Isolation of Potential Pathogenic Bacteria from Pregnant Genital Tract and Delivery Room in Erbil Hospital

Fouad H.Kamel (Ph.D.)[1], **Kownae Qader Salh** (M.Sc.)[2] **and Yasameen Abdulmajeed Shakir** (Ph.D.)[3]

Abstract

Background: Numerous studies have shown that hospital surfaces and frequently used medical equipment become contaminated by a variety of pathogenic organisms and then spread infection to others. The hypothesis that environmental microorganism cause human diseases arises from two facts, firstly, our interaction with the inanimate environment is constant and close, secondly environmental objects are usually contaminated often with important human pathogens.

Objective: To investigate the hygienic conditions of delivery room and vaginal contamination with pathogenic bacteria of referred pregnant women to the Erbil Maternity Hospitals.

Material and Methods: Fourty three vaginal swab were collected from pregnant women who attending to Erbil Maternity Hospital randomly and 13 swab samples from 6 delivery room during the period from January till July 2014. The swabs sticks for bacterial culture were inoculated on MacConkey, Mannitol salt and blood agar plates and incubated at 37°C for 18-24 hrs. Later bacterial isolates were identified by standard microbiological techniques and antibiotic susceptibility tests were done according to Clinical Laboratory Standard Instituted (CLSI) [13].

Bacterial growth had been observed in 47 cultures (83.9%).The most dominants bacteria isolated from birth space were *E.coli* and *Staph. aureus*, while from vaginal swab isolate in addition to those genera other bacterial genera were isolated including *Klebsiella sp., Proteus sp., Pseudomonas aeroginosa, Staph. albus*.

The delivery room isolated bacteria showed clear resistance toward the antibiotics Cefexime, Amoxicillin, Methicillin, Clindamycine, Norfloxacin, Amikacin, Trimetheprime,Cefotaxime, Ampicillin and Tobramycin but sisnsitive to Vancomycine, Ciprofloxacin.

Conclusion: The finding of established bacterial pathogens from delivery room and showing a high resistance to commonly used antibiotics portends danger for surgical patients. This problem could be controlled to some extent by restriction of purposeless uses of antibiotics and by eliminating contamination in the environment of hospitals by applying strict quality standards concerned with the hygienic manners both of patients and health staff, and the performance of invasive procedures using aseptic technique.

Keywords: Pathogenic bacteria, microbial resistance, hospital pollution, nosocomial infection.
Received: 24 September 2014
Accepted: 7 December 2014

[1] Medical Laboratory Technique Department - Hawler Polytechnic University – Erbil - Iraq.
[2] Collage of Medicine - Erbil Medical University – Erbil - Iraq.
[3] Maternity Hospital – Erbil - Iraq.

Introduction

Many pathogens can cause hospital infection and those are able to survive in the hospital environment for long periods and resist also to disinfections. Thus, human diseases may arise from our interaction with environment objects which are usually contaminated with important human pathogens prevalence in the environment [1].

Surgical site infection is one of the most frequent types of nosocomial infections in developing countries. The infection follows interference with the skin barrier, and is associated with the intensity of bacterial contamination of the wound at surgery or later in wards during wound care [2]. Many patient-specific risk factors have been recognized in association with surgical site infection in such patients, but environmental contamination is increasingly recognized as a contributor to hospital-acquired infection [3]. The emergence of antibiotic-resistant organisms is a major public health concern, particularly in hospitals and other health care settings [4]. Antibiotic-resistant organisms appear to be biologically fit and are capable of causing serious, life-threatening infections that are difficult to manage because treatment options are limited. This increase in the prevalence of drug-resistant pathogens is occurring at a time when the discovery and development of new anti-infective agents is slowing down dramatically. Consequently, there is concern that in the not-too-distant future, we may be faced with a growing number of potentially untreatable infections [5].

Recent studies suggest that contaminated environmental surfaces may play an important role in transmission of healthcare-associated pathogens [6, 7, 8, and 9]. Among patients diagnosed with an infection, antibiotic resistance is associated with an increased length of hospital stay, health care costs, and patient morbidity, and mortality. Improved hand hygiene, environmental cleaning, and isolation of patients carrying pathogenic bacteria are the main methods for tackling the problem [10, 11].

