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Carriage status and antimicrobial susceptibility pattern of *Acinetobacter* spp on hands and nostrils of staff of Nnamdi Azikiwe university teaching hospital, Nnewi, Neni and Oba, Anambra state.

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Abstract

A study to determine, the carriage status of *Acinetobacter* specie on hands and nostrils of hospital staff and their susceptibility pattern in branches of NnamdiAzikiwe University Teaching Hospital. This study was carried out between the months of July to August.A total of 67 individuals were sampled consisting of 10 professional groups which includes from three branches of NAUTH; Morticians, security, Lab scientist, Nurse, Orderlies, Office worker, Pharmacist, Cleaners, Doctors and Kitchen staffs. Questionnaire method was obtained by Oral interview and swab samples were collected from the hands and nostrils of the subject. Convectional cultural methods were carried out and antimicrobial susceptibity was done using Kirby-beaur disc- diffusion method. Result obtained were as follows, the highest prevalence percentage were obtained from doctors (100%, 100%), office worker (93.3%, 100%), lab scientist (84%, 87.5%), nurses (91.7%, 83.3%), pharmacist (100%, 50%) from the hands and nostril respectively while the lowest prevalence was obtained from morticians (25%, 25%) and security (60%, 60%). The age ranges of 21-30 and 31-40 had the highest prevalence of 34.7% and 45.6% respectively.Ofloxacin with 88.9% was the highest percentage of sensitive drug There was statistical significance between positive *Acinetobacter* isolates and the sector of hospital sampled, use of nose mask and the use of gloves during working hours ($p<0.05$). There was no statistical significance between the positive isolates and symptoms ($p>0.05$). *Acinetobacter* is a nosocomial threat that should not be ignored. Sanitary measures and safety precaution especially when handling patients in hospital should be adhered to.

Keywords: Carriage status,Antimicrobial susceptibility pattern, *Acinetobacter* Spp, Hands, Nostrils

Introduction

The nose is one of the few openings that bacteria have direct access to get inside the body. The nasal passage is important for filtering the air that we breathe in and it also stops tiny foreign particles or microorganisms from entering the body. What many people do not know is that the nose and nasal passages are, or can be, the perfect environment for some bacteria, good and bad.

Anything that might irritate a human's nose, like air pollution, allergies, birth control pills, etc., may cause swelling and blockage of the nasal passageways which will lead to bacterial growth and infection. The trapped mucus within the nasal will create a breeding ground for bacteria.

Acinetobacter is a typically short almost round, rod shaped gram negative bacterium. It is an opportunistic pathogen in humans, affecting people with compromised immune system and is becoming increasingly important as a hospital derived infection. Resistance to antimicrobial agents may be the main advantage of Acinetobacter specie in the nosocomial environment.

The rapid global emergence of Acinetobacter strains resistant to all β-lactams, including carbapenems, illustrates the potential of this organism to respond swiftly to changes in selective environmental pressure. Up regulation of innate resistance mechanisms and acquisition of foreign determinants are critical skills that have brought Acinetobacter great respect. Despite the absence of data on the genetic competence of *A. baumannii*, other *Acinetobacter* spp., in particular *A. baylyi*, are highly competent and recombinogenic (Vaneechoutte *et al.*, 2006).

There are three major factors possibly contributing to the persistence of Acinetobacter in the hospital environment, i.e., resistance to major antimicrobial drugs, resistance to desiccation, and resistance to disinfectants. Resistance to antibiotics may provide certain Acinetobacter strains with a selective advantage in an environment, such as the modern ICU, where microorganisms are confronted with extensive exposure to antimicrobials.

Aim

The aim of this study is to investigate the carriage status, risk factors and antimicrobial susceptibility pattern of *Acinetobacter* spp in Nnamdi Azikiwe University Teaching Hospital staff.

Specific objectives

1. To isolates *Acinetobacter* from hands and nostrils of hospital staff in NAUTH.
2. To determine the contamination prevalence rate of this strain in different hospital staff in the hospital.
3. To check the antimicrobial susceptibility of Acinetobacter specie.
4. To determine the risk factors for contamination by *Acinetobacter* bacteria in these individuals.

