



## Attitude of Medical Students Towards Hospital Acquired Infections (HAIs) Prevention in a Tertiary Hospital in Jos North Local Government Area, Plateau State, Nigeria

**Prosper Ifeancha Okonkwo**

(ORCID: 0000-0001-6822-9344)

Department of Community Medicine & PHC  
Bingham University, Karu, Nasarawa State, Nigeria

**Okafor, Kingsley C.**

(ORCID: 0000-0003-3796-2417)

Department of Community Medicine & PHC  
Bingham University, Karu, Nasarawa State, Nigeria

**Bolarinwa Boluwatito**

Department of Community Medicine & PHC  
Bingham University, Karu, Nasarawa State, Nigeria

**Joel Haruna Garba**

Department of Community Medicine & PHC  
Bingham University, Karu, Nasarawa State, Nigeria

**Bitrus Salome Kwaghal**

Department of Community Medicine & PHC  
Bingham University, Karu, Nasarawa State, Nigeria

### ABSTRACT

**Background:** The attitude of medical students and health care workers towards Hospital Acquired Infections (HAIs) is a fundamental step towards implementation of the infection control protocols. These infections are acquired illnesses that are usually not present or incubating when a patient is admitted. This study seeks to assess the attitude of medical students towards Hospital Acquired Infections (HAIs) prevention in a Tertiary Hospital in Jos North Local Government Area, Plateau State, Nigeria. **Methods:** This was a descriptive cross-sectional study done between June and November 2019 among medical students using a Multistage sampling technique. Data was collected using a self-administered structured questionnaire and analyzed using the IBM SPSS 28 (Statistical Package for the Social Sciences). **Results:** The majority (98.2%) of the medical students agree that it is important to remove blood spillages quickly, and change of linens and clothes when soiled. Concerning periodic cleaning of walls and floors with disinfectants, 98.2% consider this to be important, while 0.5% do not and 1.4% do not know. As regards the quick disposal of used syringes and needles, 98.6% see this as important, while 1.4% do not. Regarding the importance of instrument sterilization for infection control,

**97.7% said it is important, 95.5% considered the habit of hand washing between patients by health workers as important, 3.2% don't know and 0.5 said it is not important. A high proportion (84.5%) of students were willing to adopt the HAI prevention methods, 11.4% were undecided and 4.1% were unwilling. One in twenty (19.6%) were not decided about championing the promotion of HAI in the hospital, 3.7% were unwilling to be HAI ambassadors, 76.7% agreed to help promote the need for HAI prevention. Conclusion: Generally, majority of students had a positive attitude (91.8%) toward HAI prevention while 8.2% had negative attitude. This is a foundation for championing the spread of the message and monitoring compliance with the standard precautions and existing protocol for HAI prevention.**

**Keywords:** Attitude, perception, Hospital Acquired Infections (HAIs), Nosocomial Infections, Medical students

## INTRODUCTION

The management of Hospital acquired infections (HAIs) is a major problem encountered by public health experts and hospitals globally<sup>1</sup>. According to the World Health Organization (WHO), 7% and 10% of hospitalized patients in developed and developing countries respectively will acquire at least one HAI during their stay in hospital<sup>2</sup>. This presents a difficult situation for patients and the healthcare system.

The high burden of HAIs globally is mostly because of unsatisfactory attitudes and compliance with infection prevention and control measures by health care workers.<sup>2</sup> Infections acquired in healthcare facilities result in adverse healthcare outcomes such as increased hospital stays, increased morbidity, mortality, and increased cost of medical care for patients and hospitals<sup>3</sup>. Nosocomial infections, also referred to as hospital acquired infections (HAIs), are acquired illnesses that are usually not present or incubating when a patient is admitted<sup>1</sup>. A hospital acquired infection (HAI) is defined as occurring at least 48 to 72 hours following hospitalization, three days following hospital discharge, thirty days following surgery, or one year following implant<sup>4</sup>. Hospital Acquired Infections, also known as Health Care Associated Infections (HCAIs) are caused by viral, fungal and bacterial pathogens. Examples include; *Staphylococcus aureus*, *Methicillin resistant Staphylococcus aureus*, *Candida albicans*, *Pseudomonas aeruginosa*, *Acinetobacterbaumannii*, *Stenotrophomonasmaltophilia*, *Clostridium difficile*, *Escherichia coli*, influenza etc<sup>4</sup>.