The objectives of this research were isolation of Potential Pathogenic Bacteria from the delivery room as they are frequently handled by both staff and patients and represent a marker of environmental contamination. Also pregnant women vaginal swabs, which referenced to Erbil Maternity Hospital and to study the susceptility of isolated bacteria to certain antibiotics.

Materials and Methods

Sterile cotton wool swab sticks were prepared by making the cotton wool end wet with physiological saline. These were used to swab 43 pregnant vagina referred to Erbil Maternity Hospital randomly and 13 swab samples from 6 delivery room. The swabs sticks for bacterial culture were inoculated on MacConkey, Mannitol salt and blood agar plates and incubated at 37°C for 18-24 hrs.

Bacterial isolates were identified by standard microbiological techniques and antibiotic susceptibility tests to (CFM (Cefexime), Amc (Amoxicillin), Me (Methicillin), DA (Clindamycine), VA(Vancomycine), CiP (Ciprofloxacin), NOR (Norfloxacin), NK (Amikacin), SXT (Trimetheprime), CTX (Cefotaxime), Am (Ampicillin) and ToB (Tobramycin)) antibiotics were add to according to Bauer *et.al* [12]. Overnight peptone water culture of the isolates were marched with McFarland turbidity standard 0.5 and spread over the surface of Mueller-Hinton agar with the help of a swab stick and allowed to dry. Antibiotic discs were placed on the surface of the medium by use sterile forceps. Then incubated at 18-24 hrs at 37°C. The sensitivity plates interpreted by comparing

the zones of inhibition according to Clinical Laboratory Standard Instituted (CLSI) [13].

Results

Bacterial growth had been observed in 47 cultures (83.9%) out of 56 swabs samples which were collected from 6 delivery room distributed in Erbil maternity hospital as show in (Table 1).

Table (1): Types of bacteria isolated from different maternity hospital in Erbil.

Type of Bacteria	Vaginal swabs	Bed swabs	Total samples No.	%
E.coli	3	6	9	20.5
Staph. aureus	11	4	15	34
Klebsiella sp.	5	0	5	11.36
Proteus sp.	1	0	1	2.27
Pseudomonas aeroginosa	12	0	12	27.27
Staph. albus	2	0	2	4.55
No growth	6	3	9	16.98

The most prevalent Gram positive bacteria were *Staph. aureus* (34%) being also found by Manges *et. al*., [12]. Then *Staph. albus* was represented with (4.55%). While the most prevalent Gram negative was *Pseudomonas aeroginosa* (27.27%) which is an important Nosocomial pathogen invasive, toxigenic, multi-drug resistant [15]. and found to be responsible about 28.5% of ICUs nosocomial infection in Mombia, India [16]. That's may be due to gradual increase in the resistant of microbes to previously and recently produced antibiotics may interfere with the tremendous effort provided by health facilities to control the spread of microbial disease in the community.

Followed with *E.coli* (20.5%) which was inconsistence with a study done in Erbil [17] where an extremely high percentage (46.21%) of contamination with this species was found, this may be due to the differences of the sites of swabs being taken from the hospital as a whole in Erbil or may be explained by the level of health awareness of both, patients and health staff in different communities [18].On the other hand *Klebsiella sp*. represent only (11.36%) of total positive samples taken and *Proteus sp.*(2.27%). On other hand 9(16.98 %) swab samples gave no growth of bacteria. Comparing between both vaginal and bed swabs samples after sterilization , the vaginal were more contaminated (73.68 %) as a total of positive samples than the bed swabs (26.3%), whatever, only two species of bacteria (*E.coli* and *Staph. aureus*) out of sex species of microorganisms could be isolated from the beds which may be more resistant species for depended disinfections.

Susceptibility tests for some antibiotics showed different results depending on the genus of bacteria and type of antibiotic. Table (2) showed susceptibility test of isolated bacteria *E.coli* from birthing space to antibiotics, it was resistant to all antibiotics CFM, Amc, NoR, SXT and CTX except NK and Am were sensitive. Similar phenomena obtained with *Staph aureus*, since it was resistant to all used antibiotic except VA antibiotic.

