

## REVIEW OF LITERATURE

<b>TEAM UNDERTAKING REVIEW:</b> Parts A and B – Health Protection Scotland. Part C – Welsh Healthcare Associated Infection Programme (WHAIP).	
<b>CONTACT PERSON:</b> Dawn Hill	
<b>TOPIC:</b> Safe management of linen.	
<b>PRINCIPAL RESEARCH QUESTION/OBJECTIVE:</b> To establish the evidence base in relation to infection control measures for the safe management of linen.	
<b>METHODOLOGY</b>	
<b>i) Search strategy for identification of studies</b>	
<i>Period of publication</i>	Part A: 1966-2004
	Part B: 2004 – 2006
	Part C: 2007 - Feb 2009
<i>Strategy key words for Part C</i>	Bedding and linens Soiled linen\$ Hospital laundry (service) laundering Outsourced services Textiles Cloth(ing) materials Scrubs Uniforms (Bacterial) infection (prevention and control) Cross infection (prevention and control) Contamination Disinfection Blood Body fluids Pathogens Mycobacteria Handling Storage Healthcare settings
<i>Electronic databases for Part C</i>	MEDLINE ✓ EMBASE ✓
	CINAHL ✓ HMIC ✓
	Cochrane Library ✓ British Nursing Index ✓
<i>Additional Resources for Part C</i>	References checked for relevant articles   ✓ National Electronic Library-Infection, CDC, Welsh Assembly Government (WAG), Scottish Executive Health Dept. (SEHD), Health Protection Agency (HPA), Health Protection Scotland (HPS), Department of Health (DH), Department of Health & Social Services & Public Safety (DHSSPS-NI) Northern Ireland, Journal of Hospital Infection, Society of Hospital Linen Service and Laundering.
<b>ii) Selection criteria for inclusion of studies</b>	
<i>Sample</i>	All health and social care workers.
<i>Outcome measure(s) for Part C</i>	Interventions to minimize the spread of infection in the healthcare environment through the safe management of linen
<i>Other inclusion criteria</i>	N/A
<i>Language Limitations</i>	English language only.

<b>iii) Quality assessment</b>	
<i>Study quality assessment</i>	
<i>Part A (1966-2004)</i>	Identified articles were reviewed according to Roe's model. Guidance documents, however, were unable to be subjected to all such criteria.
<i>Part B (2004-2006) and Part C (2007-2009)</i>	Identified articles were reviewed according to Roe's model for critical appraisal of scientific papers, Sign 50 methodology for systematic reviews and meta-analyses and the AGREE instrument for the evaluation of guidance documents as appropriate.
<i>Data collation and analysis</i>	Qualitative analysis of data performed on studies uncovered was undertaken using a case study approach. Guidance documents reviewed for any relevant commentary.

**RESULTS**

***Part A (1966 – 2004)***

On review of the literature, a number of studies were uncovered which considered the potential for the spread of infection through used linen and the subsequent need for appropriate control measures. Several key pieces of guidance have been published in this area and are also reviewed here. This review does not refer specifically to the laundering of uniforms, rather linen used for patient care.

The terms ‘linen’ and ‘laundry’ are used interchangeably in this area of research to refer to materials which have the potential for becoming contaminated during healthcare activity. UK guidance uses the term ‘linen’ to refer to all items which require laundering or dry cleaning. In comparison, CDC Guidelines for Environmental Infection Control in Healthcare Facilities published in 2003 in the US apply the term ‘laundry’ to items in health care facilities such as bed sheets, blankets, towels, personal clothing, patient apparel, uniforms, scrub suits, gowns and drapes for surgical procedures.

In light of guidance, ‘linen’ or ‘laundry’ can be categorised as one of four types: i) used; ii) soiled/foul; iii) infected; iv) heat labile. The term used linen refers to all used linen irrespective of state, apart from linen from infectious patients or those suspected of being infectious. Soiled/foul linen refers to linen contaminated with blood or other body fluids, e.g. faeces. Infected linen, in contrast, refers to linen from patients with or suspected to be suffering from enteric fever, other salmonella infections, dysentery, hepatitis A and B, HIV (and AIDS), notifiable diseases, or other infections specified as hazardous by the infection control officer. The term ‘heat labile linen’ refers to linen which needs to be washed at lower temperatures to avoid shrinkage.

