activity of wipes.

Ramm et al., used the 3-step protocol to compare the efficacy of seven commercially available detergent wipes for the removal of *Acinetobacter baumannii*, *Staphylococcus aureus* and *Clostridioides difficile* spores from stainless steel discs.<sup>3</sup> Wipe efficacy varied considerably, depending on both wipe type and organism. In general, wipes which removed the most bacteria from discs were also associated with high levels of bacterial transfer between surfaces. This was most apparent with *S. aureus* and *C. difficile*. *A. baumannii* was removed most efficiently by all detergent wipes and was associated with the lowest level of transfer. As expected, none of the detergent wipes exhibited direct bactericidal activity. Authors of the study acknowledge that performance of the detergent wipes may have been influenced by the type and quality of the raw materials used in the wipe (woven/non-woven), the liquid to wipe ratio, and the packaging of the product rather than active ingredients alone.<sup>3</sup>

Another SIGN level 3 experimental study used the 3-step protocol to compare the efficacy of a detergent wipe (containing dimethyl oxazolidine and parfum) and a disinfectant wipe (containing two QACs and a biguanide as active ingredients) for the removal of *S. aureus* from steel discs.<sup>26</sup> There was no significant difference between the two wipes in microorganism removal, in the presence or absence of an organic load, with the exception of Methicillin-resistant *S. aureus* (MRSA) strains 49 and 55 where the QAC and biguanide wipe showed significant bactericidal activity in the absence of organic load. In addition, significant viable counts were obtained from both wipes, indicating that wipes have the potential to transfer organisms between surfaces. The disinfectant wipe was found to exhibit this to a lesser extent. As expected, only the disinfectant wipe exhibited bactericidal activity. It must be noted that these results may not be transferable to other bacteria.<sup>26</sup> These findings have limited applicability as Quat-based compounds are not a commonly used disinfectant in Scottish health and care settings owing to their limited sporicidal efficacy and nil or minimal activity against non-enveloped viruses within the exposure times that are achieved in practice.<sup>1</sup>

## Disinfectant wipes

A significant number of regulations and standards are available for testing the efficacy of liquid disinfectants, although there are no internationally acceptable standards available to test for wipes. The studies identified for disinfectant wipes as part of this review used various methods of assessing the efficacy of wipes against a range of microorganisms.

The evidence identified has been categorised according to the main active ingredient:

- peracetic acid
- sodium hypochlorite
- hydrogen peroxide
- disinfectant wipe (impregnated with additional ingredients)
- wipes with other active ingredients

The studies identified can broadly be divided into the following categories:

- in-vitro laboratory studies with levels of bioburden as outcome measure
- clinical studies with levels of bioburden as outcome measure
- clinical studies with incidence of Healthcare Associated Infections (HAI) as outcome measure.

### Peracetic acid

In two SIGN level 3 studies, peracetic acid wipes were found to be more effective than wipes containing other active ingredients against micro-organisms like human surrogate viruses (norovirus, adenovirus type 5 and polyomavirus SV40)<sup>35</sup> and multi-drug resistant organisms (MDROs).<sup>16</sup> In contrast, results from a SIGN level 3 pilot study demonstrated that peracetic acid wipes were no more effective than the traditional method already in use in the hospital (QAC/alcohol) in decreasing HAI rates of Gram negative and Gram positive organisms.<sup>14</sup>

### **In-vitro laboratory studies with levels of bioburden as outcome measure**

Becker et al., evaluated virus inactivation by four commercially available disinfectant wipes including peracetic acid based (PAA-based) wipes, using the 4-field test methodology based on the principle of the existing EN 16615:2015 standard.<sup>35</sup> The test evaluates the ability of disinfectant wipes to remove bacteria and fungi from a contaminated test field and the potential transfer between surfaces. Surrogates of human norovirus, adenovirus (AdV) type 5 and polyomavirus SV40 (SV40) were chosen as test viruses. The PAA-based wipe was able to inactivate all three test viruses and no residual virus could be detected on the wipe after usage. The QAC-based products failed to reach such reduction. Authors of the study concluded that the principle of the existing EN 16615:2015 can be transferred successfully to viruses.<sup>35</sup>

### **Clinical studies examining effect of a wipe intervention on levels of bioburden**

A SIGN level 3 controlled crossover study conducted in the UK (in 2 identical surgical and cardiovascular wards) evaluated whether daily use of a peracetic acid/hydrogen peroxide pre-impregnated wipe in place of the existing standard practice (detergent cleaning with cloth soaked in a bucket containing 1,000 ppm chlorine) led to a significant reduction in surface microbial contamination with multidrug resistant organisms (MDROs).<sup>16</sup> The peracetic acid/hydrogen peroxide wipes were found to significantly ( $P < 0.001$ ) reduce surface microbial bioburden from high-touch surfaces in the 2 wards compared to the standard practice. In the baseline period, 7% (35 / 522) of all sites sampled were positive for VRE, carbapenem-resistant *Enterobacteriales* (CRE), or extended spectrum beta-lactamases (ESBL) whereas, introduction of pre-impregnated wipes reduced this to 1% (5/522). A major limitation of this study was that the investigators were unable to get an accurate figure of patient infection rates for the trial period, and they also did not measure the influence of other hygiene measures, such as handwashing.<sup>16</sup>

### **Clinical studies examining effect of a wipe intervention on incidence of healthcare associated infections (HAIs)**

A controlled pilot study assessed as SIGN level 3 that was conducted in a UK elderly care hospital found no significant decrease in weekly HAI rates or weekly detection rates of indicator organisms (Gram-negative and Gram-positive organisms) when peracetic acid sporicidal wipes were used instead of the traditional hospital disinfection method

