

Five Moment of Hand Hygiene Practices among Community Healthcare Workers in Primary Healthcare Facilities in Ebonyi North Senatorial District, Ebonyi State

*¹Nwamaka Agbe Elom, ¹Deborah Nnebuife Alegu, ²Onyekachi Ogba Okpata, ³Rita Ngozika Ojide, ¹Uzoamaka Mercy Matthias-Ede, ¹Clementina, O. Odo

¹Department of Human Kinetics and Health Education, Faculty of Education, Ebonyi State University, Abakaliki, Nigeria.

²Department of Nursing Science, Ebonyi State University, Abakaliki, Nigeria

³Department of Public Health, Faculty of Health Sciences, Madonna University Nigeria, Elele Campus, Rivers State

*Correspondence: Email: nwamaka.elom@ebsu.edu.ng, 08039549743

Abstract

This study investigated the demographic differences in the practices of five moments of hand hygiene among community healthcare workers in primary healthcare facilities in Ebonyi North senatorial district of Ebonyi State. The study used cross-sectional survey design and the entire population of 513 community healthcare workers in primary healthcare facilities in Ebonyi North senatorial district participated in the study. Structured questionnaire titled “Practices of Five Moments of Hand Hygiene Questionnaire” ($r=0.89$) was used for data collection. Mean, standard deviation and Analysis of Variance statistics were used to analyze the data. Results showed that both senior, junior community health extension worker and chief health officer in primary healthcare facilities in Ebonyi North had poor practice of five moments of hand hygiene. However, those with work experience 1-10years, 11-20years, and 21years and above had poor practice but 11-20years and 21years and above had good practice only on hand washing after touching a patient. Furthermore, there was no statistical significant difference in the practices of five moments of hand hygiene based on job status ($P>0.05$), but statistical significant difference was observed based on work experience ($P<0.05$). The study concluded that the community healthcare workers had poor practice of five moments of hand hygiene. Therefore, recommended among others that Ministry of Health in collaboration with Officers-In-Charge in primary healthcare facilities should organize educational programs to address the issue of poor hand hygiene especially to JCHEW and to those with 1-10years work experience.

Keywords: Five moment of hand hygiene, hand Hygiene, Community Health Workers, Primary Healthcare, Ebonyi North

Introduction

Report has shown that one of the most important means of transmission of diseases in the hospital is through healthcare workers' hands. For instance, World Health Organization (WHO, 2009b) reported that Healthcare Associated Infections (HCAs) occur due to hand of healthcare

providers. Fulgence et al. (2019) opined that about 1.4 million people worldwide are affected by hand hygiene-associated infections from healthcare providers. World Health Organization (WHO) (2016) reported the cross-contamination with contaminated healthcare providers hands is the most common transmission way of infections in health facilities. It is proven that about 50% of healthcare associated infections occur due to healthcare providers hands. To reduce this burden, WHO (2009a) introduced “My five moments for hand hygiene” which include hand washing before touching a patient, before the clean/ aseptic procedure, after body fluid exposure risk, after touching a patient and after touching patient surroundings. This concept of hand hygiene was developed around three important conditions necessary for cross-transmission such as patient zone, healthcare zone and inside the patients zone from critical sites, for example skin breaks (Salmon, Pittet, Sax, & Mclaws, 2015). Patient zone includes the patient surfaces and items that are exclusively or temporarily dedicated to him or her. Healthcare-area is consisted of all surfaces in the healthcare environment outside the patient zone but includes also other patients and their patients zone (WHO, 2009b). However, the central focus of five moments for hand hygiene is the separation of microorganisms from one patient zone to the next zone and from critical sites (Salmon et al., 2015). It reduces the risk of disease transmission through contact with blood, bodily fluid, mucous membranes, and non intact skin (Srinivasan et al., 2012).

