

# Evaluation of handwashing practices among dental care providers in a tertiary hospital in South West Nigeria: A cross sectional study.

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## ABSTRACT

### Background

Handwashing prevents cross-transmission of microorganisms, thus preventing hospital acquired infections. The aim was to evaluate hand washing knowledge, attitude and practices among dental care providers in a hospital set up for infection control.

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### Materials and methods

A descriptive cross-sectional study was carried out in a tertiary hospital in South West Nigeria. A self-administered questionnaire was administered among 110 dental care providers in the hospital. Data obtained were analysed using SPSS. Association between variables was carried out using a Chi-square test.

### Results

The majority (52; 47.2%) of the respondents were dentists. The respondents had good overall level of knowledge (71.8%), attitude (84.5%) and practice (93.6%) of handwashing. However, only 35.5% stated they have heard about Ayliffe's technique of handwashing, in which 97.4% of them could not correctly state the right order of the technique. There was statistically significance association between the knowledge of handwashing and occupational status of the respondents ( $p=0.014$ ). There was statistically significance association between the practice of handwashing and occupational status of the respondents ( $p=0.013$ ).

### Conclusions

The knowledge and practice of handwashing were good, and there was positive attitude of handwashing among the dental care providers in our hospital. However, the actualisation of handwashing technique and appropriate sequence were poor.

### Keywords

Handwashing practice, dental care provider, tertiary hospital, Infection control

## INTRODUCTION

Handwashing refers to the process of physical removal of dirt, blood, body fluids and transient microorganisms from the hands whereas the destruction of microorganisms is referred to as hand antisepsis.<sup>1</sup> Historically, the primary method of handwashing had been with soap and water.<sup>2</sup> By 1800, some individuals recorded benefits of cleaning hands with antiseptics and, in 1822, a French pharmacist recommended handwashing with liquid chloride solution.<sup>3</sup>

Antiseptic hand rubs involve rubbing hands with alcohol-based solutions. These germicidal solutions could be augmented with antiseptics such as chlorhexidine, octenidine, triclosan or quaternary ammonium for persistent activity.<sup>4</sup> Routine dental examination and non-surgical procedures require handwashing and hand antisepsis which can be achieved using plain soap or antibacterial soap and water. It should last for 15 seconds to ensure removal of 90% of bacteria from hands.

	Contributor 1 %	Contributor 2 %	Contributor 3 %	Contributor 4 %	Contributor 5 %
Concepts	60	10	20	10	-
Design	50	0	30	10	-
Definition of intellectual content	60	-	40	-	-
Literature search	30	-	50	-	20
Clinical studies	50	-	-	50	-
Experimental studies	-	-	-	-	-
Data acquisition	20	20	20	20	20
Data analysis	40	-	50	10	-
Statistical analysis	40	20	20	10	10
Manuscript preparation	-	-	40	40	20
Manuscript editing	-	40	-	40	20
Manuscript review	20	20	20	20	20

Independent studies by Ignaz Seemmelweiss in 1847 and Oliver Wendell Holmes in 1843 in Boston established a link between the hands of health care workers and the spread of hospital-acquired diseases.<sup>5,6</sup>

Some of the diseases that can be contracted from non-handwashing are “Superbugs” which are multidrug resistant organisms<sup>7</sup> such as methicillin/oxacillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant enterococci (VRE) etc. Other diseases are blood borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), Human Immuno deficiency +Virus (HIV), herpes simplex virus and extensively drug resistant tuberculosis (XDR-TB).<sup>8</sup> Covid-19, which emerged in 2019 in Wuhan, China and was declared a pandemic in March 2020 by the World Health Organization, is a virus that enters the body through the eyes, nose or throat. Hands are one the most common modes of transmission of the virus from one individual to another.<sup>10</sup> Therefore, handwashing is the easiest and most effective method to prevent infection and protect everyone, especially against Covid-19, which was the most recent pandemic.<sup>11</sup>

Some studies<sup>12,13</sup> have shown knowledge gaps in the recommended methods of handwashing and inadequate practices of hand washing among dental care providers. The interventions for improving knowledge can be through regular workshops and continuing education<sup>13</sup> and the inadequacy in the practice of handwashing can be corrected with effective training.<sup>11</sup> There had been several studies<sup>12,14-18</sup> in some parts of the world and Africa that evaluated the effectiveness of handwashing in the control of infection, while few studies<sup>19</sup> had been carried out in Nigeria, especially on dental personnel.