(quaternary ammonium compound and alcohol wipes).<sup>14</sup> This study is limited by the fact that it was conducted in a low-burden HAI scenario, further studies are needed to evaluate the effectiveness of the wipe intervention in high-burden HAI scenarios, as well as comparing the wipe intervention to other methods of disinfection.<sup>14</sup>

### **Sodium hypochlorite:**

The results of eight<sup>9, 10, 12, 29, 32-34, 36</sup> SIGN level 3 studies identified as part of this literature review demonstrated greater efficacy of sodium hypochlorite wipes compared to wipes containing other active ingredients/formulations, whereas in one SIGN level 3 study<sup>37</sup> there was no significant difference between the spray and wipe containing sodium hypochlorite. Sodium hypochlorite wipes were found to be effective against microorganisms such as *Bacillus atrophaeus* and *Clostridium sporogenes* spores (surrogate organisms for *C. difficile* and *B. anthracis*, respectively)<sup>9</sup>, *S. aureus*<sup>29, 32, 33, 36</sup>, *A. baumannii*<sup>36</sup>, *S. pneumoniae*<sup>10</sup>, *C. difficile*<sup>12</sup>, *P. aeruginosa*<sup>29</sup> and other vegetative bacteria and spores.<sup>34</sup> In contrast, an experimental study found that wipes containing sodium hypochlorite performed similarly to sporicidal sprays at removing/inactivating *C. difficile*.<sup>37</sup> The concentration of sodium hypochlorite in wipes was 0.55% within the majority of studies, unless specified.

### **In-vitro laboratory studies with levels of bioburden as outcome measure:**

Three SIGN level 3 experimental studies used an Environmental Protection Agency (EPA) approved method (this is a USA approved lab method) to quantify bactericidal efficacy of sodium hypochlorite disinfectant wipes using plastic/Formica/glass sheets.<sup>29 33</sup>  
<sup>32</sup> West et al., investigated the efficacy of 0.55% sodium hypochlorite wipes against *S. aureus* and *P. aeruginosa* using the EPA approved method.<sup>29</sup> The sodium hypochlorite products were found to be more efficacious than QAC-based products against both *S. aureus* and *P. aeruginosa*. As expected, wiping larger surface areas led to reduced bactericidal efficacy of disinfectant products with higher log<sup>10</sup> reduction values achieved when wiping one ft<sup>2</sup> and two ft<sup>2</sup> areas ( $p = 0.0006$ ,  $p = 0.0015$ , respectively) as compared to eight ft<sup>2</sup>. All products tested were more effective against *P. aeruginosa* in comparison to *S. aureus* ( $p = 0.0083$ ).<sup>29</sup> The second study also used the EPA approved method to examine bacterial efficacy of 0.55% sodium hypochlorite wipes. The sodium hypochlorite wipes achieved the highest bactericidal efficacy, and the 0.76% quat + 22.5% alcohol product was the least effective against *S. aureus* at defined label concentration and contact time. Additionally, this study also found that the disinfectant wipes did not



achieve any statistically significant additional antimicrobial activity beyond label contact time using the quantitative method.<sup>33</sup> Lastly, Brown et al., found that both 0.5% hydrogen peroxide and 1.312% sodium hypochlorite wipes succeeded in inactivating *S. aureus* to undetectable levels after the 1-minute contact time, however QAC-based products could not even maintain surface wetness for the full label contact time highlighting possible regulatory compliance issues.<sup>32</sup>

One SIGN level 3 study used the ASTM Standard by William et al., (described earlier)<sup>27</sup> to evaluate the efficacy of sodium hypochlorite wipes in reducing levels of bioburden using stainless steel discs. Sattar et al., investigated the efficacy of five types of commercially available disinfectant pre-soaked wipes for the removal of *S. aureus* and *A. baumannii* from stainless steel discs.<sup>36</sup> All wipes tested were able to significantly reduce colony-forming units (CFUs) of *S. aureus* and *A. baumannii* on stainless steel surfaces within 10 seconds in comparison to negative control, although, wipes containing sodium hypochlorite and 0.5% accelerated hydrogen peroxide wipes were most efficacious in reducing all CFUs. The remaining three wipes (containing either two QACs and a biguanide, peracetic acid or a QAC alone as active ingredients) produced a more considerable reduction in *A. baumannii* than *S. aureus*.<sup>36</sup>

A SIGN level 3 experimental study by Nandy et al., investigated the bactericidal efficacy of six commercially available wipes (three cosmetic wipes, water only, 70% isopropanol and sodium hypochlorite 8.25%) to clean and disinfect the surface of a common medical device surface (pulse oximeter) after contamination with MRSA, *C. difficile* and surrogates of pathogenic bacteria (*Yersinia pestis*, *Burkholderia mallei/pseudomallei*, and spores of *Bacillus anthracis*). The wipe containing sodium hypochlorite as the active ingredient was the most effective in cleaning all types of microbes (vegetative bacteria and spores) and 70% isopropanol was not identified as an efficient sporicidal agent.<sup>34</sup>

### **Clinical studies examining effect of a wipe intervention on levels of bioburden:**

A SIGN level 3 clinical study assessed the efficacy of disinfectant wipes with different active ingredients for the removal of *Streptococcus pneumoniae* and artificial coagulated blood test soil from an anaesthesia machine.<sup>10</sup> The wipe containing sodium hypochlorite (0.55%) was most effective at removing bacterial contamination from the device surface. Interestingly, the least effective wipe also contained sodium hypochlorite but at a higher concentration (0.94%). The authors stipulate that the difference observed was due to

wipe formulation rather than any differences in terms of the active ingredient. A wipe containing hydrogen peroxide also performed favourably, demonstrating a comparable effectiveness with the 0.55% sodium hypochlorite wipe at removal of the blood test soil. The remaining three wipes (containing either phenols, a QAC or citric acid as active ingredients) resulted in similarly low levels of test soil removal.<sup>10</sup>

