STUDY OF BACTERIAL PATHOGENS ON HIGH TOUCH SURFACES AND THEIR ANTIMICROBIAL SUSCEPTIBILITY PATTERN IN A TERTIARY CARE HOSPITAL

ABSTRACT

Background: The hospital environment surfaces plays an important role in causing Hospital acquired infections. This study conducted to assess the surface contamination in four different wards at Apollo General Hospital, Hyderabad which are frequently touched by health care professionals. Hence we conducted a study to assess the bacterial pathogens on frequently touched areas in the hospital and to determine antibiotic susceptibility of these pathogens

Materials and methods: A Cross-sectional study was conducted in Apollo General Hospital from April to May 2024. A total of 48 swabs collected from surfaces of floor, bed, wall, doorhandles, stethoscope, thermometer, IV stand, examination table, sink tap, bed side trolley and drug trolley from Medicine, OBG, Surgery and Paediatric wards using sterile moist swabs. Gram staining and culture on blood agar and MacConkey agar was done. Identification of the isolates was done as per standard protocol. Antimicrobial susceptibility testing was done as per CLSI guidelines

Results: Out of the 48 samples processed, 52% showed bacterial growth. *CoNS* (68%) was the predominant isolate followed by *Staphylococcus* (16%), *Acinetobacter spp* (4%) and Proteus (4%). The other isolates were Enterococcus (4%) and *Burkholderia* (4%). Majority of the *CoNS* were isolated from floor, bed and wall. Most of the isolates were sensitive to ciprofloxacin and gentamicin and resistant to penicillin

Conclusion: These results in our study suggests that there should be increased emphasis on frequent cleaning and disinfection of frequently touched surfaces in hospital to reduce bacterial contamination.

Key words: Hospital Environment, High touch areas, Bacterial Pathogens

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INTRODUCTION

Bacterial contamination of high touch surfaces in health care facilities is a significant concern as they harbour potential pathogens and act as source of hospital acquired infections [1]. These bacteria persist in hospital environments through formation of biofilm and can resist disinfection [2]. High touch surfaces such as bed, floor, wall, tables and many other surfaces in hospital environment can become reservoirs of bacterial pathogens [3,4]. The most common organisms associated with health care associated infections are both gram positive and gram-negative bacteria such as *S. aureus, CoNS, Pseudomonas, Proteus species* [5]. This study is planned to assess the distribution of bacterial contamination of frequently touched surfaces shared by healthcare workers, patients and visitors. Identification of these sites and bacterial pathogens help to reduce transmission of pathogens.

MATERIALS AND METHODS

A hospital based Cross-sectional study was conducted in Apollo General Hospital from April to May 2024. A total of 48 swabs collected from surfaces of floor, bed, wall, doorhandles, stethoscope, thermometer, IV stand, examination table, sink tap, bed side trolley and drug trolley from Medicine, OBG, Surgery and Paediatric wards using sterile moist swabs. Gram staining and culture on blood agar and MacConkey agar was done. Identification of the isolates was done as per standard protocol. Antimicrobial susceptibility testing was done as per CLSI guidelines.

RESULTS AND DISCUSSION

Out of the 48 samples processed, 52% showed bacterial growth. *CoNS* (68%) was the predominant isolate followed by *Staphylococcus* (16%), *Acinetobacter spp* (4%) and Proteus (4%). The other isolates were Enterococcus (4%) and *Burkholderia* (4%). Majority of the *CoNS* were isolated from floor, bed and wall. Most of the isolates were sensitive to ciprofloxacin and gentamicin and resistant to penicillin

Chart 1: Profile of bacterial isolates identified

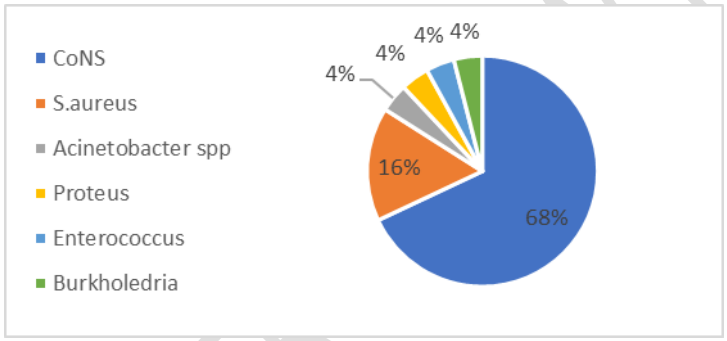
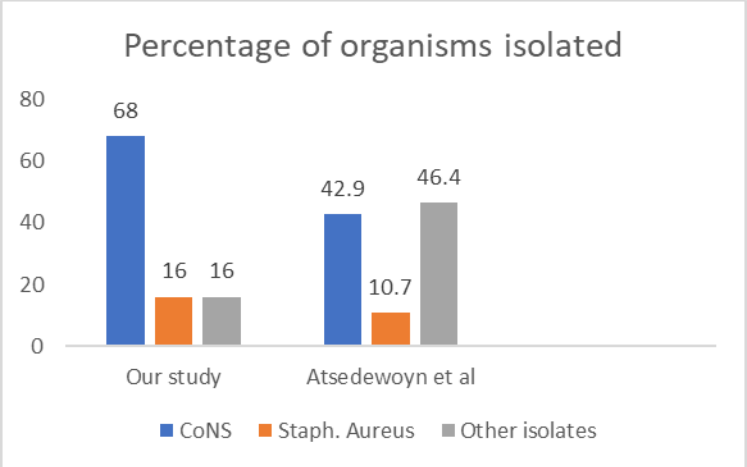


