

Pre and Post training evaluation of Hand washing techniques among undergraduate dental students

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Abstract: Hospital acquired infection damages patients, prolongs hospital stays, consumes scarce hospital resources, and thus presents a major challenge for clinical governance. Hand hygiene is recognised as the primary determinant of the incidence of these healthcare associated infections. Hence the main objectives of this study was to evaluate the knowledge of hand washing techniques among the undergraduate dental students and to train the dental students about the hand washing techniques properly proposed by World health Organisation. A sample of 70 undergraduate dental students was selected to evaluate the knowledge of hand washing technique. A proper hand washing technique given by World health organisation was used to evaluate and train the students. Pre assessment, training and post assessment of knowledge about the hand washing technique was done. The results were statistically studied. Pre assessment showed that there was a lag in proper hand washing technique. Many students were unaware of the few steps in the proper hand washing technique. A proper training was given about the Handwashing technique and the students were evaluated after the complete training. The results of the post assessment showed an improvement in the hand washing practice which was statistically significant. From the result, it was clear that the hand washing awareness and compliance among the dental students were found to be very low. Proper training was given to the undergraduate students which are needed for the practitioners before entering into the clinical practice.

Keywords: Hand hygiene, hand washing, infection control, pathogens, anti-microbial agents

I. Introduction:

Health care-associated infections are widely acknowledged as an important public health issue that affects every individual worldwide. Important risk factors for such infections include life-threatening medical or surgical conditions, the immunocompromised state, alterations in flora caused by exposure to multiple antibiotics, and the obstruction of skin and mucous membrane by the use of invasive devices. The organisms causing these infections include antibiotic-resistant gram-negative bacilli, staphylococci, enterococci, and candida species[1]. Hand hygiene prevents cross-infection in hospitals and medical care centres. However, adhering to such guidelines is found to be poor among healthcare workers. Although some interventions have been successful in order to improve compliance, none had achieved lasting improvement. Reasons for non-compliance with recommendations occur at individual, group and institutional levels[2]. Proper hand hygiene is the most important and least expensive means of preventing infections and spread of antimicrobial resistance. The hands of health care professions acts as the primary mode of transmission of most of the pathogens and cause infections in patients[3]. Unfortunately, this prevalence of these infections is high and poses as a threat to health care professionals. Poor hand hygiene in these cases has been linked to morbidity, mortality and healthcare costs. It's prevalence is high as 19% in developing countries including India[4]. To address this issue, several measures are being made to identify effective and sustainable strategies[3]. Out of such efforts is the introduction of 'six steps of hand washing techniques' by World Health Organisation(WHO)[4]. The six-step technique was found to be microbiologically more beneficial in reducing the median bacterial count (3.28 to 2.58) compared to the three-step method (3.08 to 2.88). However, using the six-step method required 25 percent longer time to complete(42.50 seconds vs. 35 seconds)[3]. Hand washing is an effective means of infection control and has been recognized by scientists for more than 150 years to decrease mortality rates in patients. By simply washing a person's hands with soap and water for 15 seconds, the bacterial count on the hands is reduced by about 90%. If that same person were to perform hand washing for an additional 15 seconds, hand bacterial count would be reduced by up to 99.9%[5]. Thus, the simple intervention of hand hygiene could reduce the incidence of health care-associated infections and deaths associated with it. This observation is especially important for physical therapists because they commonly use hands-on assistance and interventions and teach these techniques to community[6]. The physical therapist role is described as the essential participants in the health care delivery system. Physical therapists have been assumed to be given leadership roles in rehabilitation, prevention, health maintenance of programs that promote health, wellness, and fitness both in professional and community organizations. Playing such a crucial role in the health care system, physical therapists bear responsibility of educating the community on the importance of infection disease control through hand hygiene to promote optimum health and wellness [7, 8, 9]. The purpose of hand washing is to reduce the pathogens count and its transmission among patients. There are reports that the lack of handwashing remains at unacceptable levels in most medical environment as doctors forgets to wash their hands before touching other patients. The 2002 CDC Guideline for Hand Hygiene in Health-Care states that pathogen