Scholars saw hand hygiene in different ways. For example, hand hygiene is defined as the mechanical removal of organisms/chemical from contaminated hand surfaces using soap or detergent (Kestebrihan, 2016). Medically, hand hygiene refers to hygiene practices related to medical procedures (Pathama, 2019). Hand hygiene is a general term that applies to hand washing, antiseptic hand washing, alcohol based hand rub or surgical hygiene/antiseptic (Uneke et al., 2014). In this study, hand hygiene includes washing hands with soap and clean running water using an antiseptic hand wash or rub. There is growing evidence that hand hygiene practices might reduce the infections, hence, community health workers are mostly in contact with patients in primary healthcare facilities and the main providers of physical care (Fox et al., 2015). Therefore, their hands come into constant contact with patients, which increase the risk of cross-contamination of HCAs (Shinde & Mohite, 2014). Thus, community health workers’ hand hygiene practices are pivotal in preventing HCAs and limiting the transmission of microorganisms (Jeong & Kim, 2016).

Studies on five moments of hand hygiene practices among community health workers in healthcare facilities based on some demographic variables have been reported. Study in Turkey by Teker et al. (2015) reported that the assistant healthcare workers had the worst hand hygiene compliance in each moment compared with nurses and doctors in Turkey. Hence, there was significant difference among healthcare workers hand hygiene compliance in each moment. Anwar and Elareed (2019) reported a significantly higher hand hygiene performance after body fluid exposure, aseptic procedure, and after patient contact compared to before patient contact and after patient surrounding contact among health workers. Jessie, Lorna, and Lam (2021) reported that health workers had poor hand hygiene performance before patient contact and after coming into contact with the patients surrounding but showed better hand hygiene after body fluid exposure risk. The authors further reported that hand hygiene performance was best after body fluid exposure risk, after the aseptic procedure and after patient contact compared with before patient contact and after contact with the patients surroundings.

As regard work experience, Pereira, Lam, and Chan (2015) found significance differences on the five moments of hand hygiene practices among healthcare workers. However, those with 11-20 and 21 years and above experience have better practice on after touching a resident, after touching contaminated items or the residents' surrounding environment, before touching a resident, before a clean or aseptic procedure (e.g., before nasogastric tube feeding or changing dressing), after blood, body fluid, secretion, excreta, wound, or mucous membrane exposure risk (e.g., after changing diaper) compared to 1-10 years. Fulgence et al. (2019) reported no significant differences in the hand hygiene practice rates among health workers in Rwanda between 5-10 years of working experience, 15 and more years of working experiencing but low adherence rate being observed for those with less than 5 years of working experience. Moreover, there was no association between years of working experience and hand hygiene practice at all the five moments of hand hygiene. However, significant difference was not observed as whole in the study based on work experience. Study conducted by Ryan (2012) found out that years of working experience were not significant differs in hand hygiene compliance. Olushola, Adegunle and Onyedibe (2016) in Nigeria reported that there was no association between years of working experience and hand hygiene practice at all the five moments of hand hygiene.

Studies were carried out in places around the countries in relation to practices of five moments of hand hygiene. For instance, in Brazil, Santos and Celina (2015) reported low hand hygiene adherence rate among nurses in the five moment of hand hygiene precisely before touching a patient and in India, Taneja and Mishra (2015) equally reported low practices. In Rwarda, the highest adherence rate of five moment of hand hygiene was after body fluid exposure risk while lowest was before touching a patient among the nurses in hospitals (Fulgence et al, 2019). Shinde and Mohite (2014) reported that student nurses had better practice with regard to five moments of hand hygiene compared to staff nurses. That student nurses were practicing first, third, fourth and the fifth moments of hand hygiene while staff nurses practiced only fifth moment. Study conducted by Mearkle et al. (2016) in Uganda showed that the respondents had poor hand washing practice on before touching a patient. In Nigeria, Olukanni (2013) study in South-Western confirmed that the hand hygiene practices were grossly inadequate. A study done in General Hospital by Ojong (2014) in Nigeria revealed that the practice of hand washing by the respondents ranges from good to poor practice. Shobowale et al. (2016) study in Nigeria reported that the rates of compliance in hand hygiene among the health workers was low that the healthcare workers pay attention to hand hygiene only when it appears there is a direct observable threat to their wellbeing. Most of healthcare associated infections can be prevented effectively through the optimum practices of five moments of hand hygiene (Srinivasan et al., 2012). It has been estimated that 1.4 million people globally are affected by preventable healthcare-associated infections (Santos & Celina, 2015). WHO reported the prevalence ranged from 3.5% to 12% of hospitalized patients who contracted hospital acquired infections in developed countries while the prevalence of healthcare associated infections in developing countries was reported to vary from 5.7% to 19.1% (Mbim et al., 2016). The transmission of healthcare-associated infections is done through different ways, but transmission through contaminated healthcare workers hands is the most common pattern in most health facilities. It is proven that about 50% of healthcare associated infections occur due to hand of healthcare providers (Abdella *et al*, 2014)

