

Bacterial Contamination of Newborn Incubator for delivery in Al-Zahraa teaching hospital in Al-Najaf Al-Ashraf province

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Abstract: The main pathways for acquiring newborn infection are airborne transmission; direct contact from colonized person or via physical transmission from inanimate objects such as transducers, thermometer, stethoscopes, manometer, section catheters and contaminated fluids. Our study involves the detection of bacterial contamination of newborn incubator. We collected one hundred swab samples from plastic hole, respiration tubes, patient's bed, floor of incubator and air pores of newborn incubator. The swabs were streaked on suitable media and incubated at 37 °C for 18-24 hours. The observed bacteria were identified by morphological and biochemical characters. The results showed that [45%] of isolates give positive bacterial growth versus [55%] give negative bacterial growth. The result indicated that the *Staphylococcus aureus* was the most predominant bacteria that contaminated the newborn incubator detected in 20% isolates followed by *Staphylococcus saprophytic* detected in 14% isolates.

Keywords: Bacterial Infection, Newborn Incubator, pathogens, Hospital

I. INTRODUCTION

The infection is referred as acquired when the patient admitted to hospital for treatment of specific condition, their exposure to new disease was not in mind, and the measure of precaution and prevention are insufficient to avoid bacteria [1]. The first source of microbial infection of newborn is the parent strain of the mother flora. Infants do not have complete immune system against microbe and gain infection from incubators of newborn [2]. The main pathways for acquiring newborn infection are airborne transmission; direct contact [direct physical transmission] from colonized person [health care worker]. *Staphylococcus aureus*, found on the skin of health care worker as normal flora, may be transmitted to the newborn causing infections [3]. Some microorganisms transmitted by secretion or indirect contact via physical transmission from inanimate objects such as transducers, thermometer, Stethoscopes, manometer, section catheters and water or other carriers such as [contaminated fluids, intravenous solution, milk, blood transmission and derivatives] [4]. Exposure to these sources will contribute to establishing of an endogenous flora of newborn, in other word, the bacterial colonization of the skin, mucosa membrane, gastro intestinal tract and respiratory tract that, in turn are frequently the source of microorganisms that cause infection [5]. The main risk factors for infection of newborn can be divided in to intrinsic and extrinsic factors. The intrinsic factors include gestational age, sex, birth weight, severity of disease and immunological development. The extrinsic factors include hospital stay, use of invasive procedures such as arterial and venous catheters, tracheal cannulas, gastric or gastric duodenal probe peritoneal shunt and chest drains, exposure to hospital environment and staff [5].

Exposure to the hospital staff is the most important risk factors for new born infants admitted to neonatal intensive care units, have prolonged hospital stay, and frequent exposure to invasive procedure and to a great number of people responsible for the care of the infants [6]. Neonatal sepsis remains an important cause of morbidity and mortality among infants in developing countries accounting for [30-40%] of total deaths each year [7]. The pathogens most often implicated in neonatal infection in developing countries are *Klebsiella*, *E. coli*, *Pseudomonas*, *Salmonella* and *Staphylococcus* [8]. The major cause of neonatal incubator contamination is the colonized bacterial environment, these organisms have developed increased drug resistance over last decades and management of neonates with sepsis has become a major problem [9]. Since the spectrum of organisms that cause neonatal sepsis changes over time and varies from hospital to hospital through the same city or country [10]. It is necessary to conduct periodic surveillance to access the changing pattern of organisms causing neonatal infection.

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I. MATERIALS AND METHODS

Specimen collection

A total of 100 samples were collected from new born incubators in AL ZAHAR'S for delivery and children hospital, during 5 months from September (2011) to January (2012). These samples were collected from plastic hole of incubator, respiration tubes, patient's bed, floor of incubator and air pores. Firstly, swabs were treated with normal saline (NS) and immediately send to the laboratory for culturing.

