Eurofins-Inlab study results: microbial contamination of washroom surfaces with different hand drier devices.

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Sources:

- **Eurofins-Inlab study**
- **Extracts from comments by Prof. Mark Wilcox about the study** ***(Professor of Medical Microbiology, University of Leeds & Leeds Teaching Hospitals, Leeds, UK)***

Short Description

Institut for Microbiology of food, analyses, hygiene of companies and environmental hygiene

Inlab was founded in 1992 as a microbiology laboratory of food.
Inlab is member of the Eurofins Group since December 1st, 2007.

Microbiological testing, expert advice & sample drawing in the following areas:

- **Food (final-, intermediate products and raw materials), feeding stuff, articles of daily use including passing of rapid analyses**
- **Drinks and dispensing equipment**
- **Sanitary products, cosmetics and commercially available drugs**
- **Drinking- and mineral water, bath water**
- **Medical water like flushing water**
- **Hygiene of companies**
- **Compost**
- **Training courses, inspections, hygiene advice**

Accreditation:
Accredited according to DIN/EN ISO/IEC 17025 (DAR and DAkkS for second governmental samples), § 43 IfSG (permission for working with pathogens - according to NRW-governmental permission) drinking water laboratory and admitted laboratory of the “compost quality control association” for analysis of salmonella." DIN EN ISO/IEC 17025:2005; Authorised experts for double and cross checks according to § 43 LFGB (German Food and Feed Code) cosmetics excluded - authorised for drinking water analysis by German authorities

For further informations about Eurofins and Inlab look up: www.eurofins.de www.eurofins.com www.inlab-dortmund.de

Basics on the need of Hands Drying

Extracts from comments by Prof. Mark Wilcox about the study

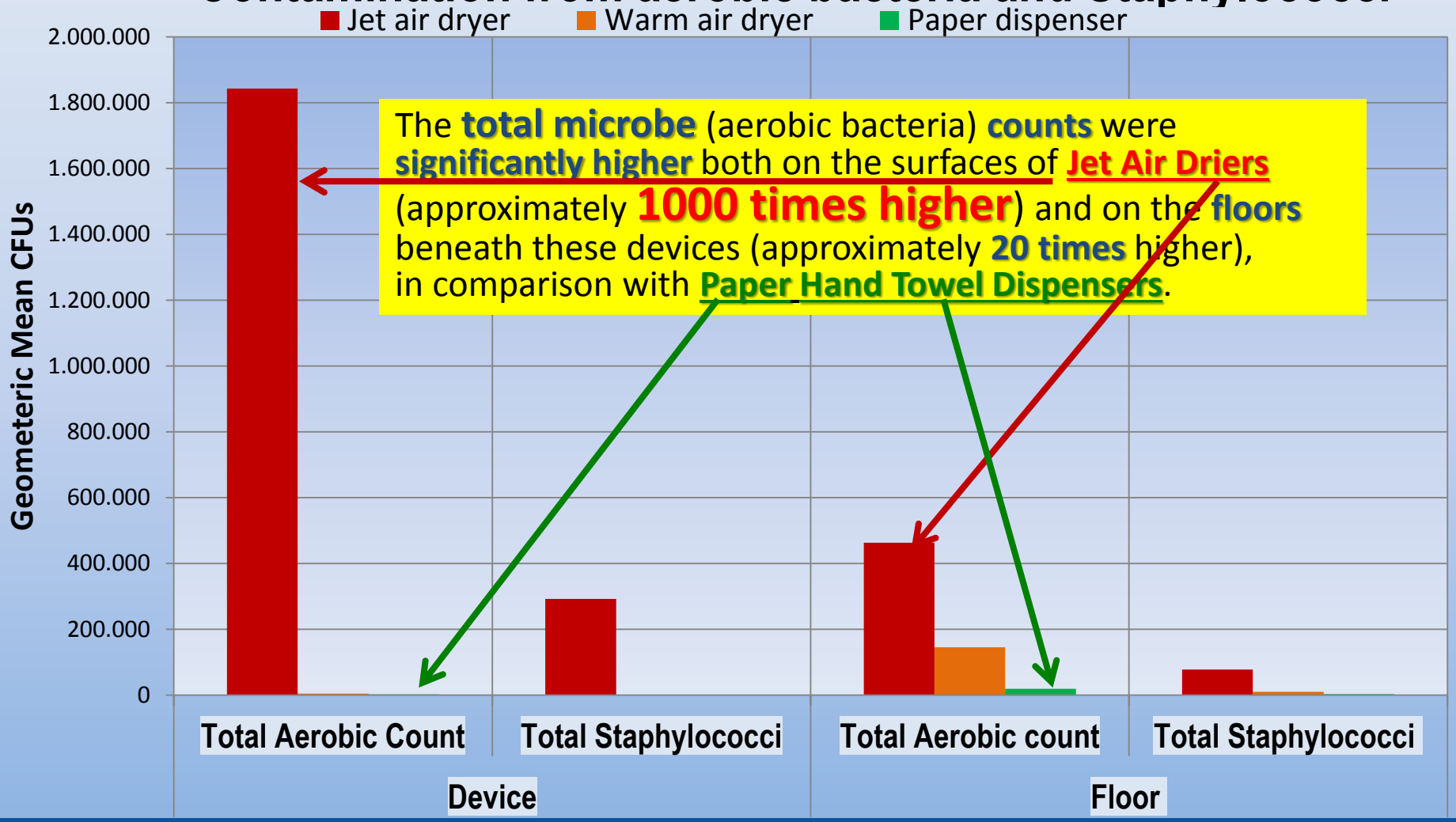
- **Hand washing** helps to **prevent the cross-contamination** of microbes from one person or surface to another.
- It **prevents infection** and can sometimes even save lives, by reducing the numbers of pathogens on hands.
- A fundamental aspect to hand washing is **the drying of hands**.
- Hands can be dried with …:
  - the use of single use **paper hand towels**,
  - reusable **cotton/textile** towels,
  - traditional **warm air driers**
  - high velocity **jet air driers**.
- The first two methods **absorb water** on the hands; the other types **disperse water into the air**, via a variety of mechanisms.
- Micro-organisms, especially **Staphylococci**, **Coliforms** and **Yeasts** may **contaminate hands during toileting**.
- Hands may **already be contaminated** with bacteria, viruses or yeasts **before** washing and could be transferred during the drying process or afterwards.

