

ORIGINAL RESEARCH

Microbiological Surveillance Of Operation Theatres, Intensive Care Units And Neonatal Intensive Care Units Of Different Hospitals In Jammu Region

¹Rajni Bharti, ^{2*}Priyanka Sharma, ³Neeru Rajput, ⁴Shashi Sudhan Sharma

^{1,3}Senior Resident, ²Lecturer, ⁴ Professor and Head, Department of Microbiology, GMC, Jammu, Jammu and Kashmir, India

***Corresponding author**

Priyanka Sharma

Lecturer, Department of Microbiology, GMC, Jammu, Jammu and Kashmir, India

Email: sharmapriyankaatul@gmail.com

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ABSTRACT

Background: Hospital-associated infections are the major cause of patient morbidity and mortality. Environmental monitoring by the microbiological testing of surfaces and equipments is useful to detect changing trends of types and counts of microbial flora.

Aim: Identify bacterial colonization of surface and equipments isolated from Operation theatres, ICUs and NICUs of a tertiary care hospital in Jammu region.

Methods: Swabs were taken from different sites and equipments and bacterial species were isolated and identified from them.

Results: Among contaminants, Micrococci (30%) and Bacillus spp. (25%) were the most common. The bacterial pathogens isolated were Klebsiella spp. (14%), Coagulase Negative Staphylococcus aureus (11%), Pseudomonas sp. (2%), Acinetobacter spp. (11%), Staphylococcus aureus (5%), and Enterococcus spp. (2%).

Conclusions: High level of microbial contamination indicates the needs for periodic surveillance aimed at early detection of bacterial contamination levels and prevention of hospital acquired infections.

INTRODUCTION

Hospital acquired infections is a topic of concern in the whole world. Over 1.4 million individuals around the world are considered to be infected in hospitals, with 80000 deaths every year. The hospital environment is a reservoir of pathogenic microorganisms to a greater or lesser extent. In developed countries, the nosocomial infections affects 5 to 10% of all patients admitted to healthcare facilities whereas this rate is 25% in underdeveloped nations¹. The prevalence of nosocomial infections increases because of the microbial contaminations in specialized units in hospitals²⁻⁴. The infections caused by antibiotic resistant bacteria in Operation Theatre (OT) and Intensive care unit (ICU) acquired infections, are significant threat to patients. They are one of the major causes of morbidity and mortality of patients⁵.

The complex environment of operation theatres leads to a high risk of infection for patients and health care workers because of their long exposures to various risks, including chemical, physical and biological factors⁶. Because of inadequate infection control measures, invasive procedures, high antibiotic usage and transmission of bacteria between patients, the OTs and

ICU are known as “hot zones” for the emergence of and spread of microbial resistance⁷. It is also associated with a considerable increase in morbidity and mortality of patients at a hospital as well as it adds to the significant increase in cost⁸. Therefore, environmental monitoring, which includes the microbiological testing of surfaces and equipments plays an important role in infection control programs by detecting the changing trends of microbial counts and microflora.^{9,10}

Keeping in view the importance of the topic, this study was done to evaluate surface bacterial contaminants in operation theatres and intensive care units so that appropriate and timely interventions can be taken to avoid the spread of the nosocomial infection.