Table (2): Susceptibility tests for bacteria isolated from the birthing space to antibiotics.

Pathogens	CFM	Amc	Me	DA	VA	Cip	NoR	NK	SXT	CTX	Am
E.coli	R	R	-	-	-	S	R	S	R	R	-
Staph aureus	R	R	R	R	S	R	-	-	R	R	R

Similar susceptibility tests were repeated but for bacterial genera isolated from vaginal swabs to some antibiotics as showed in table (3). All isolates of *E.coli* were showed resistant to antibiotic Amc and sensitivity to CFM، Cip. But all genera of *E.coli* had different response exposed to the antibiotics types NoR, NK, SXT and CTX.

Table (3): Susceptibility tests for bacteria isolated from the vaginal swabs to antibiotics.

Pathogens	CFM	Amc	Me	DA	VA	Cip	NoR	NK	SXT	CTX	ToB	Am
E.coli	S	R	-	-	-	S	R /S	R /S	S/ R	S / R	-	-
Staph aureus	R	R	R	R /S	S	S	-	-	R /S	R / S	-	R
Klebsiella sp.	R /S	R	-	-	-	S	S	S	R / S	R	-	-
Ps. aerogenosa1	R	R	-	-	-	S	S	S	R	R	R /S	-
Proteus sp.	S	R	-	-	-	S	S	R	S	S	-	

The same in genera *Staph aureus*,they were resistant to antibiotics typeCFM, Amc, Me, Am and sensitive to VA, Cip but different responseto DA, SXT and CTX. The *Klebsiella sp.* were resistant to *Amc, CTX,* and sensitive toCip, NoR,NK .But vary in *CFM, SXT*. *Ps. aerogenosa1* isolates were resistant to *CFM, Amc, SXT, CTX* and sensitive to *Cip, NoR, NK,* but varied in *Tob.* While *Proteus sp.* isolates were resistant to *Amc, NK* and sensitive to CFM, Cip, NoR, SXT, CTX *without* variation in susceptibility.

Discussion

The finding of established pathogenic bacteria in birth space after sterilization makes a big danger for surgical patients and new borne. These pathogens can easily acquire antibiotic resistance and constitute a threat to the life of patients if they eventually find their way as an etiologic agents of surgical site infection. Pregnant contaminated vaginal were act as source for contamination of delivery room and other medical instrument during the medical service in the hospitals. It will be necessary to establish regular surface cleaning intervention as part of effective infection control policy.

The recorded levels of contamination in this study could reflect a need to re-iterate the importance of basic hand-hygiene measures. Local policy [19]. Dictates that the patient beds and bed frames are formally cleaned by nursing staff, using detergent and water, following the discharge of an in-patient, with obvious visual debris removed on a regular *ad-hoc* basis in the interim. The higher bacterial contamination rates in our study could suggest that the current method of cleaning may not be fit for purpose and consideration should be given to use of disinfectant (*e.g.* hypochlorite) or other agents, as a routine practice to reduce microbial contamination in addition to more intensive cleaning regimens.

In the Young *et al.*[20] report, a number of novel potential solutions to combat bed-control contamination were described, including disposable bed-control covers, regular routine cleaning of removable

handsets at a specialist facility, and disposable handsets for individual patients. Further evaluation of these cleaning methodologies and technological adjuncts may be beneficial but hospital bed-control contamination represents a sentinel marker of healthcare environmental bacterial contamination as a whole; therefore, a wider approach, addressing the general hospital environment and process of cleaning and disinfection, may be more appropriate.

Referances

[1] Rhame FS. The inanimate environment in Hospital infections. 3rd edition edited by Beneth, JV andBrachman, PS. Little Brown and company (Inc) 1992; 299 – 333.

[2] Pryor KO, Fahey TJ, Lien CA, Goldstein PA. Surgical site infection and the routine use of preoperative hyperoxia in a general surgical population: a randomized controlled trial. Journal of the American MedicalAssociation; 2004; 291(1):79-87.

