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The most common bacteria isolated from Neonatal Intensive Care Unit at Baghdad Teaching Hospital/ Medical City

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Abstract

The present study has interested with detection of the most common bacteria that contaminate the Neonatal Intensive Care Unit at Baghdad Teaching Hospital/ Medical City therefore a total of 150 swab samples were collected from many inanimate objects (equipments and surfaces) at Neonatal Intensive Care Unit (NICU) during the period from Aug. – oct. 2019. All swab samples cultured on routine culture media and incubated at 37 ºC for 24 hrs. 53 (35.33%) out of 150 (100%) swab samples gave positive culture and the isolates were identified by traditional microbiological methods including morphological, microscopical characteristics and biochemical tests of API system. The study provide evidence that the most common bacterial species that contaminate the inanimate objects (equipments and surfaces) at NICU/ Baghdad Teaching Hospital were Pseudomonas aerugenosa, Klebsiella pneumoniae. E. coli, Enterobacter sakazaki, Acinetobacter baumanii, Bacillus spp. and Staphylococcus epidermidis.

Key word: *Neonatal Intensive Care Unit, Baghdad Teaching Hospital, Pathogenic bacteria, Pseudomonas aerugenosa, Klebsiella pneumoniae. E. coli, Enterobacter sakazaki., Acinetobacter baumanii, Bacillus spp., Staphylococcus epidermidis.*

Introduction

An estimated 2.6 million newborns die each year, mostly from largely preventable causes – prematurity, intrapartum-related complications and infections (Okomo, 2018). Premature infants in Neonatal Intensive Care Units (NICUs) are highly susceptible to opportunistic infection due to the immaturity of their immune systems, and nosocomial infections are a significant risk factor for death and poor neurodevelopmental outcome in this population (Bokulich et al., 2013). The causes of many NICU infections go undiagnosed, and there is discussion as to the importance of inanimate hospital environments (IHEs) in the spread of infections (Hewitt et al., 2013). Although the importance of IHEs in spreading infections has been controversial, studies have shown that nosocomial pathogens can persist in a viable state for months on IHEs, and that contaminated rooms are a significant risk factor for infection (Hota, 2004; Kramer et al., 2006). Studies have shown that patients exposed to a contaminated environment are more likely to contract nosocomial pathogens (Huang et al., 2006) and that cleaning improvements can reduce infection rates of certain pathogens (Hota et al., 2009). One of the biggest difficulties in preventing NICU Infections is understanding the sources of the infectious agents and the routes of transmission. The infectious bacteria may come from many different sources (e.g., individuals in the hospital, on surfaces, or on equipment), and even if it were possible to culture samples from all of these sources, culturing may *Mycobacteria* still fail if growth conditions are not known, because a particular microbe grows very slowly (e.g.,), or samples were poorly handled (Tringe et al., 2008). The present study aimed to detection of the most common bacterial

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species that contaminate inanimate objects in Neonatal Intensive Care Unit at Baghdad Teaching Hospital/ Medical City-Iraq.

Material and method

Sample collection

Sterile cotton wool swab sticks wetted in normal saline were used to collect samples from many inanimate objects (equipments and surfaces) at Neonatal Intensive Care Unit (NICU) including: Incubator, scale, neoblizer, ventilator, C PAP, sink, trolly and disinfectant agents. A total of 150 swab samples were collected and sent to the National Center for Teaching Laboratories for analysis.

Isolation Procedure

The swab samples were each used within two hours of their collection. The collected swabs were cultured on the suitable culture media represented by blood agar and MacConkey agar and incubated aerobically at 37 ºC for 24 hours. After incubation, the positive culture samples were examined morphologically, microscopically and biochemically by API system (MacFaddin, 2000).

Results

Of a total of 150 (100%) swab samples, 53 (35.33%) showed bacterial contamination including: 19 (35.84%) swab samples from incubator, 9 (16.98%) swab samples from sink, 7 (13.20%) swab samples from trolly, 7 (13.20%) swab samples from neoblizer, 5 (9.43%) swab samples from scale, 4 (7.54%) swab samples from ventilator and 2(3.77%) swab samples from C PAP. The 53 swab samples gave different bacterial isolates and the types of bacteria isolated and the rate of their isolation from many inanimate objects are presented in table 1:

Table 1: Types of bacteria and rate of their isolation from Neonatal Intensive Care Unit at Baghdad Teaching Hospital/ Medical City

Bacteria isolated	**Number of isolates and rate of their isolation (%)**
Pseudomonas aerugenosa.	**13 (16.88)**
Klebsiella pneumoniae	**6 (7.79)**
Escherichia coli	**2 (2.59)**
Enterobacter sakazaki	**3 (3.89)**
Acinetobacter baumanii	**3 (3.89)**
Staphylococcus epidermidis	**34 (44.15)**
Bacillus spp.	**16 (20.77)**
Total	**77 (100)**

Discussion

This study found that Neonatal Intensive Care Unit at Baghdad Teaching Hospital/ Medical City is variously contaminated by bacteria many of which are recognized as pathogens. Although the direct participation of contaminated area in a case of disease transmission was not investigated in this study, the isolation of *Pseudomonas aeruginosa, Klebsiella pneumoniae, Acinetobacter baumanii, E.coli* and *Enterobacter zakazaii* is a concern for possible nosocomial transmission. Okomo, 2018 in a systematic review of neonatal infection aetiology studies in sub-Saharan Africa (sSA), reported that *Klebsiella* species, *Escherichia coli*, *Staphylococcus aureus*, Group B *Streptococci*, and *Enterococcus* were the top five reported bacterial pathogens across all regions. The isolation of *P. aeruginosa* from incubator, neoblizer and sink may be important epidemiologically. *P. aeruginosa* has been shown to be a very important opportunistic pathogen in hospitals and its opportunistic ability has been demonstrated especially in neonatal. *P. aeruginosa* has also been shown to be resistant to some of the common disinfectants used in hospitals (Orji, et al., 2005). It should be remembered that Infants admitted to

NICUs, especially ones who have undergone surgery or have congenital abnormalities ,are typically immunocompromised and therefore susceptible to hospital-acquired infections (Stover et al., 2001; Urrea et al., 2003).

The isolation of *Bacillus spp* in higher numbers from sink, CPAP, trolly, neoblizer, incubator may be related to the presence of dust particles as they are easily transmitted via dust. These may explain why *Bacillus spp* were isolated in higher numbers from the previously mentioned inanimate objects.
The isolation of many members of the enterobacteriaceae may be as a result of untreated water sources in the hospitals and or due to poor hygienic practices in the wards more so as many of the isolations were made from samples collected from the wards treated with neonate. The isolation of *Staphylococcus epidermidis* from incubator, scale, neoblizer, C PAP, trolly and sink considered may be a consequence of their carriage by hospital personnel.

This study proposes that there are poor hygienic practices in NICU at Baghdad Teaching Hospital. The isolation of the previously mentioned potentially pathogenic bacteria from the inanimate objects suggests that they should be sterilize and used more carefully to avoid their being involved in nosocomial infection. It is recommended that gown, face-shields and hand gloves should be used by the staff members of NICU when being treated with neonate.

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