Chart 2: Percentage of organisms isolated



In the present study out of the total isolates identified, the predominant isolate was *CoNS* 17(68%) followed by *Staphylococcus* (16%), *Acinetobacter spp* 1(4%) and *Proteus spp* 1(4%). The other isolates were *Enterococcus* 1(4%) and *Burkholderia* 1(4%). This was similar to a study conducted by Atsedewoyn et al [3]. This suggests that *CoNS* and *S. aureus* are the most common pathogens on frequently touched areas. The higher prevalence of these organisms as they are present as part of normal flora in human body.

Areas from which organisms isolated	Our Study	Teshale et al[5]
Floor	*CoNS 50%* *S. aureus 16.6%* *Acinetobacter 16.6%* *Burkholderia 16.6%*	*CoNS 26.3%* *S. aureus 42.1%* *Proteus 5%* *Serratia 5%*
Wall	*CoNS 75%* *S. aureus 25%*	*E. coli 27.2%* *Klebsiella 27.2%*
Bed	*CoNS 75%* *S. aureus 25%*	*CoNS 33.3%* *S. aureus 33.3%*
Bedside trolley	*CoNS 100%*	*CoNS 7%* *S. aureus 7%*
Drug trolley	*S. aureus 100%*	
Examination table	*CoNS 100%*	
Door handle	*CoNS 100%*	*CoNS 15.3%* *S. aureus 30.7%*
Stethoscope	*CoNS 100%*	*CoNS 50%*
Thermometer	*CoNS 100%*	*CoNS 5.2%* *S. aureus 16.6%*
Light switches	*CoNS 100%*	
Sink tap	*Enterococcus 100%* *Proteus 100%*	

In our study most contaminated surfaces were floor and bed. The other surfaces were wall, bedside trolley, drug trolley, examination table, stethoscope, light switches, thermometer, sink tap have also presented with bacterial contamination. This suggests that these surfaces are commonly used by health care staff, patients and visitors and secondly it is related that these surfaces are not adequately cleaned or disinfected

Isolates / Antibiotics	*CoNS*		*S.aureus*		*Enterococcus*		*Acinetobacter*		*Proteus*		*Burkholderia*	
	Our study	Teshale et al study	Our study	Teshale et al study	Our study	Atsedewoyn et al study	Our Study	Bhatta et al study	Our study	Kalu MU et al study	Our study	Atsedewoyn et al study
AMP	-	-	-	-	100 %	77.7%	-	-	0	18%	-	-
PEN	23.5 %	29.4%	-	-	-	-	-	-	-	-	-	-
CIP	75%	-	75%	-	-	-	0	29.8%	100 %	45%	-	-
CTR		-			-	-	100%	68.7%	0	27%	-	-
GEN	64.7	76.4	75%	-	100 %	66.7%	0	28.5%	100 %	54%	-	-
COT	52.9 %	47.6%	50%	53.7%	-	-	100%	49.8%	100 %	100 %	0	0
ERY	35.2 5	28.9%	33.35 %	49.3%	-	-	-	-	-	-	-	-
CD	64.7	73.8	50%	69.5%	-	-	-	-	-	-	-	-
VAN	76.4	-	75%	-	100 %	-	-	-	-	-	-	-

In our study, most of the isolates of *CoNS* showed resistance to Penicillin and Erythromycin. This correlated with the study conducted by Teshale et al [5] also showed resistance to Penicillin, Erythromycin and Amoxycillin. This suggests that *CoNS* isolated from frequently touched objects in hospital are resistant to Penicillin and Macrolides.

The isolates of *S.aureus* showed resistant to Penicillin. In accordance study conducted by Atsedewoyn et al [4] showed resistant to Penicillin. Also showed resistance to Clindamycin, Cefoxitin. Our study showed susceptibility to ciprofloxacin, gentamycin, ceftriaxone.

The isolates of *Acinetobacter* showed resistance to ciprofloxacin, gentamycin. It correlates with the study conducted by Bhatta et al[1] showed resistance to ciprofloxacin and gentamycin.

The isolates of *Enterococcus* from Emergency department showed susceptibility to ampicillin and vancomycin, resistant to pencillin which agrees with the findings reported by Atsedewoyn et al showed susceptibility to vancomycin and ampicillin.

The isolates of *Proteus* isolated from sink tap of surgery ward showed resistance to ampicillin, ceftriaxone which correlates with study conducted by Mary Uche Kalu et al[6] showed susceptibility to ampicillin and ceftriaxone.

Burkholderia isolated from floor of labour room showed resistance to cotrimoxazole which agrees with the findings of study conducted by Atsedewoyn et al also showed resistance to cotrimoxazole.

All these studies have shown the presence of pathogenic bacteria on high touch surface areas of the hospital, which can cause serious infections for patients, health care and visitors

CONCLUSION

In our study *CoNS* and *S.aureus* are the predominant isolates on frequently touched surfaces. This study emphasizes on infection control practices like regular hand hygiene, cleaning and disinfection of the hospital environment

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