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RESEARCH ARTICLE

AN ASSESSMENT OF THE BACTERIOLOGICAL PROFILE AND THE CROSS CONTAMINATION OF THE AIR FROM THE HAND DRYERS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

The efficiency of hand drying is important in preventing pathogen spread, but knowledge regarding drying methods is limited. The proper drying of hands should be an integral part of the hand hygiene process in health care for controlling the infection spread. Hence, this study is undertaken to detect the bacteriological profile of the air from the hand dryers, thereby aiming to help investigate the cross contamination in addition to the hand drying action of the hand dryers.

Objectives of the study:
1) To study the bacteriological profile of the air from the hand dryers.
2) To study the bacteriological cross-contamination of the hand dryers.

Setting and Design:
The study is a prospective study and was conducted in the Department of Microbiology, Victoria hospital. Various hand dryers in Bangalore Medical College & Research Institute, Super Speciality Hospital (PMSSY), Bangalore was included under this study.

Materials and Methods: 45 hand-dryers in BMC&RI, SSH(PMSSY) were used to assess the bacterial contamination. The bacterial isolates were identified using standard microbiological procedures.

Results: Of 45 hand dryers studied, our study yielded 11 isolates of Gram positive bacilli, 4 isolates of *Micrococcus* species, 2 isolates of *Staphylococcus aureus*, and 1 *Klebsiella pneumoniae*. The 31(68.88%) hand dryers yieldedno bacterial isolates.

Conclusion:
In the hospital areas like wards and OPDs, it is difficult to maintain asepsis and hence, care should be taken to frequently maintain the hand dryers.
The above study gives us an opportunity to look into such aspects and help in creating a sterile and safe hospital environment.

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INTRODUCTION

The efficiency of hand drying is important in preventing pathogen spread, but knowledge regarding drying methods is limited (Best *et al.,* 2014). The proper drying of hands should be an integral part of the hand hygiene process in health care for controlling the infection spread. It is critical therefore, that hands are not contaminated with bacteria by the drying process (Huang *et al.,* 2012). Hence, this study is undertaken to detect the bacteriological profile of the air from the hand dryers, thereby aiming to help investigate the cross contamination in addition to the hand drying action of the hand dryers.

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Obective:

1) To study the bacteriological profile of the air from the hand dryers.
2) To study the bacter-iological cross-contamination of the hand dryers.

MATERIALS AND METHODS

Source of Data

The study was conducted in the Department of Microbiology, Victoria hospital. Various hand dryers in BMC&RI, SSH (PMSSY), Bengaluru was included under this study.

Method of collection of data

Design of Study: It is a prospective study of bacterial isolates from hand dryer air samples of the hospital.

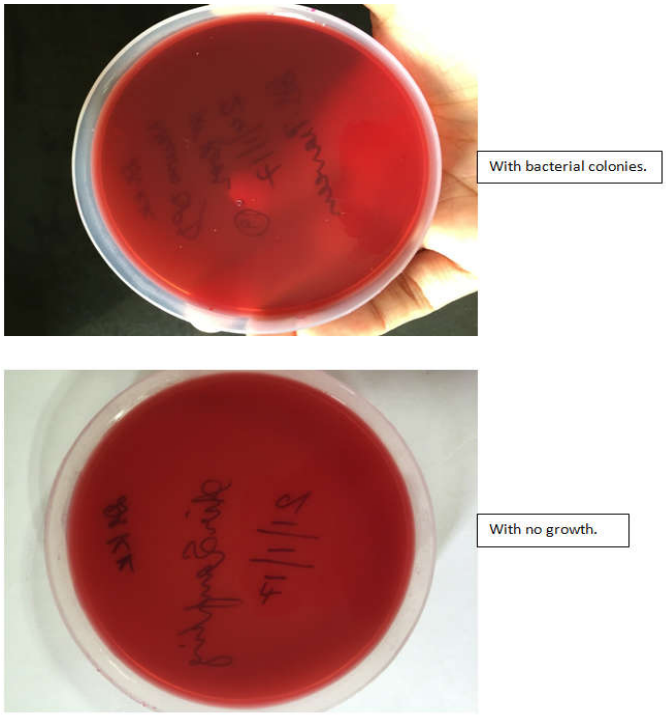
Study Period: January 2017- February 2017.

Place of Study: Department of Microbiology, Victoria hospital, Bengaluru, Karnataka, India.

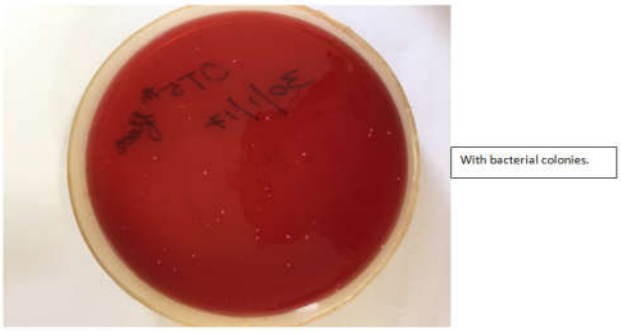
Sample Size: 45 hand-dryers in the BMC&RI, SSH(PMSSY), Bengaluru.