Used/soiled/infected ‘linen’ or ‘laundry’ from healthcare settings can harbour large numbers of microorganisms, according to the literature. However, the US Centers for Disease Control and Prevention suggest that the risk of disease to patients, staff and visitors is negligible. This suggestion stems from the fact that limited studies have been published identifying linen as a route of transmission of nosocomial infection. One of the few studies to suggest a link was conducted by Standaert et al. (1994) and implicated soiled faecal linen in an outbreak of *Salmonella hadar* in a nursing home in the US. Infection amongst the residents was initially foodborne and most of the ill residents were faecally incontinent. Laundry workers became ill a week later which

most likely represented secondary spread of the infection as the workers did not wear gloves or aprons when dealing with linen and regularly ate in the laundry room. An investigation into another outbreak, this time of *Bacillus* species, was carried out at a London hospital in 1992. The outbreak, involving 45 patients, coincided with building works being carried out close to the Intensive Care Unit and to post-natal wards where strains of the bacteria were identified. A further source was provided by the hospital laundry (e.g. steam pressers, floor, lint-extract compartments below tumble driers). Findings suggest that whether by laundry contamination or by airborne dispersal, the hot summer weather, building works and geographical positioning of these units potentiated this outbreak. However, despite the probable link in both of these cases, on the whole, studies documenting a link between healthcare associated infections (HAI) and contaminated fabric are few. Studies have often been limited due to their failure to rule out other factors (i.e. organisms also found on patient care items, hands of health care personnel) as potential routes of transmission, making confirmation of contaminated linen as the direct route of transmission very difficult (Barrie, 1994).

As standard infection control precautions imply that measures should be taken at all times regardless of whether infection is known to be present or not, this information is being used to inform guidance as often specific infections are not known until some time after admission or an event.

Given the limited evidence showing a direct link between linen and HAI, the risk of transmission of infection through contaminated linen may be low according to the evidence base. Nevertheless, the Control of Substances Hazardous to Health Regulations (COSHH, 1988) require a risk assessment to be performed to establish the potential health risks and subsequent actions required for both patients and employees. In light of such regulations, national bodies responsible for health services have produced guidance in this area to prevent and control infection following risk assessment. CDC, for example, recommend via their website that common sense hygienic practices for processing laundry be applied.

Such hygienic practices would include:

- \*Place used/soiled/infected linen in a bag/receptacle at place of use.
- \*Linen should not be sorted/rinsed at place of use.
- \*Gloves/appropriate personal protective equipment (PPE) should be worn by health and social care workers when handling linen (e.g. changing beds).
- \*Heavily soiled linen (blood/body fluids) should be bagged/transported appropriately to prevent leakage.
- \*Gloves/appropriate PPE should be used by all those handling linen (e.g. laundry staff).

\*Studies show satisfactory reduction of microbial contamination at temperatures lower than 160 degrees Fahrenheit (+50-100ppm of chlorine solution). In the home, normal 'hot' and 'cold' cycles should be adequate to ensure cleanliness of linen. Clean linen should be handled, transported, stored by methods ensuring its cleanliness. Guidance for NHS Scotland and for the UK specifies similar recommendations to those above.

\*Hand hygiene should be performed following handling of used linen

Two primary pieces of guidance have been produced within the UK in relation to the laundering of linen in recent years. However, there is a considerable lack of primary evidence to support such guidance. The first publication, produced by the Scottish Executive, was a Management Executive Letter (NHS MEL (1993) 7) and focused on hospital laundry arrangements for used and infected linen. This guidance highlights the importance of infection control measures at all stages of the laundering process from bagging, transporting and sorting to washing/disinfecting, handling, and storage.

This guidance recommends that used linen be bagged (and properly sealed to avoid leakage) and marked accordingly for transportation. The washing process of used linen should include a disinfection cycle when the temperature should be maintained at 65 degrees Celsius for not less than 10 minutes (or preferably 71 degrees Celsius for not less than 3 minutes). Machines with low and heavy degrees of loading should add up to 4 and 8 minutes respectively for mixing time to ensure heat penetration and disinfection.

All washing machines should be checked regularly to ensure compliance with disinfection standards and machines should be fitted with accurate thermometers. Checks should be carried out at 6 weekly intervals. Records should also be kept of the maintenance undertaken (Scottish Executive, 1993).

