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Dimitrios Alefragkis
Department of Nursing,
University of West Attica,
Athens, Greece

Victoria Alikari
Department of Nursing,
University of West Attica,
Athens, Greece

Martha Kelesi
Department of Nursing,
University of West Attica,
Athens, Greece

Correspondence
Dimitrios Alefragkis
Department of Nursing,
University of West Attica,
Athens, Greece

The importance of hand hygiene in health care settings Dimitrios Alefragkis

Dimitrios Alefragkis, Victoria Alikari and Martha Kelesi

Abstract

Background: Although hand hygiene is utmost importance, compliance with it is minimal.

Purpose: The investigation of the importance of hand hygiene in the hospital.

Methods: Review and research studies in PubMed databases and Google Scholar which reported the importance of hand hygiene were reviewed.

Results: Health professionals should perform the hand hygiene before contact with the patient, prior to clean or sterile handling, after exposure to body fluids of the patient, after contact with the patient as well as after the contact with the patient's immediate intact environment. Hospital staff must be aware of how to perform the hand washing technique with water and soap, the correct application of alcoholic antiseptics and surgical hand antisepsis.

Conclusions: Health professionals should be properly trained, aware of the wide range of hand hygiene because it is a powerful prevention measure with low implementation costs and with effective documentation.

Keywords: Hand hygiene, meaning, compliance, hand hygiene, guidelines, importance

1. Introduction

A major public health problem is the hospital infections since there is a significant number of hospitalized patients which leads to an increased mortality and morbidity rates of patients. Although compliance with hand hygiene is considered a good measure to reduce hospital infections, compliance with it is minimal. The importance of hand hygiene is enormous because it aims to prevent infections that are directly related to patient care. The first one who proved the effect of hand hygiene in the reduction of post-operative infections was Semmelweis in 1881^[1-3].

Also, the use of hard hand brushes in the battlefield hospitals was imposed by Florence Nightingale in 1854, from an observation that most soldiers were losing their lives from infections rather than from injuries. Finally, recent studies have shown that the use of alcoholic antiseptics with concomitant compliance with hand hygiene greatly reduces the incidence of infections^[4-6].

Epidemiological evidence for hospital infections associated with non-compliance with hand hygiene is that in the European Union 8-12% of patients admitted to hospitals in its Member States suffer due to an undesirable event it causes. 25% are hospital infections and 30-40% of these incidents are prevented. Also in the European Union, hospital infections are estimated to result in 37,000 deaths, with the cost of them be very high and amounting to around 5 billion euros per year. As for the US, although there are advanced Health Services, about 15 million patients each year suffer from hospital infections. These are the third cause of death after the heart diseases and cancers. Finally, in the US, 2,000,000 hospital infections result in 99,000 deaths at about \$ 20 billion per year^[6].

Good hand hygiene is considered to be the most effective line of defense against the transmission of harmful microbes and hospital infections. Hand hygiene is the responsibility of all staff members of a hospital. Hand flora is the permanent and transient microbial flora present in normal human skin. Bacteria found on human skin can be considered as belonging to transient and permanent flora. In resident flora, there are *CNS Staphylococci*, *Diphtheroids*, *Propionibacterium spp*, which reside permanently, survive but also multiply. In addition, they are not removed by soap or antiseptics use and are not pathogenic. In transient flora, *Enterobacteriaceae*, *Pseudomonas*, *Acinetobacter*, *MRSA* (Methicillin-Resistant *Staphylococcus Aureus*), *VRE* (Vancomycin-Resistant *Enterococcus*) are treated only with alcoholic antiseptics and are highly pathogenic microorganisms^[4, 6, 7].

The transmission of hospital pathogens from one patient to another through health professionals is done through five successive ways. With microorganisms present on the skin and the surfaces around the patient, direct or indirect contact with the patient's microbes contaminates the hands of the healthcare professional. Then the microorganisms survive and multiply in the hands of health professionals, resulting in the health professional's hands being infected due to their erroneous and ineffective cleaning. The ultimate consequence is that the healthcare professional transmits germs from one patient to another. This is why the importance of hand hygiene is the main measure that has proven effective in preventing infections related to health care and the spread of antimicrobial resistance. In addition, hand hygiene is internationally proposed as one of the ten notable strategies that hospitals have to promote for the safety of their patients^[8-10].

The World Health Organization (WHO) in the international campaign of "SAVE LIVES: Clean your hands," puts hand hygiene as the foundation stone for the prevention and control of health-related infections, as "it is the simplest and an effective measure of prevention" of these infections^[11].

The purpose of this review was the investigation of the importance of hand hygiene in the health care settings.

2. Materials and Methods

The methodology included the search for review articles and research studies in PubMed database and Google Scholar, which reported the importance of hand hygiene and published in the last six years. The keywords used were the following: hand hygiene, importance, guidelines, compliance, hand hygiene, guidelines, meaning.

