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- National guidance on the home laundering of uniforms
- Recommended changes to reduce the risk of bacterial contamination from uniforms

# Domestic laundering of nurses' uniforms: what are the risks?



Nursing Times  
Journal Club

## Talking points

**Uniforms, which are washed by staff at home, could be potential sources of bacterial contamination**

**Trusts' home laundering policies can be unclear, and inconsistent**

**Not all staff wash their uniforms at the recommended temperature**

**Guidance needs to be standardised and staff provided with better changing facilities and enough uniforms**

**A radical solution would be to move from home laundering to in-house industrial laundering of uniforms**

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**Abstract** With rises in healthcare-acquired infections (HCAs) and antibiotic resistance, understanding transmission routes of bacteria is paramount. One possible route is nurses' uniforms, which they wash at home. A study found that trusts' policies on home laundering were inconsistent and that staff did not always follow guidance. Another study showed that, when contaminated and sterile fabric samples were washed at 40°C, a small number of *Escherichia coli* and *Staphylococcus aureus* bacteria survived and cross-contamination occurred. This article details the two studies, describes the regulatory environment and discusses how to ensure adequate decontamination of uniforms.

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It is well reported that micro-organisms are able to survive on inanimate surfaces, including textiles, for extended periods (Burden et al, 2013; Fijan and Turk, 2012; Casey et al, 2010; McGovern et al, 2010; Gaspard et al, 2009; Oller and Mitchell, 2009; Lankford et al, 2006; Neeley and Maley, 2000). Research has focused on surfaces in hospital wards as potential routes of contamination, but could nurses' uniforms be another route?

### Uniforms: a contamination risk?

A decade ago, Loveday et al (2007) conducted a comprehensive literature review that showed a paucity of studies on the survival of micro-organisms on healthcare uniforms, and that most of the contamination suspected to come from uniforms actually came directly from the people wearing them. The authors found that:

- There were no studies demonstrating the transmission of hospital-acquired infections (HAIs) from nurses' uniforms;

- The few existing studies on the effectiveness of low-temperature washing showed that the wash cycles of a hospital laundry at low temperatures removed or killed micro-organisms;
- These temperatures would be similar to those used in a domestic setting when washing uniforms.

In recent years, there has been increased interest in healthcare textiles as potential sources of cross-contamination with the environment and patients. Mitchell et al (2015) wrote a good literature review on healthcare apparel as a transmission route for pathogens. This is of particular importance in light of the rise in HAIs and antibiotic-resistant bacteria.

### What is the national guidance?

In countries such as Austria and Germany, all laundering of nurses' uniforms is carried out in-house under regulated conditions. The situation is different in the UK, where nurses' uniforms (excluding

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### Box 1. How the food industry regulates workwear laundering

In the UK food industry, hygiene is maintained through adherence to the BS EN 14065 Risk Analysis Bio-Contamination Control standard, which ensures that clean and dirty laundry are separated to ensure there is no risk of cross-contamination. In line with the hazard analysis and critical control points (HACCP) guidelines, staff are also required to change in and out of their uniforms in the workplace, and clothing is not to be worn outside the food preparation area. The HACCP guidelines recommend a laundering cycle using detergent and a minimum temperature of 71°C for 25 minutes. A laundering partner providing cleaning services for uniforms is also recommended.

Source: adapted from Baroudhi (2007)

surgical scrubs) are taken home for domestic laundering (Textile Services Association, 2011). This practice is in direct contrast to those adopted by the UK food industry (Box 1).

There are two routes for the laundering of healthcare textiles in the UK:

- In-house laundering for items such as bed sheets, scrubs and curtains;
- Domestic laundering for uniforms worn by staff.

In-house and contract laundries operate according to the Department of Health's technical memorandum on the decontamination of linen for health and social care (DH, 2016), while domestic laundering guidelines are issued by individual trusts based on the DH's guidance on uniform and workwear policies for NHS employers (DH, 2010).

The 2010 DH domestic laundering policy is guided by two literature reviews conducted by Thames Valley University and practical research conducted by University College London Hospital. It states: "A wash for 10 minutes at 60°C removes almost all micro-organisms. Washing with detergent at lower temperatures – down to 30°C – eliminates meticillin-resistant *Staphylococcus aureus* and most other micro-organisms." (DH, 2010)

This guidance is disseminated by trusts in the form of individual policies applicable to staff working at each trust. To ensure that uniforms are safely

decontaminated, it is important that healthcare staff follow these policies.