Turning to linen soiled with blood or other body fluids, the guidance states that such items should not be sorted by staff, but instead put into red water soluble bags/receptacles (or bags/receptacles with water soluble seams/membranes which will release their seal in the wash process) and should be removed from the bedside immediately. This recommendation is corroborated by guidance in the Scottish Infection Manual (1998). The water soluble bag/receptacle should be placed in a polythene or laundry bag/receptacle and labelled appropriately. The inner bag/receptacle should then be placed directly into the washing machine while the outer bag/receptacle should be disposed of appropriately. These recommendations have little primary evidence available to support them and they would appear to be based on principles of best practice.

It is recommended that infected linen, for example blood soaked linen from hepatitis B, HIV or CJD patients, should be placed in a sack for incineration (Scottish Executive, 1993). Care should be taken to wash infected linen in a washer extractor with a vent pipe which is distinct, separated and vented. If the machines drain into the sump immediately below the machine drain, the valve should be covered to reduce the risk of bacteria being spread by aerosol effect when water is pumped from the machine (Scottish Executive, 1993).

A similar disinfection process as applied for used linen should be carried out for soiled/foul linen as the assumption must be made that any individual could potentially be the carrier of an infectious disease. However, additional washing at 93 degrees Celsius for no less than 10 minutes should be undertaken to eradicate HIV and hepatitis viruses and an allowance for mixing time should render linen safe.

In contrast, 'heat labile' linen needs to be washed at lower temperatures. Forty degrees Celsius is recommended to avoid shrinkage of items. However, this may not be sufficient to kill all microorganisms and, therefore, a minimum of 65 degrees Celsius is recommended where possible for the washing of items such as uniforms (Royal College of Nursing, 2005). If tumble dryers are used, the temperature must be limited to 60 degrees Celsius. Disinfection is possible with chemicals, for example hypochlorites, at low temperatures, although performance is often restricted by the presence of soiling or detergents in the wash. It may be possible to achieve disinfection by the addition of sodium hypochlorite to the penultimate rinse. However, it should be noted that hypochlorites should not be used with materials treated for fire resistance (Scottish Executive, 1993).

Alternatives to thermal and chlorine disinfection are being developed with one example being ozone technology. The OTEX validated ozone disinfection system allegedly kills all microorganisms, including MRSA and *Clostridium difficile* on all wash cycles by using an oxygen concentrator which converts air into 90% pure oxygen. An ozone generator then creates ozone, a natural gas, and a unique interfusor makes the ozone soluble by defusing it in the water in the machine. Ozone immediately attacks bacteria and soiling. OTEX, as a system, uses mostly cold water and is considered to be safe as the ozone quickly reverts back to oxygen. Most importantly, it is claimed that this system kills bacteria approximately 3000 times faster than chlorine bleach ([www.jla.com](http://www.jla.com)). Research is required to explore further the microbiological evidence to support this system as well as the practical implications of such a system for use within healthcare settings.

The protection of staff when handling linen is underlined by this guidance and considerable guidance is available specifically relating to the appropriate use of PPE in health and social care settings, for example, the draft CDC guideline for isolation precautions (2004). Staff handling linen in the sorting area, in particular, should ensure any abrasions or cuts on the hands are covered before donning gloves and appropriate protective clothing. Although masks are not considered necessary, according to the literature and an assessment of aerosol transmission, due care needs to be given to proper protection. Clean overalls should be available for laundry staff as necessary and changing and handwashing facilities should be on hand for staff. It is imperative that hand hygiene is performed following handling of used linen and that staff are aware of all related guidelines to ensure these precautionary measures are taken.

Subsequent guidance relating to the safe management of linen was published in 1995 by the NHS Executive which aimed to clarify issues raised following publication of the initial 1993 guidelines. Further clarification was sought in relation to the definition of used linen which was deemed either foul or soiled. Furthermore, the guidelines added several infections to the list of those diseases requiring labeling of linen as infected (e.g. hepatitis C and open pulmonary tuberculosis). Emphasis was also placed on the correct handling and bagging of linen and the point was raised that a sluice cycle should be included when dealing with foul linen.