Materials and Methods

Study Area

The Study area includes Nnamdi Azikiwe University Teaching Hospitals Nnewi, Anambra State, Nigeria. It consists of outstations in Nnewi, Oba and Neni

Study Design

This study was done as an epidemiological study to determine the carriage status of *Acinetobacter* specie on hands and nostrils of staff in branches of Nnamdi Azikiwe University Teaching Hospitals.

Sample size

The sample size was calculated using the formula by Naing *et al.*, (2006)

$n= Z^2 \times P (1-P)/d^2$

Where n=desired sample size
P= prevalence percentage (14%) (Nwadike V., *et al* 2013)

Z= confidence interval of 95% which is equivalent to confidence coefficient of 1.96

d= desired level of precision= 0.05
$n= Z^2 \times P (1-P)/d^2$
$n= (1.96)^2 \times 0.14(1-0.14)/ (0.05)^2$
$n= (3.8416) \times 0.14(0.86)/0.0025$
$n= (3.8416) \times 0.14 \times 344$
n=185

Using the formula, a total of sample size of 185 is required but a total of 127was used for the study.

Sample technique

Sampling group includes; Group A: Doctors, Nurses, Medical laboratory scientist, Ward maids and orderlies who are constantly in the hospital environment in close contact with patients and visitors.

Group B: Kitchen staff, Gardeners, Cleaners, Security/gatemen, Office workers, Mortuary attendants, all working in the four outstations in the above institution. (These groups do not come directly in contact with patients and visitors).Volunteers will be randomly selected.

A total of 127 samples were collected from 67 subjects. 2 swabs from each subject in each sampling group mention above except the doctors who were on strike at the time of the study.

Equal number of Samples was collected from both male and female staffs within the age range of 18-70 who have worked in the hospital from 6 months to 25 years and above. Samples were collected by Surface-rolling technique.

Inclusive Criteria

- Willingness to participate.
- staffs working in the premises of NAUTH Nnewi, Onitsha, Oba and Neni
- Male and female within the age range of 18-70
- Staff who have been working in the hospital from 6 months and above.
- Staff not on herbal or antibiotic therapy within 6days before the study.

Exclusive Criteria

- Unwillingness to participate.
- Age range outside stipulated age grades.
- Any staff outside NAUTH Nnewi, Onitsha, Neni and Oba
- Staff that have worked for below 6 months as of the time of study.
- Staff on antibiotic or herbal therapy.

Ethical consideration

This was obtained from the ethical committee of Faculty of Health Sciences and Technology and The Faculty of medicine Nnamdi Azikiwe University Teaching Hospital Nnewi and also letter of approval for sample collection was obtained from the Department of Environmental Health Science, Nnamdi Azikiwe University, College of Health sciences Okofia.

Method of Data collection

Information on demographical variables, personal data and environmental risk- factors was assessed using questionnaire method. English language as well as vernacular was used where necessary to obtain data from the volunteers. Variables like underlying disease, use of nose masks, and habits while at work wards and sections working, previous use of in dwelling catheters and hospitalization, previous anti-microbial treatment, length of stay in the hospital, etc were asked in the questionnaires.

Sample collection and preparation

Sterile cotton swab sticks (Stericon, Nigeria) was used in collecting the sample ascetically. The date of collection and Identification number of each sample individual was written on the e swab stick for ease of Identification. The swab was dipped in sterile distilled water before collection by surface rolling technique from hands and nostrils of the above mentioned groups. The swab samples was dipped into 1ml of sterile Nutrient broth inside the swab stick container, and transported immediately to the Laboratory and analyzed within 1hr of collection. This is done to enable replication of the organism.