Despite various advancement in infection control, healthcare workers might not adhere fully to the recommended hand hygiene practices. A worrisome trend was observed on the rate through which community healthcare workers in Ebonyi State touches the patient with hand as the hands of healthcare workers could then become a reservoir for the transmission of pathogens

among patients. It has been observed that Ebonyi State is one of the hotspot state for disease outbreaks. Evidence has been seen on the finding of Usuwa *et al.* (2020) whose study indicated that Abakaliki Local Government Area (LGA) had the highest proportion of confirmed cases of disease outbreaks during the 2018 and 2019 disease outbreaks. However, most of the practices of five moments of hand hygiene studies have focused only on the nurses in the hospital setting. Till date, studies on practices of five moment of hand hygiene among community healthcare workers are limited and the five moments of hand hygiene practices has yet to be fully documented in Ebonyi State, precisely Ebony North primary health facilities. Therefore, this study is designed to fill that gap.

Purpose of the Study

The main objective of this study was to investigate the demographic differences on the practices of five moment of hand hygiene among community health workers in healthcare facilities in Ebonyi North Senatorial District of Ebonyi State. Specifically, the study determine the differences in the:

1. practices of five moment of hand hygiene among community health workers in facilities in Ebonyi State Senatorial District of Ebonyi State based on job status
2. practices of five moment of hand hygiene among community health workers in healthcare facilities in Ebonyi North Senatorial District of Ebonyi State based on work experience.

Research Questions

The following research questions guided this study:

1. What is the difference in the practice of five moment of hand hygiene among community health workers in facilities in Ebonyi State Senatorial District of Ebonyi State based on job status?
2. What is the difference in the practice of five moment of hand hygiene among community health workers in facilities in Ebonyi State Senatorial District of Ebonyi State based on work experience?

Hypotheses

The following hypotheses were tested at 0.05 level of significance

1. There is no significant difference in the five moment of hand hygiene among community health workers in healthcare facilities in Ebonyi North Senatorial District of Ebonyi State based on job status

2. There is no significant difference in the practice of five moment of hand hygiene among community healthcare facilities in Ebonyi North District of Ebonyi State based on work experience.

Research Design

The study adopted cross-sectional survey research design. Cross-sectional survey design is the type of research design in which data is collected from many different individuals at a single point in time (Lauren, 2020). The design was deemed appropriate for this study based on the fact that it involved looking at data from a population at one specific point in time and the participants in the study were selected based on particular variables of interest.

Area of the Study

This study was conducted in primary healthcare facilities in Ebonyi North Senatorial District. Ebonyi North Senatorial District comprised of four LGAs namely Abakaliki, Ebonyi, Ohaukwu and Izzi Local Government Areas. The Ebonyi North has 103 recognized primary healthcare facilities which cut across the Local Government Areas. Thus, Abakaliki LGA has 20 primary health care facilities, Ebonyi 20, Ohaukwu 38 and Izzi 25. This healthcare facilities is where community healthcare workers manage day-to-day health needs of the patients, thereby always come in contact with them, hence, need to practice five moment of hand hygiene in order to prevent the risk of disease transmission.

Population and Sample Size

The population of this study was 513 community healthcare workers in primary health care facilities in Ebonyi North Senatorial District of Ebonyi State. However, Abakaliki LGA has a total of 122 community health workers, Ebonyi LGA 65 community health workers, Ohaukwu LGA 202 community health workers and Izzi LGA 124 community health workers. The entire population 513 community healthcare workers in primary health care facilities in Ebonyi North Senatorial District of Ebonyi State participated in the study. This is because the participants were of manageable size, hence, there was no sampling.