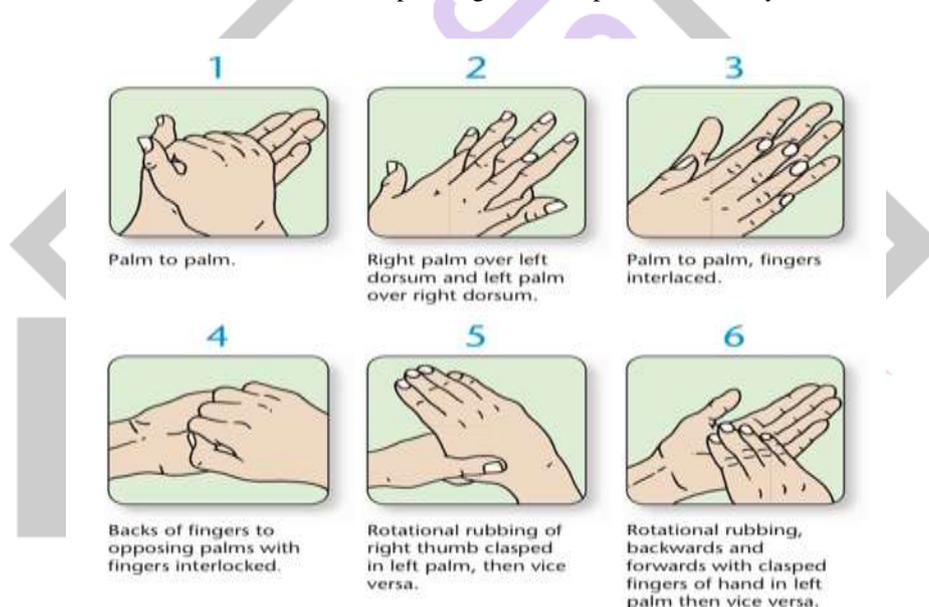
transmission can occur from the contaminated hands of the caregiver coming in direct contact with the patient or with an inanimate object that will come into direct contact with the patient[10].The study done by Trampuz et.al in 2004 showed that proper hand-washing and other simple procedures can decrease the rate of catheter-related bloodstream infections by 66%[3]. Undergraduate medical and dental students should be trained in this aspect to follow a good medical practice. Without enforcing hand hygiene for all individuals entering the patient's room, including community visitors, hospitals may be allowing a direct source of pathogens to possibly infect the patient. The purpose of this study was to evaluate the hand washing techniques among the undergraduate students of dental college and to train them with proper technique as they are the future clinical practitioners.

II. Materials and methods:

This training based study was conducted among the undergraduate dental students in registered dental college in Chennai. Randomly selected undergraduate first and second year dental students were chosen. They were evaluated on their knowledge and practice on hand washing techniques. Six steps of Hand washing technique recommended by World Health Organisation were compared with their hand washing practices.

Six steps recommended by World Health Organisation (WHO) are as follows:

1. After applying soap, rub the hands by palm to palm
2. Rub the right palm over left dorsum and let palm over right dorsum
3. Rub the hand by palm to palm with fingers interlaced
4. Rub the backs of fingers to opposing palms with fingers interlocked
5. Rub the right thumb clasped in left palm rotationally, then vice versa
6. Rub the hands backwards and forwards with clasped fingers in left palm rotationally then vice versa



The awareness and knowledge about the 'six steps of hand washing techniques' by World Health Organisation(WHO) was evaluated by asking the participants to wash their hands in stepwise manner. Their steps and method of washing their hands were noted. After recording these details, a complete training about this technique in stepwise manner and awareness on the effect of hand hygiene in hospital acquired infections was given to them by a trained individual. They were asked to wash their hands by stepwise manner after their training. The post training steps and methods were noted. The results of pre and post training records were analysed and studied statistically.