Microbiological Analysis

Convectional cultural methods using Chromogenic selective Acinetobacter media (Chromagar, france. Ref AC092B) and Chromagar Acinetobacter antibiotic supplement, Ref AC092(s) (Chromeagar, France) was used, prepared according to manufacturer's instructions. Standard sterile precautions were strictly adhered

to. Swab samples collected and transported in the sterile Nutrient broth, pre-incubated at 37°c for 2-4 hours before streaking onto the selective agar plates in a laminar hood chamber. Before Streaking, the swabs was gently shaken and pressed firmly beside the inside walls of the swab stick plastic containers. A sterile Wire loop of standard gauge was used to collect aliquots of samples from nutrient broth culture in the swab-stick plastic container. Streaked plates were incubated at 37°c for 24 hours. Colony counts were done with a colony counter.

Antimicrobial Sensitivity Test

Antimicrobial sensitivity was tested for each isolated organism using the disk diffusion method of each isolated organism using the disk diffusion method of Kirby-Baurer as described by the National Committee for Clinical Laboratory Standard. Susceptibility was done on Mueller Hinton agar incubated at 37^{0}c for 24 hours. Gram-negative discs (Oxoid, England) were used and results interpreted as sensitive, moderately sensitive and resistant.

Data analysis and sample analysis

This was carried out with the various variables which include personal data and risk factors and symptoms. Statistical analysis was done using SPSS version 20.0

Statistical analysis

Data was calculated and analyzed using the statistical package for social science-SPSS software version 20.0.

Results

Table1:showing the of frequency distribution of positive *Acinetobacter spp.*isolates from nostrils and hands of different professionals in NAUTH, Nnewi branch

s/n	Different profession sampled	Total number of individual sampled	Total no of swabs collected from hand	No of positive *Acinetobacter* isolates(hand) (n)	n%	Total no of swabs collected from nostril	No of positive *Acinetobacter* isolates (nose) (n)	n%
1	Mortician	4	4	1	25	4	1	25
2	Security	2	2	0	0	2	0	0
3	Lab scientist	5	5	5	100	3	3	100
4	Nurse	6	6	5	83.3	6	5	83.3
5	Doctors	1	1	1	100	1	1	100
6	Orderlies	4	4	4	100	4	4	100
7	Office workers	3	3	3	100	3	3	100
	Grand total	**25**	**25**	**19**	**76.0**	**23**	**17**	**73.9**

Table 2:showing the frequency distribution of positive isolates of *Acinetobacter* isolated from hands and nostrils in relation to the different professional age groups working in NAUTH, Nnewi.

s/n	Age range in years	Positive isolates from hands	Positive isolates nose	Total number of positive isolates samples from hand and nostrils (n)	n%	p-value
1	21-30	7	7	14	38.9	
2	31-40	8	6	14	38.9	0.015
3	41-50	4	4	8	22.2	
4	51-60	0	0	0	0	
	Total	**19**	**17**	**36**	**100.0**	

Age range of 21-30 years and 31-40 years old had the highest number of isolates from both hands and nostrils 14(38.9%), while 51-60 years the least 0(0%). In all the age range sampled, a total of 19(52.8%) positive Acinetobacter was obtained from the hands while 17(47.2%) positive Acinetobacter isolates from the nose. A significant statistical correlation was obtained ($p<0.05$)

Table 3:showing the frequency of sensitivity and resistance of positive isolates of *Acinetobacter* from NAUTH Nnewi branch to antimicrobialdrugs**.**

Antibiotics	Ug	Very sensitive		Moderately sensitive		Resistance	
		n	n%	n	n%	N	n%
Ceftazidime (CAZ)	30	0	0.0	0	0.0	36	100.0
Cexfuroxime (CRX)	30	0	0.0	1	2.8	35	97.2
Gentamixine (GEN)	10	4	11.1	30	83.3	2	5.56
Ceftricine (CTR)	30	0	0.0	17	47.2	19	52.8
Erythromycin(ERY)	5	0	0.0	0	0.0	36	100
Cloxacin (CXC)	5	0	0.0	0	0.0	36	100
Ofloxacin (OFL)	5	19	52.7	13	36.1	4	11.1
Augumentin (AUG)	30	0	0.0	0	0.0	36	100

Table 4:showing the correlation between positive *Acinetobacter* isolates and the different risk factors of contamination from the hands and nostrils in NAUTH Nnewi.

