

## Clinical Microbiology 2018: Bacteriological Monitoring of Inanimate Surfaces and Equipment in Some Referral Hospitals in Assiut City, Egypt- Entsar H. Ahmed- Assiut University

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Hospital-acquired infections represent a serious public health problem in all countries. It is clear that monitoring of the hospital environment is an essential element in the control and a part of the policy for preventing nosocomial infections. It allows a better understanding of the microbial ecology for the purpose of conducting preventive and corrective actions. The aims of this work were to determine the percentage of bacterial contamination of environmental samples and to identify potential nosocomial pathogens isolated from environments of seven referral hospitals from 2009 to 2015. By using the swab technique, 12863 samples were collected. Qualitative and quantitative cultures were performed. The organisms were primarily identified by colony morphology, microscopy of Gram stain, and standard biochemical tests. 25.6% of total samples showed contamination (93% was mono microbial and 7.0% was poly microbial). The predominant species was coagulase-negative staphylococcus (CNS) (32%), followed by methicillin-resistant *S. aureus* (MRSA) (26%) and then *K. pneumonia* (10.6%). The percentage of contamination varied among the covered hospitals and according to the year of monitoring with highly statistically significant difference (). Direct contact with environmental surfaces or equipment transmits the majority of nosocomial infection. Major nosocomial pathogens have been identified. Hospital managers and healthcare bodies must be aware of the reality of the concept of environmental bacterial tanks and the need for respect of bio cleaning procedures and choice of bio cleaning tools.

### 1. Introduction

Hospital or hospital-acquired infections represent a serious public health problem in all countries. The

burden of HAI is already substantial in developed countries, where it affects from 5% to 15% of hospitalized patients in regular wards and as many as 50% or more of patients in intensive care units (ICUs).

It is clear that monitoring of the hospital environment is an essential element in the control of nosocomial infections. As possible causes of infection, contamination of surfaces may be mentioned, even if cross contamination by hands is probably the greatest risk. In fact, hospital surfaces colonized by different types of microorganisms constitute special ecological niches that require cumbersome, complex, and costly procedures that are necessary for better safety of the patient.

There is a high prevalence of contamination of equipment and high-touch surfaces surrounding the patient. The ability of microorganisms to survive on surfaces is due to their production of adhesion molecules and biofilm. Direct contact primarily with environmental surfaces or equipment transmits the majority of nosocomial infection. Major nosocomial pathogens have been identified. They can circulate between the patients and might persist in the environment for a long time.

As established by microbiological studies, certain hospital pathogens can survive on dry hospital surfaces for extended periods. Both Gram-negative and Gram-positive bacteria can survive up to months on dry inanimate surfaces with longer persistence under lower temperature and humid condition.

Surfaces of commonly used medical equipment and high-contrast communal surfaces (e.g., medical chart and telephones) could be contaminated by multidrug-resistant bacteria (MDR). In the issue of

intensive care unit (ICU) where critically ill patients have several risk factors for nosocomial infection, the issue of environmental contamination poses an even greater challenge.

Monitoring of the hospital environment is lacking in hospitals in Assiut city, so the main objectives of this study were to determine the percentage of bacterial contamination of environmental samples and to identify potential nosocomial pathogens isolated from environments of seven referral hospitals in Assiut city as identification of bacterial contamination of environmental samples is a guide for appropriate preventive measures of infection.

## 2. Materials and Methods

This descriptive cross-sectional study was conducted in seven referral hospitals in Assiut city, Egypt, from 2009 to 2015. All hospitals belong to Assiut University Hospitals, except health insurance hospitals, as they are present in Assiut city, they are the most important hospitals in Assiut and for the whole upper Egypt, easy access, large drainage area for Assiut Governorate as well as for nearby Governorates and preferred to other hospitals due to highly qualified medical staff, good equipment, and facilities allowing good percentage of referral from near as well as distant areas. The selection of sampling sites was made in consultation with the heads of departments and targeted to the most representative and most critical location in each hospital. Random, undirected sampling was collected. Sterile swabs were moistened in sterile normal saline and rolled over the targeted inanimate surfaces/equipment separately (e.g., beds, ventilators, monitors, bedside tables, operation tables, anaesthesia equipment, trolley, dressings,

bench, and surgical blades). Samples were transported to the Infection Control Laboratory of Assiut University Hospital. The swabs were cultured on blood agar plates at 35°C for 48 hours and sub cultured on Mac Conkey' agar for the selection of Gram-negative bacteria.

Colonies were primarily identified by colony morphology, microscopy of Gram stain, and standard biochemical tests. Only pathogenic microbes are examined.

### 2.1. Statistical Analysis

Data entry and analysis were performed using Statistical Package for Social Science version 14 (SPSS). value was considered statistically significant when .

## 3. Results

A total of 12863 swab samples (covering different surface points/equipment) were collected in seven referral hospitals in Assiut city, Egypt, from 2009 to 2015. Most of the samples were collected in the years 2010 and 2011 and the least percentage (1.9%) in the year 2015. More than half of the samples (57.5%) were collected from Main Assiut University Hospital and the least percentage (0.2%) from Urology University Hospital Contamination was positive in 25.6% of samples. According to the pattern of contamination, 7% of samples were poly microbial. About 32% and 26% of isolated organisms were CNS and MRSA, respectively, followed by *K. pneumoniae* (20.7%) then Gram-positive bacillus(*C.difficile*) (10.6%)In the year 2011, 31.0% of the samples were contaminated followed by the years 2015 and 2014 (26.9% and 26.7%), respectively, and the least contamination was in the year 2012 (9.0%) with statistically.