When developing guidance in relation to the management of linen, advice for patients and their relatives taking used/soiled linen home to be washed must also be addressed. To date, however, this particular aspect has been relatively unresearched and instead guidance is based on the common principles of best practice. Local policies, for example NHS Greater Glasgow's Prevention and Control of Infection Manual (2005), suggest that used/soiled linen should be given to patients/relatives in a polythene (not water soluble) bag/receptacle for transportation. At home, care should be taken to minimise handling of this linen and it should be placed directly into the domestic washing machine and washed according to manufacturers' instructions. Patients/relatives are encouraged to wash their hands following handling of such linen.

Review of the literature to date, therefore, underlines the importance of the appropriate management of used, soiled/foul, infected and heat labile linen in a bid to eliminate the spread of infection via this route to staff/patients. However, further investigation is required to clarify particular areas of uncertainty in relation to the risk of transmission of infection via linen as highlighted above.

<p><b>Part B (2004 – 2006)</b></p>	<p>The literature search using the described strategies identified only one additional, relevant study specifically on management of linen, during the period of review.</p> <p>This paper (Patel <i>et al.</i>, 2006) looked at whether domestic laundering of linen (in this case staff uniforms) was sufficient to remove bacterial contamination. This was assessed by inoculation of high viable counts of <i>Staphylococcus aureus</i> onto squares of linen, which were then processed as normal domestic laundry. Results showed that even after washing at 40°C, there was no detectable contamination with <i>S.aureus</i>. However measurement of total viable counts revealed some survival of environmental organisms from the washing machine itself. Washing at 60°C, however, resulted in far fewer environmental organisms. The results demonstrated that complete removal of these environmental organisms occurred during the subsequent tumble-drying and ironing process. The authors conclude that domestic laundering of linen is adequate when combined with tumble drying and ironing.</p> <p>This is essentially in line with the guidance within the model policy on Safe Management of Linen, regarding home laundering of patients' items by families / friends, although there is no specific mention of tumble drying as part of the process. However, although these results are from a small study, it may be appropriate to include the advice that patients' items should be tumble dried after laundering, if in accordance with manufacturers' instructions.</p>
<p><b>Part C (2007-Feb 2009)</b></p>	<p>This literature review aims to identify, review and critique any scientific studies or guidance, which have been published in the intervening period since the previous literature review, to determine if changes to guidance are required. In addition, certain documents not reviewed in previous parts were considered here and the original 1995 Department of Health ((HSG(95)18)) was re-visited.</p> <p><i>Wilson et. al</i> (2007) and <i>Loveday et. al.</i> (2007) provide the evidence from systematic reviews underpinning the Department of Health (2007) guidance on uniforms and workwear. Whilst this policy/procedure does not cover uniforms per se, there are some general extrapolations that can be made in general terms pertaining to laundering.</p> <ul style="list-style-type: none"> <li>*There is no conclusive evidence that uniforms (or other work clothes) pose a significant hazard away from the workplace.</li> <li>*It seems that the public believe there is a risk. They do not like seeing hospital staff in uniform away from the workplace.</li> <li>*All components of a properly designed and operated laundry process contribute to the removal or killing of micro-organisms on fabric. It is likely that dilution/flushing is the main contributor.</li> <li>*A ten minute wash at 60 degrees Celsius is sufficient to remove most micro-organisms. In tests, the only organisms remaining were a small number (less than 10%) of <i>Clostridium difficile</i> spores.</li> </ul>

\*Using detergents means that many organisms can be removed from fabrics at lower temperatures. MRSA is completely removed following a wash at 39 degrees Celsius.

\*Ensuring an optimal ratio between fabric load and water volume is important in both industrial and domestic settings to facilitate the effect of agitation and dilution of removing contamination.

\*There is no conclusive evidence of a difference in effectiveness between commercial and domestic laundering in removing micro-organisms.

*Creamer and Humphreys (2008)* published a review article looking at the significance of bed contamination and the disinfection of beds as an important aspect in the prevention and control of healthcare-associated infection. They discuss the fact that bed linen can rapidly become heavily contaminated with colonised skin scales and may contribute to the spread of infection. They state that although it is

sometimes suggested that frequent bed changing is of limited value and could contribute to aerial dispersal, evidence of the impact of frequent changing on transmission of infection is lacking. They state that sheets and sheets and pillow cases should be changed at least twice weekly and if wet, soiled, stained, wrinkled or contaminated with potentially infectious fluids. Bed linen, including sheets, pillow covers, blankets and fire blankets should be changed on discharge of the patient. Linen should be laundered according to national or other standards, and stored in designated clean linen storage presses, reserved solely for clean linen. Trolleys for holding linen prior to bed making should be clean and kept separate from contaminated items or materials.

