

## Case Profile Analysis on Health- Care Associated Staphylococcal Infections and Community Acquired Sources: Demographic and Clinical Surveillance Study Ile – Ife South Western Nigeria

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**Abstract:** We looked into the frequent incidence of Staphylococcal infections among some clinical diagnosed infectious diseases reported cases at the Obafemi Awolowo University Teaching Hospital Complex, Ile – Ife, Nigeria and its community-based involvement. Eight hundred and fifty samples of different cultures were taken from hospital and community sources. The clinical sources were the routine specimens of wound swabs, urine, stool, blood and sputum from the Department of Microbiology and Parasitology laboratory of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) Ile–Ife. The non-clinical samples were obtained from the nasal cavity of apparently healthy food handlers at restaurants in Obafemi Awolowo University campus and food vendors in Ile–Ife central market. Samples were cultured on mannitol salt agar and incubated at 37°C for 24-48 hours. *Staphylococcus aureus* were isolated and identified based on mannitol fermentation, Gram's reaction, positive results for catalase, coagulase and DNase tests. The data generated were subjected to statistical analysis using T-Test. Two hundred and thirty (56.8%) of *S. aureus* isolates were recovered from the hospital sources and 175 (43.2%) from the community setting. Incidence rate was the highest in age range 21-30 among urine, wound, sputum and blood Case -based samples analyzed. Urine *S. aureus* Case-based infection in female (58.6%) was higher than (41.4%) in male, Sexually Transmitted Disease (STD) reported cases was about more than doubled of other infections follow by the urinary tract (UTI) independent infection. Wound associated case- based infections among Female (65.5%) was doubled that of Male which was (34.3%) and sepsis independent cases constituted 32.8%; Sputum based *S. aureus* infection in female was 56.8% higher than 43.2% in Male. 66.7% from Pulmonary Inflammation Case- based investigated constituted overwhelmingly more than double of other infections. In addition, (63.8%) Stool associated Case-based infections from Female was higher than 36.2% observed among Male. Diarrhea cases constituted majorly of 38.3% and it showed an exceptional incident rate of infections which was noticed to be higher among the age range 11-20. Blood *S. aureus* associated infections in female (53.3%) was higher than 46.7% in Male and bacteremia/ sepsis cases predominated about 63.3%. (T= 95% confidence interval of the difference). Community *S. aureus* isolates accounted for 43% of the total isolates from which cell phones and food handlers constituted 15%, and stethoscopes *S. aureus* isolates 13%. The carrier rate of *S. aureus* in the nose of apparently healthy individuals among the food handlers in the community was higher among Male (64.5%) than 35.5% Female. (T=95% confidence interval of the difference). Plan are underway to evaluate the relationship between antibiotics use in this hospital and the pattern of antimicrobial resistance observed.

**Keywords:** Staphylococcal infection, Hospital, Community, Case –based profile.

### Introduction

*Staphylococcus aureus* had been isolated from

several clinical specimens from Nigeria (Esan *et al.*, 2009). In 2003-2004, approximately 29% (78.9

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Published at: <http://www.ijsciences.com/pub/issue/2016-07/>

DOI: 10.18483/ijSci.841; Online ISSN: 2305-3925; Print ISSN: 2410-4477



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million persons) and 1.5% (4.1 million persons) of the US population was colonized in the nose with *S. aureus* and Methicillin Resistant *Staphylococcus aureus* (MRSA) respectively (Gorwitz *et al.*, 2008). Over the past several decades, *S. aureus* has been a leading cause of hospital acquired infections (Lowy, 1998). It is also associated with wound sepsis, osteomyelitis and post surgical toxic shock syndrome with substantial rates of morbidity and mortality (Shopsin *et al.*, 2001; Engemann *et al.*, 2003). Methicillin- resistant *S. aureus* infections have become a common problem in the community acquired infections, and has also been associated with prolonged hospital stay and increased costs ( Kopp *et al.*, 2004; Lodise and Mckinnon, 2005; Nixon *et al.*, 2006).