Risk factors	Correlations	Presence of Acinetobacter organism
Length of working time	Correlation value	.200
	p-value	.169
	N	49
Hospital sector sampled	Correlation value	.423
	p-value	.002
	N	49
Length of time worked in the hospital	Correlation value	-.156
	p-value	.283
	N	49
Length of time spent per day	Correlation value	-.282
	p-value	.050
	N	49
Antibiotic therapy	Correlation value	-.253
	p-value	.079
	N	49
Length of time on antibiotics	Correlation value	-.253
	p-value	.079
	N	49
Smoking habit	Correlation value	-.253
	p-value	.079
	N	49
Length of bacterial infection	Correlation value	.116
	p-value	.428
	N	49
Length of time of bacterial infection	Correlation value	.121
	p-value	.408
	N	49
Use of handkerchief	Correlation value	.094*
	p-value	.520
	N	49
Use of nose mask	Correlation value	-.016**
	p-value	.915
	N	49
Use of gloves	Correlation value	.102
	p-value	.486
	N	49
Hand washing during work	Correlation value	-.143
	p-value	.328
	N	49
Content of washing	Correlation value	-.166
	p-value	.255
	N	49
Safety precaution during work	Correlation value	.102
	p-value	.486
	N	49

Table 5:showing the correlation of *Acinetobacter* symptoms with positive *Acinetobacter* isolated from NAUTH Nnewi.

Symptoms	Correlation	Positive isolates
Dizziness	Pearson Correlation	.[a]
	Sig. (2-tailed)	.
	N	36
Headache	Pearson Correlation	.073
	Sig. (2-tailed)	.672
	N	36
Blisters	Pearson Correlation	.[a]
	Sig. (2-tailed)	.
	N	36
Fever	Pearson Correlation	.[a]
	Sig. (2-tailed)	.
	N	36

Table 6:showing the frequency distribution of positive *Acinetobacter* spp isolates from nostrils and hands of different professionals in NAUTH, Neni branch.

s/n	Different profession sampled	Total number of individual sampled	Total no of swabs collected from hand	No of positive Acinetobacter isolates(hand) (n)	n%	Total no of swabs collected from nostril	No of positive Acinetobacter isolates (nose) (n)	n%
1	Security	3	3	3	100	3	3	100
2	Lab scientist	5	5	5	100	5	4	80
3	Nurse	5	5	5	100	5	4	80
4	Orderlies	3	3	2	66.6	2	0	0
5	Office workers	1	1	0	0	1	1	100
6	Pharmacist	1	1	1	100	1	1	100
	Grand total	**18**	**18**	**16**	**88.9**	**17**	**13**	**76.4**

Table 7:showing the frequency distribution of positive isolates of *Acinetobacter* isolated from hands and nostrils in relation to the different professional age groups working in NAUTH, Neni.

s/n	Age range in years	Positive isolates from hands	Positive isolates nose	Total number of positive isolates samples from hand and nostrils (n)	n%	p-value
1	20-30	5	4	9	31.0	
2	31-40	7	6	13	44.8	0.00
3	41-50	3	2	5	17.3	
4	51-60	1	1	2	6.9	
	Total	**16**	**13**	**29**	**100.0**	

Table 8:showing the frequency of sensitivity and resistance of positive isolates of *Acinetobacter* from NAUTH Neni branch to antimicrobial drugs.