III. Results:

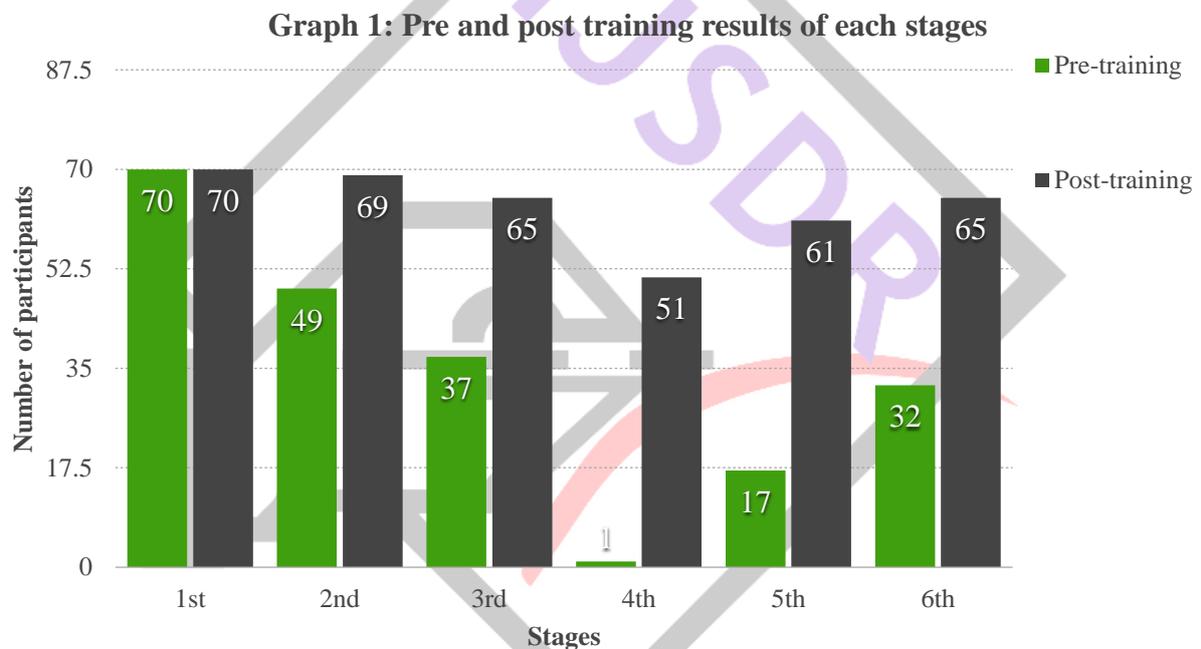
This study was conducted among 70 undergraduate dental students studying first and second year. Out of 70 students, 28(40%) students were males and 42(60%) students were females. The number of participants who performed each stage was noted. The results of both pre-training and post-training were tabulated (Table 1 and Table 2) and studied (Graph 1).

The number of steps performed by each participant was noted. The results of pre-training and post-training were also tabulated (Table 3 and Table 4) and studied (Graph 2 and Graph 3).

The two-tailed P value is < 0.05. By conventional criteria, this difference was considered to be statistically significant (Table 5).