In 2005, there was an estimated 478,000 hospitalization with a diagnosis of *S. aureus* infection in US hospitals, and of these, approximately 278,000 hospitalizations were related to MRSA. These include, people admitted to the hospital for treatment of an infection that was acquired or occurred outside the hospital. (Klein *et al.*, 2007). In hospitals, the proportion of healthcare associated staphylococcal infections that are due to MRSA has been increasing and 2% of *S. aureus* infections in US intensive care units were MRSA in 1974, 22% in 1995, and 64% in 2004 (Klevin *et al.*, 2006). One of the reasons for the success of this human pathogen is its great variability in occurring at different periods and places with diverse clonal types and antibiotic resistance patterns within region and countries. Infections caused by antibiotic- resistant *S. aureus* bring about serious problem in the general population, such infections can be particularly devastating for the very young, the elderly and the immunocompromised (American Society of Microbiology, 2007). *Staphylococcus aureus* strains colonise and establish infection in a wide range of body sites, including the blood, indwelling biomaterials, mucosa surfaces, bone, and other tissues. The mechanisms underlying the tropism of *S. aureus* for specific infection sites are unclear, associations have been demonstrated between the disease type, the pattern of toxin genes, and the genetic backgrounds of particular *S. aureus* strains (Jarraud *et al.*, 2002). For example, a correlation has been found between unrelated cases of *S. aureus* infection and a single subset of strains, such as a clone producing TSST-1 responsible for most epidemiologically unrelated cases of urogenital toxic shock syndrome (Musser *et al.*, 1990), a clone producing Pantone Valerine Leukocidin (PVL) and causing neurotic pneumonia (Gillet *et al.*, 2002), and clones producing Toxic Shock Syndrome Type 1 and enterotoxin C in neonatal toxic shock syndrome-like exanthematous disease (Kikuchi, 2003).

Patients and individuals that are at high risk of

developing Staphylococcal infections include surgical patients, the elderly, neonates, diabetic patients and patients with chronic illness (Huda *et al.*, 2011) and immune-compromised patients such as cancer and HIV/AIDS patients others include patients with indwelling devices such as catheters, trauma, burn patients and kidney dialysis patients (Klevens *et al.*, 2007). *S. aureus* infections can be spread through contact with pus from an infected wound, skin to skin contact with an infected person by producing hyaluronidase that destroys tissues, and contact with objects such as towels, bed sheets, clothing, or athletic equipments used by an infected person. Deeply penetrating *S. aureus* infection can be severe. Prosthetic joints put a person at particular risk for septic arthritis, and staphylococcal endocarditis and pneumonia (Huda *et al.*, 2011).

This study marked the cooperative effort for surveillance among health- care institution, academia and Ile -Ife central community and was designed to isolate and identify *S. aureus* in samples stocks of various patients' with related case histories in Academic Teaching Hospital sources viz, clinical ; (stool, blood, urine, sputum, wound), and non-clinical , viz food handlers and cell phones and doctors' stethoscope. Univariate analysis of correlated variables was done with T-test Statistical Significance.

## Materials and Methods

### Source of bacterial isolates

*Staphylococcus aureus* isolates were recovered from both clinical and non-clinical specimens. The clinical sources were from the routine specimens of wound swabs, urine, stool, and sputum of different diagnosed patients' samples submitted to the Microbiology laboratory of the Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), (Urban Centre), Ile – Ife. The non-clinical isolates were recovered as nasal swabs from food handlers at the Obafemi Awolowo University (OAU) campus restaurants, marketers at the Ile-Ife central market and also from fomites within the hospital, which comprised of doctors stethoscopes, and cell phones from the community dwellers and the Health care workers.

### Samples collection

Samples were collected between the period of October 2007 and November 2009. Eight hundred and fifty (850) swab samples from clinical and non-clinical sources at Obafemi Awolowo University Teaching Hospital Complex; OAU Campus community and Ile-Ife environs were obtained. Sterile cotton-tipped applicators (Sterilin, England) appropriately moistened with sterile distilled water were used for swabbing sample surfaces.

Samples from both hospital ( hospitalized patients who were on different types of antibiotic treatment) and the community with different sexes, age ranges and of different diagnostic infections histories ranging from diabetic ulcers, cancers (breast cancer, prostate carcinoma) obstructive uropathy, (e.g benign prostate hypertrophy (BPH)) septicaemia, urinary tract infection, burnt injuries, gastroenteritis, pelvic inflammatory diseases, sexually transmitted infections, pneumonia and many other clinical diagnosis cases were considered.