3. Results

Hand Hygiene is the most important measure to prevent the spread of pathogenic microorganisms and hospital infections, being the cornerstone of infection control programs^[12-14]. The importance of its implementation is undoubted and the ways of its proper implementation are known to all health professionals. Researches have shown that this practice alone is able to greatly reduce hospital infections. Finally, hand hygiene, apart from being one of the strongest preventive measures, has low implementation costs and its effectiveness is well documented^[6, 15-17].

3.1 Purpose and indications of hygiene hand

Hand hygiene is defined as hand cleanliness, which is performed with water and common soap, water and soap with antiseptic action as well as the direct application of antiseptic in various forms. Hygiene is achieved by hand washing, antiseptics of hands and surgical antiseptics. The purpose of hand washing is to remove visible pollutants, biological materials, and transient microbial flora. The effectiveness of handwashing is determined by the following parameters such as the quantity of soap required 3 - 5 ml or a dose in standard pumps. Washing time is also a parameter and should be 40-60 seconds^[2, 4]. The last parameter concerns the applied technique. Hand antiseptics aims to remove the transient microbial flora. This is achieved by the use of antiseptic solutions, pure such as alcoholic or by the addition of other antiseptic agents such as chlorhexidine and quaternary ammonium salts. Using these, a transient flora reduction of $\geq 4 \log_{10}$ is achieved. This process is called fast hand antiseptics and should be

applied before and after each contact with the patient. If the hands are visibly soiled with dirt or blood, they must have been washed with soap and water before being antiseptics. Finally, surgical antiseptics of the hands is intended to remove the transient but also the significant reduction of the permanent microbial flora. This is achieved either by hand washing with water and antimicrobial soap or by applying hands to an antiseptic solution without the use of water. The ideal time required is unclear. In studies that have been performed, they have shown that preoperative washing for five minutes reduces microbial load as effectively as the ten-minute traditional wash. Other studies suggest that surgical antiseptics should be performed in two phases, initially using 4% chlorhexidine gluconate or 1 to 2 minutes povidone iodide followed by alcoholic solution^[8, 9, 18].

According to the World Health Organization, the five steps of hand hygiene are those that make up the essential indications and determine the specific moments when hand hygiene is needed to stop the transmission of germs during patient care^[19].

Step 1 involves the application of hand hygiene before contact with the patient. It is considered very important to apply it for the protection from pathogenic germs which are transmitted by hands, such as handshaking, helping the patient to be moved, and by measuring the pressure^[20-22].

Step 2 reports the application of hand hygiene before any clean or sterile procedure, aiming at protecting the patient from the transfer of microbes that colonize both the health professional and the patient himself. Examples include catheter placement, intravenous, subcutaneous drug infusion, aspiration of respiratory secretions and others^[17, 21, 22].

Step 3 states that hand hygiene should be performed immediately after the risk of exposure to body fluids of the patient and immediately after disposing of the gloves to protect the health professional and his / her professional environment from the patient's pathogenic microbes. This is the case after the wound care, after placing the endotracheal tube and following contact with body fluids of the patient such as respiratory secretions, gastric fluids, intestinal contents and urine^[20-22].

Step 4 applies hand hygiene after contact with the patient and his immediate environment to protect the health professional and his / her professional environment from the pathogenic germs of the patient (Pulse measurement, pressure measurement, stethoscope, ventricular palpation and electrocardiogram recording)^[20-22].

Finally,

Step 5 refers to the application of hand hygiene if the health professional touches objects or furniture in the immediate environment of the patient, even if he has not touched the patient himself. The aim is to protect the health professional and his / her environment from the pathogenic microbes of the patient. For example, changing the bed linen, as well as regulating the serum infusion device^[17, 20-22].

Hand hygiene should, therefore, be applied when the hands are visibly soiled upon contact with the body fluids of the patient after use of the toilet and if there is a potential but also confirmed exposure to sporegenic microorganisms including the epidemics by the *Clostridium Difficile*. In addition before handling medication or food preparation, hand hygiene is required by alcoholic solution or washing with either simple or antimicrobial soap and water. Soap and alcohol solution should not be used at the same time^[17, 20-22].

3.2 Hand hygiene techniques and recommendations

Because of the major importance of applying and maintaining hand hygiene in the hospital area, health professionals need to know the hand hygiene techniques and perform them safely in order for patients' and their protection. For this reason, in 3 techniques, ie hand hygiene with soap and water, alcohol and surgical wash, the health care professionals should be aware of the way they are performed and the duration of each technique. In hand hygiene with soap and water, the duration of the overall procedure is 40-60 seconds and should be carried out when the hands are clearly soiled after exposure to a patient with suspected or confirmed *Clostridium Difficile* infection or when there is an epidemic or an endemic from this particular pathogen. In addition, when a health professional is exposed to a patient with suspected or confirmed diarrheal syndrome from norovirus or an epidemic of the particular pathogen [8, 9]. Finally, it can be applied before eating and after using the toilet. Hand hygiene with an alcoholic solution is applied in all other cases except for handwashing. The duration of application of the alcoholic antiseptic is 20-30 seconds, thus shorter than washing with water and soap lasting 40-60 seconds. As far as its activity against hospital pathogens is concerned, it is stronger due to the alcohol it contains but also the combination with substances known for their antimicrobial action such as chlorhexidine increases the residual activity of the product. Finally, the use of alcoholic antiseptic is better tolerated than washing hands with soap and water, which often causes dry skin problems in health professionals [12, 22, 23].