Handwashing with respect to dental practice in Nigeria has not been well documented in literature. Therefore, the reason for this study is to evaluate handwashing knowledge, attitude and practices among dental care providers which would help in infection control.

### Materials and methods

The descriptive cross-sectional study was carried out in Lagos State University Teaching Hospital, a tertiary hospital in South West Nigeria. Ethical approval was obtained from the Health Research and Ethics Committee of Lagos State University Teaching Hospital (LREC/06/10/2304). A self-administered questionnaire was distributed to 110 dental care providers in the hospital. The questionnaire was in four sections. The first section comprised sociodemographic information of the respondents, the second section comprised their knowledge of specific areas related to handwashing and disease. The third section included their attitude towards handwashing in respect to health and safety and the fourth section comprised how they practice handwashing at the dental clinic/laboratory.

Data obtained were analysed using Statistical Package for Social Sciences (SPSS, IBM) version 25.0. Data presentation was done using frequency distribution and tables. Association between variables was carried out using Chi-square test; p-value <0.05 was assumed to be statistically significant at 95% CI.

### RESULTS

A total of one hundred and ten (110) respondents were recruited in this study. The majority (60; 54.5%) of the

respondents was within the age group of 31-50 years, with a mean age of 34.2±10.1 and a range of 18-65 years. There were more females (82; 74.5%) than males (28; 25.5%). The majority (52; 47.2%) of the respondents were dentists, while most of the respondents had a diploma as their highest level of education (Table 1).

Table 1: Demographic characteristic of respondents

Variable	Frequency (N=110)	Percentage (%)
<b>Age group (Years)</b>		
≤30	44	40.0
31-50	60	54.5
>50	6	5.5
Range	<b>18-65</b>	
Mean SD	<b>34.2±10.1</b>	
<b>Gender</b>		
Female	82	74.5
Male	28	25.5
<b>Marital Status</b>		
Single	48	43.6
Married	60	54.6
Divorced	2	1.8
<b>Tribe</b>		
Yoruba	94	85.5
Hausa	2	1.8
Igbo	11	10.0
Others	3	2.7
<b>Occupational status</b>		
Dental nurse	15	13.6
Dental technician	12	10.9
Dental technologist	17	15.5
Dental therapist	14	12.7
Dentist	52	47.3
<b>Department</b>		
Child Dental Health	17	15.5
Oral Med/Path	7	6.4
Oral&Maxillo	17	15.5
Preventive	28	25.5
Restorative	41	37.3
<b>Level of education</b>		
Diploma	56	50.9
Bachelor	38	34.5
Postgraduate	16	14.5

Table 2 shows respondents' general level of knowledge on handwashing. The majority (63; 57.3%) incorrectly noted that handwashing should be done using sterile water. Less than half of the respondents (45; 40.9%) correctly stated that locally made soap should be used for handwashing. Only (25; 22.7%) rightly noted that Chlorhexidine is used for handwashing. More than half the respondents (56; 52.7%) did not know if *Pseudomonas Aeruginosa* is resistant to antiseptics used in handwashing. The majority (69; 62.7%) believed it is not necessary to wash hands before handling sterile dental instruments.