Antibiotics	Very sensitive		Moderate sensitive		Resistance	
	n	n%	n	n%	N	n%
Reflacine (PEF)	4	13.8	0	0.0	25	86.2
Streptomycin (S)	5	17.2	4	13.8	20	68.9
Oflaxicine (OFL)	6	20.7	3	10.3	20	68.9
Ciproflox (CPX)	5	17.2	1	3.5	23	79.3
Gentomycin (CN)	6	20.7	3	10.3	20	68.97
Septin (SXT)	1	3.5	2	6.9	26	89.7
Amplicin (PN)	0	0	0	0	29	100
Nalidixic acid	0	0	1	3.5	28	96.6
Ceprox (CEP)	1	3.5	0	0	28	96.6
Augmentin (AU)	1	3.5	4	13.8	24	82.8

Table 9:showing the correlation between positive *Acinetobacter* isolates and the different risk factors of contamination from the hands and nostrils in NAUTH, Neni.

Risk factors	correlation	Positive *Acinetobacter* isolates
Length of working time	Correlation value	-.197
	p-value	.249
	N	36
Hospital sector sampled	Correlation value	-.400
	p-value	.016
	N	36
Length of time worked in the hospital	Correlation value	.176
	p-value	.305
	N	36
Length of time spent in the hospital per day	Correlation value	-.085
	p-value	.634
	N	34
Antibiotics therapy	Correlation value	.086
	p-value	.618

	N	36
Length of time on antibiotics	Correlation value	.063
	p-value	.713
	N	36
Smoking habit	Correlation value	.[a]
	p-value	.
	N	36
Bacterial infection status	Correlation value	.272
	p-value	.108
	N	36
Length of time bacterial infection	Correlation value	.308*
	p-value	.068
	N	36
Use of handkerchief	Correlation value	.140
	p-value	.415
	N	36
Use of nosemask	Correlation value	-.066**
	p-value	.703
	N	36
Use of working gloves	Correlation value	-.136
	p-value	.429
	N	36
Hand washing during work	Correlation value	.309
	p-value	.067
	N	36
Content of washing	Correlation value	.215
	p-value	.208
	N	36
Adherence to safety precaution	Correlation value	-.086
	p-value	.618
	N	36

Table10:showing the correlation of symptoms of *Acinetobacter* and positive *Acinetobacter* isolatesin NAUTH Neni branch.

Symptoms	Correlation	Positive isolates
Dizziness	Pearson Correlation	.086
	Sig. (2-tailed)	.735
	N	18
Headache	Pearson Correlation	.189
	Sig. (2-tailed)	.453
	N	18
Blisters	Pearson Correlation	.086
	Sig. (2-tailed)	.735
	N	18
Fever	Pearson Correlation	.[a]
	Sig. (2-tailed)	.
	N	18

Table 11:showing the frequency distribution of positive *Acinetobacter spp* isolates from nostrils and hands of different professionals in NAUTH, Oba branch.

s/n	Different profession sampled	Total number of individual sampled	Total no of swabs collected from hand	No of positive Acinetobacter isolates(hand) (n)	n%	Total no of swabs collected from nostril	No of positive Acinetobacter isolates (nose) (n)	n%
1	Lab scientist	3	3	1	33.3	0	0	0
2	Nurse	1	1	1	100	1	1	100
3	Orderlies	2	2	1	50.0	2	1	50.0
5	Office workers	11	11	11	100	11	11	100
6	Pharmacist	2	2	2	100	1	0	0
7	Kitchen staff	3	3	3	100	3	2	66.7
8	Cleaners	2	2	2	100	2	0	0
	Grand total	**24**	**24**	**21**	**87.5**	**20**	**15**	**75.0**

Table 12:showing the frequency distribution of positive isolates of *Acinetobacter* isolated from hands and nostrils in relation to the different age groups of the subjects in NAUTH, Oba.

s/n	Age range in years	Positive isolates from hands	Positive isolates nose	Total number of positive isolates samples from hand and nostrils (n)	n%	p-value
1	20-30	9	5	14	38.8	
2	31-40	9	8	17	47.2	0.001
3	41-50	1	1	2	5.6	
4	51-60	2	1	3	8.3	
	Total	**21**	**15**	**36**	**99.9**	

Table 13:showing the frequency of sensitivity and resistance of positive isolates of *Acinetobacter* from NAUTH Oba branch to antimicrobial drugs.