Box 2 summarises key rules of home laundering.

### Is domestic laundering safe?

Two studies conducted at De Montfort University on the domestic laundering practices of nurses and their implications in terms of bacterial survival and contamination have highlighted a number of factors that need consideration when assessing the safety of domestically laundering healthcare uniforms.

The first study, conducted in four hospitals (Riley et al, 2015), showed that not all staff were following their trust's policies on the laundering and aftercare of uniforms. It also showed variation between trusts on recommended wash temperatures, and patchy guidance regarding the use of detergents, the drying of uniforms and whether or not to wash them separately from other items of clothing (Table 1).

### Exploring nurses' practices

In total, 265 healthcare staff from a range of disciplines including nurses, healthcare assistants, ward clerks, housekeepers, physiotherapists responded to the study questionnaire; 43.7% laundered their uniforms below the 60°C recommended by the DH; 33% washed them at 40°C and 5% at 30°C (Fig 1) (Riley et al, 2015).

Results in the study were divided into two categories: infectious departments (clinical areas considered to have a high risk of infection) and non-infectious departments (considered to have a lower risk of infection). Infectious departments included surgical, critical care and isolation wards; emergency departments and emergency assessment units were also



considered infectious, since any patient could enter with an infection. Non-infectious departments included medical physics, orthopaedic trauma, respiratory medicine, orthodontics, acute medicine, occupational therapy, day wards, stroke units, X-ray and physiotherapy. Patients at risk of having an infection would be identified on arrival in the emergency department before being allocated to a ward (Riley et al, 2015).

### Box 2. Key rules for washing uniforms at home

- A minimum temperature of 60°C should be used in a wash cycle of at least 10 minutes
- Uniforms should be stored (pre-wash) and washed separately from other items
- Healthcare uniforms should always be laundered after every shift
- A detergent should be used

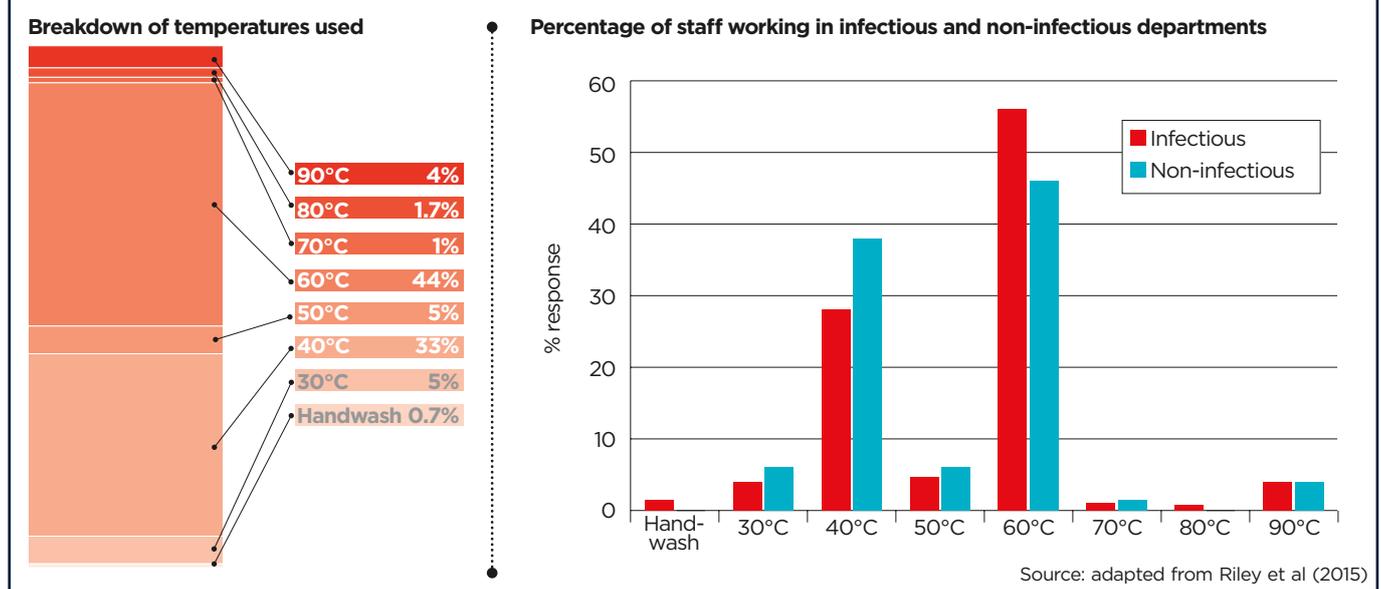
Sources: Department of Health (2010); Riley et al (2017)