The non-clinical samples were obtained from the nostrils of apparently healthy community food handlers, also from cell phones and stethoscopes. The swabs after collection were taken to the laboratory immediately for bacteriological analysis.

#### Microbiological analysis

Isolation of *S. aureus* was done by standard procedure in which the samples were inoculated on freshly prepared mannitol salt agar plates (Oxoid, Basingstoke, Hampshire, England) and incubated at 37°C for 24h. Golden yellow colonies on Mannitol Salt agar (MSA) after the incubation period were taken presumptively for *S. aureus*.

#### Phenotypic and biochemical identification of the isolates

The isolates were Gram stained as described by Olutiola *et al.* (1991). Biochemical identification of the isolates was carried out using standard methods. The following biochemical tests were carried out on the isolates namely catalase, tube coagulase test, and the DNase test using DNase agar based (Oxoid Ltd., Basingstoke, Hampshire, England). The confirmed isolates were stored as stock culture on nutrient agar slants and kept at about 4°C until further use.

#### Gram's reaction Test

Gram staining technique is a differential staining procedure that separate bacteria into two classes i.e Gram positive and Gram negative. A smear of an 18-24 hour old culture on nutrient agar was prepared on a clean microscopic slides. The smear was then heat-fixed by passing the slide through a bursen burner flame. The smear was flooded with crystal violet and allowed to react for 1 minute after which the stained was poured of and the smear rinsed under gentle running tap water. Thereafter, the slide was flooded with Gram's iodine solution ( a mordant) and then rinsed off under gentle running tap water. The smear was later decolorized with 95% ethanol, rinsed under gentle running tap water, and counterstained with safranin for about 30 seconds. The slide was then washed under gentle running tap, allowed to air dried and then examined under the oil immersion objective of the light compound microscope (Leica Gallen 111; Leica Inc, NY, USA). Gram positive

staphylococci appeared as round clustered and purple in color.

#### Catalase test

This test was used to differentiate between staphylococci (catalase positive) and streptococci (catalase negative). Catalase positive bacteria are capable of producing an enzyme known as catalase which breaks down hydrogen peroxide to water and two drops of 3% hydrogen peroxide was placed on a clean grease-free slide. Colonies of the isolate similar to Gram positive cocci in clusters was emulsified in the drop. Rapid effervescence of gas was recorded as positive. A control slide containing only drop of hydrogen peroxide showed no gas bubbles.

#### Coagulase test

The isolates were inoculated into 1ml of nutrient broth in test tubes and incubated overnight at 37°C. One milliliter of fresh human plasma was added into the tubes previously incubated with the isolates and further incubated at 37°C and were examined at intervals for 4 hours. Formation of clot up to 4hr at 37 °C indicates positive coagulation (Olutiola *et al.*, 1991). ATCC25923 serves as control strain.

#### DNase test

This is a confirmatory test for *S. aureus* based on its ability to produce DNase enzyme that can degrade nucleic acids. Thirty nine grams of the agar was suspended in 1 litre of distilled water and dissolved completely by boiling. The content was sterilized by autoclaving at 121°C for 15 minutes. The plates were inoculated by spotting the bacterial culture onto the surface of the agar so that a thick plaque of growth became evident after 18 hours incubation. The plates were flooded with 1N HCl and allowed to stand for 2 minutes. The clear zones around the colonies were taken as positive result for the growth of *S. aureus*.

*Staphylococcus aureus* ATCC25923 and *S. epidermidis* served as positive and negative control.

#### Results and Discussion

##### *Staphylococcus aureus* isolates

A total of 405 *S. aureus* isolates were obtained from the 721 staphylococci recovered from 850 samples collected from clinical and non-clinical sources. The clinical isolates comprised of 230 (57%) and 175 (43%), non – clinical. clinical isolates were sourced as follows; wounds (58) ; stools (47) ; urine (58) ; sputum (37) and blood (30), (Table 1).