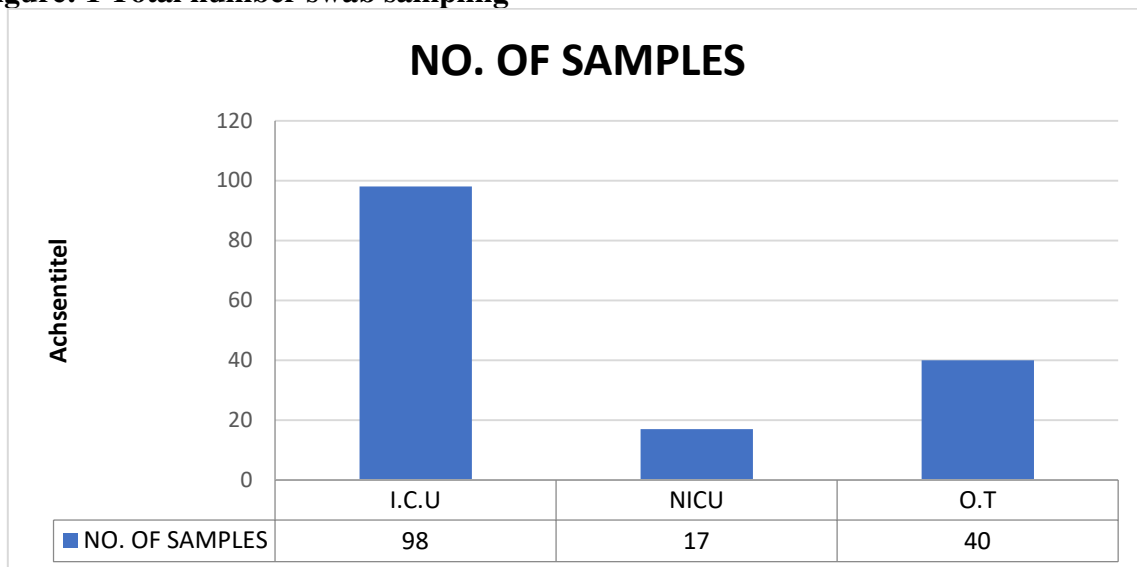
METHODS

The study was conducted in the Department of Microbiology; Government Medical College and Hospital, Jammu, J&K, India. To avoid false-positive results, the area being sampled was left vacant for more than one hour before the commencement of sampling. The doors were kept closed prior to and during the sampling period.

SAMPLES FROM SURFACES AND EQUIPMENTS (SWAB METHOD)

Total 155 surface samples were taken from different sites and equipments of 3 ICU, 2 NICU, and 6 OT of GMC Jammu and different District hospitals and PHC of Jammu region. Sterile swabs were used for collection of samples. A Total of 98 samples were taken from all ICU, 17 samples from NICU and 40 samples from OT.

Figure: 1 Total number swab sampling



After collection the swabs were kept in nutrient broth. All the samples were labelled properly and immediately transported to the Microbiology laboratory and incubated at 37°C for 4 hours. After incubation the swabs were inoculated on Blood agar and Mac Conkey agar. These culture plates were incubated at 37°C under aerobic condition for 24 hours. After 24 hours isolation and identification of isolates were done as per departmental standard operating procedure.

RESULT

Out of total 155 swab samples, 50(32%) samples showed positive growth. 31(20%) bacterial species were isolated from ICU, 7 ((5%) from NICU and 12 (8%) from OT.

