TIP No. 025-0224

Hand Drying at Medical Treatment Facilities

Hand Hygiene

Hand hygiene (HH) is one of the most important ways to prevent the spread of infections in the healthcare, childcare, and food service industries. HH is a general term that applies to—

- **Hand washing**: washing hands with soap and water.
- **Clinical antiseptic hand washing:** washing hands with water and soap or other detergents containing antiseptic agents such as alcohols, chlorine, iodine, etc.
- **Alcohol-based hand sanitizer:** applying an alcohol-based hand sanitizer, including foam or gel, to all surfaces of the hands.
- **Surgical hand antisepsis:** a technique performed before operations by surgical staff to reduce the amount of microorganisms (or germs) on the hands.

Hand drying after hand washing is a very important part of the HH process. Studies show that the spread of infection is more likely to occur from wet skin than dry skin. This is because moisture droplets help to transfer the microorganisms from one surface to another. Additionally, this moisture allows microorganisms to survive better in their new environment.

Hand drying methods

There are three general methods used to dry hands at Military Treatment Facilities (MTFs):

- Absorption via the paper towels
- Evaporation via warm air
- Shearing forces and dispersion via jet drying

Paper towels

Studies show that paper towels are superior to electric air dryers for hand drying. A Mayo Clinic paper by Huang, Ma, and Stack (2012) and a literature review by Gammon and Hunt (2019) compared different hand-drying methods. They concluded that when compared to electric hand dryers, paper towels more effectively—

- Dry hands;
- Remove microorganisms from the hands; and
- Cause less contamination of the washroom

Electric hand dryers

Warm air and jet dryers are both considered electric hand dryers. Both methods of hand drying have been found to spread spores outside the washroom, which increases the risk of healthcare acquired infections (HAIs). Additionally, jet dryer noise levels may be considered a health hazard (Gammon and Hunt 2019).

Cost and sustainability

The following assumptions were used to compare the cost of hand-drying methods:

- A 5-year life cycle serving 350,000 pairs of hands
- An electric cost of $0.24 per kilowatt hour (kWh)
- Two towels used per pair of hands

Table 1 shows a life-cycle comparison of two types of jet dryers, a warm air dryer, and two types of paper towel dispensers.

Table 1. Example Cost and Sustainability of Hand-Drying Methods

Type of Hand Dryer	Methods	Capital Purchase Cost per Device	5 Year Operational Cost per Device	Life Cycle Global Warming Potential [kg CO2 eq]
Jet dryer	Dyson Airblade 9jK® for 12 seconds per pair of hands	$1249	$280	550
Jet dryer	Xleratoreco® for 8 seconds per pair of hands	$580	$187	337
Warm air dryer	American Dryer Extreme GXT9 for 12 seconds per pair of hands	$290	$280	550
Paper towel dispenser	Touch-less paper dispenser with 40 D batteries	$150	$11,900 + waste disposal	5311
Paper towel dispenser	Manual single towel dispenser	$25	$10,500 + waste disposal	5250

The paper towels were the most expensive and had the highest global warming potential over 5 years when compared to electric hand dryers. Out of the electric dryers, the type and model determined the highest sustainability impact due to the varying drying times and power usage.

Jet air dryers are more sustainable and economical than using paper towels. However, there are HH compliance issues surrounding these devices. The MTF may utilize jet air driers in order to support sustainability goals and promote cost efficiency in segregated areas where HAIs are of lesser concern (e.g., administration, warehousing, and maintenance locations.)

Benefits of single-use, disposable paper towels

While jet dryers are both more cost-friendly and sustainable, hand drying with single-use, disposable paper towels is the recommended hand-drying method in healthcare, childcare, and food service. Paper towels—

- **Effectively remove transient microorganisms (i.e., *Staphylococci*, *Klebslella* spp., and *Candida* spp.) from the skin.**

Workers' hands can become contaminated with microorganisms through direct contact with patients and contaminated surfaces. Transient microorganisms are most frequently associated with HAIs.

Hand washing separates the transient microorganisms from the skin. Paper towels remove the excess water along with the suspended contaminants that remain after rinsing. Thorough hand drying with paper towels after hand washing reduces the number of microorganisms transferred to skin, food, and other surfaces by 99% (Snelling et al. 2011).

- **Increase compliance with HH procedures.** Most people prefer to dry their hands with paper towels (Huang, Ma, and Stack 2012). If paper towels are not available, it is likely that compliance with HH guidelines will decrease. For example, access to an electric hand dryer is limited to one person at a time and electric hand drying takes longer than drying with paper towels. When there is a backup, workers may not wait to use the electric hand dryers.