	1st	2nd	3rd	4th	5th	6th
Number of participants	70	49	37	1	17	32

	1st	2nd	3rd	4th	5th	6th
Number of participants	70	69	65	51	61	65

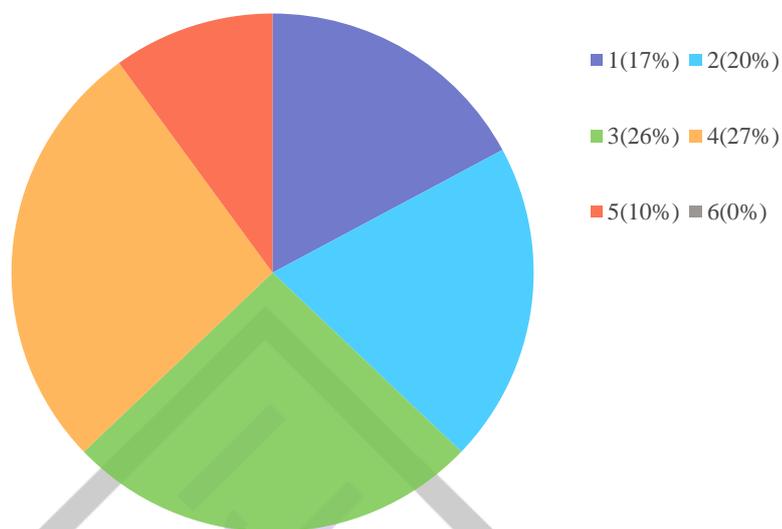


	1	2	3	4	5	6
Number of participants	12	14	18	19	9	-

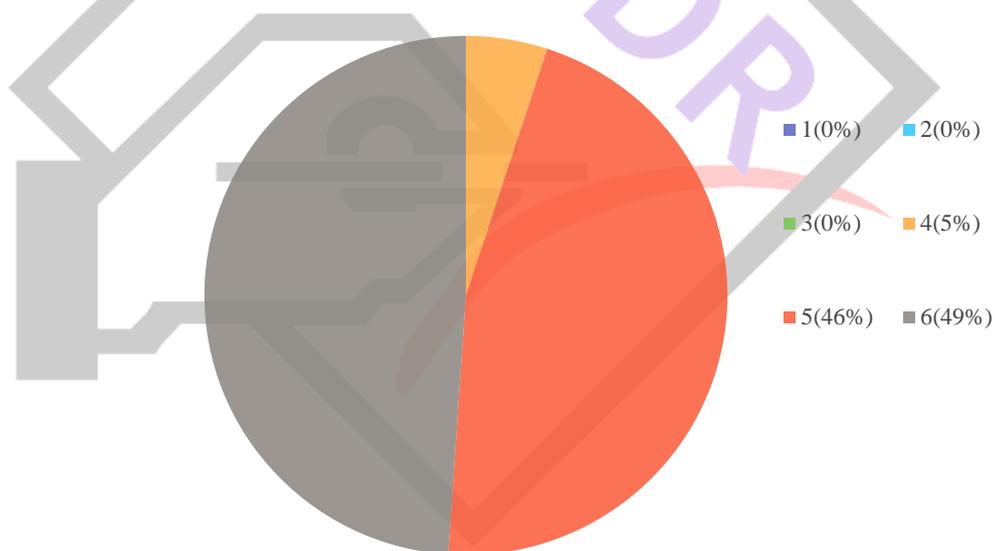
	1	2	3	4	5	6

Number of participants	-	-	-	4	32	34
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Graph 2: Number of steps done by participants in pre training



Graph 3: Number of steps done by participants in post training



	No. Of participants in pre training	No. Of participants in post training
Mean	34.33	63.50
SD	24.13	6.92
t	3.9878	
df	5	
Standard error of difference	7.314	
Two tailed P value	0.0104 (<0.05)	

IV. Discussion:

Hand hygiene is the important preventive measure of hospital acquired infection and to reduce patient morbidity, hospital stay and hospital care cost [3]. Ariyaratne MH et.al comparatively studied the knowledge of hand hygiene among medical and nursing students. They concluded that nursing students have more knowledge of hand hygiene than medical students[13], as they had trained with proper teaching curriculum than medical students. Previous study of Cowling et.al had suggested that promoting hand hygiene may be one of the most cost-effective means of reducing the global burden of disease. It is important to conduct hand hygiene programmes regularly in health care centres to reduce probability of infections [14,30]. Dental professionals are subjected to various microorganisms through the direct or indirect contact of blood and saliva of the patients. These microorganisms may cause infectious diseases such as the common cold, pneumonia, tuberculosis, herpes, hepatitis B, and acquired immune deficiency syndrome (AIDS). The use of effective infection control procedures in the dental office and the dental laboratory will prevent cross-contamination that may extend to dentists, dental office staff, dental technicians, and patients[15]. Previous study in registered dental college also showed that knowledge and practices of dental students towards cross infection control was inadequate and were not adhering to proper preventive measures[16].

In this study, 42(60%) of females and 28(40%) of males were participated. Most of the males didn't hear of this method. In the pre-training, everyone was asked about the awareness of this 'six steps of hand washing technique'. Most of the students hadn't even heard of the 'six steps of hand washing technique'. Males had comparatively less knowledge and awareness of this technique. Few had learned it but hadn't remembered it because of its rarity in use. Some students were aware of few steps but not the proper method. They were asked to wash their hands and results were studied. In the 'six steps of handwashing' everyone did the first step. Some of the students did the first step only. In this study, before the students were given training, 49 students did 2nd step, 37 students did 3rd step, 17 students did 4th step and 32 students did 6th step(Table 1). From the table, it is also clear that they were completely unaware of the fourth step as only one student had performed, which evidently depicted their lack of hand hygiene.