Another SIGN level 3 study by Gonzalez et al., assessed the efficacy of various disinfectant wipes for the removal of *S. aureus*, *Bacillus atrophaeus* spores and *Clostridium sporogenes* spores from the surface of an anaesthesia machine and flat/ridged caps.<sup>9</sup> All wipes including positive (5% sodium hypochlorite) and negative control wipes, significantly ( $P < 0.05$ ) lowered the colony forming units (CFUs) for the tested organisms following wiping in a horizontal motion three times. The two wipes, containing either sodium hypochlorite or hydrogen peroxide as the only active ingredients were the most effective. The sodium hypochlorite wipe was significantly better than other wipes at removing both *B. atrophaeus* and *C. sporogenes* spores from the anaesthesia machine whereas, the hydrogen peroxide wipe was significantly better than other wipes at removing *S. aureus* from caps.<sup>9</sup>

### **Clinical studies examining effect of a wipe intervention on incidence of healthcare associated infections (HAIs)**

A SIGN level 3 before and after study conducted in the USA evaluated *C. difficile* rates in two wards (housing gastro-intestinal and respiratory illness patients) with a high incidence of infection.<sup>12</sup> The intervention involved disinfection with 0.55% sodium hypochlorite (bleach) wipes. Prior to the wipe use intervention, wards were cleaned with a QAC solution. The intervention reduced *C. difficile* infection (CDI) incidence by 85%. The authors stipulate that approximately 27 cases of hospital-acquired CDI were prevented by implementation of the 0.55% sodium hypochlorite wipe intervention. The main limitations of this study relate to the targeted approach utilised; incidence of other HAIs was not evaluated, areas disinfected were associated with high CDI rates, the implication being that the results may not be generalisable to other healthcare scenarios. In addition, QAC-based disinfectant products are not recommended for use in Scottish health and care settings due to their poor sporicidal efficacy.<sup>12</sup>

## Hydrogen peroxide

Nine studies including one SIGN level 1 and eight SIGN level 3 studies evaluated the efficacy of hydrogen peroxide wipes in comparison to a range of different wipes/disinfectant products.<sup>9, 15, 30-32, 8, 28, 36, 37</sup> The results from eight out of nine studies demonstrated that hydrogen peroxide wipes were more effective than wipes containing other active ingredients against a variety of bacteria and spores.<sup>8, 9, 15, 28, 30-32, 36</sup> In five experimental studies<sup>31, 28, 30, 32, 36</sup> and one clinical study<sup>9</sup> hydrogen peroxide wipes were found to be effective against microorganisms like *C. difficile*, *S. aureus*, *A. baumannii*, *P. aeruginosa*, VRE and other vegetative bacteria and spores, although in one study<sup>28</sup> the hydrogen peroxide wipe also contained QAC, chlorhexidine and alcohol as active ingredients, hence results should be interpreted with caution. In the RCT details of microorganisms were not provided, instead they were categorised by clinical risk.<sup>8</sup> In contrast, one SIGN level 3 study evaluating hydrogen peroxide wipes for efficacy against *C. difficile*, found these wipes to be as effective as the sporicidal spray.<sup>37</sup> Lastly, in another clinical study, both QAC and hydrogen peroxide wipes were found to be equally effective in removing bacteria like *E. faecium* and Coagulase-negative *staphylococci* from non-critical patient devices.<sup>15</sup>

### **In-vitro laboratory studies with levels of bioburden as outcome measure:**

Four SIGN level 3 experimental studies assessed hydrogen peroxide wipes using an EPA approved method.<sup>28, 30, 31, 32</sup> The first study assessed the efficacy of disinfectant wipes for the removal of VRE, MRSA, *Pseudomonas aeruginosa* and *Candida albicans* from a plastic surface.<sup>28</sup> Wipes containing a QAC or hydrogen peroxide performed most favourably against VRE whereas, chlorhexidine-alcohol wipes eliminated significantly more MRSA. The only other comparator wipe contained 5% ethanol as a listed active ingredient which is unlikely to be bactericidal at this concentration. No analysis was provided for *C. albicans* and *P. aeruginosa* due to low overall colony count.<sup>28</sup> Voorn et al., investigated the efficacy of different disinfectant wipes against *S. aureus* and *P. aeruginosa* using the EPA approved method. 0.5% hydrogen peroxide wipes were found to be more efficacious than QAC-based products against both *S. aureus* and *P. aeruginosa* and transferred significantly ( $P < 0.05$ ) less  $\log^{10}$  CFU/100 cm<sup>2</sup> to previously uncontaminated surfaces than QAC products.<sup>30</sup> Nkemngong et al., used the EPA method to assess the risk of cross-contamination from different disinfectant wipes with no sporicidal claims when challenged with *C. difficile* spores. Results indicated that all disinfectant wipes tested transferred *C. difficile* spores from a contaminated surface to

otherwise uncontaminated surfaces regardless of active ingredient, with two QAC-based wipes transferring at significantly higher amounts compared to the control (sodium hypochlorite). In addition, although the products tested did not make a sporicidal claim, 0.5% hydrogen peroxide wipes exhibited significant sporicidal activity.<sup>31</sup> As discussed earlier, Brown et al., found that both 0.5% hydrogen peroxide and 1.312% sodium hypochlorite wipes succeeded in inactivating *S. aureus* to undetectable levels after the 1-minute contact time using the EPA approved method, however QAC-based products failed to do so.<sup>32</sup>