Common examples of Hospital Acquired Infections (HAIs) include; Ventilator-associated pneumonia, mycobacterium tuberculosis, Urinary tract infections, Hospital-acquired pneumonia, Skin infections, Surgical site infections, Gastroenteritis, Puerperal fever, Central line-associated bloodstream infections<sup>4,5</sup>. Bloodstream infections (BSI), pneumonia (including ventilator-associated pneumonia [VAP]), urinary tract infections (UTI), and surgical site infections (SSI) are the most prevalent types of healthcare-associated infections (HAIs)<sup>4,5</sup>. Generally speaking, there are two subcategories of transmission: direct-contact transmission and indirect-contact transmission.

Direct-contact transmission involves a direct body surface-to-body surface contact and physical transfer of microorganisms<sup>7,8</sup>. An example is the spread of infection from patient to medical student, medical student to patients and from medical student to another student

through handshakes, patient examination etc. Indirect-contact transmission involves contact of a susceptible host with a contaminated intermediate object, usually inanimate<sup>4,5,8,9</sup>. An example is human contact with an infected surface, accidental needle pricks, hospital bedding, airborne transmission through droplets and/or aerosols and by common vehicles such as food or water<sup>6,10,11</sup>.

The perception and attitude of health care workers will determine if they will be willing to practice or implement the required infection prevention and control protocol<sup>11,12</sup>. Studies on healthcare worker attitudes are important to establish individual or group commitment toward the set targets or goals<sup>8,10,11,12</sup>. This is important for proper application of different guidelines and standards. The practical guide on Prevention of Hospital Acquired Infections<sup>12,13</sup> suggests that prevention of Nosocomial infections requires an integrated, monitored programme that includes limiting transmission of organisms between patients in direct patient care, controlling environmental risks for infection and protecting patients with appropriate use of prophylactic antimicrobials, nutrition, and vaccinations. Others include limiting the risk of endogenous infections by minimizing invasive procedures, surveillance of infections, identifying and controlling outbreaks, and enhancing staff patient care practices<sup>14,13</sup>.

The control and prevention of healthcare associated infections is critical to the provision of safe and top-quality health service<sup>14,15</sup>. The prevention and control of HAIs is also dependent on health care workers' attitude towards implementation<sup>7,9,10</sup>. Apparently, students and trainees are a part of the healthcare team and are also at increased risk of these HAIs. It is plausible to state that their risk is high due to their increased training and contact time in the hospital<sup>8,9,12</sup>. Their activities such as clerking of patients, patient examinations, attending clinics, ward rounds, observing surgical sessions and other clinical activities make them susceptible to HAIs<sup>14,15</sup>. The risk is further compounded during their attempt to learn basic skills like setting a line, assisting during surgeries and wound dressing. Similarly, because of the fact that they are still on a learning curve, they are prone to accidents such as needle pricks, and getting in contact with infected body fluids. This makes this study imperative<sup>3,14,15</sup>. This study seeks to assess the attitude of medical students towards Hospital Acquired Infections (HAIs) prevention in a Tertiary Hospital in Jos North Local Government Area, Plateau State, Nigeria.

## **MATERIALS AND METHODS**

The study was carried out in Jos North Local Government Area (LGA), which is one of the seventeen local government areas in Plateau State, and it is mainly metropolitan<sup>16</sup>. It extends over an area of over 291 km<sup>2</sup> with a population of 429,300 projected from the 2006 National Population and Housing Census, with 266,666 (62%) being urban dwellers and 163,134 (38%) being rural dwellers<sup>16,17</sup>. The local government shares boundaries to the north with Toro LGA of Bauchi state, to the east with Jos East LGA, to the west with Bassa LGA and to the south with Jos South LGA.

Jos North Local Government has 20 political wards which include Tafawa Balewa, Lamingo, Tudun Wada, Jenta Adamu, Kabong, Mazah amongst many others. There are diverse ethnic groups in Jos North LGA which include Berom, Annaguta, Mwaghavul, Rukuba, Irigwe and Ngas as the major ethnic groups, while the others are Hausa, Fulani, Yoruba, Igbo and other minorities<sup>17,18</sup>. The prominent occupations are civil service, farming and small-scale businesses while Christianity and Islam are the two most commonly practiced religions in the area.

