

# Proper hand drying is essential to hand hygiene

Hand hygiene is the single most important measure to reduce the burden of healthcare-associated infections.

In everyday life, however, we know that:

- Only 5% of people using washrooms wash their hands long enough to kill the germs that cause infections\*;
- 33% of people do not use soap due to its drying effect on the skin\*;
- 10% of people don't wash their hands at all\*.

\*Source: Borchgrevink et al. 2013, Journal of Environmental Health

Therefore, whether your hands are washed with soap or simply rinsed in plain water, once effectively dried, the risk of contamination is hugely reduced.

Crucially, as the transmission of bacteria is more likely to occur from wet skin than from dry skin, the proper drying of hands after washing is an essential component of hand hygiene. Wet hands that touch a surface will contaminate a clean surface - or be contaminated by a dirty one - more quickly than properly dried hands.



## Hygienic Hand Drying

A comparative study of four systems:

Cotton Towel • Paper Towel • Warm Air Dryer • Jet Air Dryer

The contents of this brochure are based on the *Comparative study of four drying methods: cotton towels, paper towels, jet air dryer and warm air dryer* – A research report of the Hjelt Institute of Hygiene and Microbiology of the University of Helsinki. Kirsi Laitinen, PhD.

This study was commissioned by ETSA, with the following purpose:

- to compare the hygienic efficiency of the four hand drying systems in terms of reduction of microbes from the hands
- to analyse the hygiene of the surrounding area in the washroom, both the touchable surfaces of the dryers and dispensers and the hygiene of the surrounding air.

The full study is available from ETSA.

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The Hjelt Institute of Hygiene and Microbiology (University of Helsinki) studied the effectiveness of four common hand-drying systems in terms of hand hygiene.

**The results of the study are clear:**

- Cotton towels are more effective and hygienic than air dryers;
- Cotton towels eliminate the highest number of bacteria from wet hands;
- The mechanical action of rubbing one's hands with cotton is essential to effectively removing bacteria;
- Good hand hygiene involves both washing and drying hands.

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## Cotton towel dispensers have the most hygienic surfaces

When testing the contamination of the surfaces of the four drying methods, the most commonly touched parts of each dispenser or dryer were swabbed (Fig. 2):

- The jet air dryer is the only device which showed heavy contamination by E-coli, with a particularly heavy concentration at the inside bottom of the dryer (Fig. 1);
- A smaller number of bacteria were found on the warm air dryer, followed by the paper dispenser, where they are most likely to be touched by wet hands;
- An insignificant amount of bacteria was found on the cotton towel dispenser.

This clearly shows that:

- The surfaces of cotton towel dispensers carry significantly less risk of contamination for wet hands than the surfaces of jet air dryers.

Device	Swabbed locations	No. of bacteria measured
Jet Air Dryer	Inside, bottom	208 (E.coli)
	Inside, front	81 (E.coli)
	Inside, rear	19 (E.coli)
Warm Air Dryer	Front panel	2 (non E.coli)
	Bottom panel	12 (non E.coli)
Paper Towel Dispenser	Front panel	11 (non E.coli)
	Bottom panel	6 (non E.coli)
Cotton Towel Dispenser	Front panel	3 (non E.coli)
	Bottom panel	1 (non E.coli)

Fig 1. Surface contamination results

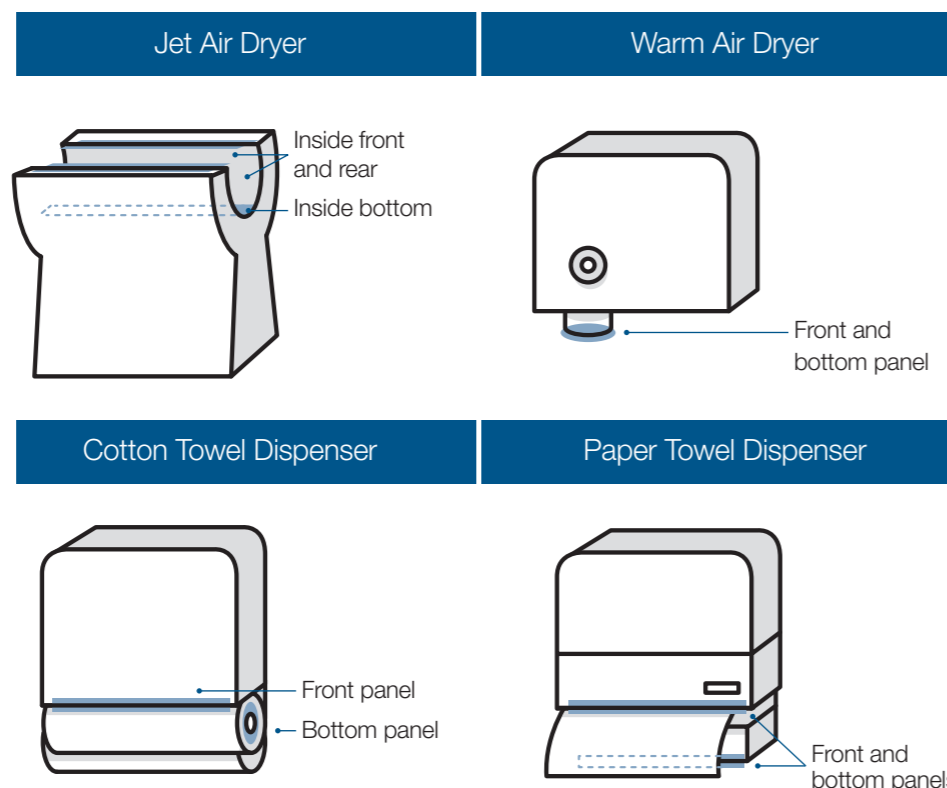


Fig 2. The most commonly touched surfaces of each dryer were swabbed for contamination

## Cotton towels remove more bacteria from your hands than air dryers

The performance of cotton towels in removing bacteria from hands is over and above the minimum requirement set by the European hand washing standard EN 1499\*. The performance of jet and warm air dryers, however, did not meet the European standard\* requirements.