Eurofins – Inlab Study description

- The Eurofins-Inlab study measured the **microbial contamination** of **three types of drier devices** in the washrooms. Commissioned by ETS, it was carried out in various settings in the **Ruhr region**, **West Germany** (Feb-May 2012).
- **150 washrooms** were selected by Eurofins –Inlab (ETS doesn't know their location) and contained **jet air driers**, **warm air driers**, or **hand towel dispensers** (50 of each). They were **balanced** to represent high versus low use settings.
- Specialised sponges were used to swab the surfaces of hand drying devices.
- The sampled surfaces were those **most likely touched** during hand drying, i.e. the **inside surface of jet air driers**, the **inside** or **outside surfaces** of the **outlet tube** of **warm air driers**, and the **outlet** (bottom) of **paper towel dispensers.** Also a **surface area** (100 cm^2) of the **floors** below was sampled.
- The sponges were processed to **determine the total number of microorganisms** and numbers of **potential pathogens** (e.g. Staphylococci including *Staphylococcus aureus,* and coliforms including *Escherichia coli*).
    - As the sampled drier device surfaces differed in size, measured microbial counts were **reanalysed** according to counts per unit surface area.

Eurofins – Inlab Study: key findings (1a)

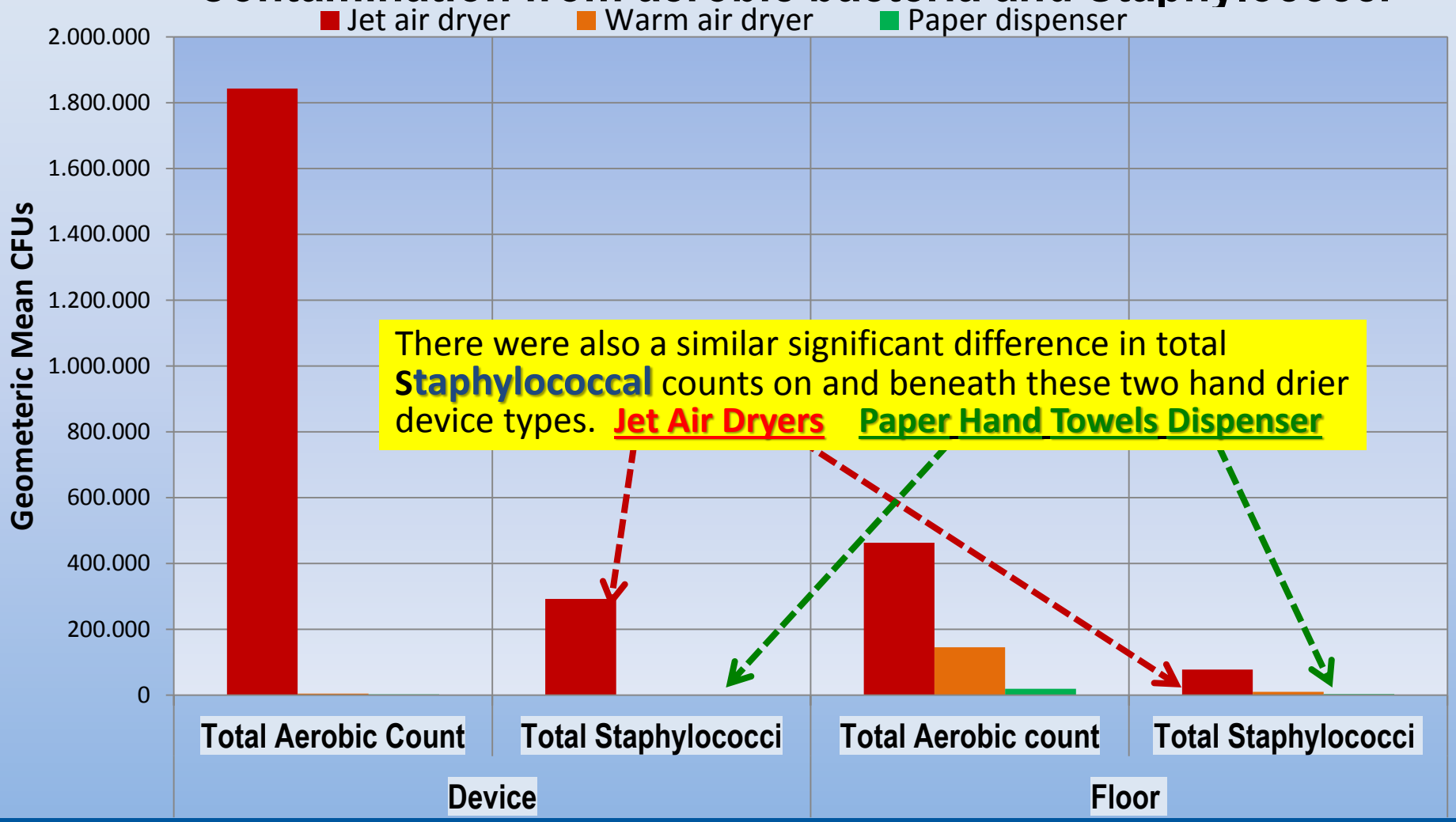
Contamination from aerobic bacteria and Staphylococci



The **total microbe** (aerobic bacteria) **counts** were **significantly higher** both on the surfaces of **Jet Air Driers** (approximately **1000 times higher**) and on the **floors** beneath these devices (approximately **20 times** higher), in comparison with **Paper Hand Towel Dispensers**.

Eurofins – Inlab Study: key findings (1a)