METHODOLOGY

Pic 1- Hand dryer



Pic 2- Hand dryer settle plates



Pic 3 - Air sampling settle plates

Sample Collection and Processing

45 hand-dryers in BMC&RI, SSH (PMSSY) were used to assess the bacterial contamination. The air-dryers were turned on for 30 seconds and the air was played onto Blood agar culture plates. The blood agar plates along with appropriate controls were then incubated at 37°c for 48 hours. After incubation the total bacterial count was noted. Gram stain of the smears was done (Collee and Marr, 2014; Alharbi *et al.,* 2016).

Statistical analysis

Statistical Analysis was done by using descriptive analysis.

Ethics

Investigation or intervention was not conducted on patients or other humans or animal.

RESULTS

- Of 45 hand dryers studied, our study yielded
- 11 isolates of Gram positive bacilli,
- 4 isolates of *Micrococcus* species,
- 2 isolates of *Staphylococcus aureus*,
- 1 case of *Klebsiella pneumoniae*.
- The 31(68.88%) hand dryers yielded no bacterial isolates (Table 1 and Fig.1).

Table 1. Bacterial isolates from the hand dryers air samples

Bacterial isolates	No of isolates
No growth	31
Gram positive bacilli	11
Micrococcus species	4
Staphylococcus aureus	2
Klebsiella pneumoniae	1

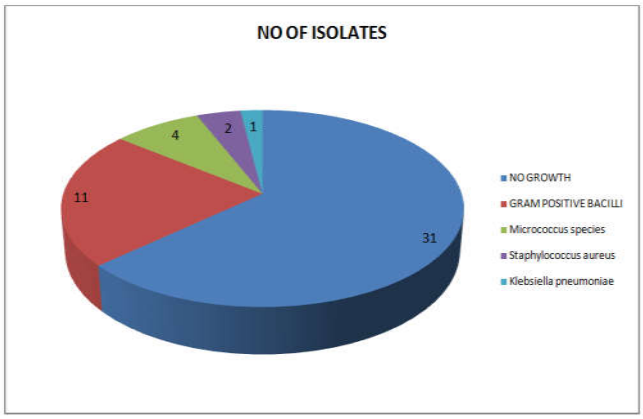


Fig.1. Bacterial isolates from the hand dryers air samples

Further the air sampling was done for the sites where the hand dyers which yielded growth were installed. The results are compiled in Table 2 and 3.

Table 2. Areas with pathogenic isolates

Special ward	*Staphylococcus aureus*
Sge opd dressing room	*Staphylococcus aureus*
Paediatric surgery opd	*Klebsiella pneumoniae*

The following 14 of the 45 Hand dryers yielded significant growth. Hence, the air sampling was done for these sites where the hand dyers were installed. The results are tabulated below.

Table 3. Air Sampling Results:

S.No.	Site	Isolates	Colony count (CFU/ml)
1	Triage	*Staphylococcus aureus*	50
2	5TH FLOOR OT	*Staphylococcus aureus*	30
3	Special Ward	*Staphylococcus aureus &* *Micrococcus* species	30
4	SGE OPD Dressing Room	No growth	0
5	Paediatric Surgery OPD	Gram positive bacilli *&* *Micrococcus* species	10
6	Paediatric Surgery OPD Consultant Room	Gram positive bacilli & *Micrococcus species*	10
7	Paediatric Surgery Female General Ward	*Staphylococcus aureus*	12
8	Paediatric Surgery Male General Ward	*Staphylococcus aureus*	12
9	SGE Male General Ward	Gram positive bacilli	10
10	Cardiology Female General Ward	No growth	0
11	Plastic Surgery OPD Dressing Room	*Staphylococcus aureus*	20
12	Neurology OPD	No growth	0
13	EEG Room	*Staphylococcus aureus*	15
14	Video EEG	Gram positive bacilli	12

DISCUSSION

- Hand dryers can deposit bacteria onto the users, and disseminate.
- It is therefore, recommended that the hand dryers should be essentially maintained at defined intervals in critical locations as hospitals.
- The isolates in this study were also compared with the reference studies (Table 4).

Table 4. Comparative Study

S.No.	Study	Isolates
1	Best *et al*.	*Staphylococcus aureus* *Escherichia coli*
2	Alharbi *et al*.	*Staphylococcus haemolyticus,* *Micrococcus luteus,* *Bacillus cereus,* *Pseudomonas alcaligenes*
3	Present study	*Staphylococcusaureus* *Klebsiellapneumoniae* *Micrococcus* species Gram positive bacilli

Conclusion

- In the hospital areas like wards and outpatient departments (OPDs), it is difficult to maintain asepsis and hence, care should be taken to frequently maintain the hand dryers.
- The above study gives us an opportunity to look into such aspects and help in creating a sterile and safe hospital environment.

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