Figure 2: Swab sampling from ICU

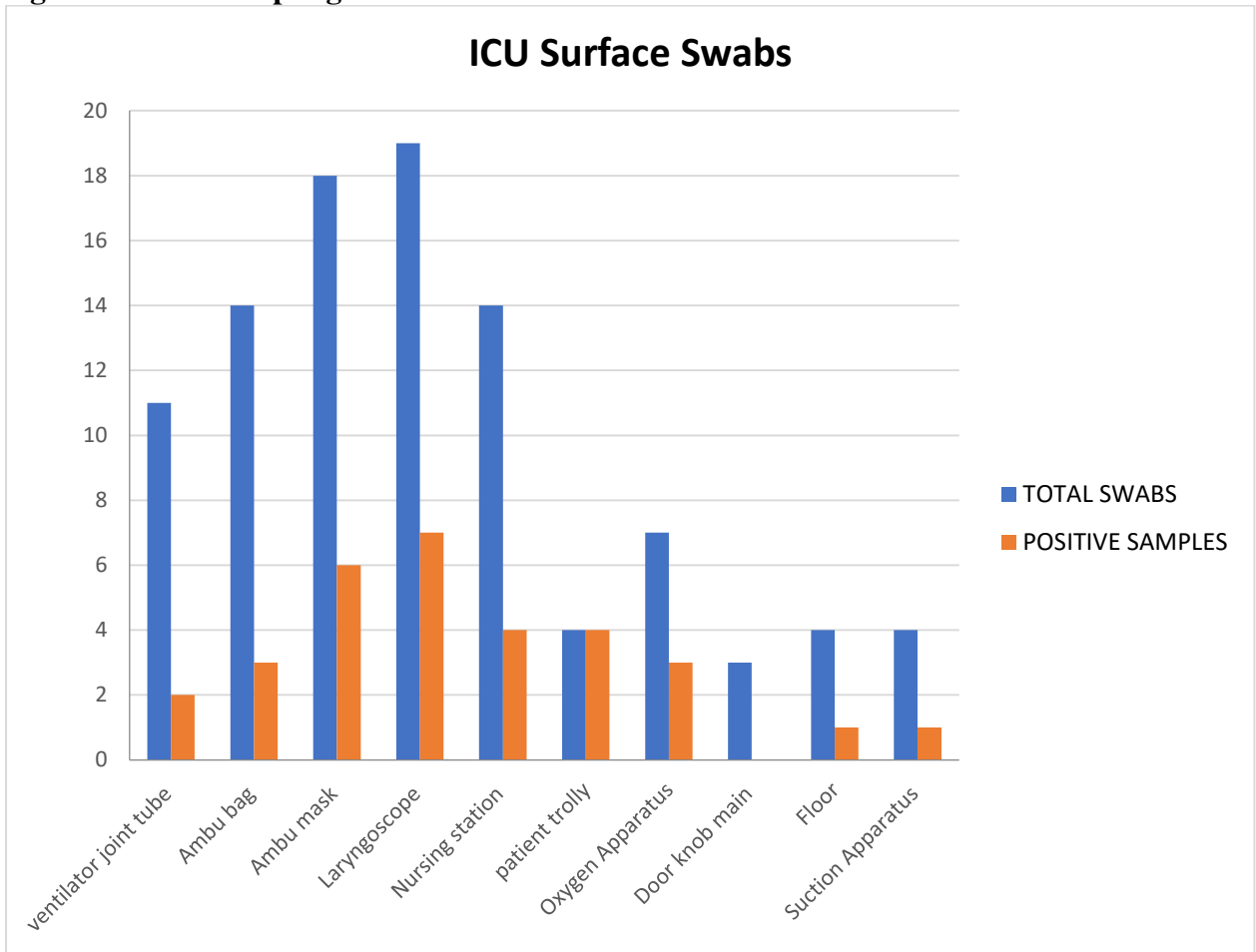


Figure 3: Swab sampling from NICU