Jos North LGA has 29 primary healthcare centers, one federal (Jos University Teaching Hospital) and one state hospital (Plateau State Specialist Hospital - PSSH) and over 40 private and faith-based institutions including Bingham University Teaching Hospital, Our Lady of Apostles Hospital and Faith Alive Foundation. The study was carried out at the Bingham University Teaching Hospital, Jos Campus of the College of Medicine and Health Sciences.

This study used a descriptive cross-sectional study design. Data was collected using structured self-administered questionnaires among undergraduate medical students in the clinical arm of the College of Medicine and Health Sciences of Bingham University

The sample size was determined using the Kish formula for calculating sample size.

The P value for the sample size determination was obtained from prevalence from similar previous studies<sup>19</sup>. These values were used as the prevalence, at 95% confidence interval and margin of error set at 5%. Kish formula  $n = Z^2pq/d^2$

Where n - Minimum sample size; Z - Standard normal deviant at 95% confident interval = 1.96; d - Level of precision = 0.05; q = 1-p; p = Proportion of the population having the characteristic of interest = 15%<sup>19</sup>;  $n = (1.96)^2 \times 0.15 \times 0.85 / (0.05)^2$ ;  $n = 0.4898 / 0.0025$ ;  $N = 195.92$ ;  $N = 196$ . Approximately 10% of the minimum sample size was added to 196 to make room for non-response and rounded up, which resulted in a sample size of 216.

A multistage sampling technique was employed in the selection of study participants. Stage one (1) - Selection of institution - there are 3 tertiary institutions in Plateau state. These include Jos University Teaching Hospital - JUTH, Plateau State Specialist Hospital -PSSH, and Bingham University Teaching Hospital -BHUTH). Simple random sampling (balloting) was used to select one Teaching hospital from three.

Stage two (2) -. Selection of classes - Stratified random sampling method was used. Each class was regarded as a stratum, we determined and presented the number of students in each class and did proportional allocation to size. And selected using simple random sampling (balloting) the class list served as sampling frame. Then, 4<sup>th</sup> year - 89 students selected, 5<sup>th</sup> year - 85 students selected, 6<sup>th</sup> year - 45 students selected, and a total of 219 students were selected.

Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 20. After entry, data was analyzed and results were illustrated with frequency tables.

Ethical clearance was obtained from the Bingham University Teaching Hospital Health Research and Ethics Committee. Permission was sought and gotten from College of Medicine and Health Sciences. Informed consent was obtained from each participant in the study. Each study participant was informed that their participation in the study was voluntary and that they could decide to withdraw from the study at any point in time. Participants were also assured of confidentiality of information given.

## RESULTS

**Table 1: Socio-demographic Characteristics of Respondents**

Socio-demographic Characteristics of Respondents	Freq	Percent (%)
<b>Level/Batch</b>		
600L Set G	46	21.0
500L A Set H	42	19.2
500L B Set I	45	20.5
400L A Set J	47	21.5
400L B Set K	39	17.8
<b>TOTAL</b>	<b>219</b>	<b>100</b>
<b>Age Years</b>		
18-21	68	31.1
22-25	131	59.8
26-29	14	6.4
>29	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>
<b>Sex</b>		
Male	84	38.4
Female	132	60.3
<b>TOTAL</b>	<b>219</b>	<b>100</b>
<b>Religion</b>		
Christianity	210	95.9
Islam	4	1.8
Others	4	1.8
<b>TOTAL</b>	<b>219</b>	<b>100</b>

### Socio-Demographic Characteristics of Respondents

Table 1 illustrates the socio-demographic characteristics of medical students. Three batches (G, I and J) had almost the same proportion at 21%, 20.5% and 21.5% respectively, which was closely followed by Batch H (19.2%). Batch K had the least proportion (17.8%). Most of the students were within the age range of 22-25 years (59.8%), followed by 18-21 years (31.1%) then 26-29 (6.4%). The age group with the least proportion was >29 (1.4%).

Majority of the respondents were females (60.3%), with males accounting for 38.4%. The respondents were predominantly Christians at 95.9%, with Islam at 1.8% and others at 1.8%. The three major Nigerian tribes Hausa, Igbo, Yoruba were 7.8%, 14.6% and 16.4% of the respondents respectively. Other minor tribes accounted for the majority of respondents (61.2%).