Antibiotics	Ug	Very sensitive		Moderately sensitive		Resistance	
		n	n%	n	n%	n	n%
Ceftazidime (CAZ)	30	0	0	0	0	36	100
Cexfuroxime (CRX)	30	0	0	0	0	36	100
Gentamixine (GEN)	10	8	22.2	4	11.1	24	66.7
Nitrofuratin (NIT)	0.03	0	0	0	0	36	100
Ciproxacin (CPR)	5	15	41.7	5	13.9	20	55.6
Cefixime (CXM)	0	0	0	0	0	36	100
Ofloxacin (OFL)	5	19	52.8	13	36.1	4	11.1
Augumentin (AUG)	30	0	0	0	0	36	100

Table 14:showing the correlation between positive isolates of *Acinetobacter* isolated from NAUTH Oba and risk factors.

Risk factors	correlation	Positive isolates
Length of working time	Correlation value	.053
	p-value	.720
	N	48
Hospital sector sampled	Correlation value	-.268
	p-value	.066
	N	48
Length of time worked in the hospital	Correlation value	-.514
	p-value	.000
	N	48
Length of time spent	Correlation value	-.018
	p-value	.903
	N	48
Antibiotic therapy	Correlation value	.184
	p-value	.211
	N	48
Length of time on antibiotics	Correlation value	.184
	p-value	.211
	N	48
Smoking habit	Correlation value	.[c]

	p-value	.
	N	48
Length of bacterial infection	Correlation value	.133
	p-value	.369
	N	48
Length of time of bacterial infection	Correlation value	.144
	p-value	.329
	N	48
Use of handkerchief	Correlation value	-.014
	p-value	.924
	N	48
Use of nose mask	Correlation value	-.356**
	p-value	.013
	N	48
Use of working gloves	Correlation value	-.399
	p-value	.005
	N	48
Hand washing during work	Correlation value	-.135
	p-value	.359
	N	48
Contents of washing	Correlation value	.231
	p-value	.115
	N	48
Safety precaution during working hours	Correlation value	-.185
	p-value	.209
	N	48

Table 15:showing the correlation of the symptoms of *Acinetobacter* with positive isolates of *Acinetobacter*.

Symptoms	Correlation	Positive isolates
Dizziness	Pearson Correlation	.157
	Sig. (2-tailed)	.369
	N	35
Headache	Pearson Correlation	.307
	Sig. (2-tailed)	.023
	N	35
Blisters	Pearson Correlation	.[a]
	Sig. (2-tailed)	.
	N	35
Fever	Pearson Correlation	.[a]
	Sig. (2-tailed)	.
	N	35

Table 16:showing the total frequency distribution of positive *Acinetobacter spp.* isolates from nostrils and hands of different professionals in the three branches NAUTH.

s/n	Different profession sampled	Total number of individual sampled	Total no of swabs collected from hand	No of positive *Acinetobacter* isolates(hand) (n)	n%	Total no of swabs collected from nostril	No of positive *Acinetobacter* isolates (nose) (n)	n%
1	Mortician	4	4	1	25	4	1	25.0
2	Security	5	5	3	60	5	3	60.0
3	Lab science	13	13	11	84	8	7	87.5
4	Nurse	12	12	11	91.7	12	10	83.3
5	Orderlies	9	9	7	77.8	8	5	62.5
6	Office worker	15	15	14	93.3	15	15	100.0
7	Pharmacist	3	3	3	100	2	1	50.0
8	Cleaners	2	2	2	100	2	0	0
9	Doctor	1	1	1	100	1	1	100
10	Kitchen staff	3	3	3	100	3	2	66.7
	Grand total	**67**	**67**	**56**	**83.5**	**60**	**45**	**75.0**

Table 17:showing the total frequency distribution of positive isolates of *Acinetobacter* isolated from hands and nostrils in relation to the different professional age groups working in the three branches of NAUTH.

