

Isolation of Common Nosocomial pathogens from Gate Pass Used in Aminu Kano Teaching Hospital and Bayero University Kano, Nigeria

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Abstract: Microbial contamination of fomites like gate pass is of public health concern as contaminated materials might act as vehicles for the transmission of pathogenic microorganisms. This study was carried out in February 2019 to September 2019 to isolate common nosocomial pathogens from gate passes used in Aminu Kano Teaching Hospital (AKTH). Fifty gate passes each from AKTH and BUK were investigated, the samples were screened for common nosocomial pathogens using culture, microscopy and biochemical test according to standard microbiological techniques. The results of the study revealed that 56% of the gate passes were contaminated. Bacteria isolated were *Staphylococcus aureus* 5(10%), *Pseudomonas* spp. 5 (10%), *Escherichia coli* 6(12%) and gram negative rods 8(16%) in AKTH while that of BUK were *S. aureus* 7(14%), *Pseudomonas* spp. 6(12%), *E. coli* 8(16%) and Gram negative rods 11(22%) and *P*-value 0.0313. The contamination level of gate passes used in hospital (48%) were not statistically different from gate passes used in school gate (64%). Gate pass handled by drivers are contaminated due to large samples obtained from drivers. Conclusively, the study showed that gate pass used in hospital and non-hospital sources are contaminated with various bacterial agents including potential nosocomial pathogens, aseptic measures should therefore be employed to ensure the safety of handlers.

Keywords: Microbial Contamination, Nosocomial pathogens, *S. aureus*, *Pseudomonas* spp., *E. coli*, Gram negative rods, hospital and non-hospital sources, handlers

1. Introduction

Diseases nowadays are well known to be complicated in the hospital, majority of these diseases are not the original reason of taking the patients to the hospitals. The type of disease that happen in the hospital and it is not the original disease that leads the patients to the hospital is as a result of what is called nosocomial infection. Nosocomial pathogens are organisms causing diseases that are acquired from the hospital and healthcare environment within few days of admission and are responsible for nosocomial infections [10]. Experts believe that fomites object play an important role in the acquisition and transmission of pathogens in healthcare [19]. Environmental surfaces in healthcare centres act as reservoir for bacteria and can as well serve as vectors of the bacterial pathogens and depending on the environmental conditions, these pathogens may remain infectious on the surfaces for weeks after the contamination event [10].

Pathogens responsible for nosocomial infections are bacteria, viruses and fungal parasites [13]. The major problems people are facing nowadays in hospitals are cases of infection by hospital acquired pathogens (Nosocomial pathogens) that use to accumulate surfaces and form Biofilms. Gate passes as it is being used in the hospital may act as reservoir for bacteria and can as well serve as vectors of the bacterial pathogens. Researches on these pathogens were not sufficiently carried out. Therefore, it is important to carry out this project research on Nosocomial pathogens isolation from gate pass used in some hospitals. Surfaces in

the hospital may act as reservoir for bacteria and can as well serve as vectors of the bacterial pathogens [10]. Studies on nosocomial pathogens isolation was carried on mobile phones at Anyigba Kogi state by Nwankwo *et al.* 2014. The regular handling and exchange of gate passes by the patients, health care workers, visitors and other hospital personnel makes it vulnerable to contamination by various nosocomial pathogens [20]. Therefore, this research is aimed at isolating the common nosocomial pathogens from gate pass used in Hospital in Kano state, Nigeria using normal microbiological culturing technique.

2. Materials and Methods

Sampling sites

Samples (gate pass swab) was collected from gate passes of Aminu Kano Teaching Hospital (AKTH) Zaria road Tarauni local government and Bayero University Kano (BUK) Gwarzo road Gwale local government all in Kano state, Nigeria.

Samples collection

Hundred sterile swab stick was obtained from a good source that are known to be producing standard materials. The swab stick was moisten with 0.5ml of normal saline [20].

Fifty gate passes each from AKTH and BUK were swabbed using the sterile swab stick. Entire surface of each gate pass was swabbed and the handler of the gate pass at the moment was noted. The environmental hygiene was also noted.

Immediately after the swabbing the gate pass surface the swab stick was covered and labelled accordingly and transferred immediately to microbiology laboratory.

Bacteriological procedures

Sterile swab sticks was made wet slightly with physiological saline and rubbed over the entire surface of the gate pass and inoculated on nutrient agar plates and incubated at 37°C for 18–24 hours. This was followed by Gram staining technique, from the obtained culture a sub-culture was made on mannitol salt agar, eosine methylene blue agar, salmonella shigella agar and MacConkey agar plates and incubated at 37°C for 18–24 hours and biochemical tests was carried out

3. Results

The result of this study showed that out of the 100 samples analyzed, 56 was found to be positive of bacterial contamination. Incidence of positive and negative samples from gate passes surfaces of BUK and AKTH, physical and biochemical characteristics of the isolates isolated from the various sites with respect to the handlers in this study are shown in the following tables.

Table I: Result of Bacterial contamination level of gate pass according to sampling sites.

Bacteria isolated	AKTH (%)	BUK (%)
<i>Staphylococcus aureus</i>	5(10)	7(14)
<i>Pseudomonas spp.</i>	5(10)	6(12)
<i>Escherichia coli</i>	6(12)	8(16)
Gram negative rods	8(16)	11(22)
Total	24(48)	32(64)

Statistically using t-test assuming equal variance, Calculated P-value 0.0313 > table P-value 0.05, no significant difference between AKTH and BUK.