**Table 2: Perception towards HAI prevention**

Perception towards HAI prevention	Frequency	Percent
<b>Is it important to remove blood spillages quickly?</b>		
Yes	215	98.2
No	1	.4
Don't know	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>
<b>Is it important to change linens and clothes if soiled?</b>		
Yes	215	98.2

No	1	.4
Don't know	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>
<b>Is it important to periodically clean walls and floors with disinfectants?</b>		
Yes	215	98.2
No	1	.4
Don't know	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>
<b>Safe and quick disposal of used syringes and needles?</b>		
Yes	216	98.6
No	-	-
Don't know	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>

### Perception Towards HAI Prevention

Table 2 shows that on the importance of removing blood spillages quickly, 98.2% affirm its importance, while 0.5%. 1.4 of respondents do not know. Also, 98.2% of respondents consider changing of linens and clothes when soiled to be important, while 0.5% do not. 1.4% of respondents do not know.

Concerning periodic cleaning of walls and floors with disinfectants, 98.2% consider this to be important, while 0.5% do not and 1.4% do not know. As regards the quick disposal of used syringes and needles, 98.6% see this as important, while 1.4% do not.

**Table 3: Perception of sterilization of hospital equipment, hand washing and willingness to advocate for HAI prevention and control**

Perception of sterilization of hospital equipment HAI prevention and infection control	Frequency	Percent (%)
Important	214	97.7
Not important	2	0.9
Don't know	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>
Perception on the importance of hand washing between patients by healthcare workers	Frequency	Percent (%)
Yes	208	95.0
No	2	0.9
Don't know	7	3.2
<b>TOTAL</b>	<b>219</b>	<b>100</b>
Willingness to adopt HAI prevention methods		
Yes	185	84.5
No	9	4.1
Undecided	25	11.4
Willingness to be an HAI prevention ambassador		
Yes	168	76.7
No	8	3.7
Undecided	43	19.6

## Perception of Sterilization of Hospital Equipment, Hand Washing and Willingness to Advocate for HAI Prevention and Control

As shown in the Table and Figure above, regarding the importance of instrument sterilization for infection control, 97.7% said it important, followed by 1.4% who don't know and finally 0.9% who said no.

According to the respondents, 95.5% considered habit of hand washing between patients by health workers as important, 3.2% don't know while 0.5 said it is not important.

A higher of proportion (84.5%) of students were willing to adopt the HAI prevention methods, 11.4% were undecided and 4.1% were unwilling.

One in twenty (19.6%) were not decided about championing the promotion of HAI in the hospital, 3.7% were unwilling to be HAI ambassadors, 76.7% agreed to help promote the need for HAI prevention

**Table 4: Overall Attitude of students towards HAIs prevention and control**

	Frequency	Percent
Positive Attitude	201	91.8
Negative Attitude	18	8.2
<b>Total</b>	<b>219</b>	<b>100.0</b>

Majority of students had a positive attitude 201 (91.8%) towards HAI prevention while, 18 (8.2%) had negative attitude.

## DISCUSSION

Attitude towards HAI prevention was assessed by evaluating the response of participants on the importance of instrument sterilization for infection control. Most respondents (97.7%) agreed to the importance of instrument sterilization in preventing the risk of acquiring HAIs. This was significantly higher compared to the findings in a study among medical students at the University of Colombo, where their attitude to instrument hygiene was 62%<sup>40</sup>. This finding clearly shows that respondents had a positive perception of HAI prevention. They also agree that it is important to remove blood spillages quickly, change the linens and clothes when soiled, periodic cleaning of walls and floors with disinfectants, and quick disposal of used syringes and needles.

This study utilized responses of participants on habit of hand washing in between patients to determine attitude. Majority of respondents attested to the importance of habit of hand washing practices when attending to patients. This is similar to findings in a survey done in the western region of Nepal among nursing students, where 82% felt that they would be less likely to transmit infection to the patient if they performed hand hygiene which is in keeping with our finding<sup>21</sup>. Meanwhile, there was a contradictory finding from a study at Raichur, India where the attitude of hand washing of medical students was negative at 12.9%<sup>22</sup>. Generally, majority of students had a positive attitude (91.8%) towards HAI prevention while, 8.2% had negative attitude. This is in keeping with a study done in India among 80 under graduate final year medical students to assess their attitude towards HAIs where the overall attitude of the students was satisfactory as greater than 90% understood the risk of getting or transmitting