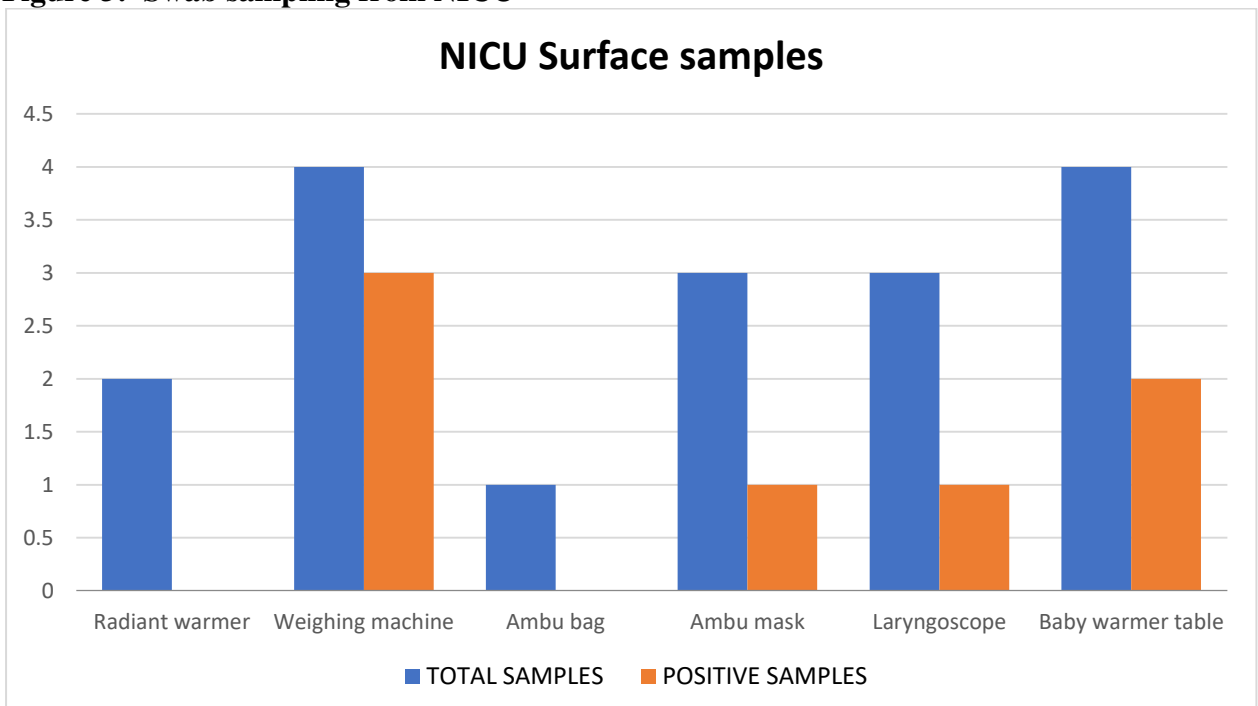
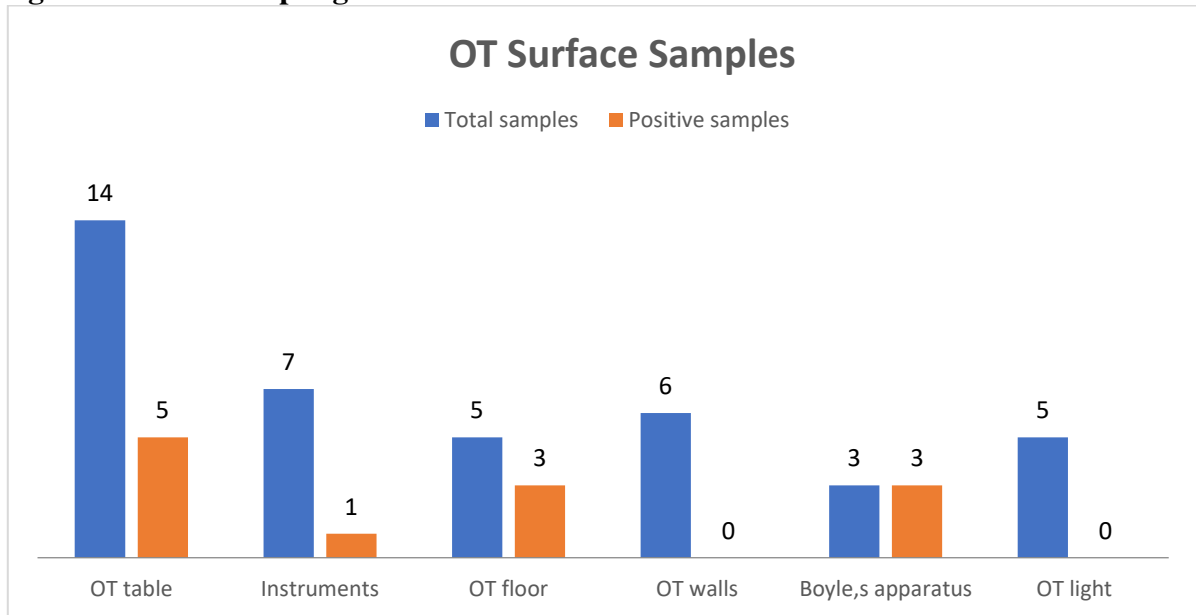
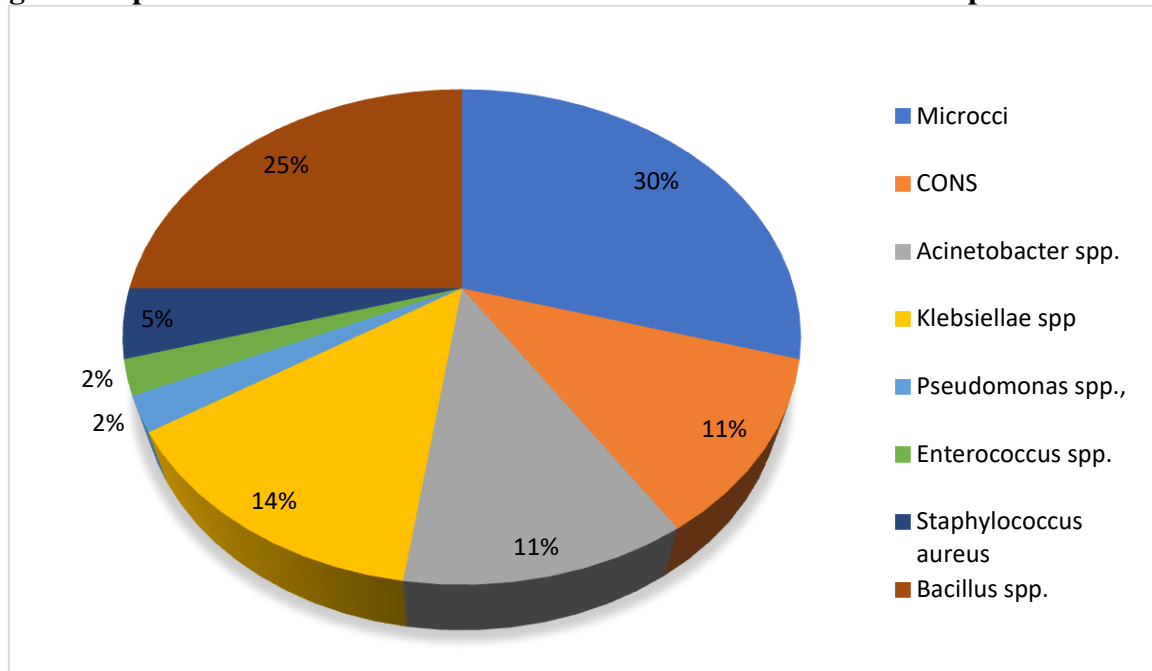