[3] RRW Brady, P Kalima, NN Damani, RG Wilson, and MG Dunlop. Bacterial Contamination of HospitalBed-Control Handsets in a Surgical Setting: A Potential Marker of Contamination of the HealthcareEnvironment. Ann R Coll Surg Engl. 2007; 89(7): 656–660.

[4] Schwartz B, Bell D, Hughes JM. Preventing the emergence of antimicrobial resistance: a call for action by clinicians, public health officials, and patients. JAMA1997; 278: 944-5.

[5] Spellberg B, Guidos R, Gilbert D, *et al.* The epidemic of antibiotic-resistant infections: a call to action for the medical community from the Infectious Diseases Society of America. Clin Infect Dis 2008; 46:155-64.

[6] F. Trillis III, E. C. Eckstein, R. Budavich, M. J. Pultz, and C. J. Donskey. Contamination of hospitalcurtains with healthcare-associated pathogens. Infection Control and Hospital Epidemiology, 2008; 29, (11), 1074–1076.

[7] A. M. Treakle, K. A. Thom, J. P. Furuno, S. M. Strauss, A. D. Harris, and E. N. Perencevich. Bacterial contamination of health care workers' white coats," American Journal of Infection Control. 2009; 37, (2), 101–105.

[8] P L Lu, L K. Siu, T.-C. Chen *et al.*. Methicillin resistant Staphylococcus aureus and Acinetobacterbaumannii on computer interface surfaces of hospital wards and association with clinical isolates. BMCInfectious Diseases, 2009; 9, article 164.

[9] J. M. Boyce.Environmental contamination makes an important contribution to hospitalinfection.Journal of Hospital Infection, 2007; 65(2); 50-54.

[10] A. Bhalla, N. J. Pultz, D. M. Gries *et.al*.Acquisition of nosocomial pathogens on hands after contactwith environmental surfaces near hospitalized patients. Infection Control and Hospital Epidemiology, 2004; 25(2):164-167.

[11] M. K. Hayden, M J M Bonten, D. W. Blom, E. A. Lyle, D. A. M. C. Van De Vijver, and R. A. Weinstein. Reduction in acquisition of vancomycin-resistant Enterococcus after enforcement of routine environmental cleaning measures. Clinical Infectious Diseases,2006; 42(11) 1552–1560.

[12] Bauer WA, *et al*. Antibiotic susceptibility by standard single disc method. Amer J Clin Path. 1966; 45(4):493-496.

[13] CLSI–Clinical and Laboratory standards institute. Performance standards for antimicrobial susceptibility testing. Twentieth informational supplement. 2010; 30(1):M100-S20.

[14] Manges, A. R., Johnson, J R, Foxman, B., O'Bryan, T. T., Fullerton, K. E., & Riley, L. W. Widespreaddistribution of urinary tract infection caused by a multidrug resistance *Escherichia coli* clonal group.*J. Medical*

Science,2001; 345(14), 1007-1013. http://dx.doi.org/10.1056/NEJMoa011265

[15] Greenwood, D., Slack, R., Peutherer, J., & Barer, M. Medical Microbiology, 17th ed 2007; Churchill
Livingstone Elsevier.

[16] Pal Ramprasad Balikaran.. Role of *Pseudomonas* in Nosocomial infections and Biologicalcharacterization of local strains, *J. Biosci. Tech*, 2010; 1(4), 170-79.

[17] Muhammed, S A. A bacteriological study on the incidence urinary tract infection in Rizgari TeachingHospital in Erbil City 2002; Msc. thesis, college of science, Univ. of Salahaddin.

[18] Delzell, JE, and Lefevre, ML. Urinary tract infection during pregnancy. *Am. Academy of familyphysicians, 2000; 35*(3), 40-66.

[19] Lothian University Hospitals Trust Infection Control Team. Lothian University Hospitals Trust. Infection Control Policy Manual. Edinburgh: Lothian University Hospitals Trust; 2005. Section 1.7, page 6.

[20] Young JM, Naqvi M, Richards L. Microbial contamination of hospital bed handsets. Am J Infect Control. 2005; 33:170–4.