Microbiological Screening of the Environments of Two Hospitals In Nablus

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Summary

Both blood agar and MacConkey plates were used for the isolation of bacteria from the environments of two hospitals in Nablus. Pseudomonas aeruginosa , Escherichia coli and Staphylococci were isolated from saline solution kept in glass bottles for washing and cleansing wounds, suction machines, respirators, endotracheal tubings, oxygen pumps and sinks. Alcaligenes odorans was isolated from the suction machines and Dettol solution. Aeromonas species were isolated from deionised water and sinks, The implications of these findings were also discussed.

دراسة بيئية لأجواء اثنين من مستشفيات نابلس

ملخص

لقد تم في هذه الدراسة عزل أنواع مختلفة من البكتيريا من بيئة مستشفيات منطقة نابلس باستعمال الوسطين الغذائيين MacConkey and blood agar حيث عزل و Coll Escherichia و Staphylococci Pseudomonas aeruginosa من المحلول الملحي المتعادل الذي يستعمل لغسل وتنظيف الجروح والأحواض وأجهزة التنفس والأكسجين. كذلك تم عزل Alcaligenes dorans من محلول الديتول المطهر والأحواض وماكنات التنفس وعزل Aeromonas من الماء الأيونات والأحواض . كما نوقشت في الورقة الآثار المتوقعة لنتائج هذه الدراسة .

Introduction

At least 5 to 10% of patients entering U.S. hospitals acquire an infection that was not present on admission (1). Almost any microbe can cause a hospital acquired infection. The pattern of hospital infection has changed over the years due to advances in medicine and the development of antimicrobial agents (6). Formerly, the majority of infections were caused by Gram positive organisms (Streptococcus pyogenes and Staphylococcus aureus) (4,8). Nowadays, after the development of antimicrobial agents, Gram-negative organisms such as Escherichia coli and Pseudomonas aeruginosa emerged as important pathogens.

The source of infection in the hospital may be human, or environmental, from contaminated objects, food, water or air. The source may become contaminated from environmental reservoir of organisms, e.g. contaminated antiseptic solution distributed for use into sterile containers, normal saline and suction machines.

In our area nosocomial infections caused by P. aeruginosa, E. coli, and Staphylococci have been frequently detected among people attending hospitals for surgery and internal medicine (unpublished medical records, Faydi Medical, Laboratory, Nablus).

This study was thus aimed at investigating the incidence of pathogenic bacteria in the environments of Nablus hospitals and identifying sources of contamination within their environments. The study was carried out on two hospitals in Nablus. Another study is being carried out on the other two hospitals in Nablus and on Tulkarim hospitals.

Experimental

Two hospitals (referred to as hospital I and hospital II, both in Nablus, were surveyed in this work. Hospital I is a private hospital with 110 beds. It has wards for surgery, internal medicine, pediatrics, gynecology, emergency and two operating rooms. Hospital II is a governmental surgical hospital with 120 beds. It has wards for surgery, gynecology, pediatrics and three operating rooms. The hospital has also an emergency room and nursery.

Due to the small size of the two hospitals, the numbers and samples sizes were small.

Nutrient agar and MacConkey agar, and, sterile cotton-tipped applicators were used in the study.

Blood agar and MacConkey agar plates were prepared fresh according to the instructions of the manufacturer. Cotton-tipped applicators were used to swab the hospitals walls, floors, suction machines, respirators, oxygen pumps, operating theatere, tables, sinks, disinfectants, endotracheal tubes and normal saline solutions kept in glass bottles with tubing for cleaning wounds. Also plates were kept opened in the environment of the hospital for half an hour. Inoculated plates were incubated at 37°c for 24 hours. Negative growth plates were incubated for further 24 hours to permit slow-growing pathogens to develop.

Results

This study was carried out in the period between November, 1992 and August, 1993. at An-Najah University laboratories. Isolated microorganisms were identified according to Lennette et al.(5).

Tables I and II show the different types of microorganisms isolated from the environments of the two hospitals. The variation in the numbers of samples as shown in the tables, was due to variation in the availability of different items in the hospitals. As shown in table I for hospital I, P. aeruginosa , Alcaligens. odorans, E. coli and Aeromones species were the most predominant microorganisms isolated from suction machines, oxygen pumps, sinks and deionised water.

Table II for hospital II shows that P. aeruginosa is the most predominant microorganism followed by E. coli. The main sources of contamination in hospital II were: suction machines, sinks and normal saline. Walls and floors of both hospitals were colonized by Staphylococcus epidermidis. Disinfectants in both hospitals were negative for the growth of bacteria . However , other samples obtained from cotton pads, deionized water and other disinfictant solutions, seem to be contaminated mainly with A. odorans. The data for these isolates was excluded from the tables mainly due to the small size of the available samples.

Discussion

Nosocomial transmission has been suggested for a number of infections (2,10). These infections are acquired by patients admitted to the hospitals. Both surgery and internal medicine patients are liable to infection (6).

In our study, the most predominant microorganism isolated from the two hospital environments was P. aeruginosa. This is in accordance with other studies (6). This microorganism was isolated from suction machines and normal saline.

Suction machines are used by most patients admitted to the hospital. The habit of leaving these machines for long periods without cleaning and disinfection after use is possibly responsible for this contamination.

P. aeruginosa and E. coli were isolated from normal saline kept in glass bottles with tubings for days or weeks which exposed it to contamination. This practice may have resulted in infection of wounds cleaned and washed by this saline. In hospital II, bottles of normal saline and disinfectants were always kept in each division of the hospital. P. aeruginosa is known to be resistant to most antibiotics (9). So it is expected to be detected in such instruments, and this study confirm this fact. It is widely distributed in nature and is commonly present in moist environment in hospitals, and is an important nosocomial pathogen (3).

It is worth noting that the findings of contaminated deionized water, cotton pads and other disinfictant solutions is of great value and needs further investigations .

The two hospitals were informed with these findings and appropriate measures (cleaning and disinfection of respirators and suction machines; use of proper concentrations of disinfectants; and bags of saline and glucose solutions should be used immediately after have been opened) have been taken to eliminate contamination sources within these hospitals and therefore reduce nosocomial cases. We recommend that other hospitals in the area should monitor their environments and make sure that microbe control measures are always applied.

Table I
Incidence of bacteria in hospital I

Site of Isolation	Tested Sample	Positive Samples	Percent of Positive	Bacteria
Suction machines	7	4	57	P. aeruginosa Aeromonas species + A. odorans + E. coli
Oxygen pump	3	1	33	P. aeruginosa + E. coli
Sinks	7	7	100	P. aeruginosa A. odorans Aeromonas species
Plates exposed to the environment	20	20	100	S. epidermidis
Walls, Floors	20	20	100	S. epidermidis

Table II
Incidence of bacteria in hospital II

Site of Isolation	Tested Sample	Positive Samples	Percent of Positve	Bacteria
Suction machines	23	12	52	P. aeruginosa
O_2 mask	12	2	16	E. coli + P. aeruginosa
Sinks	5	5	100	E. coli
Plates exposed to the environment	20	20	100	S. epidermidis
Walls, Floors	20	20	100	S. epidermidis
H_2O_2	3	1	33	S. epidermidis
Cetavlon	5	-	0	Negative
Alcohol	4	-	0	Negative
Pevidine iodine	4	-	0	Negative
Glycine	3	2	66	S. epidermidis
Endotracheal tubings	4	2	50	P. aeruginosa
Vacuum machines	8	6	87	P. aeruginosa E. coli

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