Table 1. Domestic laundering guidance of surveyed hospitals

Specification	Hospital 1	Hospital 2	Hospital 3	Hospital 4
Wash temperature	65°C-71°C for a minimum of 3 minutes	60°C for 10 minutes	Minimum 50°C	Minimum 60°C
Detergent use	No guidance	Detergent must be used	No guidance	No guidance
Drying	Dry quickly or tumble-dry	No guidance	Preferably tumble-dry	Dry quickly or tumble-dry
Separate wash	Uniform to be washed separately	No guidance	Uniform to be washed separately	No guidance
Frequency of change	Uniform should be changed daily	Not specified	Uniform should be changed daily	Uniform should be changed daily

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Fig 1. Temperatures used for uniform laundering at home (n=265)



**QUICK FACT**  
**33%** Percentage of staff who said they wash their uniform at 40°C

Although not a requirement in all four hospitals, 91% of respondents said they used a detergent in the wash cycle with their uniforms; 37% of respondents used a biological detergent, 35% used a non-biological detergent and 14% used a 'two-in one' detergent (Riley et al, 2015).

Biological detergents contain enzymes in addition to the ingredients found in non-biological detergents (such as anionic surfactants, non-ionic surfactants, phosphonates, polycarboxylates, perfumes and optical brighteners). Enzymes have the ability to break down proteins – such as those contained in blood or vomit – but they can also irritate the skin. The second study (Riley et al, 2017) showed no significant difference in the activity of biological and non-biological detergents against micro-organisms at similar wash temperature conditions.

The questionnaire from the 2015 study further revealed that 26% of respondents wore their uniform for two or more shifts before washing it, longer than the recommended wash after every shift (Table 1). It also showed that 78% of staff had their uniforms for more than 18 months before these were replaced by new ones (Riley et al, 2015), so uniforms are being worn and washed repeatedly for long periods. A small number of respondents (3%) raised the issue of changing facilities, indicating that these were limited or located some distance away

from the wards. This could be one reason why staff wear uniforms outside the work place.

### Testing bacterial survival and cross-contamination

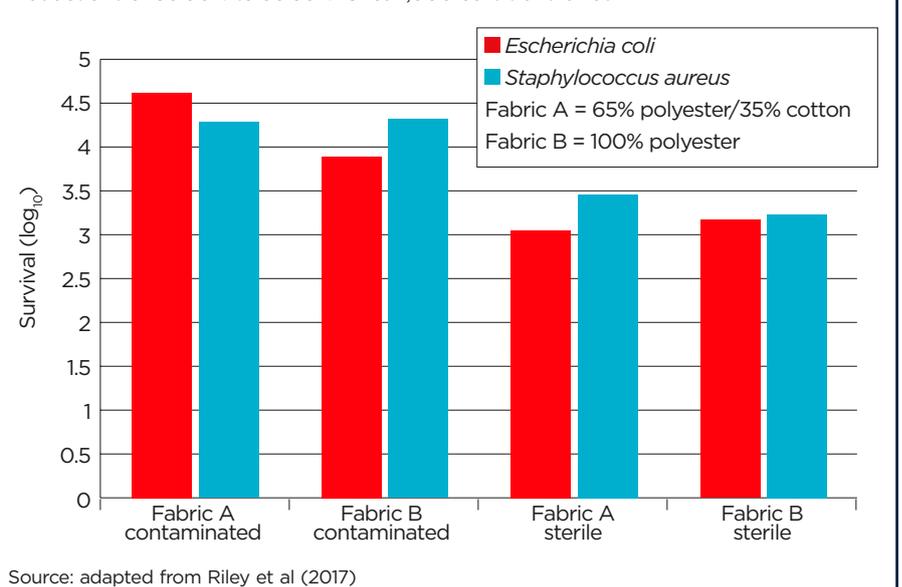
The 2017 study involved mimicking, in the laboratory setting, nurses' most common laundering practices established by the 2015 study, and assessing the survival of *Staphylococcus aureus* and *Escherichia coli* on cotton and polyester fibres (Riley et al, 2017). The data showed that both bacteria were able to survive on polyester for up to seven days and on cotton for up to 21 days. This raises the question of the storage of