The highest rate of isolation of *S. aureus* isolates from clinical sources was from wounds (14.3%) and stools samples (14.3%), while cell phones 15% and food handlers (15%) constituted the highest among non – clinical *S. aureus* isolates. Overall, the

prevalence of *S. aureus* isolates recovered from clinical sources are of statistical different (T = 0.141).

Table 2 shows the colonial morphology and biochemical identification of *S. aureus* isolates from clinical and non-clinical sources. The observation of golden yellow colouration showed fermentation of

the mannitol salt agar by the *Staphylococcus sp.* The isolates appeared purple coloration with Gram stain (Gram positive cocci). Rapid effervescence of gas recorded showed positive catalase reaction coupled with positive tube coagulases. All the 405 *S. aureus* were DNase positive.

**Table 1: Distribution of *S. aureus* isolates in the sample sources.**

<b>Clinical Sources.</b>	<b>Nos of <i>S. aureus</i> isolated</b>
Urine n=100	58 (14.3%)
Wound n=100	58 (14.3%)
Stool n=100	47 (11.6%)
Sputum n=100	37 (9.1%)
Blood n=70	30 (7.4%)
<b>TOTAL</b>	<b>230</b>
<b>MEAN</b>	<b>11.4% ± 7.8</b>
<b>Non-clinical Sources</b>	
Cell phone n= 100	62 (15.3%)
Stethoscopes n=51	51 (12.6%)
Food handlers. n=100	62 (15.3%)
<b>Total</b>	<b>175</b>
<b>Sum total 405</b>	<b>14.333 ± 1.333</b>

**Table 2: Colonial morphology and biochemical identification of *S. aureus* isolates**

<b>Colonial Morphology</b>	<b>Characteristics.</b>
Growth on Nutrient agar	Raised, Smooth, serrate, opaque
Growth on Mannitol salt agar	Ferment mannitol golden yellow coloration
Gram reaction	Positive cocci
Catalase Test.	Positive
Coagulase Test	Positive.
DNase	Positive

The frequency of urine *S. aureus* infections in relation to the age range and sex is presented in Table 3. Fifty eight samples were confirmed of *S. aureus* infections of which 24 (41.4%) were males and 34 (58.6%) were females.

Table 4 shows the distribution of *S. aureus* in the urine samples of patients with their case histories. The various *S. aureus* infections occurred as follows: Sexually Transmitted Disease cases which constituted overwhelmingly 25 (43.1%) followed by Urinary Tract Infection cases 15 (25.7%) ; Pelvic inflammatory disease cases 7 (12.1%) ; Benign prostatic hypertrophy 6 (10.3%) ; both cancer of prostate gland and chronic renal failure cases

constituted 2 (3.4%) and 1(1.7%) respectively.

The distribution of wound infections in relation to age and sex is shown in Table 5. Fifty eight (58) patients' samples were confirmed of *S. aureus* infections of which 20 (34.5%) were male and 38 (65.5%) were female.

Table 6 shows the distribution of wound *S. aureus* among individual case histories of the wound samples collected. The various *S. aureus* infections occurred as follows: Septicaemia cases which constituted overwhelmingly 32.8% followed by Burnt injury cases, 24.1% ;

**Table 3. Distribution of urine infections in relation to age and sex.**

Age range	Total number of patient samples	No. Prevalence Male (%)	% Female (%)
11-20	5	2 (40.0%)	3 (60%)
21-30	16	5 (31.25)	11 (68.75%)
31-40	12	6 (50%)	6 (50.0%)
41-50	14	4 (28.57)	10 (71.43%)
51-60	7	5 (71.43%)	2 (28.57%)
61-70	4	2 (50.0%)	2 (50.00%)
<b>Total</b>	t - 0.7476 = 0.4883 <b>58</b> <b>Median</b>	<b>24 (41.4%)</b> <b>45.28</b>	<b>34 (58.6%)</b> <b>54.79</b>

**Table 4: Distribution of Urine *S. aureus* case histories**

Case histories/ Urine <i>S. aureus</i> infections	Total number (%)
STD	25 (43.1)
UTI	15 (25.7%)
BPH	6 (10.3%)
CAP	2 (3.4%)
PID	7 (12.1%)
U	2 (3.4%)
CRF	1 (17.0%)
<b>TOTAL</b>	<b>58</b>

**STD:** Sexually Transmitted Diseases; **UTI:** Urinary Tract Infection; **CAP:** Cancer of prostate Gland , **BPH:** Benign Prostatic Hypertrophy, **PID** ; Pelvic Inflammatory Diseases, **U:**Urethritis , **CRF:** Chronic renal failure.