Figure 4: Swab sampling from OT**Table 1: Bacterial isolates from OTs, NICUs and ICUs**

1. OT	Bacterial sp. obtained
SDH Ramnagar	Micrococci, CONS,
CHC Katra	Acinetobacter spp. Bacillus spp.
DH Reasi	NG
SSH JAMMU	Micrococci, Bacillus spp.
SMGS JAMMU	Klebsiella spp., Acinetobacter spp., Micrococci,
DH Udhampur	Micrococci, Bacillus spp.
2. ICU	
GMC JAMMU	Pseudomonas spp., Enterococcus spp., Klebsiella spp., Staphylococcus aureus, Micrococci, Acinetobacter spp., Bacillus spp.
SSH JAMMU	CONS, Klebsiella spp., Citobacter spp., Acinetobacter spp., Escherichia coli, Bacillus spp.
DRDRO JAMMU	Micrococci, Bacillus spp.
3. NICU	
NICU-B SMGS	Micrococci, Staphylococcus aureus, Bacillus spp.
NICU-C	Acinetobacter spp., Klebsiella spp, Bacillus spp.

Figure 4: Species-wise distribution of isolates obtained from surface sample.

DISCUSSION

In this study, the surface swab samples from different OT, ICU and NICU of GMC, District Hospital, PHC were processed. In the study out of 155 surface swab samples from OT and ICU 32% shows growth of bacteria whereas in a study which was conducted in Telengana India, out of 111 samples 48% shows growth of bacteria¹¹. In another study which was done in New Delhi on 960 surface samples, 9.89% were positive for culture.¹²

Bacterial growth was positive in 8% of samples collected from OT. In a study conducted in Iraq on 1216 samples, the percentage of positive growth was 3.7% in 2001 and 4.0% in 2002¹³. A similar study was conducted in Gaza Strip, Palestine where 24.7% of surface swabs shows positive result¹⁴. In an another study conducted in Telengana, out of total 3492 surface swabs collected from 5 different OTs, 8.42% samples showed positive growth¹³. In the studies done by Kiranmai S *et al*¹¹ and Meenakshi T *et al*¹⁷, the positivity rate varied from 23.4% to 45.8% which is quite higher than the present study.

Among contaminants, Micrococci (30%) and Bacillus spp. (25%) were the most common. The bacterial pathogens isolated were Klebsiellasp. (14%), Coagulase Negative Staphylococcus (11%), Pseudomonas sp. (2%), Acinetobacter spp. (11%), Staphylococcus aureus (5%), and Enterococcus spp. (2%). In study by Anjali *et al*¹ the most common isolate was Coagulase negative Staphylococcus species (5.8%) followed by Bacillus and Klebsiella species; (4.4%) each. In another study done by Desai SN *et al*¹⁷, the most common isolate was Bacillus species (91.9%) followed by S. aureus (18.9%). Mishra and Wadhai¹⁸ described the spread of bacterial contamination and its rate in operation theaters and they also find out how it contributes to the nosocomial infections of various hospitals of Wardha city, India. The pathogens like Staphylococcus spp. Coagulase-negative Staphylococcus spp. and Pseudomonas spp. were found.

The ICU was found to be colonized with contaminants as well as potential pathogens. OT table and drug trolleys were the most contaminated sites in OTs. Beds, BP apparatus and floors were the most contaminated sites in ICUs. This finding is similar to the study of Desai SN *et al*¹⁷.

Among contaminants, 11.25% of ICU and OT were found to be colonized with *Bacillus* species. Whereas in the study done by Singh S *et al*¹², 46.51% were the contaminant *Bacillus* species.

CONCLUSION

Regular microbiological surveillance of OT, ICU, NICU is essential to detect contamination. For control and prevention of HAI, strict and frequent implementation of disinfection procedures, timely conduction of CME for Health Care Workers, hands on workshops on Prevention of hospital infections, supervision by Hospital Infection Control team and restrictions of entry into sterile areas could help in minimizing the nosocomial infections.

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