infectious diseases by a HCW while working, and that utilization of disinfection procedures during work would reduce the rates of HAI<sup>3</sup>. Possible explanations for the positive attitude score in our study could be that all students are taught about safety precautions during their first year in the teaching hospital. The students are also exposed to frequent training's, management in infectious diseases and community medicine practice. There is also a surveillance system in place to manage these diseases. It is important to note that over 85% of students were willing to adopt the HAI prevention methods and 4% were unwilling to adopt these important practices. This high-level willingness is a critical aspect of implementation of Infection prevention and control practices necessary for the prevention of Hospital Acquired Infections<sup>34, 35, 36</sup>. The students also take it further by having three quarters of them willing to participate as ambassadors of prevention Hospital Acquired Infections in the hospital, to help other change attitude and ensure a sustained implementation of Infection prevent and control protocol in the hospital setting<sup>34, 35, 36</sup>. This makes the students critical stakeholders in helping to promote the need for HAI prevention and community engagements in controlling this menace.

### CONCLUSION

Majority (98.2%) of the medical students agree that it is important to remove blood spillages quickly, and change of linens and clothes when soiled, periodic cleaning of walls and floors with disinfectants, quick disposal of used syringes and needles, continuous instrument sterilization for infection control, and constant habit of hand washing between patients by health workers. Over 84.5% of students were willing to adopt the HAI prevention methods, and three-quarters wanted to champion the prevention of HAI in the hospital. Generally, majority of students had a positive attitude (91.8%) toward HAI prevention while 8.2% had negative attitude. This finding lays a solid foundation for the implementation and practical application of Hospital Acquired Infections (HAI) prevention strategies by students and healthcare workers.

### RECOMMENDATION

**To Government, The University (Or Teaching Hospital),** whichever is intended

1. To leverage the positive attitude of students toward HAI prevention to promote the practice of standard precautions within the hospital and ensure strict implementation of these policies.
2. Reward departments whose staff comply with safety measures, while penalizing those who fail to comply with HAI prevention strategies to improve attitude and boost willingness.
3. They utilize the willingness of students to become ambassadors of Infection Prevention and control. This entails championing the spread of the message and monitoring compliance with the standard precautions and existing protocol for HAI prevention.

**For medical students:**

1. To identify students who still have a negative attitude towards the prevention of HAIs to change their behaviour and join in the proactive steps towards supporting the reduction of the burden of the disease.
2. To keep up and sustain a positive attitude towards the prevention of Hospital Acquired Infections (HAIs).