Data Collection Tools and Procedure

The instrument for data collection was researcher-structured questionnaire titled: Five Moment of Hand Hygiene Practices Questionnaire (FMHHPQ). The instrument consisted of two sections: A and B. Section A contained two items on demographic data of the respondents, section B had 5 items 1-5 which elicited information on five moments of hand hygiene practices. The respondents were required to indicate on four point scale of Always (4), Often (3), rarely (2), and Never (1), in each of the items. Face validity of the instrument was determined by three experts in health education and two in measurement and evaluation. Thirty community health workers selected from two primary health care facilities in Ebonyi East not included in the study were used to establish the internal consistency of the instrument using the statistical tool, Cronbach alpha which yielded overall reliability coefficient $r=0.89$ which is adjudged high reliability (Ogbazi & Okpala, 2014). In order to have access to the health facilities in the district and then the respondents, consent was obtained from each Officer- In- Charge (OIC) in the health facilities that were used in the study. Four research assistants, who were instructed before the exercise, were used for data collection. Questionnaire was administered only on the community health workers at the spot (in their respective primary healthcare facilities at a mutually agreed time). This was to fulfill ethical demands for the study and avoid disruption of work. The entire 513 copies of questionnaire distributed were retrieved and used for data analysis.

Data Analysis

Data analysis was done using IBM SPSS for Windows (Version 20). Mean and standard deviation were used to answer all the research questions. Mean (\bar{x}) and standard deviation (SD) were calculated for the purposes of description and to answer the research questions. The following criterion means were used to interpret the results of the study: a mean (\bar{x}) of above 2.50 and above was adjudged as good practice (GP) while below 2.50 was adjudged as poor practice (PP). Analysis of Variance (ANOVA) statistic was used to analyze all the hypotheses. The entire hypotheses were tested at 0.05 level of significance.

Results

Table 1: Socio-demographic Variables of the Respondents

Variable	Frequency	Percentage
----------	-----------	------------

Job Status

SCHEW	236	46.0
JCHEW	259	50.4
CHO	18	3.5
Work Experience		
1-10yrs	200	38.9
11-20yrs	225	43.8
21yrs & Above	88	17.1

SCHEW= Senior Community Health Extension Worker

JCHEW= Junior Community Health Extension Worker

CHO= Chief Health Officer

Data in Table 1 showed the demographic characteristics of respondents. However, majority 259 (50.4%) JCHEW, followed by SCHEW 236(46.0%) and 225 (43.8%) and 200(38.9%) community healthcare workers whose work experience ranged from 11-20years and 1-10yeras participated in the study.

Table 2: Mean and Summary of Analysis of Variance of Five Moment of Hand Hygiene Practices among Community Health Workers in Primary Health Care Facilities in Ebonyi North Senatorial District based on Job Status

Variables	N	\bar{x}	SD	F-value	P-value	Decision
Hand washing before touching a patient						
SCHEW	236	2.04	0.83			
JCHEW	259	2.03	0.76	0.011	0.989	NS
CHO	18	2.05	0.53			
Hand washing before clean/aseptic procedure						
SCHEW	236	2.03	0.82			
JCHEW	259	2.10	0.85	0.605	0.546	NS
CHO	18	2.16	0.51			
Hand washing after body fluid exposure risk						
SCHEW	236	2.19	0.92			
JCHEW	259	2.29	0.95	0.933	0.394	NS
CHO	18	2.38	0.84			
Hand washing after touching a patient						
SCHEW	236	2.66	0.96			
JCHEW	259	2.44	0.95	1.989	0.138	NS
CHO	18	2.55	1.09			
Hand washing after touching patient surrounding						

SCHEW	236	1.55	0.62			
JCHEW	259	1.66	0.67	2.318	0.100	NS
CHO	18	1.77	0.64			
Overall						
SCHEW	236	2.14	0.49			
JCHEW	259	2.05	0.53	2.161	0.116	NS
CHO	18	2.18	0.46			

P>0.05

SCHEW= Senior Community Health Extension Worker

JCHEW= Junior Community Health Extension Worker

CHO= Chief Health Officer

Result on Table 2 showed that in overall, SCHEW (2.14±0.49), JCHEW (2.05±0.53) and CHO (2.18±0.46) were below a criteria mean of 2.50 set for this study. Implies that community health workers in primary healthcare in Ebonyi North had poor practice of five moment of hand hygiene. Summary of ANOVA statistic indicated no significance difference in the five moment of hand hygiene practice based on work experience (P>0.05). This means that the hypothesis which stated that there is no significant difference in the five moment of hand hygiene practice among community health workers in primary healthcare in Ebonyi North senatorial district of Ebonyi State based on job status was thus accepted.