Sattar et al., used the 3-step protocol by William et al., to investigate the efficacy of five types of commercially available disinfectant pre-soaked wipes for the removal of *S. aureus* and *A. baumannii* from stainless steel discs. Wipes containing 0.5% accelerated hydrogen peroxide and sodium hypochlorite wipes were most efficacious in reducing all CFUs. Wipes containing two QACs and a biguanide, peracetic acid or a QAC alone as active ingredient produced a more considerable reduction in *A. baumannii* than *S. aureus*.<sup>36</sup>

One SIGN level 3 experimental study by Rutala et al., assessed the efficacy of various disinfecting agents (a QAC solution, a sodium hypochlorite solution, a hypochlorous acid solution) and wipes (hydrogen peroxide and peracetic acid wipe and a sodium hypochlorite wipe) for the removal of *C. difficile* from plastic sheets. Findings suggest that all sporicidal disposable wipes tested were effective in both removing and inactivating the *C. difficile* spores whereas disinfectant solution sprays were associated with clinically unacceptable drying times.<sup>37</sup>

### **Clinical studies examining effect of a wipe intervention on levels of bioburden:**

A randomised controlled trial (RCT) compared the efficacy of two disinfectant wipes (one wipe containing isopropanol, chlorhexidine and hydrogen peroxide as active ingredients and the second containing two QACs and a biguanide) for the removal of microorganisms from computer keyboards and computer mice used within general medical and intensive care wards.<sup>8</sup> Both wipe types reduced microbial contamination significantly in comparison to baseline measurements obtained prior to disinfection, but the wipe containing isopropanol, chlorhexidine and hydrogen peroxide was significantly more effective ( $P < 0.001$ ) than the QAC/biguanide containing wipe. As keyboards and mice were not artificially contaminated prior to disinfection, the results from this RCT

have the potential to be clinically relevant. A key limitation of the RCT was that it was conducted in Israel, with the authors not specifying which microorganisms were investigated, stating only that microorganisms were classified into '3 groups: high-, moderate-, and minimal-risk groups based on pathogenicity and clinical risk for hospital-acquired infection.' This adds ambiguity to the relevance of the results for consideration of specific healthcare associated organisms within UK health and care settings. It must be noted that the hydrogen peroxide wipe also contained isopropanol and chlorhexidine within the formulation so results should be interpreted accordingly.<sup>8</sup>

A SIGN level 3 clinical study evaluated the effectiveness of low-level disinfection of noncritical devices (re-useable oxygen tubing connectors) with two different wipe types (0.5% hydrogen peroxide and a QAC/isopropyl alcohol wipe).<sup>15</sup> Both disinfectant wipes tested were efficacious in removing bacteria such as *E. faecium* and coagulase-negative *staphylococci*. A significant number of bacteria were recovered from one device after disinfection, authors stipulate that this was due to using a partially dry wipe, reinforcing the need to use fully saturated wipes and the importance of fully closing the top of the wipe container after use.<sup>15</sup> It must be reiterated that QAC based products are not recommended for use in Scottish health and care settings as they do not provide sufficient sporicidal efficacy.<sup>1</sup>

Gonzalez et al., assessed the efficacy of various disinfectant wipes for the removal of *S. aureus*, *Bacillus atrophaeus* spores and *Clostridium sporogenes* spores from the surface of an anaesthesia machine and flat/ridged caps.<sup>9</sup> All wipes including positive (5% sodium hypochlorite) and negative control wipes, significantly ( $P < 0.05$ ) lowered the colony forming units (CFUs), although, the two wipes, containing either sodium hypochlorite or hydrogen peroxide as the only active ingredients were the most effective for the tested organisms. The hydrogen peroxide wipe was significantly better than other wipes at removing *S. aureus* from caps.<sup>9</sup>

### **Disinfectant wipes (impregnated with additional ingredients)**

A SIGN level 3 before and after study conducted in a UK tertiary hospital evaluated the effect of universal disinfection with a disinfectant wipe (containing a quaternary ammonium compound, a biguanide, water and detergent additives) on MRSA acquisition rates in all wards.<sup>13</sup> Wards were previously cleaned by nursing staff using a two-wipe system, firstly a detergent wipe, followed by a disinfection step using an alcohol wipe. The use of a one wipe regime was associated with a significant reduction (MRSA acquisition rates reduced from 20.7 to 9.4 per 100,000 patient bed days;  $p < 0.005$ ) in the incidence of healthcare associated MRSA, although the effect did not translate to MRSA bacteraemias. This study also showed a change from an alcohol wipe to a QAC-based wipe alongside the change in the methodology adding ambiguity to the findings. As discussed earlier, QACs are not recommended in Scottish health and care settings so applicability of these findings is limited. Furthermore, it could not be determined whether the new wipe regime reduced the amount of environmental contamination with MRSA as environmental monitoring was not conducted before and after implementation of the new wipe regime, including the effect of other confounders.<sup>13</sup> Depending on disinfectant wipe type, a number of manufacturers recommend that disinfectant wipes impregnated with detergent additives can be used in place of a detergent for the removal of contamination,<sup>22</sup> although there is currently limited evidence to show that their use is superior over a two stage (cleaning then disinfection) process.<sup>1</sup>

### **Wipes with other active ingredients:**

The effectiveness of other wipes was largely inconclusive, these included QAC and biguanide wipes or wipes containing a mixture of both of these active ingredients, in addition to citric acid, chlorine dioxide or phenol containing wipes. There were no studies included within the literature review which looked specifically at alcohol wipes, although in a few studies alcohol was included as an additional active ingredient at various concentrations.

