Original Article

Role of ultrasound probes in transmission of hospital infections

Mohammad Kazem Tarzmani (MD)[1]
Nazanin Eshraghi (MD)[*1]
Behrooz Pour Asghari (MS)[2]
Rasoul Estakhri (MD)[2]
Azadeh Eshraghi (PhD)[3]

1- Department of Radiology, Tabriz University of Medical Science, Tabriz, Iran
2- Department of Microbiology, Tabriz University of Medical Sciences, Tabriz, Iran.
3- Department of Clinical Pharmacy, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

*** Correspondence:**
Nazanin Eshraghi, Radiologist, Tabriz University of Medical Science, Tabriz, Iran.

E-mail: radiologyne@yahoo.com
Tel: 0098 411 3347054
Fax: 0098 411 3367373

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Abstract

Background: *The ultrasonography probes are cleaned by absorbent soft, dry cloth. This question arose whether linear and convex ultrasound probes coupling with gel could perform as a means for nosocomial infections transmission, and which method is economical and more efficient for cleaning the probes. This study was conducted to answer these questions.*

Methods: *One hundred – ninety two patients who referred at sonography department were evaluated. Half of the probes were cleaned with routine course while the others with cloth containing alcohol. Then, determination of microbial identity was done.*

Results: *The probes that were cleaned by cloth soaked in alcohol, showed the growth of bacterial colony to be zero. The probes that were cleaned by non-sterile cloth, the bacterial count was 48.38%, 22.6%, 9.7% for the staphylococcus epidermis, ureus was less and pseudomas aerogenosa, respectively; the other organisms are enterobacter, E. Coli, cytrobacter and yeast. There was no difference in the infected percentage between the linear and convex probes.*

Conclusion: *Cleaning the probe and ultrasound gel as a device of bacterial growth is time saving and cost effective. We recommend disinfection of probes using alcohol in patients prone to infection.*

Key words: *Cross infection, Ultrasonography, Probe.*

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Hospital infections are acquired 48 hours after admission in hospital (1). These infections increased morbidity and mortality in hospitalized patients. The medical instruments such as bronchoscope, endoscope and stethoscope are the devices of transmission used in the hospital infections. In some hospitals, ultrasound probes are usually cleaned with absorbent, dry and soft cloth after performance of sonography. Although it is unclear, whether this method is sufficient for controlling probes infection transmittance or not. In the absence of controlling probes infection with this method, this question arose whether convex and linear coupling gel could be performed as a means for transmission of nosocomial infections.

The finite studies is conducted in the field of possibility of hospital infection transmission by sonography probes and coupling gel (2,3). Often, this study insists on the role of probes because of its direct contact with the patient's skin as a significant role in the transmission of infection. The different methods are advocated for cleaning probes with better results but their application in all centers is not possible (4,5).

The aim of this study was to know whether ultrasound probe and gel played a role in the transmission of hospital infection or not, and which one is the most effective cleaning method that can minimize the disease transmission risk and also if it is time-saving and cost- effective.

Methods

The Sonography Department of Emam Reza Hospital had 5 ultrasound machines that serve full-time for many patients annually. Every ultrasound probe serves up to 20 patients each day. This study was planned to assess 192 patients with linear and convex probes, referred for various purposes at Sonography Department in Tabriz Emam Reza Hospital. The used ultrasound probes in this study were Siemens 3.5-5-10 MHZ, Aloka 3.5, 5-10 MHZ, Sonix 3.5-5-7 MHZ. The used ultrasound technique consists of standard methods for subcutaneous and abdominal evaluation (6).

After the sonography of half of the patients, the probe was cleaned with tissue, non-sterile and dry cloth and the other half probe was wiped with 70 percent alcohol. Then culture swabs from probe surface were taken and conveyed to brain-heart infusion (BHI) broth. The probes were cleaned with nonsterile tissue, and sampled with swab. Then the probes were cleaned with neat, nonsterile and dry tissue and were sampled. The broth medium were tested in Microbiology Laboratory at Emam Reza Hospital and the isolates were identified using standard methods (7,8). The gel of every probe located in culture medium contained staphylococcus in order to determine microbial growth level in contacted medium (9) and uncontacted medium with gel.

Results

In probes cleaned with alcohol, the growth of bacterial colonies was zero. In 31 probes which were cleaned with nonsterile cloth, staphylococcus epidermis was isolated from 15 cases (43/38%), staphylococcus aureus from 7 cases (22.6%), Pseudomonas aerogenousa from 3 cases (9.7%), enterobacter from 2 cases (6.45%), yeast from 2 cases (6.45%). E.coli and Citrobacter were isolated from one case (Table 1).

Table 1. Results of Quantitative Cultures of the Ultrasound Probes after Cleaning with non-sterile cloth

Organism	Probes of Bacterial Growth N(%)
Staphylococcus aureus	7(22.6)
Staphylococcus Epidermis	15(43.38)
Pseudomonas aeruginosa	3(9.7)
Yeast	2(6.45)
E.coli & Citrobacter	1(3)
Enterobacter	2(6.45)

In probes which were cleaned twice with nonsterile cloth, the growth level of 31 cases decreased to 9 cases in which 6 cases were epidermis staphylococcus, 2 cases had aureus staphylococcus and one case was yeast respectively (Table 2). There were no differences in infection percentage between the linear and convex probes.

Table 2. Results of Quantitative Cultures of the Ultrasound Probes after Cleaning with non-sterile cloth twice.

Organism	Probes of Bacterial Growth N(%)
Staphylococcus aureus	2(6.45)
Staphylococcus Epidermis	6(19.35)
Yeast	1(3.22)

Discussion

The nosocomial infections are hospital -acquired infections that play a major role in mortality of hospitalized patients. All medical instruments were found as potential source of hospital infection transmission. This problem has led the departments for application of methods in order to decrease probe infection. These methods consist of using clean latex cover for every patient, cleaning of probes with antiseptic solution and applying of gloves by sonologists (10). The application of these methods are not feasible in all centers because of limitation of probe, equipment at sonography department and many other cases that might cause the unnecessary increase in charges. Conventionally, the ultrasound probe is cleaned with dry and neat cloth after each process as a standard method for probe decontamination. Similar to other studies, our study showed that ultrasound probe if cleaned with dry and neat cloth could be a source of potential hospital infection especially in patients with open skin ulcers. The application of 70 percent ethyl alcohol is used to complete the cleaning of probes, but its use is not recommended because it shortens the life of probes.

The results showed that if probe is cleaned twice with dry, neat and non-sterile tissue, the bacterial infection level of probes decreased significantly but this point showed that if sonography is performed in patients with open ulcer, the risk of infection transmission remains still high which is better in these patients in order to decrease bacterial and viral

(such as hepatitis) infection transmission. The antiseptic material is surely good for cleaning probes (11). It is recommended that the probes are to be cleaned at the end of each week with 70 percent ethyl alcohol and/or antiseptic material for utilizing next day. It is better that gel as bacterial growth place is cleaned from probe's surface (12). It seems that this method saves time and cost effective in loaded centers with more clients. In conclusion, cleaning the probe and ultrasound gel as a device of bacterial growth is time-saving and cost effective. We recommend disinfection of probes with alcohol in patients prone to infection.

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