**Table 5. Distribution of wound infections in relation to age and sex**

Age range	Total number of patients samples	No. % Prevalence Male (%)	Female (%)
11-20	10	5 (50.0%)	5 (50%)
21-30	21	6 (28.5%)	15 (71.43%)
31-40	6	1 (16.67%)	5 (83.33%)
41-50	12	5 (41.67)	7 (58.33%)
51-60	8	5 (25.00%)	6 (75.00%)
61-70	1	1 (100%)	(0%)
<b>Total</b>	<b>58</b>	<b>T=57.9785</b> <b>20 (34.5%)</b> <b>X=47.018</b>	<b>T=54.8292</b> <b>38 (65.5%)</b> <b>X=49.73</b>

**Table 6: Distribution of Wound *S. aureus* case histories**

Case histories/ Wound <i>S. aureus</i> infections	Total number (%)
BI	14 (24.1)
ISI	4 (6.9%)
DF	6 (10.3%)
B	2 (3.4%)
VLU	3 (5.2%)
AB	2 (3.4%)
TEN	8 (13.8%)
Sep	19 (32.8%)
<b>TOTAL</b>	<b>58</b>

**BI:** Burnt Injuries; **Sep:** Septicaemia; **ISI:** Infected Surgical Implant. **DF:** Diabetic foot; **B:** Boil, **VLU:** Venous leg ulcer; **AB:** Abscess. **TEN:** Toxic epidermal necrosis.

Table 7 shows the frequency of sputum *S. aureus* infections according to the age range and sex of individual sources of the sputum samples. Thirty seven, patients' samples were confirmed of *S. aureus* infections of which 16(43.2%) were male and 21(56.8%) were female.

Table 8 shows the distribution of sputum *S. aureus* among individual case histories of the sputum samples collected. The various *S. aureus* infections occurred as follows: pneumonia cases which constituted overwhelmingly 24(64.9%) followed by bronchitis cases, 11(29.7%); *Mycobacterium tuberculosis* cases and HIV each constituted 1(2.7%) only.

Table 9 shows the frequency of stool *S. aureus* infections according to the age range and sex of individual sources of the stool samples. Forty seven,

patients' samples were confirmed infected with *S. aureus* and of which 17(36.2%) were male and 30(63.8%) were female.

Table 10 shows the distribution of stool *S. aureus* among individual case histories of the stool samples collected. The various *S. aureus* infections occurred as follows: diarrhoea cases which constituted 18(38.3%) followed by amoeboid dysentery cases, 15(31.9%) ; gastroenteritis cases, 11(23.4%) and cholera, 3(6.4%).

Table 11 shows the frequency of blood *S. aureus* infections according to the age range and sex of individual sources of the blood samples. Thirty patients' samples were confirmed of *S. aureus* infections of which 14(46.7%) were male and 53.3% were female.

**Table 7. Distribution of sputum infections in relation to age and sex**

Age range	Total number of patients samples	No. % Prevalence	
		Male (%)	Female (%)
11-20	3	1 (33.33%)	2 (66.67%)
21-30	15	5 (33.33%)	10 (66.67%)
31-40	5	3 (60%)	2 (40.0%)
41-50	6	5 (83.33%)	1 (16.67%)
51-60	3	1 (33.33%)	2 (66.67%)
61-70	5	1 (20.0%)	4 (80.00%)
		<b>T=3.8478</b>	<b>T=4.06292</b>
<b>Total</b>	<b>37</b>	<b>16 (43.2%)</b>	<b>21 (56.8%)</b>
		<b>X=48.018</b>	<b>X=50.7303</b>

Table 8: Distribution of Sputum *S.aureus* infection case histories

Case histories/ Sputum <i>S. aureus</i> infections	Total number (%)
<b>HIV/AIDS</b>	1 (2.7%)
<b>PN</b>	24 (64.9%)
<b>TB</b>	1 (2.7%)
<b>CB</b>	11 (29.7%)
<b>Total</b>	<b>37</b>