In summary, a large number of studies looked at in this section were experimental in nature which may not mimic real-life scenarios thus limiting their generalizability to health and care settings. In addition, the studies used multiple techniques, protocols, organisms and products to assess wipe efficacy hence limiting the ability to make comparisons. Some studies compared wipes with different active ingredients, while other studies compared a disinfectant wipe to another method of disinfection (non-wipe) making it impossible to draw any conclusions about the superiority of wipes over traditional/existing methods (for example bucket method using

detergent or disinfectant solutions) or other novel methods for reducing levels of bioburden within a clinical setting. Unless an internationally accepted standard/protocol/benchmark is created for wipes, it will continue to be challenging to summarise the findings from such a variable evidence base.

Disinfection is a complicated process which is highly product, organism and surface specific. In addition, there are multiple other factors that affect the efficacy of wipes, including compliance, training, contact time, material of wipe and HAI burden which must be kept in mind when interpreting these results.

## What is the procedure for using wipes?

As previously outlined, detergent wipes are formulated to remove contamination from surfaces (that is to physically clean). Disinfectant wipes contain specific antimicrobial agent/s and are used to inactivate bioburden on surfaces, which may contain infectious microorganisms and blood/bodily fluids.<sup>1</sup>

Evidence from SIGN level 3 experimental studies shows that contact times for wipes generally range from 30 seconds to 10 minutes, depending on the target pathogen and wipe formulation.<sup>10, 26 12, 15, 29, 32</sup> Authors of one experimental study have highlighted that manufacturer contact times may sometimes be unrealistically long for adoption in clinical practice.<sup>4</sup> The authors of this study state that a spore kill of  $>5 \log_{10}$  can only be achieved after several minutes ( $> 5-10$  minutes), such long contact times may delay the start of subsequent clinical activities within a busy health care environment. In addition, it also raises concerns around safe disposal of wipes and whether organisms are fully inactivated on the wipe at the time of disposal.

Manufacturers typically do not specify the desired frequency of wipe use. One SIGN level 3 experimental study compared wiping frequencies of saline-moistened wipes vs. disinfectant wipes using one, three and five 'wipes' against the following microorganisms: MRSA, VRE, and *P. aeruginosa*.<sup>28</sup> An increase in wiping frequency was associated with an improved removal of microbial contamination irrespective of the active ingredient used in the wipe, although disinfectant wipes were superior to the saline-moistened wipe at lower frequencies of wiping.<sup>28</sup> Similarly Rutala et al. also demonstrated that wiping surfaces twice compared to once with disinfectant wipes (both sporicidal and non-sporicidal) led to improved removal of *C. difficile* spores from plastic sheets.<sup>37</sup> Two SIGN level 3 experimental studies demonstrated the transfer of microorganisms onto multiple surfaces by wipes and hence authors of these studies

recommend a '1 wipe, 1 surface, 1 direction approach' which is considered to be applicable for use in practice.<sup>4, 26</sup> Manufacturers may sometimes recommend a multi folding action to achieve a similar action to one wipe, one surface, one direction, in order to ensure optimal use of product.<sup>22</sup>

Lastly another SIGN level 3 experimental study examined cleaning of iPads within a clinical setting and recommended a six hourly disinfection protocol using a wipe containing 70% alcohol and 2% chlorhexidine.<sup>11</sup> The disinfectant wipes were able to successfully remove MRSA and VRE, with a single disinfection preventing further contamination of the device for up to 12 hours, although none of the wipes studied were able to completely eradicate *C. difficile* spores.<sup>11</sup> Of note, in actual clinical practice there may be ongoing repeated contamination of the device, rather than at discrete time-intervals as modelled in this study.

Due to the variety of detergent and disinfectant wipes available, it is advisable that manufacturer instructions are followed regarding correct use. Based on SIGN level 4 RCN UK guidance<sup>1</sup> and Canadian expert opinion<sup>21</sup>, instructions for use of detergent/disinfectant wipes can be summarised as follows:

1. Wipes should be considered as single-use products unless specified by the manufacturer as being re-useable.
2. Use one or more detergent wipes to clean the surface of gross debris/heavy soil before disinfection.
3. To disinfect, use enough disinfectant wipes to ensure that the surface remains visibly wet for the allocated contact time.
4. Wipes should be compatible with surfaces and equipment to be cleaned and disinfected.
5. Education and training should be provided to staff to ensure optimal use of the product (for example multi folding action to expose a clean portion for each step).
6. Discard wipes appropriately (according to manufacturer's instructions) after use.



## **Are there any safety considerations associated with using wipes in the health and care setting?**

In terms of transmission by transference, improper use of wipes can cause unintended contamination events.<sup>26</sup> In addition, some disinfectants used in wipes may damage hands (for example contact dermatitis) therefore manufacturers generally provide instructions for gloves to be worn when using wipes.<sup>1, 21</sup>

The safety profiles of disinfectants within wipes will vary depending on the exact formulation of individual wipes. It should also be noted that in general, the low concentrations used within wipes are unlikely to cause any detrimental effects.

Irrespective of active ingredient used in the wipe, all products should be used with the proper safety precautions (as stipulated by the manufacturer's instructions) and only for the intended purpose. Employers and organisations must have safety data sheets readily available for employees who are exposed to these products.<sup>5</sup> Storage of products must be in accordance with Control of Substances Hazardous to Health (COSHH) Regulations.<sup>6, 18</sup>

## **Are there any practical or logistical considerations associated with using wipes in the health and care setting?**

Time saving benefits associated with the use of wipes have been reported in some studies compared to other disinfection methods.<sup>38, 39</sup>

The majority of wipes are provided in a 'ready-to-use' formulation. Exceptions include peracetic acid wipes which require the addition of water<sup>38</sup> and chlorine dioxide wipes which are generally part of a three-step system, requiring initial activation and rinsing after use.<sup>11</sup>