Table II: Result of contamination level based on the handlers

Handler	Sample number collected	<i>Staphylococcus aureus</i> .	<i>Pseudomonas spp.</i>	<i>Escherichia coli</i>	Gram negative rods
Drivers	24	2	1	2	4
HCW	16	1	1	1	2
Patients	6	1	3	2	1
Others	4	1	0	1	1
Total	50	5	5	6	8

Key; HCW = Healthcare worker

Table III: Result of Biochemical test of the potential Bacterial pathogens

Bacteria isolated	CAT	CAO	IND	MET	VOG	CIT	OXI	GST
<i>Staphylococcus aureus</i>	+	+	-	+	+	+	N	+
<i>Pseudomonas spp.</i>	N	N	N	N	N	N	+	-
<i>Escherichia coli</i>	+	-	+	+	-	-	-	-
<i>Klebshiella spp.</i>	+	-	-	-	+	+	N	-
<i>Salmonella spp.</i>	+	-	-	+	-	+	N	-
<i>Shigella spp.</i>	+	-	-	+	-	-	N	-

Key: CAT= Catalase test, COA= Coagulase test, IND= Indole test, MET= Methyl red test, VOG= Vorge's proskauer test, CIT= Citrate utilization test, OXI= Oxidase test, + = Positive, - = Negative and GST= Gram's staining techniques. N=Not done.

Table IV: Result of Bacterial contamination according to Gram's Staining reaction

Bacteria isolated	AKTH (%)	BUK (%)
<i>Staphylococcus aureus</i>	5(10)	7(14)
<i>Pseudomonas spp.</i>	5(10)	6(12)
<i>Escherichia coli</i>	6(12)	8(16)
Gram negative rods	8(16)	11(22)
Total	24(48)	32(64)

4. Discussion

The hospital environment plays a critical role in the transmission of organisms associated with nosocomial infections which can be transferred from person to person or from inanimate objects (such as stethoscopes, bronchoscopes, pagers, ballpoint pens, patient hospital charts, computer keyboards, gate passes, mobile phones and fixed telephones) to hands and vice versa [20]. Experts believe that fomites play an important role in the acquisition and transmission of pathogens in healthcare [19]. The regular handling and exchange of gate passes by the patients, health care workers, visitors and other hospital personnel makes it vulnerable to contamination by various nosocomial pathogens. Many studies have shown that, the spread of nosocomial infection may be linked to contaminated surfaces of fomites handled by health care workers [20].

In this study, gate passes used in the hospital and non-hospital sources, showed high contamination with bacteria including potential nosocomial pathogens.

The gate passes used in the hospital showed 48% contamination with potential bacterial pathogens which is in variance with the reports of the study carried out on fomite object (a mobile phone) at Anyigba Kogi state university teaching hospital 94.6% [20] contamination in their studies, but compared comfortably with the findings from the study on fomite object (a mobile phone) at Kerman university teaching hospital Iran [25] and the research carried out at Ahmadu Bello university teaching hospital on hospital surfaces, Kaduna Nigeria [10]. This may be mainly due to lack of awareness and low hygiene standards. Aminu Kano teaching hospital was the best hospital in Kano state and Nigeria at large when it comes to awareness and hygiene standards and they just recently switched to using plastic gate passes.

From table.I, Gram negative rods 8(16%) happens to be the group with highest number of appearance this is because the family Enterobacteriaceae are the major constituent of normal bacterial contaminant associated with human. As individual genera *Staphylococcus aureus*5(10%), *Pseudomonas spp.*5(10%), *Escherichia coli*6(12%) compared comfortably with what Hammuel *et al.*, (2014) reported from his study [10]. *Staphylococcus aureus*, *Pseudomonas spp.* and *E. coli* are all the major contaminant that are the commonest nosocomial pathogens associated with humans. *S. aureus* a normal skin flora is of medical importance, *Pseudomonas spp.* are associated with wound and burns, *E. coli* are faecal contaminant and Gram negative rods are potential bacterial pathogens.

From table.II, according to the handlers of the gate passes at AKTH drivers have the highest number of sample collected being with more number of Gram negative rods normal flora and less count of the other common nosocomial pathogens. Followed by health care workers having less count of the bacterial contaminants due to the strict adherence to the hospital ethics. Followed by the patients with moderate number of sample but relatively highest count of *Pseudomonas spp.* associated with wounds and burns this is probably because the patients are the sources of the contaminants. The last as well as the least group was the group of others that are neither all the above group but only a visitors, they are having the least count of all the species isolated with zero count of *Pseudomonas sp.*

5. Conclusion

The study revealed that Gate pass used in hospital and non-hospital source are heavily contaminated with various bacterial agents including potential nosocomial pathogens.

6. Recommendation

Firstly, it is recommended that hospital and non-hospital centers should be sanitizing their gate passes to overcome the problem of spread of nosocomial pathogens.

It is also recommended that more researches should be done on nosocomial pathogens in Nigeria due to its' danger and abundance of its cases reported in Nigerian hospitals.

It is also recommended that the major advances in overall prevention and control of nosocomial pathogens have resulted from immunization and improved hygiene, particularly hand washing. So we must work with hospital personnel on better implementation of existing nosocomial pathogens prevention and control technologies so that we will not need to rely solely on technologic advances.

It is also recommended that, more works should be done on nosocomial pathogens and the normal procedures to achieve prevention and control of nosocomial infection with more priority to antimicrobial resistance.

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