s/n	Age range in years	Nnewi	Neni	Oba	Total Positive isolates from all branches (hands)	Nnewi	Neni	Oba	Total Positive isolates from all branches (nose)	Total number of positive isolates samples from hand and nostrils (n)	n%
1	20-30	7	5	9	19	7	4	5	16	35	34.7
2	31-40	8	7	9	26	5	6	9	20	46	45.6
3	41-50	4	3	1	8	4	2	1	7	15	14.7
4	51-60	0	1	2	3	0	1	1	2	5	5.0
	Total	**19**	**16**	**21**	**56**	**17**	**13**	**15**	**45**	**101**	**100**

Discussion

Healthcare personnel have frequent contact with environmental surfaces in patient's rooms, providing ample opportunity for contamination of gloves and/or hands (Huslage *et al.,* 2010). In Nnewi branch, lab scientist (100%; 100%), Doctors (100%; 100%), Orderlies (100%; 100%) and Office workers (100%; 100%) had the highest prevalence percentage positive *Acinetobacter* isolates for hands and nostrils respectively

This could be as a result of lab scientists' regular contact and exposure to micro organisms and especially of immune suppressed patients which could have increased their chances or risk of contraction. The result of high prevalence percentage among the doctors and nurses could be attributed to direct contact with patients and exposure to pathological situations. Orderlies also make direct contact with patient i.e they move patients from one ward to another or from the theater to the ward usually on trolleys or wheelchairs, they also have contacts with dirt in the wards these could result to the high rate of positive *Acinetobacter* isolates from their hands and nostrils this collaborates with research carried by Agumas *et al.* (2013) in the isolation of nasal *Staphylococcus aureus* among Dessie Referral Hospital health care workers, Dessie, Northeast Ethiopia. Security in this branch (Nnewi), had the lowest percentage (0%; 0%) of positive isolated from hands and nose respectively this could be as a result of their position in the hospital environment. These professionals do have direct contact with patients. The security gate is handled by the securities alone and it is constructed in such a way that patients or other health care professionals do not have direct contract with it, this reduces the risk of contamination. The morticians on the other hand had a very low percentage (25%; 25%) of positive isolation from hands and nostrils respectively this could be as a result of the formalin used in embalmment. As a chemical sterilizer, it could have contributed to the low incidence in morticians.

In Neni, the security (100%, 100%), lab scientist (100%, 80%), Nurses(100%, 80%) and pharmacist (100%,100%) from hands and nostrils respectively a high positive *Acinetobacter* isolate was obtained. This percentage in security professionals is quit alarming. Despite the fact that they don't or are not supposed to come in contact with patients. According to Wendt *et al*.(1997), *Acinetobacter spp*. is able to survive on moist and dry surfaces for a long period of time.The high percentage of the positive organisms could be as a result of their regular contact with same surfaces that patients and health care professionals make contact with. For example, the gate in Neni branch of NAUTH is constructed in such a way any individual passing through makes contact with the handle.

In NAUTH Oba branch, with the nurses (100%,100%), office workers (100%,100%), kitchen staffs (100,66.7) in line with Huslage *et al.* (2010), these professionals have close and/or direct contact with immunosuppresed patients. The office workers are the first point of call for the patient while pharmacists are the last point of call there by increasing the risk of their contamination. During the study it was observed that the building for the office, wards and kitchen are at close range, this could also increase the chances or risk of contamination of the organism. This is line with Beggs (2003), who stated that airborne transmission plays a role in nosocomial outbreaks

In the three branches, from a total of 67 individual sampled, 127 sample had 101 (79.5%) positive Acinetobacter organism. That is, a total 67 swabs collected from the hand, revealed a total of 56 (83.5%) positive *Acinetobacter* were isolated from the hand and from a total of 60 swabs collected from the nose, 45 swab samples were positive *Acinetobacter* isolates (75%). In relation to total number of positive isolates, positive isolates from the hands showed 55.5% while the positive isolates from the nose showed 45.5% of the total number of positive organism isolated. The reason for higher percentage of positive isolates in the hand could be because the hand is in contact with an infinitive amount of environments and objects, its physical conditions are continually changing, and ph of the hand in line with Larson (2001), the acidic pH of the skin is crucial because the development of many bacteria is strongly inhibited in conditions of low ph than in conditions of neutral to higher pH's. If grit and soil begins to accumulate on the skin then it begins to lose its protective barrier. The lower rate nasal growth could be attributed to the presence of protective lining in the mucus membrane of the nose.