Table 3: Mean and Summary of Analysis of Variance of Five Moment of Hand Hygiene Practices among Community Health Workers in Primary Health Care Facilities in Ebonyi North Senatorial District based on Work Experience

Variables	N	\bar{x}	SD	F-value	P-value	Decision
Hand washing before touching a patient						
1-10years	200	1.98	0.82			
11-20years	225	2.03	0.76	1.493	0.226	NS
21years & above	88	2.15	0.75			
Hand washing before clean/aseptic procedure						
1-10years	200	1.96	0.81			
11-20years	225	2.05	0.83	7.767	0.000	S
21years & above	88	2.37	0.77			
Hand washing after body fluid exposure risk						
1-10years	200	2.08	0.88			
11-20years	225	2.31	0.96	6.853	0.001	S
21years & above	88	2.48	0.90			
Hand washing after touching a patient						
1-10years	200	2.40	0.94			
11-20years	225	2.57	0.99	6.991	0.019	S

21years & above	88	2.73	0.90			
Hand washing after touching patient surrounding						
1-10years	200	1.54	0.60			
11-20years	225	1.64	0.67	1.908	0.149	NS
21years & above	88	1.68	0.70			
Overall						
1-10years	200	1.99	0.50			
11-20years	225	2.12	0.52	10.594	0.001	S
21years & above	88	2.10	0.05			

Data on Table 3 indicated that community health workers with work experience 1-10years (1.99 ± 0.50), 11-20years (2.12 ± 0.52) and 21years and above (2.10 ± 0.95) overall mean scores were below a criteria mean of 2.50 set for this study. Summary of ANOVA statistic showed that there is significance difference on the five moment of hand hygiene practices among community health workers in primary healthcare in Ebonyi North Senatorial District of Ebonyi State based on work experience (f-value=10.594, p=0.000).

Discussion

Data on Table 1 indicated that majority of majority 259 (50.4%) JCHEW, followed by SCHEW 236(46.0%) and 225 (43.8%) and 200 (38.9%) community healthcare workers whose work experience ranged from 11-20years and 1-10years participated in the study. However, result on Table 2 showed that community health workers in primary healthcare in Ebonyi North had poor practice of five moment of hand hygiene. This finding was expected and attests to the observation of the researchers on the rate through which community healthcare workers in Ebonyi State touches the patient, indicating poor practice in the hygiene practices. However, Senior Community Health Extension Worker (SCHEW) and Chief Health Officer (CHO) had good practice on hand washing after touching a patient. This appears that many community health workers prefer to perform hand hygiene after patient contact rather than before, which indicated they perceived their risk of susceptibility and severity of illness more important than the patient. Based on these finding, it is evident that the WHO five moments for hand hygiene are not adequately practiced and likely worldwide problem among CHWs. According to the WHO, poor practice rate equates to missed actions and amount to increase in infections in the hospitals (WHO, 2009). This finding attested to the report of Usuwa *et al.* (2020) whose study indicated that Abakaliki LGA had the highest proportion of confirmed cases of disease outbreaks

during the 2018 and 2019 disease outbreaks in the health care facilities despite the emphasis on the practices of hand hygiene in prevention of the infections which is expected to have reduced hospital infections. However, there was no significance difference in the five moment of hand hygiene practice based on work experience. This finding disagrees with Teker et al. (2015) study which indicated significant difference among healthcare workers hand hygiene compliance in each moment in Turkey.

Data on Table 3 indicated that community health workers in primary healthcare in Ebonyi North had poor practice of five moment of hand hygiene based work experience. However, 11-20years, 21years and above had good practice on hand washing after touching a patient. The ANOVA statistic indicated that there was significance difference on the five moments of hand hygiene practices among community health workers in primary healthcare in Ebonyi North Senatorial District of Ebonyi State based on work experience. This finding agree with Pereira, Lam and Chan (2015) whose finding indicated significance differences on the five moments of hand hygiene practices among healthcare workers. However, those with 11-20 and 21years and above experience have better practice on after touching a resident. However, other studies conducted among health workers contradicted the finding on this study. For example, Fulgence, Rajeswaran, Anita, and Geldine (2017) showed no difference between years of working experience and hand hygiene practice on all the five moments of hand hygiene among health workers in Rwanda between. Study conducted by Ryan (2012) found out that years of working experience were not significant differs in hand hygiene compliance. Olushola, Adegunle, and Onyedibe (2016) in Nigeria reported that there was no association between years of working experience and hand hygiene practice at all the five moments of hand hygiene.