  A key consideration is that paper towels protect workers' hands from recontamination when workers use them to turn off the sink faucets and to open the bathroom doors (Harrison et al. 2003).

- **Reduce cost.** Paper towels appear to be more costly than electric hand dryers. However, the costs to treat HAIs or foodborne illnesses can exceed an organization's annual budget for the purchase of HH products. For example, the cost to treat HAIs can range from $1,000 up to more than $36,400 per case (Stone 2009).

  Adhering to good HH is a low-cost preventive action that contributes significantly to preventing the spread of many of the microorganisms that cause HAIs and foodborne illnesses (Huesca-Espitia 2018).

MTF hand-drying recommendations

- **Display posters** from Appendix C in hand-washing and hand-drying areas.
- **Incorporate HH training into the Infection Control Program**. Annually educate staff on the types of activities that can result in hand contamination, the various methods that they can use to clean their hands, and proper hand-washing and hand-drying techniques.
- **Monitor the staff's adherence to HH practices** and provide feedback regarding their performance.
- **Provide training** during the launch of the program and annually thereafter. Refer to the Proper Hand-Drying Techniques in Appendix B.
- **Use hands-free or minimal contact paper towel dispensing systems** to further reduce hand contamination.
- **Utilize paper towels** for hand drying to include:
    - Food preparation, childcare, and direct patient care areas, as well as contiguous spaces adjacent to these areas.

- **Replace** any restroom paper towel dispenser or warm air dryer in isolated or segregated, non-patient care areas, such as contracting, logistics, and maintenance areas, etc., with jet air dryers.
- **Provide in-service training** during the launching of the program and annually thereafter. Refer to the Proper Hand -Drying Techniques in Appendix B.
- **As part of the Infection Control Program**, annually educate staff on the types of activities that can result in hand contamination, the various methods that they can use to clean their hands, and proper hand-washing and hand-drying techniques.
- **Monitor the staff's adherence to HH practices** and provide staff with feedback regarding their performance.

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APPENDIX A

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Appendix B

Proper Hand-Drying Techniques

Paper Towels

After washing and rinsing their hands, workers should—

1. Remove a single-use, disposable paper towel from a dispenser.
2. Pat hands with the paper towel to remove the excess water.
3. Rub the backs and palms of hands with the paper towel.
4. Rub all sides of each finger and thumbs with the paper towel, and carefully dry the spaces between fingers.
5. Discard the paper towel and repeat with a fresh paper towel if necessary to make sure hands get thoroughly dry. Spend a total of about 20 seconds drying all the surfaces on hands.
6. Avoid contact with contaminated surfaces such as sink faucet handles, paper towel dispenser cranks or levers, and exit door handles. Use a dry paper towel to turn off faucets and open exit doors.
7. Discard used paper towels in a waste receptacle.

TIP No. 025-0224

“Hands Under" Air Dryers

After washing and rinsing hands, workers should—

1. Shake excess water from hands into the sink.
2. Put hands, palms up, under the air flow and tilt them slightly downward to allow the water to run off.
3. Leave hands, palms up, under the air flow until they are dry.
4. Slowly move hands backwards and forwards through the air, turning them over so both back and front are exposed to the airflow. Continue this step until hands are completely dry.

Do not—

- Rub hands together while drying them under the air flow.
- Use clothing to dry your hands.

Note: Based on the manufacturer’s instructions, hand-drying technique may vary slightly from one device to another.

TIP No. 025-0224

"Hands In" Air Dryers

After washing and rinsing hands, workers should—

1. Shake excess water from hands into the sink.
2. Put hands, palms up, under the air flow and tilt them slightly downward to allow the water to run off.
3. Leave hands, palm up, under the air flow until they are dry.
4. Slowly move hands backwards, forwards, and side-to-side through the air. These devices typically have air jets on the top and bottom so turning them over is not necessary. Continue this step until hands are completely dry.

Do not—

- Rub hands together while drying them under the air flow.
- Use clothing to dry your hands.

Note: Based on the manufacturer's instructions, hand-drying technique may vary slightly from one device to another.

"V" Shaped Air Dryers

After washing and rinsing hands, workers should—

1. Shake excess water from hands into the sink.
2. Put hands, palms up, under the air flow and tilt to mimic the V-shape created by the two air-blades.
3. Leave hands, palm up, under the air flow until they are dry.
4. Slowly move hands backwards and forwards through the air, turning them over so both back and front are exposed to the airflow. Continue this step until hands are completely dry.

Do not—

- Rub hands together while drying them under the air flow.
- Use clothing to dry your hands.

Note: Based on the manufacturer's instructions, hand-drying technique may vary slightly from one device to another.