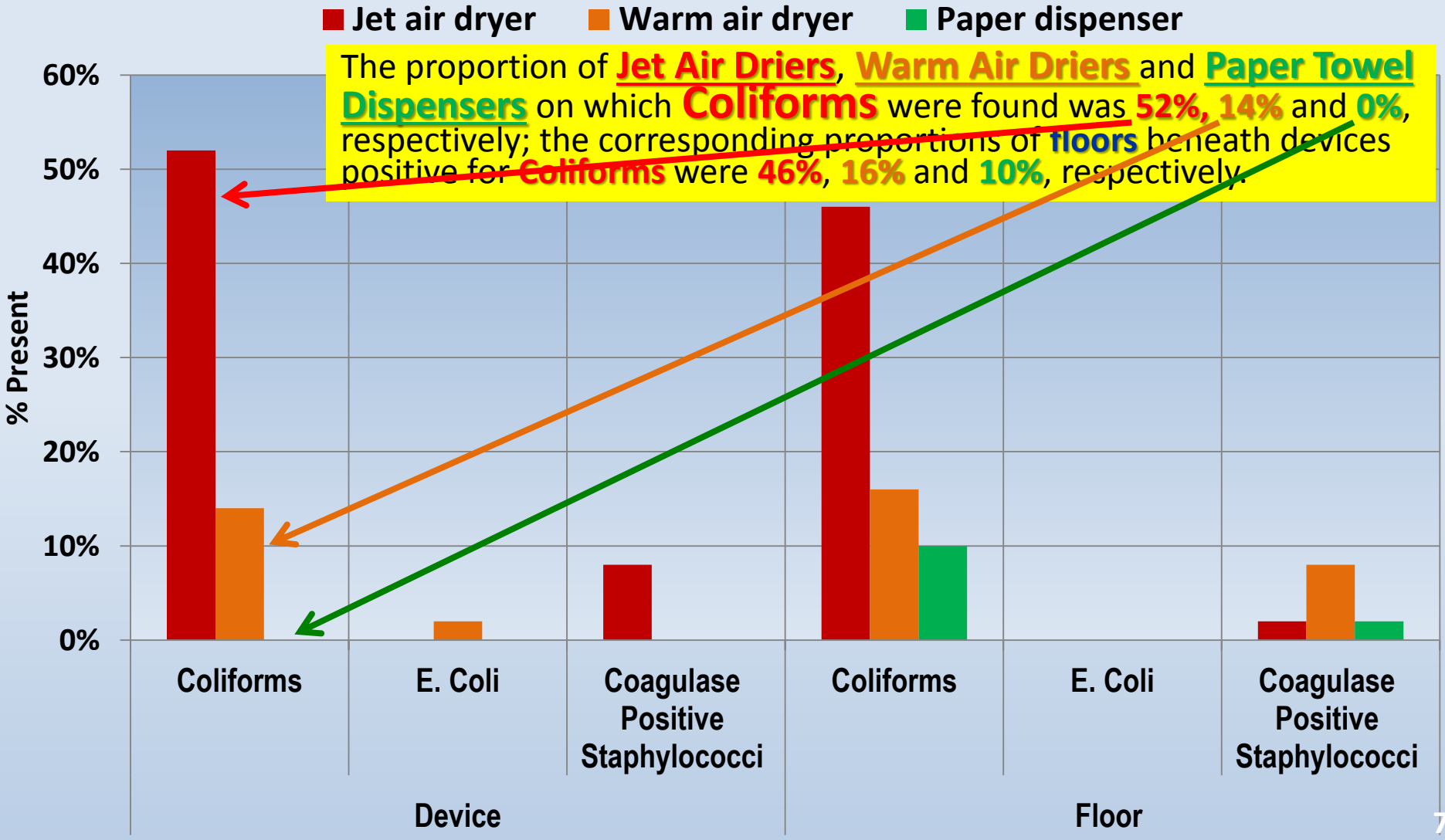
Contamination from aerobic bacteria and Staphylococci



There were also a similar significant difference in total **Staphylococcal** counts on and beneath these two hand drier device types. **Jet Air Dryers** **Paper Hand Towels Dispenser**