Conclusion

From the findings of this study, the study concluded that both JCHEW, SCHEW and CHO community health workers in primary healthcare facilities in Ebonyi North Senatorial District of Ebonyi State had poor practice of five moments of hand hygiene. However, it was observed that SCHEW, CHO, those with 11-20years and 21years and above had good practice only on washing hand after touching a patient. This implies that many community health workers prefer to perform hand hygiene and pay attention to hand hygiene when it appears there is a direct observable threat to their wellbeing. It is evident that the WHO five moments for hand hygiene is not adequately practiced and likely worldwide problem among CHWs. This poor

practice rate equates to missed actions and is amount to increase in infections in the primary health facilities. The paper therefore, recommended that there is need for continuous health education, monitoring and training of community health workers in primary healthcare facilities by hospital management in everyday wards round and educational programs need to be organized by Officers-In –Charge in the primary healthcare facilities to address the issue of poor hand hygiene especially to JCHEW and to those with 1-10years work experience.

References

- Abdella, N. M., Tefera, M. A., Eredie, A. E., Landers, T. F., Malefia, Y. D., & Alene, K. A. (2014). Hand hygiene compliance and associated factors among health care providers in Gondar University. *BMC Public Health, 14*(96), 4-5.
- Anwar, M.M., & Elareed, H. R. (2019). Improvement of hand hygiene compliance among health care workers in intensive care units. *Journal of Prevention Medicine Hygiene, 60*(1), E31.
- Boyce, J. M. & Pittet, D. (2002). Guideline for hand hygiene in health-care settings. Recommendations of the healthcare infection control practices advisory committee and the HICPAC/SHEA/APIC/ IDSA hand hygiene task force. *Society for Healthcare Epidemiology of America /Association for Professionals in Infection Control/Infectious Diseases Society of America, 51*, 1-45.
- Fox, B.C., Wavra, T., Ash, D., Mulligan, D., Bennett, Y.P., & Nelson, C. (2015). Use of a patient hand hygiene protocol to reduce hospital-acquired infections and improve nurses' hand washing. *America Journal of Critical Care, 24*, 216–224.
- Fulgence, M., Rajeswaran, L., Anita, C., & Geldine, C. (2019). Assessment of nurses' perceptions and adherence to five moments of hand hygiene in selected units at a university teaching hospital in Rwanda. *Rwanda Journal of Medicine and Health Sciences, 2*(2), 160-171.
- Jeong, S.Y., & Kim, K.M. (2016). Influencing factors on hand hygiene behavior of nursing students based on theory of planned behavior: A descriptive survey study. *Nurse Education Today Elsevier Ltd, 6* (36), 159–164. Retrieved on 3/4/2021 from <http://dx.doi.org/10.1016/j.nedt.2015.09.014>
- Jessie, K. L, Lorna, K. P., & Lam, S.C (2021). Observational study of compliance with infection control practices among healthcare workers in subsidized and private residential care homes. *BMC Infectious Diseases, 21*, 75.
- Kestebrihan, F. (2016). *Food safety*. A world wide public Health issue. World Health Organization.