Due to the variety of wipes currently available, SIGN level 4 UK and Canadian expert guidance state that various other wipe characteristics should be considered alongside manufacturer claims of effectiveness.<sup>1, 21, 22</sup> These include size, surface compatibility, storage requirement and material composition, which ultimately determine the quantities of detergent or disinfectant released and retained by the wipe. The degree of wipe saturation may also impact on cleaning efficacy. One SIGN level 3 experimental study<sup>9</sup> reported an optimal wipe moisture content of approximately 0.6 g/cm<sup>3</sup> as being most effective at removing microorganisms from surfaces and the authors of a further two SIGN level 3 experimental studies<sup>10, 29</sup> stipulated that wipes which are too wet lose effectiveness in terms of the physical removal of debris. Furthermore, the

surface area and size of item requiring cleaning also requires consideration, as wipes lose efficacy during use due to gradual drying and contamination with debris.<sup>22</sup> Additionally, authors of one SIGN level 3 experimental study reinforced the need to use fully saturated wipes to perform decontamination tasks, in addition to properly closing the top of the wipe container after use to maintain wipe integrity.<sup>15</sup>

According to the authors of one SIGN level 3 study, decontamination wipes should have clinically acceptable drying times for routine healthcare use (for instance minimum disruptive impact on clinical activity).<sup>37</sup>

As with all disinfection products, there may be a risk of surface damage due to the repeated use of wipes on surfaces, although this will be dependent on the active ingredients and concentrations used in individual wipes. Previously, an alert from the MHRA has raised the issue of damage caused by detergent and disinfectant wipes to plastic surfaces of medical devices through various incident reports.<sup>40</sup> Hence, the MHRA advises that staff should look for signs of damage to medical devices and follow local reporting procedures as appropriate.<sup>40</sup>

Wipes also need to be properly discarded after use to prevent environmental damage (for instance dangers arising from them being non-compostable/non-flushable).<sup>21</sup> The benefit arising from the use of these products must be balanced against the risks, and it must be established whether their use poses any threat to man and the environment.<sup>25</sup>

## **What costs are associated with using wipes in the health and care setting?**

Limited information is available on costs associated with wipe use. SIGN level 4 expert opinion from the RCN recognises the fact that the use of wipes can be associated with a significant cost increase based on the volume of wipes used and therefore recommend, that a reasoned approach should be applied to product selection where possible.<sup>1</sup>

Only two SIGN level 3 UK studies evaluated the cost of using peracetic acid wipes for disinfection.<sup>14, 38</sup> The first was an experimental study conducted in 2012 which compared eight disinfection methods for *C. difficile* spores.<sup>38</sup> It concluded that the cost per clean of using peracetic acid wipes was £23.01. As a comparison, the cost per use of the most expensive methods evaluated within the study; dry ozone and hydrogen peroxide exceeded £100. It must be noted that this was an experimental study and the cost of these disinfection methods would need to be evaluated within a clinical scenario.<sup>38</sup> In addition, as this study was conducted approximately 10 years ago, valid comparisons cannot be made, keeping in mind the effect of

inflation and cost rises in the last 10 years. The second study from the UK conducted in 2016 evaluated the efficacy and cost of peracetic acid wipes in comparison to the traditional method (QAC and alcohol wipe).<sup>14</sup> It did not find any advantage of using peracetic acid wipes over the traditional method in terms of environmental decontamination. In addition, peracetic acid wipes came with a higher cost of \$0.47 (£0.33) per wipe.<sup>14</sup>

Individual cost analyses should be conducted by organisations/boards as there is variation in the products available, size of settings, intended use and therefore the associated costs.

### 3.2 Implications for research

Pre-prepared wipes are currently used for cleaning/disinfection within UK health and care settings, although specific information relating to wipe type and indicated use is generally limited.

The majority of studies identified in this review assessed the efficacy of disinfectant wipes, with very few looking at detergent wipes. There was a lack of consistency between these studies, impeding a detailed evaluation of the evidence. Namely, active ingredients within wipes and specifically the use of multiple active ingredients and differing concentrations of these, varied widely between studies. In addition, several studies compared wipe use alone while others compared wipe use to other methods of disinfection. Furthermore, studies evaluated a number of microorganisms and surface types. The study outcomes also varied significantly, with wiping frequency, wiping time, contact time, drying time and direct/residual antimicrobial effect being assessed by different studies. As a result, there was insufficient evidence to formulate any conclusions regarding the effectiveness of specific disinfectant and detergent wipes.

It should also be noted that several experimental studies failed to include a negative wipe control, therefore not accounting for the physical removal of contamination associated with wiping action alone.

It is reasonable to infer that the results from some of these studies are applicable in Scotland because they investigated commercially available wipes which are commonly used in UK health and care settings. It is also important to note that the majority of the studies were undertaken in a laboratory environment which may not adequately represent use in clinical practice.

Future research should look to assess the variety of wipe types available in health and care settings, as well as the efficacy and feasibility of these wipes in clinical practice against a range

of microorganisms. There was a paucity of prospective trials which compare the antimicrobial effectiveness of wipes and liquid disinfectant/wipe combinations in real-life clinical settings. This review also highlighted the lack of available guidance and legislation in relation to wipe selection and use. At present much of the guidance/standards are specific to liquid disinfectants which do not account for physical wiping action of wipes or the application of practice relevant contact times. There was also a lack of studies investigating detergent wipes, although they are routinely used in Scottish health and care settings for cleaning surfaces. Differing variables such as contact times, drying times and methods of assessing the efficacy and impact of mechanical wiping action between studies suggest the need for an internationally accepted and validated test method. Lastly, more research is needed in the area of sustainability and potential environmental damage caused by wipes and ways to mitigate this.