dirty uniforms at home, especially with regard to potential cross-contamination with surfaces in the home environment.

Mixed polyester and cotton (65%/35%) and 100% polyester fabric samples inoculated with high bacterial loads ( $10^8$ ) – to mimic a worst-case scenario – were washed at 40°C and 60°C using biological detergent. To determine whether cross-contamination could occur in the wash, sterile samples were included. The 40°C wash did remove most micro-organisms, but the cells that were left were in excess of 1,000, and similar numbers had been transferred to the sterile items (Fig 2). This highlights

Fig 2. Survival and cross-contamination after laundering at 40°C

Reductions of 99.90% to 99.99%. Circa 1,000 cells transferred



the risk that other items of clothing in the home could become contaminated, or that domestically laundered uniforms could re-contaminate the home and/or healthcare environment.

That said, a number of other factors need to be considered, such as:

- Drying practices that could further reduce microbial load;
- In cases where visible soiling occurred, the most highly contaminated uniforms being classed as infectious and thus laundered industrially;
- The levels at which micro-organisms start to be infectious.

Studies in a real-life setting are required. Although the data collected by Riley et al (2017) concurs with the DH (2010) in that most micro-organisms are removed from textiles at lower washing temperatures, the risk that surviving micro-organisms may be present needs to be fully quantified. When the samples were washed at 60°C, no micro-organisms were detected, which supports the DH's recommendation that uniforms should be washed at a minimum temperature of 60°C.

### Why is guidance not followed?

In the four hospitals surveyed by Riley et al (2015), the guidance provided by the trusts was inconsistent and not all staff followed local policies when laundering their uniforms domestically. This could occur for a variety of reasons.

Staff may be unable to follow specific guidance, such as laundering after every shift, because they are not provided with enough uniforms. Previous research has shown that staff were not always able to change uniform after every shift due to limited items being available (Potter and

Justham, 2012; Nye et al, 2005; Callaghan, 1998). Providing staff with enough items so they can change uniform after every shift is an ongoing issue.

As shown by Riley et al (2015), there may be limited on-site facilities for nurses to change in and out of their uniforms, and if they exist, they may be far from the wards. Some hospitals have on-site laundries for staff, but nurses still prefer to wash their uniforms at home (Patel et al, 2006). This could be because they do not have enough uniforms to wash them after each shift, and because of the time required to visit the on-site changing and laundering facilities after a shift.

The guidance on domestic laundering may be vague, unclear or patchy, as found in the four hospitals surveyed (Table 1), thus not giving staff clear instructions. Nurses moving between trusts may receive contradictory information, as local policies can be inconsistent.

The cost of regularly laundering uniforms at high temperatures could be one reason why temperatures below the recommended 60°C are used. Another reason could be consumer information circulating in the media saying that lower temperatures and 'quick wash' cycles are more environmentally friendly. Other potential issues around wash temperatures are that domestic washing machines are difficult to regulate, no two machines perform a cycle in the same way, and ageing machines often fail to reach the required wash temperature.

Further research is needed to determine why guidelines are not always followed and how compliance can be improved. The laundering of uniforms at 40°C may present a risk of cross-contamination risks, and this needs to be fully researched and quantified.

### What can we do?

Increasing staff awareness, improving their education on infection prevention, and standardising domestic laundering policies at national level would be useful steps towards ensuring that staff know how to effectively wash their uniforms at home. Providing suitable changing facilities so staff can easily change in and out of their uniforms in the workplace would reduce the need for them to wear their uniforms to and from work. However, the ideal solution would be a change from home laundering to in-house industrial laundering of uniforms. This would avoid cross-contamination in the domestic setting altogether and increase the chances of uniforms being washed according to guidance. **NT**

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