Tschudin and Sutter A et.al[17] had shown overall low compliance with WHO technique and better compliance with step 1 and 2 while lower compliance with step 4 and 6. Our study showed less compliance with step 4 and 5 and better compliance with other steps. From table 3, it reveals, 12 students did 1 step, 14 did 2 steps, 18 did 3 steps, 19 did 4 steps and 9 did 5 steps. No students did all six steps before training. After that, a complete training about this hand washing technique was given to all students. They were asked to wash their hands again and the results of the post training was studied and tabulated. From the table 2, it reveals, 70 students did the 1st step, 69 did the 2nd step, 65 did the 3rd step, 51 did the 4th step, 61 did the 5th step and 65 did the 6th step. Hence it clearly shows that in the post training, the results were improved significantly which had been statistically proven($p < 0.05$). In the post training, all the students had performed atleast 4 steps and 32 did 5 steps. About 34 students (49%) did all the six steps of hand washing.

Alcohol-based hand-rub may be superior to traditional handwashing as it requires less time, acts faster, irritates hands less often, and recently proved significantly to contribute to sustained improvement in compliance associated with decreased infection rates[2]. Fischler GE et.al studied that use of an antimicrobial showed greater potential to reduce transmission and acquisition of disease than the normal plain soap[18].G.Muthulakshmi et.al study shows that the alcohol rub is more potent than other disinfectants during clinical practice[19]. Aiello et.al study shows that use of non-antibacterial soap along with hygiene interventions is efficacious in preventing respiratory and gastrointestinal illness[20]. In addition to this, Curtis et.al study showed that alongside adequate sanitation, handwashing with soap after stool contact is an important barrier to the faecal-oral spread of diarrhoea because it prevents pathogens from reaching the domestic environment and hence their subsequent ingestion. Handwashing with soap before contact with food and water also reduces the secondary transmission of pathogens from the environment to a new host[21]. Previous studies such as Blencowe et.al, Isaac et.al., Filteau et.al, Freeman et.al, Greenland et.al, showed that besides gastrointestinal illness, handwashing is also thought to play a role in reducing the transmission of infections such as pneumonia, influenza, helminths, trachomae, neonatal infections, HIV-associated infections and environmental enteropathies[22-26]. Microorganisms are located in both the outer surface and deeper layers within the skin. Deeper layers within the skin contain the resident flora—microorganisms that normally reside on a person's body. These microorganisms are not easily removed and are not commonly associated with disease transmission. The transient flora consist of microorganisms n the outer surface of the skin that are associated with healthcare acquired infections[27]. A study by Rhee et.al showed that the practice of handwashing has been reported to reduce neonatal mortality[28]. Many studies has consistently supported that when health care workers improve their hand hygiene a significant decrease in health care-associated infections such as methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus*, *C. difficile*, and respiratory and diarrheal diseases occurs[4].

Overall, in this study, the students had below average knowledge about the hand washing techniques. They lacked in the knowledge and awareness about the 'six steps of hand washing technique'. However, in the end, the majority of the students were taught proper hand washing technique and their practice was improved significantly.

V. Conclusion:

From the results, it is clear that the hand washing awareness and compliance among the dental students were found to be very low. A proper training improved the student's performance the hand washing techniques significantly. Though 49% of the students performed all the six steps, no one did in the correct sequence. It is clear that dental students were failed to understand the importance of hand washing. This issue is so crucial that we need a greater commitment from management to influence their behaviour. The failure of healthcare workers to decontaminate their hands reflects fundamentals of attitudes, beliefs, and behaviour, and there are no simple solutions. Many attempts have been made to improve hand washing compliance through education, and indeed elementary hygiene practice should be taught explicitly in medical schools. Principles taught in the lecture theatre can be reinforced by experiential learning, such as demonstrating the need for proper hand washing technique by showing microbial growth from unwashed hands and by using fluorescent oil-based dyes to illustrate the effectiveness of hand washing. Such methods increase personal impact, but, though they may be temporarily improve compliance, behavioural changes tend not to be maintained[29]. Hence multifaceted and dedicated efforts must be taken to rectify this attitude and behaviour.

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