- Mbim, E. N., Mbotto, C. I., & Agbo, B. E. (2016). A review of nosocomial infections in Sub-Saharan Africa. *Microbiology Research Journal*, *15*, 1–11.
- Mearkle, R., Houghton, R., Bwonya, D., & Lindfield, R. (2016). Barriers to hand hygiene in ophthalmic outpatients in Uganda: a mixed methods approach. *Journal of Ophthalmic Inflammation and Infection*, *3.5-9*. Retrieved on 4/6/2021 from <http://dx.doi.org/10.1186/s12348-016-0077-0>
- Nteli, C., Galanis, P., Koumpagioti, D., Poursanidis, G., Panagiotopoulou, E., & Matziou, V. (2014). Assessing the effectiveness of educational program on compliance with hand hygiene in a pediatric intensive care Units of a tertiary care hospital. *Journal of Patient Safety Infection Control, Hospital Infection Society India*, *2*, 210-212.
- Ofori, A.O., Jennings, R., & Burges, J. (2010). Assessing hand hygiene resources and practices at a large African teaching hospital. *Infection Control Hospital, Epidemiology*, *31*, 802-808.
- Olukanni, D.O. (2013). Assessment of WASH program in public secondary schools in South-West Nigeria. *Journal of Engineering and Applied Sciences*, *8(3)*, 222-228.
- Ogbazi, J. N., & Okpala, J. (2014). *Writing research report: Guide for researchers in education the social sciences and humanities*. Enugu: Press Time Ltd.
- Ojong, I. N. (2014). The practice of hand washing for the prevention of Nosocomial infections among nurses in general hospital Ikot Ekpene, Akwa Ibom State, Nigeria. *Advanced Applied Science Research*, *6(1)*, 97–101.
- Pittet, D., Hugonnet, S., & Harbarth, S. (2000). Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Lancet*, *356*, 1307–1312
- Pereira, F.M.V., Lam, S .C., & Chan, J.H.M. (2015). Difference in compliance with standard precautions by nursing staff in Brazil versus Hong Kong. *America Journal of Infection Control*, *43(7)*, 769–772.
- Ryan, C. (2012). *Determinants of hand hygiene among registered nurses caring for critically ill infants in the neonatal intensive care unit*. Retrieved on 1/2/2021 from <https://scholar.uwindsor.ca/cgi/viewcontent.cgi?article=1220&context=etd>
- Srinivasan, A., Craig, M., & Cardo D. (2012). The power of policy change, federal collaboration, and state coordination in healthcare-associated infection prevention. *Clinical Infection Disease*, *55(3)*, 426-431.
- Shinde, M.B., & Mohita, V. (2014). A study to assess knowledge, attitude and practices of five moments of hand hygiene among nursing staff and students at a tertiary care hospital at Karad. *International Journal of Science Research*, *3(2)*, 311-321.
- Salmon, S., Pittet, D., Sax, H., & Mcclaws, M. L. (2015). The “My five moments for hand hygiene” concept for the overcrowded setting in resource-limited healthcare systems.

Journal of Hospital Infection. Elsevier Ltd. doi: 10.1016/j.jhin.2015.04.011.

- Santos, E., & Celina, L. (2015). Adherence to the five moments for hand hygiene among intensive care professionals. *Rev Gaúcha Enferm*, 36.
- Shobowale, E. O., Adegunle, B., & Onyedibe, K. (2016). An assessment of hand hygiene practices of healthcare workers of a semi-urban teaching hospital using the five moments of hand hygiene. *Journal of the Nigeria Medical Association*, 57 (3), 52.
- Taneja, J., & Mishra, B (2015). Promotion of successful hand hygiene practices in the intensive care units of a tertiary care hospital. *Journal of Patient Safety Infection Control Hospital Infection Society India*, 3,130–133.
- Teker, B., Ogutlu, A., Gozdas, H.T., Ruayercan, S., Hacialioglu, G., & Karabay, O. (2015). Factors affecting hand hygiene adherence at a private hospital in Turkey. *European Journal of Medicine* ,47(3), 208.
- Uneke, C .J., Ndukwe, C.D., Oyibo, P.G., Nwakpu, K.O., Nnabu, R.C., & Prasopa-Plaizier, N. (2014). Promotion of hand hygiene strengthening initiative in a Nigerian teaching hospital: Implication for improved patient safety in low income health facilities. *The Brazilian Journal of Infectious Diseases*, 18(1), 21-27.
- Usuwa, I. S., Akpa, C. O., Umeokonkwo, C. D., Umoke, M., Oguanuo, C.S., Olorukooba, A. A., Bamgboye, E., & Balogun, M.S. (202). Knowledge and risk perception towards lassa fever infection among residents of affected communities in Ebonyi State, Nigeria: implications for risk communication. *BMC Public Health*, 20,217
- World Health Organization (WHO). (2009a). Hand hygiene in health care first global patient safety challenge clean care is safer care. *World Health*, 30(1), 270.
- World Health Organization (WHO). (2009b). *Hand Hygiene Technical Reference Manual*. Retrieved on 4/9/2021 from http://apps.who.int/iris/bitstream/10665/44196/1/9789241598606_eng.pdf
- World Health Organization (WHO), (2016). *Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level*. Retrieved on 23/8/2021 from <https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/>