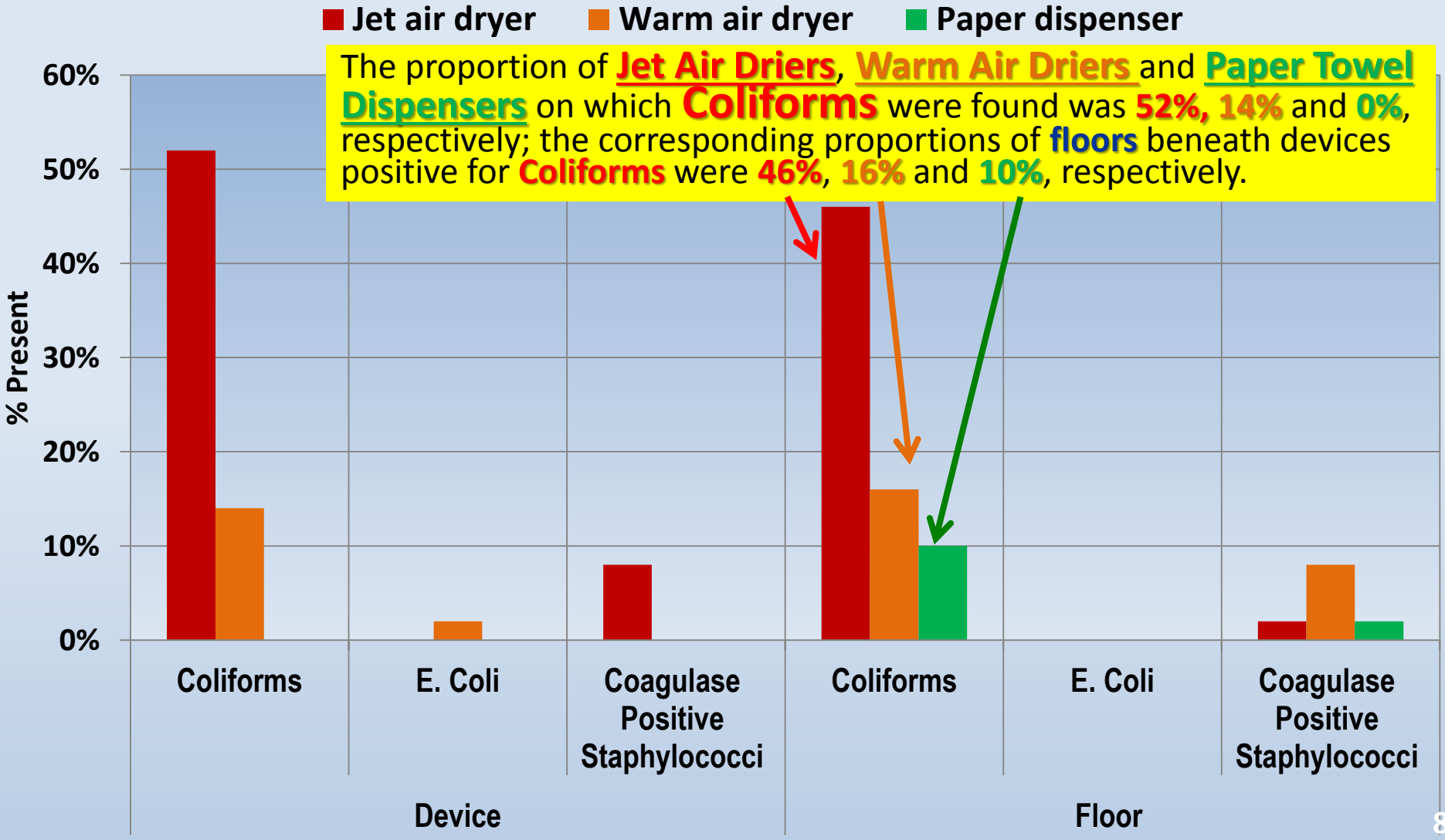
Eurofins – Inlab Study: key findings (1b)

Contamination from Coliforms, E. Coli, and coagulase positive Staphylococci



Eurofins – Inlab Study: key findings (1b)

Contamination from Coliforms, E. Coli, and coagulase positive Staphylococci



Eurofins – Inlab Study: key findings (2)

- Approximately **1 in 8** of the **floors** below **Jet Air Driers** had **staphylococcal counts > 10 million** (per 100 cm^2); **none** of the counts on the **floors** below **Paper Hand Towels Dispensers** exceeded this level.
  4% of floors beneath **Warm Air Dryers** had counts above this level.
- There was **consistency of results**: higher drier surface microbe counts were usually accompanied by higher counts on the floors beneath the devices.
- The surfaces that were tested were those **most likely to be touched**.
  As a result, the actual surfaces that were examined differed in terms of size (surface area); the jet air driers had the largest potential touch areas.
- In a recent observational study (commissioned by the Kimberly-Clark Corporation), one or both hands of all subjects (n=120) touched the blades of a Dyson Jet Air Drier during hand drying; the avg. number of **observed device touches** by hands per drying was **13**.
- The **microbe counts** were **adjusted** to take account of the **differences in surface areas** that were sampled. Having made this adjustment, the microbe counts were still significantly higher (i.e. **over 300 times higher** per unit area sampled) on the **inner surfaces of Jet Air Drier** in comparison with those found on **bottom surface of Hand Towel Dispensers.**