**HIV** = Human Immunodeficiency virus/ Acquired Immune Deficiency Syndrome.

**PN** = Pneumonia.

**TB** = Tuberculosis

**CB** = Chronic bronchitis

Table 9. Distribution of Stool infections in relation to age and sex

Age range	Total number of patients samples	No.%Prevalence	
		Male (%)	Female (%)
<b>11-20</b>	10	3 (30.0%)	7 (70.0%)
<b>21-30</b>	14	7 (50.0%)	7 (50.0%)
<b>31-40</b>	8	1 (12.5%)	7 (87.5%)
<b>41-50</b>	6	3 (50.0%)	3 (50.0%)
<b>51-60</b>	6	1 (16.7%)	5 (83.3%)
<b>61-70</b>	3	2 (66.7%)	1 (33.3%)
<b>Total</b>	<b>47</b>	<b>T=3.84780</b> <b>17 (36.2%)</b> <b>X=48.018</b>	<b>T=4.06292</b> <b>30 (63.8%)</b> <b>X=50.7</b>

Table 10: Distribution of Stool *S.aureus* infection Case histories

Case histories/ Stool <i>S. aureus</i> infections	Total number (%)
<b>Gts</b>	11 (23.4%)
<b>Dia</b>	18 (38.3%)
<b>AD</b>	15 (31.9%)
<b>C</b>	3 (6.4%)
<b>Total</b>	<b>47</b>

**Gts** = Gastroenteritis

**Dia**= Diarrhoea

**AD** = Amoeboid dysentery

**C** = Cholera

**Table 11. Distribution of Blood infections in relation to age and sex**

Age range	Total number of patients samples	No % Prevalence	
		Male (%)	Female (%)
11-20	4	2 (50.0%)	2 (50.0%)
21-30	8	3 (37.5%)	5 (62.5%)
31-40	3	2 (66.7%)	1 (33.3%)
41-50	8	4 (50.0%)	4 (50.0%)
51-60	3	1 (33.3%)	2 (66.7%)
61-70	3	1 (33.3%)	2 (66.7%)
71-81	1	1 (100%)	0%
<b>Total</b>	<b>30</b>	<b>14 (46.7%)</b> <b>X=48.0178</b>	<b>16 (53.3%)</b> <b>T=4.06292</b> <b>X=50.7303</b>

**Table 12: Distribution of Blood *S. aureus* infection Case Histories.**

Case histories/ Blood <i>S. aureus</i> infections	Total number %.
<b>B</b>	19 (63.3%)
<b>PC</b>	1 (3.3%)
<b>CML</b>	3 (10.0%)
<b>MM</b>	7 (23.3%)
<b>Total</b>	<b>30</b>

**PC:** Prostate cancer.; **CML:** Chronic myeloma leukemia.; **MM:** Multiple myeloma  
**B:** Bacteremia.

**Table 13. Distribution of Food handlers nasal swabbed samples in relation to age and sex**

Age range	Total number of nasal swabbed samples	Number of Male (%)	Number of Female (%)
11-20	12	11 (91.67%)	1 (8.33%)
21-30	19	12 (63.16%)	7 (36.84%)
31-40	19	9 (47.37%)	10 (52.63%)
41-50	6	5 (83.33%)	1 (16.67%)
51-60	6	3 (50.0%)	3 (50.0%)
<b>Total</b>	<b>62</b>	<b>40 (64.5%)</b>	<b>22 (35.5%)</b>

Table 12, Shows the distribution of blood *S. aureus* among individual case histories of the blood samples collected. The various *S. aureus* infections occurred as follows: bacteremia cases which constituted overwhelmingly 19(63.3%) followed by multiple myeloma cases, 9(23.3%) ; chronic myelomic leukemia , 3(10.0%) and prostate cancer only 1(3.3%).

Table 13: Shows the frequency of food handlers nasal swabbed *S. aureus* according to the age range and sex of individuals surveyed. 62 participants nasal samples were confirmed of *S. aureus* infections of which 40(64.5%) were male and 22(35.5%) were female.