Table 2: Respondent's General knowledge on handwashing

Variable	Yes (freq)(%)	No (freq)(%)	Don't know (freq)(%)
<b>Handwashing should be done with(N=110)</b>			
Sterile water	63(57.3)	34(30.9)	13(11.8)
Tap water	100(90.9)	6(5.5)	4(3.6)
Pipe borne water	66(60.0)	21(19.1)	23(20.9)
Distilled water	53(48.2)	38(34.5)	19(17.3)
Locally made soap	45(40.9)	47(42.7)	18(16.4)
Detergent soap	43(39.1)	54(49.1)	13(11.8)
Perfumed soap	55(50.0)	33(30.0)	22(20.0)
Toilet soap	71(64.5)	30(23.7)	9(8.2)
<b>Antiseptic used for handwashing (N=110)</b>			
Chlorhexidine	25(22.7)	61(55.5)	24(21.8)
Cetrimide	19(17.3)	41(37.3)	50(45.5)
Trichoson	16(14.5)	48(43.6)	46(41.8)
Ampicillin	2(1.8)	76(69.1)	32(29.1)
Tetracycline	1(0.9)	74(67.3)	35(31.8)
<b>Germ's resistance to antiseptic(N=110)</b>			
Covid-19	32(21.9)	53(48.2)	25(22.7)
Staphylococcus Aureus	18(16.4)	45(40.9)	46(42.7)
Pseudomonas Aeruginosa	18(16.4)	34(30.9)	56(52.7)
<b>Diseased via non sterile unwashed hand(N=110)</b>			
Covid-19	98(89.1)	7(6.4)	5(4.5)
Hiv	29(26.4)	68(61.8)	13(11.8)
Hepatitis	72(65.5)	29(26.4)	9(8.1)
Herpes Simplex	67(60.9)	11(10.0)	32(39.1)
Influenza	47(51.8)	16(14.5)	37(33.7)
<b>Reasons for handwashing(N=110)</b>			
Prevent germs being passed to the patient	108(98.2)	0(00.0)	2(1.8)
Allows dental procedures to be successful /infection free	109(99.1)	0(00.0)	1(0.9)
Quickens healing of dental extraction sockets:	54(49.3)	36(32.7)	20(18.0)
Prevents hospital acquired infections	104(94.5)	1(0.9)	5(4.5)
<b>Procedure required handwashing only before procedure</b>			
Handling of impression moulds	76(69.1)	24(21.8)	10(9.1)
<b>Procedure required handwashing only after procedure</b>			
Handling of dental instruments	69(62.7)	28(25.5)	13(11.8)
Handling of dental consumables	56(50.9)	37(33.8)	17(15.3)
<b>Required handwashing before and after procedure</b>			
When examining patients on the dental chair	100(90.9)	5(4.5)	5(4.5)
When carrying out any treatment on the patient	104(94.5)	3(2.7)	3(2.7)
When handling instruments	96(87.3)	9(8.2)	5(4.5)
<b>Should not wash hand in treating patients</b>			
If he/she is suffering from cold	11(10.0)	83(75.5)	16(14.5)
Diagnosed of having infectious diseases	16(14.5)	82(74.5)	12(11.0)
The personnel have diarrhea	11(10.0)	84(76.4)	15(13.6)

Table 3 represents the attitude of the respondents to handwashing. Most of the respondents (83; 75.5%) and 107 (97.3%) reported that they adhere to rules of handwashing all the time and have sufficient information about handwashing respectively, whereas 55 (50.0%) of the respondents noted that the new members of staff are trained/instructed to comply with rules of hand hygiene.

Table 4 displays the practice of handwashing among the respondents in which the majority (105; 95.4%) rightly noted that handwashing should be practiced in dental hospitals. However, only 35.5% stated they have heard about Ayliffe's technique of hand washing, in which 97.4% of them could not correctly state the right order of this technique (Figure 1). In addition, the majority (104; 96.4%) could not state the general

Table 3: Respondent's attitude of handwashing

Variable	Yes (freq)(%)	No (freq)(%)	N (freq)(%)
Adhere to rules of handwashing all the time	83(75.5)	24(21.8)	3(2.7)
Have sufficient information about handwashing	90(81.8)	13(11.8)	7(6.3)
Adhering to handwashing rules reduce cross-infection	107(97.3)	2(1.8)	1(0.9)
Handwashing rules easy and normal	93(84.5)	14(12.7)	3(2.7)
Staff trained/instructed to comply with rules of hand hygiene	55(50.0)	23(20.9)	32(29.1)