Two documents are reviewed here that provide useful guidance of safe linen handling in care homes. The Department of Health (2006) and National Public Health Service for Wales (2007) both provide a useful summary for good practice in care homes covering:

\*Requirements for laundering if providing this service onsite.

\*Handling dirty linen

\*Categorisation and segregation of linen

\*The laundering process.

These documents also recommend dealing with heavily soiled/foul linen the same way as infected linen.

In addition, the HSE (2009) proposed guidance update on blood borne viruses re-iterates current guidance and good practices. Recommended wash conditions, based on levels of soiling, are as follows:

**Current recommended treatments to ensure cleaning and disinfection of used (soiled and foul) linen:**

\*a 65°C temperature hold for a minimum of 10 minutes within the wash cycle, or

\*preferably 71°C for not less than 3 minutes.

Mixing time must be allowed to ensure heat penetration and assured disinfection. A sluice cycle must be added in to the cycle when dealing with foul linen.

**Recommended treatment to ensure disinfection of infected linen (mostly applicable to healthcare settings):**

\*Linen in this category should not be sorted, other than in to a red, water-soluble bag – this is then placed in an outer polyester or nylon carriage bag

\* the inner bag is removed from the outer bag only at the point of transfer to the wash-extractor, followed by the outer bag

\*Storage of infected linen must be done in a secured area, prior to washing.

The same wash temperature profile as used linen (soiled and foul) is thought to be sufficient to inactivate HIV, but the evidence is less certain for hepatitis B. The wash temperature, couples with the dilution factor, should render linen safe to handle on cycle completion.

**Current recommended treatment to ensure disinfection of heat labile linen:**

\* these items need to be washed at about 40°C, so the wash temperature is insufficient to disinfect, and chemical alternatives are required

\*addition of hypochlorite may be possible, but efficacy may be reduced by the presence of soiling, detergents, and alkalis in the main wash

\* disinfection with hypochlorite is only available if the linen can tolerate its addition and if sodium hypochlorite is added during the penultimate rinse of the cycle.

A final concentration of 150ppm available chlorine must be achieved for a minimum of 5 minutes exposure time.

**Laundering contaminated items in the community setting.**

Existing guidance states that in the community setting or elsewhere without access to specialist services, contaminated clothing or linen should be treated in one of the following ways:

\*washed with detergent using the hot wash cycle of a domestic washing machine to a temperature of least 80°C. Machine overloading should be avoided, or

\*dry cleaned at elevated temperatures, or dry cleaned cold followed by steam pressing, or

\*incinerated if items cannot be effectively washed as described above.

\*Machine overloading should be avoided. If washing by hand is unavoidable, household rubber gloves must be worn.

**CONCLUSIONS**

***Part A (1966 – 2004)***

\*Terms 'linen' and 'laundry' are used interchangeably in this field.

\*Used linen from healthcare settings can harbour large numbers of microorganisms, according to the literature.

\*Limited studies published identifying linen as a route of transmission of nosocomial infection, in the main due to the difficulties of eliminating other potential contributory factors.

\*The importance of infection control measures at all stages of the laundering process from bagging, transporting and sorting to washing/disinfecting, handling, and storage is highlighted by the literature in this field.

\*Risk assessments should be undertaken to ensure potential health risks and appropriate actions are taken.

\*Two principle pieces of guidance have been issued in the UK in relation to the management of linen in healthcare settings.

