Bacterial Contamination of Some Hospital Equipments in Kano, Nigeria

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One hundred swabs of some hospital equipments that come in contact with patients were collected and analysed at five (5) different hospitals in Kano State, Nigeria. These were cultured on selective and enrichment media for the purpose of isolation and identification of bacterial pathogens. Plates with growth were Gram-stained and subjected to biochemical analysis. The results showed that 76% of the swabs were positive for bacterial growth. The isolated bacteria were *Corynebacterium* spp. (10%), *Lactobacillus* spp. (8%), *Staphylococcus* spp. (52%) and *Streptococcus* spp. (6%). Isolation of potential pathogens on surface of hospital equipments indicated that these equipment predispose the patients to nosocomial infections, sometimes with lethal repercussion to both patients and healthcare providers.

Keywords: Bacterial contamination, Nosocomial, Swab, Healthcare, Equipments.

Introduction

Bacterial contamination of hospital equipments is one of the most probable cause of nosocomial infections. These infections are developed within a hospital or other type of clinical care facility and are acquired by patients while they are in the facility (Singh *et al.,* 2002; Willey *et al.,* 2008). Besides harming patients, nosocomial infections can affect nurses, physicians, aides, visitors, delivery person, custodians and any one who has contact with the hospital. The Center for Disease Control (CDC) estimates that about 10% of all hospital patients acquire some type of nosocomial infection as a result of contact with some contaminated hospital equipment. Approximately 40 million people are admitted to hospitals annually, 2 to 4 million people may develop an infection they did not have upon entering the hospital. Thus, nosocomial infections represent a significant proportion of all infectious diseases acquired by humans (Willey *et al.,* 2008).

Multi reservoirs have been reported as being responsible for hospital contamination particularly due to stethoscope, in the delivery theater and intensive care units (ICU) (El-Mishad, 2005). Several researches have been carried out on contamination of hospital equipment. Bernard *et al.* (1999) reported 85% contamination of physician's stethoscope with both Gram-negative and Gram-positive bacterial pathogens. Gram-positive pathogens isolated were *Staphylococcus aureus, Staphylococcus epidermidis* and *Enterococcus faecalis*, while Gram-negative pathogens were *Escherichia coli, Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. Bdareen (2009) also reported 38.2% coagulase negative *Staphylococcus* and 23.9% *E. coli* isolated from 50 swab samples collected from instruments, equipments, devices and patients contact equipments from different hospital departments in educational hospital in Maber. Clinical thermometers, stethoscopes, sphygmomanometers, x-ray machines cassette, table coach and stationary grid do come in contact with patients skin during usage thereby putting the patient at risk of developing skin infections, if these equipments are contaminated with these organisms and are not disinfected (Willey *et al.,* 2008). It is with the above report in mind that this research was set up with the aim of isolating and identifying bacterial pathogens, which may put patients at risk of acquiring nosocomial infections.

Materials and Methods

Sampling Sites

Five hospitals were surveyed for sample collection in this research were: Bayero University Clinic (BUC) (Old Campus), Muhammad Abdullahi Wase Specialist Hospital (MAWSH), Hasiya Bayero Paediatrics Hospital (HBPH), Murtala Muhammad Specialist Hospital (MMSH) and Sheik Muhammad Jidda General Hospital (SMJGH) all in Kano State, Nigeria.

Sample Collection

Sterile swab sticks were dipped in a sterile normal saline, which were then used to swab the surfaces of clinical thermometers, stethoscopes, sphygmomanometer, x-ray cassette, stationary grid and table coach. One hundred swabs were collected as follows: BUC (11), MAWSH (18), MMSH (36), HBPH (12) and SMJGH (23).

Bacterial growth and Identification

Each swab was streaked on selective and enrichment media and incubated at 37°C for 24 hours (Cheesbrough, 2006). Bacterial growth observed after the incubation period were Gram-stained and biochemical analysis, which included catalase test and coagulase test were carried out.

Results and Discussion

The number of positive growth out of the 100 swabs was 76% as shown in Table 1. This indicated high level of contamination of the hospital equipments in the studied hospitals. As stated by Bernard *et al.* (1999), hospitals equipments should not harbour potential pathogenic organisms that pose the risk of acquiring nosocomial infections by patients and hospital staff.