\*N=I don't know

Table 4: Respondent's general practice of handwashing

Variable	Yes(freq%)	No(freq%)	N(freq%)
Handwashing should be practiced in dental hospitals	105(95.4)	2(1.8)	3(2.7)
Before attending to patients	96(87.3)	4(3.6)	10(9.1)
After attending to patients	103(93.6)	2(1.8)	5(4.5)
Before and after attending to patients	104(94.5)	3(2.7)	3(2.7)
Wipe hands with paper towel	97(88.2)	7(6.4)	6(5.4)
Wipe hand with cloth towel	57(51.8)	42(38.2)	11(10.0)
Nothing should be used to wipe hands	10(9.0)	81(72.9)	19(17.1)
Whatever used to wipe hands be disposed and not reused	90(81.8)	8(7.3)	12(10.9)
Know what is Ayliffe's technique of handwashing	39(35.5)	71(64.5)	

\*N=I don't know

sequence of hand washing (Figure 1). The respondents had good overall level of knowledge (71.8%), attitude (84.5%) and practice (93.6%) of handwashing (Figure 2).

Among the dental care providers, dentists were the highest respondent that had good knowledge (45; 86.5%) and practice (51; 98.1%) of handwashing. There was statistically significant

association between the knowledge of handwashing and occupational status of the respondents ( $p=0.014$ ) (Table 5). There was statistically significant association between the practice of handwashing and occupational status of the respondents ( $p=0.013$ ). There was statistically significance association between the knowledge of handwashing and educational level of the respondents ( $p=0.009$ ) (Table 5).

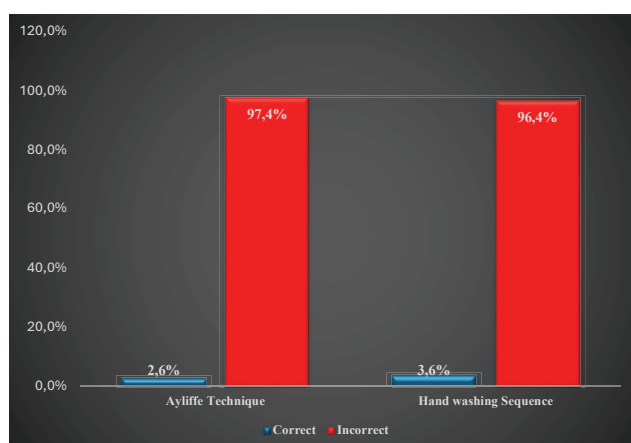


Figure 1: Ayliffe's technique and general handwashing sequence among dental care providers.

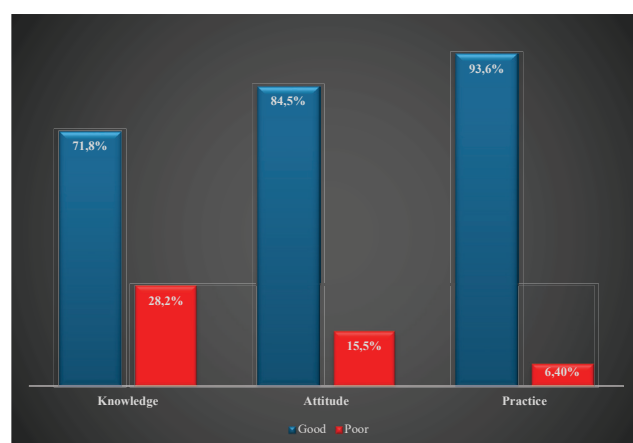


Figure 2: Overall Level of knowledge, attitude and practice.