\*Guidance identifies used linen as all used linen irrespective of state which includes linen contaminated with blood or other body fluids, apart from linen from infectious patients or those suspected of being infectious. Infected linen refers to linen from infectious patients or those suspected to be suffering from enteric fever, other

	<p>salmonella infections, notifiable diseases or other infections specified as hazardous by infection control staff.</p> <p>*Used linen should be properly bagged and sealed to avoid leakage and marked accordingly for transportation.</p> <p>*Studies show satisfactory reduction of microbial contamination at temperatures lower than 160 degrees Fahrenheit (+50-100ppm of chlorine solution). Therefore, the washing process used for used linen should include a disinfection cycle when the temperature should be maintained at 65 degrees Celsius for not less than 10 minutes (or preferably 71 degrees Celsius for not less than 3 minutes).</p> <p>* Appropriate time should be given for low and heavy degrees of loading for mixing time to ensure heat penetration and disinfection.</p> <p>*Soiled/foul or infected linen should undergo additional washing at 93 degrees Celsius for not less than 10 minutes to eradicate HIV and hepatitis viruses.</p> <p>*Soiled/foul or infected linen should not be sorted by staff. Red water soluble bags/receptacles should be used and removed from patient bedside immediately.</p> <p>*Primary container should be placed in polythene (not water soluble) bag/receptacle and labelled appropriately. Inner bag/receptacle should then be placed directly into the washing machine while outer bag/receptacle should be incinerated.</p> <p>*Care should be taken to wash infected linen in a washer extractor with a vent pipe which is distinct, separated and vented to prevent cross infection.</p> <p>*Heat labile linen needs to be washed at lower temperatures.</p> <p>*Disinfection of heat labile linen is possible with chemicals, for example hypochlorites, at low temperatures although performance is often restricted by the presence of soiling or detergents in the wash.</p> <p>*However, it should be noted that hypochlorites should not be used with materials treated for fire resistance.</p> <p>* All washing machines should be checked at 6 weekly intervals to ensure compliance with disinfection standards with records being kept of any maintenance undertaken. Accurate thermometers should be fitted.</p> <p>* Staff handling linen in the sorting area should ensure that any abrasions or cuts on the hands are covered before donning gloves and appropriate protective clothing.</p> <p>*Advice should be given to patients/relatives taking home used/soiled linen in relation to laundering. Linen should be given to patients/relatives in a polythene (not water soluble) bag/receptacle for transportation. At home, care should be taken to minimise handling of this linen and items should be placed directly into the domestic washing machine and washed according to manufacturers' instructions. Patients/relatives are encouraged to wash their hands following handling such linen.</p>
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<p><b>Part B (2004 – 2006)</b></p>	<p>*The only relevant study identified within the period of review assessed the efficacy of domestic laundering of linen which had been experimentally contaminated with <i>Staphylococcus aureus</i>.</p> <p>*Domestic laundering at 60°C followed by tumble drying was shown to be the most effective method of removing bacterial contamination, although washing at 40°C was also shown to be highly effective.</p> <p>*This is essentially in line with guidance within the model policy regarding home laundering of patients' items by families / friends. However, it may be appropriate to include the advice that patients' items should be tumble dried after laundering, if in accordance with manufacturers' instructions.</p>
<p><b>Part C (2007-Feb 2009)</b></p>	<p>*All components of a properly designed and operated laundry process contribute to the removal or killing of micro-organisms on fabric. It is likely that dilution/flushing is the main contributor.</p> <p>*Using detergents means that many organisms can be removed from fabrics at lower temperatures. MRSA is completely removed following a wash at 39 degrees Celsius.</p> <p>*Ensuring an optimal ratio between fabric load and water volume is important in both industrial and domestic settings to facilitate the effect of agitation and dilution of removing contamination.</p> <p>*There is no conclusive evidence of a difference in effectiveness between commercial and domestic laundering in removing micro-organisms.</p> <p>*Recommended treatments to ensure cleaning and disinfection of used (soiled and foul) linen are a 65°C temperature hold for a minimum of 10 minutes within the wash cycle, or preferably 71°C for not less than 3 minutes.</p> <p>* The same wash temperature profile as used for used linen (soiled/foul), should be used for infected linen.</p> <p>* A sluice cycle is necessary for foul linen.</p> <p>*Recommended treatment to ensure disinfection of heat labile linen is that these items need to be washed at about 40°C, so the wash temperature is insufficient to disinfect, and chemical alternatives are required.</p> <p>*In community settings or elsewhere without access to specialist services, contaminated clothing or linen should be treated in one of the following ways:</p> <ul style="list-style-type: none"> <li>- washed with detergent using the hot wash cycle of a domestic washing machine to a temperature of least 80°C. Machine overloading should be avoided, or</li> <li>- dry cleaned at elevated temperatures, or dry cleaned cold followed by steam pressing, or</li> <li>- incinerated if items cannot be effectively washed as described above.</li> </ul>