In the three branches of NAUTH sampled, age ranges of 21-30 and 31-40 had the highest percentage of positive isolates (34.7%) and (45.6%) respectively and this could be as a result of activeness of the lower age range. Individuals within these age range could be due to their lack of knowledge with regard to infection control policies and their missing experience in taking care of these patients. Unlike the older age ranges 41-50 and 51-60 which had (22.2% and 0%) respectively; this could be because this age ranges are more experience in taking care of patients and knowledge in infection control policies. From the study it was revealed that lower age range reveals high percentage *Acinetobacter* positive isolate. This is in line with Agumas (2013).

In NAUTH Nnewi branch, Ceftazidime , Augmentin, Cloxacin and Erythromycin showed a total resistance to *Acinetobacter* isolates (100%) while Cexfuroxime shows a 97.2% resistance to Acinetobacter spp this could be as a result of frequent use of this drug by health care professionals in the treatment of prophylaxis and prevention of contamination. Acinetobacter tend to develop antibiotic resistance to drugs that are frequently used. This is in line with Goossens *et al.* (2005) who stated thatthe widespread use of antibiotics both inside and outside medicine is playing a significant role in the emergence of resistant bacteria.

In Neni branch, Peflacine (86.20%), Streptomycin (68.97%), 0flaxin (68.97%), Ciproflox (79.3%), Gentomycin (68.9%), Septin (89.7%), Amplicin (100%), Nalidixic acid (96.6%), Ceporex (96.6%), Augmentin (82.8%) had a high resistance with isolates from this branch this could be attributed to extensive use of drugs thereby developing resistance.

In NAUTH Oba branch, ceftazidime (100%), cefuroxime (100%), cefixime (100%), augumentin (100%) and nitrofurantan (83.3%) revealed a very high resistance to positive isolates of Acinetobacter this may also be attributed to poor quality of drugs, poor storage and exposed drug (Okeke *et al*., 1999) . Positive isolates of *Acinetobacter* showed the highest sensitivity to oflaxacin with 88.9% and the lowest resistance of 11.1%. This could be as a result of its broad spectrum and quinolones' attributes and can also be as a result of the cost thereby making it not readily available.

The correlation risk factors with positive *Acinetobacter* isolates in NAUTH Nnewi revealed that there is a strong statistical significance between the hospital sector sampled and the positive *Acinetobacter* isolate. This study shows that the prevalence of positive isolates of *Acinetobacter* is affected by the sector in which the different professionals work in. the laboratory for example is exposed to pathological samples, surgery unit are exposed to pathological situations; surgical wards and ICU are exposed to immunosupressed patients. This is in line with Michalopoulos *et al.* (2010) who stated that Hospitalized patients (particularly those in intensive care units), especially very ill patients on a ventilator, those with a prolonged hospital stay, or those who have open wounds (e.g. recent surgery or invasive procedure), are also at greater risk for *Acinetobacter* infection. There is a strong statistical significance between use of nose mask and the use of surgical gloves. Intact surgical gloves act as a physical barrier against transmission of blood-borne pathogen from hospital staff to patient (Tanner, 2006)

The correlation of symptoms with positive *Acinetobacter* isolates revealed no statistical significant correlation in the three branch branches; this could as a result of the fact that sample individuals are not patients and so not immunosuppressed and could be as a result of some of the professionals being asymptomatic. Studies have shown that some Acinetobacter spp do not show signs nor symptoms.

Conclusion

Conclusively, this study has shown that Nurses, Doctors and Lab scientist are at greater risk of contamination. This is in correlation with the sector of the hospital sampled, the use of nose mask and use of gloves during working hours.

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