Table 5: Association between knowledge, attitude, practice and demographic characteristics

Variable	Knowledge			Attitude			Practice		
	Good	Poor	P	Negative	Positive	P	Good	Poor	P
Age group			.561			.912			.635
≤30	29(65.9)	15(34.1)		6(13.6)	38(84.4)		40(90.9)	4(9.1)	
31 - 50	45(75.0)	15(25.0)		10(83.3)	50(83.3)		57(95.0)	3(5.0)	
>50	5(83.3)	1(16.3)		1(16.7)	5(83.3)		6(100.0)	0(00.0)	
Gender			.432			.555			.428
Female	58(70.7)	24(29.3)		13(15.9)	69(84.1)		76(92.7)	6(7.3)	
Male	21(75.0)	7(25.0)		4(14.3)	24(85.7)		27(96.4)	1(3.6)	
Occupation			.014*			.240			.013*
Dental Nurse	10(66.7)	5(33.3)		1(6.7)	14(93.3)		15(100.0)	0(00.0)	
DST	7(58.3)	54(1.7)		0(00.0)	12(100.0)		11(91.7)	1(8.3)	
DT	9(52.9)	8(47.1)		3(17.6)	14(82.4)		16(94.1)	1(5.9)	
Dental therapist	8(57.1)	6(42.9)		1(7.1)	13(92.9)		10(71.4)	4(28.6)	
Dentist	45(86.5)	7(13.5)		12(23.1)	40(76.9)		51(98.1)	1(1.9)	
Department			.278			.282			.064
Child Dental Health	13(76.5)	4(23.5)		4(23.5)	13(76.5)		15(88.2)	2(11.8)	
Oral Med/Path	7(100.0)	0(00.0)		1(14.3)	6(85.7)		7(100.0)	0(00.0)	
Oral&Maxillo	14(82.4)	3(17.6)		1(5.9)	16(94.1)		16(94.1)	1(5.9)	
Preventive	18(64.3)	10(35.7)		7(25.0)	21(75.0)		24(85.7)	4(14.3)	
Restorative	27(65.9)	14(34.1)		4(9.8)	37(90.2)		41(100.0)	0(00.0)	
Experience(yrs)			.506			.542			.188
≤10	50(72.5)	19(27.5)		11(15.9)	58(84.1)		63(91.3)	6(8.7)	
>10	29(70.7)	12(29.3)		6(14.6)	35(85.4)		40(97.6)	1(2.4)	
Education			.009*			.117			.201
Postgraduate	13(81.3)	3(18.8)		4(25.0)	12(75.0)		16(100.0)	0(00.0)	
Bachelor	33(86.8)	5(13.2)		8(21.1)	30(78.9)		37(97.4)	1(2.6)	
Diploma	33(58.9)	23(41.1)		5(8.9)	51(91.1)		50(89.3)	6(10.7)	

\*=Statistically significant, DST=Dental Surgeon Technician, P=P-value, DT=Dental Technologist

## DISCUSSION

Handwashing is an essential practice in the control of cross-infections. This study evaluated the attitude, knowledge and practice of handwashing among the dentists, dental nurses, dental surgery technicians, dental therapists, and dental technologists in Lagos State University Teaching Hospital, Ikeja, Lagos State. Most of the respondents in this study were aged between 31-50 years (54.5%), with more females (74.5%). The majority of the respondents (52; 47.3%) were dentists.

Seventy-nine (71.8%) respondents had good knowledge of handwashing, similar to a study<sup>13</sup> which had 89.8%. Most of the respondents (61; 55.5%) stated that chlorhexidine is not used for handwashing, whereas chlorhexidine forms 2% to 4% of antiseptic handwash.<sup>20</sup> From this study, 50% of the dental care providers wrongly stated that perfumed soap is used for handwashing. The use of perfumed soap for handwashing is not recommended nor indicated for professional medical use.<sup>21</sup>

Majority of the respondents (71.8%) had a positive attitude towards handwashing. Of these attitudes, 97.3% of respondents believed that adhering to handwashing reduces cross-infection; this result was similar to a study

by Bello *et al*<sup>22</sup> which was carried out among healthcare providers in Southern Nigeria. Omogbai *et al*<sup>19</sup> conducted a similar study among dental professionals; he reported that majority (91.4%, 92.4% and 89.5%) of the respondents strongly agreed that handwashing helps to prevent spread of infection to the patients, health workers and family of health workers, respectively. Most of the respondents in this study were aware that dental care providers are at risk of infection in their various clinics; this might be attributed to them having sufficient information about handwashing.