	<p>*Where on-site laundry facilities are provided in a community setting, it is important that national guidance and good practice documents are adhered to, ensuring the safe handling of linen.</p> <p>* Trolleys for holding linen prior to bed making should be clean and kept separate from contaminated items or materials.</p>
<b>RECOMMENDATIONS</b>	
<i>Part A (1966 – 2004)</i>	<p>*Following risk assessment, staff should wear appropriate PPE (e.g. gloves, apron) to handle used/soiled/infected linen.</p> <p>*Used linen should be placed immediately into an appropriate bag/receptacle at place of use.</p> <p>*Linen/bags/receptacles should be tagged appropriately to aid tracing.</p> <p>*Soiled/foul linen should be placed directly into a water soluble bag/receptacle to prevent leakage before being placed in a polythene bag/receptacle for transportation.</p>

	<p>It should be labeled appropriately and should be removed from the bedside immediately.</p> <ul style="list-style-type: none"> <li>*To avoid cross-contamination, linen should not be held against clothes nor should it be placed on the floor.</li> <li>*Linen should not be sorted/rinsed at place of use.</li> <li>*Following completion of task, PPE should be removed and disposed of appropriately.</li> <li>* Hand hygiene should be performed following handling of used linen.</li> <li>*Clean and used/infected linen should be transported in dedicated vans to avoid cross contamination.</li> <li>*Laundry personnel should wear gloves/appropriate PPE when sorting soiled linen for washing.</li> <li>*Washing process for used linen should include a disinfection cycle when the temperature should be maintained at 65 degrees Celsius for not less than 10 minutes (or preferably 71 degrees Celsius for not less than 3 minutes). Infected linen should undergo additional washing at 93 degrees Celsius for not less than 10 minutes to eradicate HIV and hepatitis viruses. In the home, normal ‘hot’ and ‘cold’ cycles should be adequate to ensure patient safety.</li> <li>*A schedule should be in place for the cleaning of non-disposable linen bags/receptacles.</li> <li>* Clean and used linen should be kept separate at all times.</li> <li>*Clean linen should be handled, transported and stored by methods ensuring cleanliness.</li> <li>*Advice should be given to patients/relatives taking home used/infected linen in relation to laundering. Linen should be given to patients/relatives in a polythene (not water soluble) bag/receptacle for transportation. At home, care should be taken to minimise handling of this linen and items should be placed directly into the domestic washing machine and washed according to manufacturers’ instructions. Patients/relatives are encouraged to wash their hands following handling such linen.</li> </ul>
<b>Part B (2004 – 2006)</b>	<p>Recommend that an additional statement should be included to the section on guidance on home laundering that patients’ items should be tumble dried after laundering, if in accordance with manufacturers’ instructions.</p>
<b>Part C (2007-Feb 2009)</b>	<p>The same wash profile as used linen should be sufficient for linen contaminated with HIV or hepatitis B.</p> <p>Recommendation that foul/infected linen are dealt with in the same manner i.e soluble red bags, then red secondary bags. This ensures that this policy/procedure is in keeping with the guidance in “Infection Control Guidelines for Care Homes” published by the NPHS for Wales in 2007.</p>

<b>PRACTICAL APPLICATION</b>	As the safe management of linen has been recommended for some time, no significant change to practice should be required, however, the standards set down must be achieved.
<b>RESOURCE IMPLICATIONS</b>	As per current policies. All resources required for dealing with the management of linen should already be in place.
<b>KEY REFERENCES</b>	
<i>Part A (1966 – 2004)</i>	<p>Anon. (1997) Nosocomial infections get through the laundry, <i>Laundering and Rental Spotlight</i>, Issue Nos. LR27 &amp; 33.</p> <p>Barrie D (1994), How hospital linen and laundry services are provided, <i>Journal of Hospital Infection</i>, 27: 219-235.</p> <p>Bradley CR &amp; Fraise AP (1996), Heat and chemical resistance of enterococci, <i>Journal of Hospital Infection</i>, 34: 191-196.</p> <p>Centers for Disease Control and Prevention (2003) <i>Guidelines for Environmental Infection Control in Healthcare Facilities</i>, CDC, Atlanta, USA.</p> <p>Control of Substances Hazardous to Health Regulations (COSHH) (1988)</p>

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