Specimens Identification

The swabs were streaked on suitable laboratory media such as macconky agar, manitol salt agar and incubated at 37°C for 18-24 hours. After incubation period, the identification of bacterial isolated was performed according to criteria established by McFadden, 2000 [11]. This included morphological characters such as Gram reaction, shape and color of colony, appearance of colony and Motility test. It also included biochemical characters represented by lactose and mannitol fermentation, Catalase test, Oxidase test, IMVIC test, Ureastest, Triple sugar iron (TSI) test.

II. EXPERIMENTAL RESULTS

One hundred swabs were collected from different sites of newborn incubators in order to detect the role of incubator contamination in bacterial infection. From these 45 samples, showed positive result for bacterial growth and 55 samples did not showed any bacterial growth (Table 1). Bacterial contamination was observed mostly in plastic hole, floor of incubators and air pores. Whereas, least bacterial contamination were observed in respiration tubes.

Table 1: Distribution of specimens according to collection site.

Type of isolates	Total	Positive (+ve)	Negative (-ve)
Plastic hole	20	12	8
Respiratory tubes	20	2	18
Patients beds	20	8	12
Floor of incubator	20	11	9
Air pores	20	12	8
Total	100	45(45%)	55(55%)

Identification of isolates were per formed according to some critical established by Mc Fadden (2000) which included morphological and biochemical characters. The results of these tests are presented in Table 2.

Table 2: The morphological and biochemical characteristics of bacterial isolates.

Bacterial types test	S. aureus	S. saprophytics	Pseudomonas	Klebsiella	E. coil	Proteus
Gram strain	G+ve	G+ve	G-ve	G-ve	G-ve	G-ve
Catalase	+	+	+	+	+	+
Oxidase	-	-	+	-	-	-
Coagulase	+	-	-	-	-	-
Indol	Non	Non	-	-	+	+
Methyl red	Non	Non	-	-	+	-
Vogasproaskour	Non	Non	+	+	-	+
Citrate test	Non	Non	+	+	-	+
Urease	+	-	-	-	-	+
TSI	Non	Non	AL/A	A/A	A/A	AL/A
Glucose fermentation	+	+	-	+	+	+
Lactose fermentation	+	+	-	+	+	-
Motility	-	-	-	-	+	(+)

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The result indicated that the *Staphylococcus aureus* was the most predominant bacteria that contaminated the newborn incubator detected in 20% isolates followed by *Staphylococcus saprophytic* detected in 14% isolates. Since *Staphylococcus* is widely distributed in nature on the body of many health care persons it is transmitted to newborn [12]. Gram-negative bacteria was detected in 13 isolates of *Klebsiella* and in isolated of *Pseudomonas*, *Proteus* and *E. coli* respectively as shown in table 3. Mixed growth was appeared in some of the specimen, 3% specimen represented by *Staphylococcus saprophyticus* and *Klebsiella* and 2% specimen represented by *Staphylococcus aureus* and *Klebsiella*. The incubation period was appeared to have important role in contamination of bacteria between patient to incubator and to other newborn. The results revealed that the high level of contamination was detected after 1 -2 day after admission period, it was recorded in 19 cases, followed by 5 – 6 day of admission period it was recorded in 9 of bacterial isolated as showed in table [4].

Table 3: The effect of incubation period on distribution of bacteria.

Incubation period	Male	Female	Total
(1-2)day	10(4.5%)	9(4.05%)	19(8.55%)
(3-4) day	3(1.35%)	2(0.9%)	5(2.25%)
(5-6) day	7(1.15%)	2(0.9%)	9(4.04%)
(7-8) day	1(0.45%)	3(1.35%)	4(1.8%)
(9-10) day	3(1.35%)	1(0.45%)	4(1.8%)
(11-12) day	0(0.00%)	1(0.15%)	1(0.45%)
(13-14) day	1(.45%)	1(0.45%)	2(0.95%)
(15-16) day	0(0%)	0(0.0%)	0(0%)

III. CONCLUSION

Staphylococcus aureus and *Staphylococcus saprophyticus* were the most common organisms that cause bacterial contamination of newborn incubator. Prematurity strongly associated with neonate infection. Bacterial surveillance and study of their resistance patterns must be an essential component of neonatal care. Acknowledgement of these patterns is essential when local on the use of antibiotics are being derised.

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