Results on the frequency of organisms isolated from various equipments shows that virtually most of the equipments were contaminated with the organisms (Table 2). For example out of 39 stethoscopes examined, 29 were contaminated, while all the tested x-ray cassette, stationary grid and table coach were contaminated with different organisms. Contamination of this magnitude clearly is an indication of lack of sterilization of these equipments during usage or storage. As pointed out by Cheesbrough (2002), sterilization of hospital equipments most especially those that come in contact with patients and hospital personnel is very vital to control and prevent hospital acquired and transmitted infections.

Diversity of organisms isolated indicated that *Staphylococcus* spp. had the highest frequency of contamination of hospital equipments 52 (68.4%), while *Streptococcus* spp. was the least isolated with incidence of 6 (7.9%) (Table 3). Bdareen (2009) in his report also indicated that *Staphylococcus* spp. had the highest incidence of 38.1% from hospital equipments from hospital theaters and orthopaedic units in Maber hospital. The population of *S. aureus* detected in this study might harbour antibiotic-resistant *Staphylococci,* which poses risk to both hospital staff and patients that come in contact with these equipments (Sleigh and Timbury, 1998).

Isolation of these organisms from the equipments indicates possible contamination from patients and staff handling the equipments. *Staphylococcus* spp. is harboured by many people as a normal flora of the skin while *Streptococcus* spp., also a normal flora of the skin as well as the respiratory tract, may be transmitted to the equipments via coughing and sneezing (Cheesbrough, 2002). As pointed out by Pittet *et al.* (1999), environmental and personal hygiene of staff and patients is very important and strict hygienic measures could curtail the incidence of nosocomial infections in hospital settings.

Clinical equipments such as stethoscopes, thermometers, sphygmomanometers, x-ray cassettes, table coach etc. come in direct contact with patients skin during usage thereby putting the patient at risk of developing skin infections if these equipments are contaminated with these organisms and are not disinfected (Willey *et al.,* 2008). In addition, patients with impaired or compromised immunity may be susceptible to opportunistic bacteria present on or in these equipments (Grady *et al.,* 2002).

All personnel in the care of patients should be familiar with basic infection control measures such as proper handling of equipments (Willey *et al.,* 2008). The disinfection procedures must be undertaken before and after usage of hospital equipments.

TABLE 1
Incidence of Bacterial Contamination Among the Hospital Equipments

Equipment	Number examined	Number positive (%)
Stethoscope	39	28 (71.8)
Sphygmomanometer	36	26 (72.2)
Clinical thermometer	13	10 (76.9)
X-ray cassette	4	4 (100)
X-ray stationary grid	4	4 (100)
X-ray table coach	4	4 (100)
Total	**100**	**76 (76)**

TABLE 2
Incidence of Contamination Among the Hospitals

Hospital	Number examined	Number positive (%)
BUC	11	11 (100)
MAWSH	18	11 (61.1)
MMSH	36	28 (77.8)
HBPB	12	08 (66.7)
SMJGH	23	18 (78.3)
Total	**100**	**76 (76)**

Key: Bayero University Clinic (BUC), Muhammad Abdullahi Wase Specialist Hospital (MAWSH), Murtala Muhammad Specialist Hospital (MMSH), Hasiya Bayero Paediatrics Hospital (HBPH), Sheikh Muhammad Jidda General Hospital (SMJGH).

TABLE 3
Incidence of Contaminants on the Hospital Equipments Examined

Bacteria isolated	Frequency (%)
Corynebacterium spp.	10 (13.2)
Lactobacillus spp.	08 (10.5)
Staphylococcus spp.	52 (68.4)
Streptococcus spp.	06 (7.9)
Total	**76 (100)**

Conclusion

Results of this study reveal gross inadequacy in the disinfection programmes of the investigated hospitals; and the result of detection of pathogens on hospital equipments that could place life of staff and patients at risk of acquiring nosocomial infections.

Recommendations

In view of the results obtained in this work, it could be recommended that:

1) Government should strengthen awareness campaigns on improved hygienic practices so as to reduce the rate of infections and spread of bacterial pathogens that may lead to nosocomial infections.

2) Healthcare settings should improve control measures such as proper handling and disinfection of equipment.

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