## 4. Recommendations

This review makes the following recommendations based on an assessment of the extant scientific literature on wipes in the health and care setting.

### **What are the different types of wipes used in health and care settings and what is their actual or proposed mechanism of action?**

#### **Detergent wipes**

Detergent wipes are formulated to remove dirt/contamination from surfaces. They contain surfactants combined with additional compounds including preservatives, enzymes, and perfume. They do not have disinfecting properties as they do not contain an active ingredient intended to kill microorganisms, hence they should only be used for cleaning purposes and not as a method of disinfection.

#### **(Category C recommendation)**

#### **Disinfectant wipes**

Disinfectant wipes should contain a disinfectant agent (with an active ingredient) which will provide anti-microbial activity. The mechanism of action of disinfectant wipes is largely dependent on the active ingredient/s within the formulation and manufacturer's instructions on

efficacy data must be referred to with regards to the disinfectant wipe's efficacy against specific micro-organisms.

**(Category C recommendation)**

### **What is the current guidance or legislation regarding the use of wipes in health and care settings?**

Activity test data should be sought from manufacturers on the efficacy of active ingredients used in wipe formulations employing simulations of real-life use (realistic levels of organic matter) and clinically acceptable contact times.

**(Category C recommendation)**

Control of Substances Hazardous to Health (COSHH) Regulations should be adhered to with regards to storage and usage of all products.

**(Mandatory)**

### **When should wipes be used in health and care settings?**

#### **Detergent wipes**

Detergent wipes should be used for dirt removal (cleaning purposes) of environmental surfaces. The inclusion of a disinfectant to a detergent wipe may provide additional antimicrobial activity, provided that manufacturer's instructions are followed.

**(Category C recommendation)**

#### **Disinfectant wipes**

Disinfectant wipes can be used in health and care settings for disinfecting environmental surfaces as well as many types of non-critical/low-risk patient equipment (non-invasive equipment).

**(Category C recommendation)**

Disinfectant wipes can be used in health and care settings for terminal cleaning and isolation cleaning.

**(Category C recommendation)**

Alcohol wipes may be used for manual disinfection of care equipment that cannot tolerate soaking, specifically, those with electrical contacts/elements (for instance switches and buttons).

**(Category C recommendation)**

The decision to use wipes for decontamination of low-risk equipment and near-patient environment should be based on local infection prevention and control (IPC) policies and the expert opinion of IPC advisers, based on evidence from efficacy data and manufacturer's instructions.

**(Category C recommendation)**

**What is the scientific evidence for effectiveness of wipes for decontamination of the healthcare environment?**

**Detergent wipes**

Detergent wipes provide an effective way to clean and remove debris prior to disinfection, however they should not be used for disinfecting the healthcare environment as they do not contain an active ingredient and do not exhibit antimicrobial properties.

**(Category C recommendation)**

**Disinfectant wipes**

When considering the implementation of disinfectant wipes for disinfection of the healthcare environment, confirmation of sporicidal, bactericidal, virucidal, and fungicidal efficacy should be sought from the manufacturer.

**(Category C recommendation)**

## **What is the procedure for using wipes?**

It is advisable that manufacturer instructions are followed regarding the use of detergent and disinfectant wipes.

### **(Category C recommendation)**

The choice of disinfectant wipe should always be cross checked with the manufacturer's instructions to determine if a detergent wipe is required pre disinfection.

### **(Category C recommendation)**

Regardless of the wipe being used, an approach of one wipe, one surface and one direction is recommended to prevent microbial transfer. This should be cross referenced against the manufacturer's instructions for use.

### **(Category C recommendation)**

Where manufacturers produce wipes with a multi folding action to achieve a similar action to one wipe, one surface, one direction then education and training should be provided for staff.

### **(Category C recommendation)**

For all types of wipes, it is recommended that surfaces are wiped more than once (using different wipes) to increase the removal of microbial contamination.

### **(Category B recommendation)**

All wipes should be:

- considered as single-use products unless specified by the manufacturer as being re-useable
- able to keep the surface visibly wet for the allocated contact time
- compatible with surfaces and equipment to be cleaned and disinfected
- used after education and training has been provided to ensure optimal use of the product
- discarded appropriately (according to manufacturer's instructions) after use.

### **(Category C recommendation)**

Manufacturer instructions should be followed regarding correct wipe contact times.

### **(Category C recommendation)**

**Are there any safety considerations associated with using wipes in the health and care setting?**

Manufacturer's instructions should always be followed when using wipes, to maintain safe working practices (for example wearing of gloves) with proper safety precautions.

**(Category C recommendation)**

Storage of products must be in accordance with Control of Substances Hazardous to Health (COSHH) Regulations.

**(Mandatory)**

Employers and organisations should have safety data sheets of wipe formulations readily available for employees who may be exposed to these products.

**(Category C recommendation)**

Wipes should be properly discarded according to manufacturer instructions after use to prevent environmental damage.

**(Category C recommendation)**

**Are there any practical or logistical considerations associated with using wipes in the health and care setting?**

Wipe characteristics that should be considered alongside manufacturer claims of effectiveness include:

- size of wipe
- surface compatibility
- storage requirement
- material composition
- degree of wipe wetness/ saturation
- clinically acceptable drying times.

**(Category C recommendation)**



Wipes should be evaluated taking into consideration their potential to damage surfaces. Any damage should be reported as per local reporting procedures.

**(Category C recommendation)**

**What costs are associated with using wipes in the health and care setting?**

In the absence of a formal policy in relation to wipes, setting specific cost analysis should be undertaken to determine local costs associated with using wipes.