The baseline measurement is the level of bacteria on the hands after they were contaminated and before they were dried.

**Cotton removes more bacteria from hands than jet air and warm air dryers:**

- Hands dried with cotton show a log reduction of 4.41;
- Hands dried with paper show a log reduction of 4.41;
- Hands dried with jet air show a log reduction of 2.48;
- Hands dried with warm air show a log reduction of 1.79.

**In conclusion:**

- Air dryers do not meet the minimum requirements of the European standard\* and are therefore not hygienically safe;
- Cotton performs over and above the European standard\* minimum requirements and is therefore the most hygienic hand drying solution.

\*European standard EN 1499

The study was carried out according to the European standard EN 1499: Chemical disinfectants and antiseptics – Hygienic handwash- Test method and requirements (phase 2/step2), April 2013

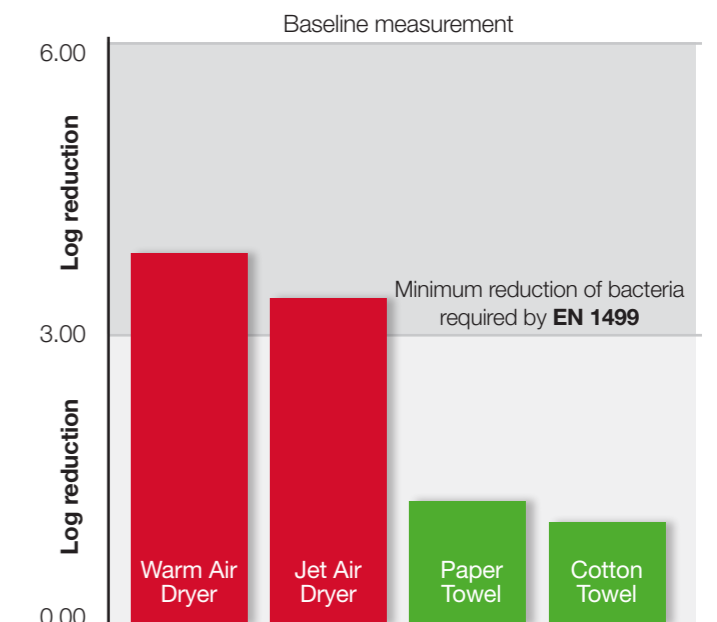


Fig 3. Bacteria remaining on hands after contamination with E-coli and drying

**Log reduction of bacteria**

The removal of bacteria from hands is calculated as a log reduction. This measures the number of bacteria eliminated from skin or from an inanimate surface. **The European standard EN 1499\* on hand washing requires a minimum log reduction of 3.** In other words, there should be 1,000 times less bacteria on the hands after measurement than there were before.

## Cotton towels do not contaminate the air

Tests to quantify the number of bacteria in the air in the vicinity of the air dryers show the following cross-contamination effect:

- within 1m of the jet air dryer, a significant amount of bacteria was found in the air, including E-coli;
- the air in the washroom can still be highly contaminated by aerosol up to 2m distance from the air dryers;
- bacteria were quasi non-existent in the air surrounding the cotton and paper dispensers at a distance of 1m or 2m.

**Put simply:**

- It would appear that bacteria are dispersed via the air stream of air dryers and that this leads to contamination of the surrounding air. This phenomenon was not found with cotton and paper towels.
- Limiting the spread of pathogenic microbes is particularly important in healthcare environments.
- Cotton towels ensure better air quality in the washroom than air dryers.

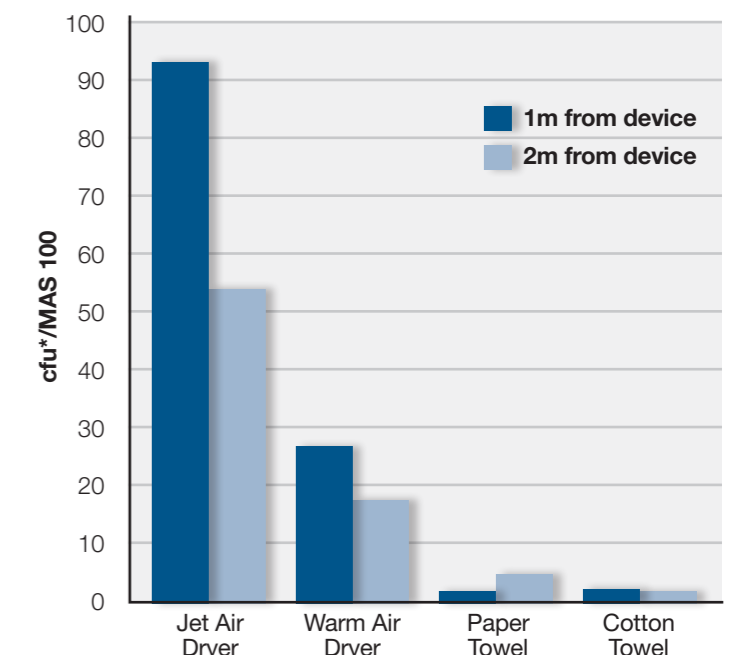


Fig 4. Bacteria present in the air near the hand dryers, as measured by an air sampler (MAS 100) (\*cfu = colony forming unit)