In surgical antisepsis, it is recommended to remove the rings, watches, and bracelets before surgical handwashing is started and the health professional is prohibited from having artificial nails. Also, wash basins and sinks should be properly designed in order to prevent wet of the staff.[8] When the hands are visibly soiled, they are washed with clean soap and any pollutants under the nails are removed using a nail grinder under running water. In surgical hand washing the brushes are not recommended. In addition, surgical hand antisepsis should be done by using a suitable antimicrobial soap or a suitable alcoholic antiseptic hand solution to ensure the use of products with continuous activity before the sterile gloves [8-9].

3.3 Compliance of health care professionals in hand hygiene

Although the importance of implementing hand hygiene is an indisputable and simple process and known by all healthcare professionals, their compliance with hand hygiene is quite low, with great variations across countries, hospitals, and professional specialists [2, 3]. In addition, compliance with the indications of hand hygiene is a complex issue, difficult to tackle completely. Briefly, some factors of non-compliance are that hand hygiene products irritate and dry the skin, there is difficulty in accessing washing equipment due to the inappropriate position. Also, the lack of necessary equipment, lack of time and lack of staff is a factor of non-compliance as well as that the patient's needs are prioritized [5, 6]. Due to the fact that it has been proved that the effective application of hand hygiene can also lead to a significant reduction of hospital infections, multi-faceted and cross-sectoral strategies are required aiming at changing the culture and behavior of both the hospital and the health professional [11, 24].

3.4 Use of gloves and hand hygiene

The gloves are used as personal protective equipment to protect the hands of the healthcare professional. They can reduce the transmission of pathogens and act as helpers in combating outbreaks as part of the recommended use of personal protection measures [9, 12]. Of course, the use of gloves does not replace the need for hand hygiene either by washing or by hand scrubbing. Gloves should be used when the healthcare professional is in contact with blood or other potentially infectious materials, with mucous secretions or with non-intact skin. They should be removed after taking care of the patient [17, 18]. The healthcare professional should not wear the same pair of gloves to care for more than one patient. Reuse of gloves is not recommended. It is, therefore, necessary to apply hand hygiene before using gloves. During the patient's care, the gloves are contaminated and when disposed of they may contaminate the hands of the healthcare professional. Finally, the gloves should be changed from patient to patient, from septic to aseptic area as well as when are obviously damaged [14, 25, 26].

3.5 Multi-level hand hygiene strategy

In order to increase compliance, the WHO proposes a multilevel strategy based on five components, the sufficiency of necessary tools, education, evaluation-feedback, reminders and patient safety as an institutional priority. In short, the sufficiency of the necessary means that the necessary means, namely sinks, alcoholic antiseptics, liquid soap, hand towels should be available and easily as well as alcoholic antiseptics, it is important to assure the strong antimicrobial activity and to be friendly to the healthcare professionals. Health care professionals should learn which activities in patient care lead to hand infection but also on the pros and cons of the various methods used for hand cleanliness [7, 9]. Cooperation between patients, their families and workers should also be encouraged to promote hand hygiene in the hospital environment. The evaluation and feedback of hand hygiene programs can be carried out in two stages. On the one hand, before implementing a program to assess the current situation and on the other hand immediately after the implementation of any program [17, 21, 26].

With regard to reminders, they seem to have an important role in encouraging and recalling well-known practices for improved implementation of hand hygiene. Essentially special forms are posted at the workplace. Frequent renewal and change of reminder systems seem to make a significant contribution to maintaining their effectiveness. Lastly, patient safety as an institutional priority states that administrative support and commitment are essential to promote each program to improve compliance with hand hygiene [17, 21]. The administration of health organizations is responsible for setting up a specific business plan, describing the expected costs and benefits, and focusing on improving the quality and cost-effectiveness. The use of incentives to improve the performance of health professionals is also very important [21, 26].

4. Conclusions

In conclusion, health professionals need to be aware of the importance of hand hygiene and the negative effects that will be caused when it is not followed. It is, also, necessary to know the ways of transmission of pathogenic micro-organisms and also the micro-organisms responsible for it. It

is necessary to always apply the hygiene of the hands and health professionals should have knowledge on the wide range of hand hygiene. It is worth noting that all people who hold administrative positions in hospitals should take the necessary measures to properly observe and implement the guidelines for hand hygiene. Finally, the ideal solve is the surveillance from infection control nurses who will oversee health professionals as well as ensure their education.

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