### Discussion

This surveillance report of Staphylococcal infections underscores the important roles of Gram positive organisms in the hospital and community settings. In this study, prevalence of 230 (56.8%) of *S. aureus* isolates recovered from the clinical sources and 175 (43.2%) from the non-clinical setting is in support of earlier finding of Ellingson *et al.*(2011), who reported that the most commonly encountered hospital acquired infections involved wound, urinary tract, respiratory tract and blood stream. This might be due to the fact that the hospital represents a special



environment which provides health care to patients and serves as work environment for medical and other staff where organisms may pass from patient to patients or from staff to patients.

*Staphylococcal aureus* can be acquired in a numbers of ways as the pathogen is ubiquitous and man and other animals are healthy carriers. It could be community acquired especially from the colonized healthy family members (Shiojima *et al.*, 2003) or hospital acquired which could be inform of acquisition from Health care workers during treatment and examination (Stein *et al.*, 2006), and hospital environment which comprises of hospital equipment and materials (Centers for Disease Control and Prevention, 2006). These major sources have been documented as the main source of acquiring staphylococcal infections.

In this finding, different clinical diagnostic cases were studied for possible associated *S. aureus* infections viz; urine, wound, sputum stools and blood. Nasal samples of healthy individuals among food handlers in the community were considered for the non- clinical. The sex and age groups distribution frequency were determined. The analysis of the study reveal that urine *S. aureus* infection in female (58.6%) was higher than (41.4%) in male, STD cases was about more than doubled of other infections follow by the urinary tract infection (UTI) ; Wound infections in female (65.5%) was doubled that of male which was (34.3%) and sepsis cases constituted 32.8% ; Sputum *S. aureus* infection in female was 56.8% higher than 43.2% in male and pulmonary inflammation diagnosis 66.7% constituted overwhelmingly more than double of other infections ; Stool infections in female (63.8%) was higher than 36.2% in male and diarrhea cases constituted highly of 38.3% ; Blood *S. aureus* associated infection in female (53.3%) was higher than 46.7% in male and bacteremia/ sepsis cases predominated about 63.3%. (T= 95% confidence interval of the difference). This findings corroborated the report of Bennie Lindeque *et al.* (2008) in the work conducted on prevalence of MRSA among orthopaedic patients at large academic hospital that statistically significant increases in the incidence of MRSA per year occurred in women whereas the increase in MRSA incident was not significant for men. In this report, it is worth noting that incidence rate was the highest in age range 21-30 among urine , wound, sputum and blood samples analyzed which was in agreement with Harptuluoglu *et al.* (2005) which revealed that the rates of *S. aureus* carriage tends to decrease with age. Diarrheal stools analysis showed an exceptional incident rate of infections which was noticed to be higher among the age range 11-20 and this might likely be associated with infant diarrhea. The limitation of this finding was that the underlying risk factors of individual

patients' from which clinical samples were obtained was not known.

Community source *S. aureus* isolates accounted for 43% of the total isolates from which cell phones and food handlers constituted 15%, and stethoscopes *S. aureus* isolates 13%. In this finding, the carrier rate of *S. aureus* in the nose of apparently healthy individuals among the food handlers in the community was higher among male (64.5%) than female 35.5% ( T=95% confidence interval of the difference). The present finding was at variance to the work conducted by Shanmugan *et al.* (2008) on the prevalence, antibiogram and characterization of *S. aureus* including MRSA among the healthy staff, and patients from Sri Manakula Vinayagar Medical College and hospital (SMVMCH) Pondicherry, that the carrier rate of *S. aureus* in the nose of male and female healthy carrier among medical students are nearly same which are 24.4% and 23.5%, respectively. The incident rates of nasal infections among the food handlers surveyed individual was higher among age groups 21-30. Plans are underway to evaluate the relationship between antibiotic use in the hospital and the pattern of antimicrobial resistance observed

Periodic epidemiological studies must be encouraged to determine the interrelatedness of community/hospital sources of isolates in Nigeria, establishing the pathogens biodiversity to assist infection control measures.

#### Acknowledgement

The authors thank the Infectious Control Practitioners and Microbiology Laboratory at OAUTHC for their active participation in this project.

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