



EVALUATION OF DEGREE OF MICROBIAL CONTAMINATION AND HAZARD REDUCTION IN SELECTED LABORATORY FACILITIES IN RIVERS STATE, NIGERIA

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Abstract

Surface contamination in laboratories is a key source of unintentional exposure to biological agents and toxins that can lead to laboratory-acquired infections. The aim of this study was to investigate the occurrence of work-related surface contamination. A cross-sectional study was carried out in selected laboratory facilities at Rivers State University, Nigeria, to ascertain the degree of surface contamination in some research, teaching and diagnostic laboratories. The results showed a high presence of contamination with 28.95%, 22.37%, and 48.69% of surfaces tested being positive for *Bacillus* species, *Salmonella* species and *Staphylococcus aureus* respectively. The findings suggest inadequate or poor decontamination of these surfaces. A number of factors could contribute to this, such as poor training of personnel, poor equipment sterilization, a lack of appropriate decontaminating reagents and failure of performance evaluation following decontaminating practices. The insights from this study would enable us identify next steps in improving our local biosafety practices.

Introduction

Laboratory personnel are at risk of laboratory-acquired infections. Studies indicate that most hospitals in developing countries, have infection control programs owing to the lack of awareness of the problem; a lack of personnel trained in infection control practices; inadequate and aging infrastructure and limited availability of PPE. The situation in Nigeria is unlikely to be any different. Evidence exists that compliance with universal safety precautions reduces the risk of infections and protects health care practitioners.

In Nigeria, there is currently no legislative guideline for enforcing biosafety in clinical laboratories. At present, very few reports exist on biorisk assessment of clinical diagnostic laboratories in the country. Against this background, the aim of this study was to

Table 1. Overall Percentage Occurrence of Laboratory Contamination

Organism Type	Percentage Occurrence (%)
<i>Bacillus spp</i>	28.95 %
<i>Salmonella spp</i>	22.36 %
<i>Staphylococcus aureus</i>	48.69 %

In general assessment, the sink contained the highest bacteria count, followed by the bench surfaces and door handles with the prevalence of 67.4%, 29.1%, and 3.5% respectively. From the result obtained it has shown that the sink contained more bacteria than other parts of the laboratory. This might be due to the fact that the sink is the site where laboratory glass wares, chemicals or waste substances are washed or disposed and as such have the highest number of microorganisms.

Conclusion

The findings suggest inadequate or poor decontamination of these surfaces. A number of factors could contribute to this, such as poor training of personnel, poor equipment sterilization, a lack of appropriate decontaminating reagents and failure of performance evaluation following decontaminating practices.

The insights from this study would enable us identify next steps in improving our local biosafety practices. Most of the strains isolated were potential pathogens and known causes of laboratory acquired infections (LAI). Most of the isolated organisms were from the sink followed by the bench surfaces and the door handles.

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Sandia National Laboratories

investigate the occurrence of work-related surface contamination in selected laboratory facilities in Rivers State, Nigeria.

Methods

Sample Collection and Processing: A total of one hundred (100) samples were collected from three major hospitals where laboratory work is carried out routinely. They include, University of Port Harcourt Teaching Hospital (UPTH), Rivers State University Teaching Hospital (RSUTH) and Lulu-Briggs Hospital Laboratory, Port Harcourt, Nigeria. The samples collected included swabs of door handles, sinks, bench surfaces and equipment surfaces. Sterile swab sticks moistened with sterile normal saline were used to collect samples.

The processing of the samples was done in the Department of Medical Laboratory Science Diagnostic Centre, Rivers State University, Port Harcourt, Nigeria. Samples were cultured on MacConkey Agar, Nutrient broth and *Salmonella*-shigella agar in an aseptic condition and identified using standard microbiological procedures. Statistical analysis was done using simple percentage occurrence.

Results and Discussion

The results showed that 48.69% of samples tested were positive for *Staphylococcus aureus*, while 22.37% and 28.95% of the samples were positive for *Salmonella* and *Bacillus* species respectively. The bacteria isolated were distributed as follows: 81.8% of *Bacillus* species from the sink, and 18.2% from the bench surface; 62.5% of *Salmonella* from the sink, and 37.5% from bench surfaces; 57.9% of *Staphylococcus aureus* from the sink, 10.5% from the door, and 31.6% from the bench surface. The overall percentage occurrence of laboratory contamination is shown in Table 1. While the bacteria distribution pattern is shown in Table 2.

Table 2. Bacteria Isolated Distribution Pattern

Sample type	(No. of isolate)	(No. of isolate)	(No. of isolate)
	<i>Bacillus subtilis</i>	<i>Salmonella spp</i>	<i>Staphylococcus aureus</i>
Sink	81.8 %	62.5 %	57.9 %
Door Handles	0	0	10.5 %
Bench Surfaces	18.2 %	37.5 %	31.6 %
Total %	100%	100%	100%