Moreover, it's a known fact that the oral cavity is an environment rich in various types of microorganisms.<sup>23</sup> Some of these microbes are airborne such as Mycobacterium tuberculosis, Staphylococcus epidermis and Staphylococcus haemolyticus. Other microbes include viruses such as the human immunodeficiency virus and hepatitis B and C viruses<sup>24</sup> and Covid-19.<sup>9</sup> Therefore, proper handwashing is very important before and after every procedure, handling of dental instruments and consumables, in which correct response was recorded regarding this in the present study. Sofola *et al*<sup>25</sup> reported that blood borne pathogens risk is especially elevated in dental settings due to the use of sharp instruments in a small operating field (ie the oral cavity) which introduces an even greater occupational hazard.

Adherence to the proper rules of handwashing all the time was noted in 77.5% of respondents and 84.5% claimed that adhering to rules of handwashing were easy and normal. This might be due to availability of wash basins, adequate running water, antiseptic soaps and disposable towels in the various clinics. In addition, overrating their personal compliance might not be overemphasised. However, Bello *et al*<sup>22</sup> found that adherence with handwashing guidelines has been hampered by inadequate facilities such as water, antiseptic soaps etc and heavy patient traffic. Moreover, forgetfulness and lack of time have also been identified as barriers to regular handwashing.<sup>19</sup>

Most of the respondents (93.6%) had good practice of handwashing in terms of when to practice it and what to use when practicing handwashing. Nevertheless, only 35.5% knew the Ayliffe's technique of handwashing in which 97.6% could not rightly state the order of the technique and 3.6% of the respondents were able to state the handwashing sequence correctly. This showed that the respondents had not been practicing the right way of handwashing. In a similar study by El Dokky *et al*<sup>26</sup>, the respondents (100%) had correct answers about handwashing practice, but only 40% of them could demonstrate the proper method of washing of hands. Improper handwashing could be attributed to lack of continuous monitoring and evaluation.<sup>26</sup> A study<sup>19</sup> reported that most of their respondents indicated for more information on steps in handwashing and should be delivered in form of seminars.

Since most of the participants in the present study did not know the Ayliffe's technique or the correct sequence of handwashing, seminars should be advocated for in the training of the dental care providers in the institution. Moreover, visual guide and tips can be pasted in the various clinics as a reminder until mastering it becomes part of the dental care provider. The Ayliffe's technique (1978)<sup>27</sup> focused on the process of physically rubbing specific areas of the hand. This technique is widely advocated in infection control manuals throughout healthcare facilities and has been widely adopted as the gold standard for hand hygiene.

Among the dental care providers, dentists were the highest respondents (86.5%) who had good knowledge of handwashing and 98.1% had good practice; there was statistically significant association in this finding. This can be attributed to the constant continuing medical education (CME) to which the dentists are exposed; this CME is a prerequisite for renewal of an annual practicing licence. Regarding the level of education, respondents with a Bachelor's degree had the highest good knowledge of handwashing (86.8%), even higher than postgraduates. Respondents with a Bachelor's degree in the tertiary institution might be exposed to more information because they tend to study more and attend various seminars, academic updates and conferences, while respondents with postgraduate qualification might have the feeling that they have attained their ultimate achievements. Therefore, seminars on handwashing guidelines should involve every dental care provider irrespective of their level of education.

## CONCLUSION

The knowledge and practice of handwashing were good, and there was a positive attitude to handwashing among the dental care providers in our hospital. However, the actualisation of handwashing technique and appropriate sequence were poor, which may not be adequate to prevent infection transmission. Regular seminars on handwashing guidelines in relation to infection control should be embraced quarterly among dental care providers. New staff should be subjected to training of handwashing as soon as they are employed in the hospital. Visual guides and tips should be placed in strategic locations to improve the adherence to handwashing practice.

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