Why microbes dispersal must be avoided

- But how may micro-organisms contaminate the hand driers?
  - direct transfer by **hands touching** a device (direct touch transfer),
  - transfer by the **air during hand drying** (direct air transfer),
  - transfer by the **air after hand drying** (indirect air transfer).
- Procedures should **minimise the risk of microbes dispersal**.
- **Avoidance** of **touching contaminated surfaces** and **prevention** of **airborne spread** of **microbes** are key ways of **minimising the transmission of infection**.
- In cases of increased dispersal of microbes during hand drying, hands are more likely to be **re-contaminated** during the drying process, and this could lead to **increased spread** of **potential pathogens**.
- In some cases this could affect the person who acquires the microbes **during hand drying**, or a **subsequent person** using the same washroom.
- Microbes could be acquired either by **touching** a contaminated surface (e.g. the hand drier device), from microbe-containing **droplets/particles** present in the **air that land on a person**, or by **breathing** in tiny **microbe-containing particles** or **droplets**.

Examples of risks associated with microbes dispersal: Staphylococcus aureus and flu virus

Staphylococcus aureus is carried in the nose and some skin sites of about 1 in 5 people.

- It can cause a wide range of disease if the bacteria gain access to certain sites e.g. a skin wound; some types of *Staphylococcus aureus* can also cause food poisoning.
- **The most common way that *Staphylococcus aureus* is transferred is on hands**.
- Therefore, the contaminated surface of some hand driers *(particularly, according to this study, **Jet Air Driers**)* may **pose** a **greater risk** of the **transfer** of such potential **pathogens**.

The **influenza (flu) virus** is highly contagious.

- Influenza can spread so easily because of the **large amounts of virus that an infected person can spread** into the environment, plus the **low number of virus cells needed** to set up a new infection, and the **time** that the viruses can survive (in the air / on surfaces).
- Acquisition of the influenza virus occurs when an infected person coughs or sneezes and small **droplets/particles** (each one can contain > 100 virus cells) are **breathed** in by another individual. **One or a few droplets/particles** can be **enough** to **initiate infection**.
- Transmission may also occur by **touching a surface that is contaminated** with the virus/respiratory secretions. Influenza virus can live on a hard surface for several hours.
- **Floors** in particular reflect the **potential for airborne transmission**, including from droplets emitted during hand drying. **Droplets/particles released during hand drying could transmit respiratory viruses such as influenza from contaminated hands**; alternatively, viruses could be acquired by **touching Hand Dryer surfaces**.
  Both possibilities would appear to be **more likely with Jet Air Driers**.

Conclusions drawn by Prof. Mark Wilcox

- **Good hand washing** followed by **careful hand drying** are **key** ways to **prevent microbe spread**.
- A **hand drying method** should be chosen that **minimises** the risk of **re-contaminating** the hands.
- From the results of the current study, it appears that there may be a **greater risk** of **exposure** to **microbes** associated with some types of hand driers.
- There was an increased level of microbial contamination on and beneath **air driers, particularly Jet Air Driers**, in comparison with **Hand Towel Driers**.
- These findings have **implications** for the **prevention** of spread of microbes and infection, that should be explored further.

For more information about the studies and the activities of the European Tissue Symposium, please look at:

http://www.europeantissue.com/

In particular to have access to the summary and the dataset of the Eurofins-Inlab study, please look at:

http://www.europeantissue.com/hygiene/NewStudy/

The Mayo Clinic Proceedings article can also be read at:

http://www.europeantissue.com/facts-studies/research/published-on-mayo-clinic-proceedings-the-hygienic-efficacy-of-different-hand-drying-methods/