## References

1. Oli AN, Okoli KC, Treasure N, Adje DU, Ezeobi I. Health Professional Knowledge about relative prevalence of hospital acquired infections in Delta state of Nigeria. *Pan African Journal* June 2016 24:148.9270
2. Mainul H, Massimo S, Judy M, Muhamadm A.B. Healthcare-Associated Infections – An Overview. *Dovepress* 15th Nov 2019 vol 2018;11 pg 2321-2333
3. Monegro AF, Regunath H. Hospital acquired infections. [Updated in October 2018]
4. Kabir AS, Akahter F, Sharmin M, Akhter A, Begun MB, Saha A K, Ahmed I. Knowledge Attitude and Practice of staff nurses on HAIs in tertiary care hospital of Dhaka City. *Northern International Medical College Journal* July 2018 10:1347 pg 347-353
5. <http://www.emedicine.com>
6. Ojulong J, Mitonga K H, Lipinge SN. Knowledge and attitude of infection prevention and control among health sciences students at university of Namibia. *African health sciences* 2013; 13(4): 1071-1078
7. EHA Consulting Group Inc, Nosocomial Infections and Hospital Acquired Illnesses Overview. [www.ehagroup.com/nosocomialinfections](http://www.ehagroup.com/nosocomialinfections) Cited 27th august 2019
8. WHO Guidelines on Hand Hygiene in Health Care. WHO; Geneva 2009.
9. AMBOSS Knowledge of Nosocomial Infections. [http://www.amboss.com/us/knowledge/Nosocomial\\_infections](http://www.amboss.com/us/knowledge/Nosocomial_infections) Cited 7th September, 2019
10. Borg M A. Prevention and Control of Health Care Associated Infections Within Developing Countries. *International Journal of Infection Control* 2010:16:1-6
11. S. U. Arinze-Onyia, A.C. Ndu, E. N. Aguwa, I. Modebe, U. N. Nwamoh. Knowledge and Practice of Standard Precautions by Health-care Workers in A Tertiary Health Institution in Enugu, Nigeria, *Nigerian Journal of Clinical Practice*, Vol. 2, No 2 (2018)
12. Arthi E, Abarna V, Bagyalakshmi R, Anitharaj M, Vijayasree S. Assessment of Knowledge, Attitude and Practice of Hand Hygiene Among Nursing and Medical Students in a Tertiary Care Hospital in Puducherry, India. *International Journal of Contemporary Medical Research* 4th April 2016 ICV :50.43
13. Duce G., Fabry J., Nicolle L., *Prevention of Hospital Acquired Infections, A Practical Guide, 2nd Edition*. WHO 2002.
14. Collins AS. Preventing healthcare associated infections. In: Huges R G, editor. *Patient safety and quality: An Evidence-Based Handbook for Nurses*. Rockville (MD): Agency for health care and research and quality (US); 2008 April chapter 41
15. Chauhan K. (2017) Knowledge Attitude and Practice towards Infection Control Measures amongst Medical Students in a Medical Teaching Tertiary Care Hospital. *International Journal of Clinical Medicine* 2017 :10.4236
16. Okafor, K.C., Omeiza, D.V., Idoko, L.O., Inyangobong, E.A., Unubi, O.E. and Bassi, A.P. (2022) Attitude, Practice, and Factors Affecting Contraceptive Use among Women Attending Postnatal Care in a Tertiary Health Facility in Jos North LGA, Plateau State, Nigeria. *Open Journal of Obstetrics and Gynecology*, 814-831. <https://doi.org/10.4236/ojog.2022.128069>
17. Okafor K.C, Isah H. O, Bimba J S, Thilza S, Parah Z. G, Attitude and Use of Pentavent Vaccine among Pregnant Women Attending Antenatal Care in Plateau State Specialist Hospital, Jos, Nigeria. *European Journal of*

- Medical and Health Sciences (EJMED), 2019; 1 (2) 1- 6. <https://ej-med.org/index.php/ejmed/article/view/43>
18. Okafor, K.C., Idoko, L.O., Temple-Obi, L. and Bimba, J.S. (2023) The Prevalence, Pattern, and Factors Affecting Cigarette Smoking among Undergraduate Students in a Tertiary Institution in Plateau State, Nigeria. *Open Journal of Preventive Medicine*, 13, 169-182. <https://doi.org/10.4236/ojpm.2023.135011>
  19. WHO Guidelines on hand hygiene in health care. Geneva: WHO; 2009
  20. Jayarajah U, Athapathu A, Jayawardane B et al. Hygiene Practices During Clinical Training: Knowledge, Attitude and Practice Among a Cohort of South Asian Medical Students. *BMC Med Educ* 19, 157 (2019) [doi:10.1186/s12909-019-1582-2](https://doi.org/10.1186/s12909-019-1582-2)
  21. Ishwari S.P, Vivek G, Purushottam A. Knowledge, Attitude and Practice of Nursing students on Hospital Acquired Infections in Western region of Nepal. *Journal of College of Medical Sciences-Nepal* Sept 2<sup>nd</sup> 2016 10.3126
  22. Sreejith S, Ramesh H, Poojar. Knowledge Attitude and Practice of Hand Hygiene Among Medical and Nursing Students at a Tertiary Care Centre in Raichur, India. *ISRN Preventive Medicine* 2014 Feb:608927
  23. Wasiu O.A, Asekun-olarinmoye, Esther O, James O. Awareness and Attitude to Nosocomial Infections Among Levels of Health-care Workers in Southwestern Nigeria. *Continental Journal of Tropical Medicine* 5(2);5 2011.
  24. Principles, S. (2001). Standard Principles for Preventing Hospital-acquired Infections. 47, 21–37. <https://doi.org/10.1053/jhin.2000.0889>
  25. Abdulraheem I. S, Amodu M. O, Saka M. J, Bolarinwa O. A and Uthman M. M. B. Knowledge Awareness and Compliance with Standard Precautions Among Health Workers in North Eastern Nigeria. *Journal of Community Medicine and Health Education*. 22nd March 2012.