**(Category C recommendation)**

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## Appendices

### Appendix 1: Specific standards pertaining to testing of disinfectants and pre-prepared wipes.

Standard	Title	Description	Publication Date
<b>BS EN 1040:2005</b>	Chemical disinfectants and antiseptics. Quantitative suspension test for the evaluation of basic bactericidal activity of chemical disinfectants and antiseptics. Test method and requirements (phase 1)	This European Standard specifies a test method and the minimum requirements for basic bactericidal activity of chemical disinfectant and antiseptic products that form a homogeneous, physically stable preparation when diluted with water.	January 2006
<b>BS EN 13727:2012+A2:2015</b>	Chemical disinfectants and antiseptics. Quantitative suspension test for the evaluation of bactericidal activity in the medical area. Test method and requirements (phase 2, step 1)	BS EN 13727 is an international standard that focuses on quantitative suspension tests for the evaluation of the bactericidal activity in the medical area. BS EN 13727 specifies a test method and the minimum requirements for bactericidal activity of chemical disinfectant and antiseptic products that form a homogeneous, physically stable preparation when diluted with hard water, or - in the case of ready-to-use products - with water	October 2012
<b>BS EN 14561:2006</b>	Chemical disinfectants and antiseptics. Quantitative	BS EN 14561 specifies a carrier test for establishing whether a chemical disinfectant for use on instruments	June 2006

Standard	Title	Description	Publication Date
	carrier test for the evaluation of bactericidal activity for instruments used in the medical area. Test method and requirements (phase 2, step 2)	(surgical instruments, anaesthesia material, endoscopes etc.) has a bactericidal activity in the fields described in the scope.	
<b>BS EN 16615:2015</b>	Chemical disinfectants and antiseptics. Quantitative test method for the evaluation of bactericidal and yeasticidal activity on non-porous surfaces with mechanical action employing wipes in the medical area (4- field test). Test method and requirements (phase 2, step 2)	BS EN 16615 layouts a test method and the minimum requirements for bactericidal and yeasticidal activity of chemical disinfectant products that form a homogeneous, physically stable preparation when diluted with hard water – or in the case of ready-to-use products – with water. BS EN 16615 applies to products that are used in the medical area for disinfecting non-porous surfaces including surfaces of medical devices by wiping.	April 2015
<b>ASTM Standard E2967-15</b>	Standard Test Method for Assessing the Ability of Pre-wetted Towelettes to Remove and Transfer Bacterial Contamination on Hard, Non-Porous Environmental Surfaces Using the Wiperator	This standard is designed for use with a mechanized device (the Wiperator) to test pre-wetted towelettes. The method described here is to assess the role of wiping in ridding non-porous environmental surfaces of bacterial contamination using prewetted towelettes, and also to determine if the used towelette can transfer viable contamination to clean surfaces on contact.	May 2015

**Legend:**

BS = British Standards produced by the British Standard Institution

EN = European Standards (European Norm) produced by the European Committee for Standardisation

ISO = International Standards produced by the International Standards Organization

EN standards are gradually being replaced by ISO standards – when these are adopted in the UK they are prefixed with BS (e.g. BS EN; BS EN; BS EN ISO). This is usually to accommodate UK legislative or technical differences or to allow for the inclusion of a UK annex or foreword

ASTM = American Society for Testing and Materials



## Appendix 2: Efficacy tests

Efficacy Test	Description
<b>Non-standard wipe tests:</b>	These are tests where the disinfectant product is used to wipe a contaminated surface which has been formulated by the producer or a test laboratory. A comparison is made between the disinfectant wipe and a disinfectant-free wipe. Relevance of test method is assessed for proposed real-life use with consideration given to exposure times (30 seconds or less) in presence of sufficient organic matter to simulate dirty conditions with a validated method of neutralisation.
<b>Suspension tests:</b>	<p>Phase 1- quantitative suspension tests are used to establish that substances/products under development have antimicrobial activity. <b>These are basic tests and results from these tests should not be used for any product claims.</b> Examples include BS EN (British Standards European Norm) 1040 (demonstration of bactericidal activity).</p> <p>Phase 2, Step 1 tests are quantitative suspension tests to establish that a product has antimicrobial activity under simulated practical conditions appropriate to its intended use. Examples specific to the medical industry include BS EN 13727 (demonstration of bactericidal activity). Suspension tests performed under dirty conditions should be included along with a disinfection neutralisation validation step. Suspension tests may not prove to be a good guide to how the ingredients in a wipe would work in real-life applications as they tend to use exposure times that are far longer than would occur in practice and are less stringent than surface tests.</p>
<b>Surface tests</b>	Phase 2, Step 2 tests are quantitative laboratory tests to establish that a product has antimicrobial activity when applied to a surface under simulated practical conditions. In surface tests, microbes are dried onto a surface which is then exposed to the disinfectant, following which the microbes are recovered to test survival rates. Tests performed under dirty conditions should be included along with a disinfection neutralisation validation step. Examples specific to the medical industry include BS EN 14561 (demonstration of bactericidal activity)

Efficacy Test	Description
	<b>Phase 2, step 1, and phase 2, step 2 tests are generally needed in combination to support efficacy claims for chemical disinfectants or antiseptics.</b>

## Appendix 3: Grades of recommendation

Grade	Descriptor	Levels of evidence
<b>Mandatory</b>	'Recommendations' that are directives from government policy, regulations or legislation	N/A
<b>Category A</b>	Based on high to moderate quality evidence	SIGN level 1++, 1+, 2++, 2+, AGREE strongly recommend
<b>Category B</b>	Based on low to moderate quality of evidence which suggest net clinical benefits over harm	SIGN level 2+, 3, 4, AGREE recommend
<b>Category C</b>	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 NIPC group
<b>No recommendation</b>	Insufficient evidence to recommend one way or another	N/A

## Appendix 3: PRISMA Flow Diagram

