



## Assessment of risk profile of medical and dental students regarding hospital-associated infections in Nigeria

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### Abstract

**Background:** Medical education involves intense clinical training which necessitates exposure of the medical and dental students to patients. In some instances, the student comes in contact with infectious diseases and are vulnerable to getting infected or by themselves becoming a carrier of the disease.

**Objectives:** We aim to assess the risk profile of medical and dental students in clinical settings in terms of hospital-associated infections.

**Study Design:** This is a cross sectional studies conducted among medical and dental students in Nigeria, with focus on 4th to 6th year students from 4 Public universities using anonymous structured questionnaire.

**Result:** Two hundred and ninety-five (295) participants were enrolled in this study. The mean ( $\pm$ SD) age of the respondents was 23.45 ( $\pm$ 2.88) years. The majority (65.1%) of them were males, 82.4% were medical students. Only 68% of the respondents reported that they had received a comprehensive lecture on infection control in the course of their training. Less than half of the respondents indicated that their institutions provide free vaccination against tetanus, hepatitis, yellow fever, and cerebrospinal meningitis. 47.1% and 57.3% of the respondents keep their clinical apparels in their school bag and room wardrobe, respectively. More than 70% of the respondents agreed that hand washing is the most important step in infection control. However, only a minority (<40%) always practice hand washing in accordance with recommendation.

**Conclusion:** The present study shows that there is a need for improvement in the attitude and practice of medical students towards hand hygiene use and vaccination. There is also a need for advocacy in institutionalization of preventive measures for the control of nosocomial infections.

Keywords: Medical students, Infection control, vaccination

### Introduction

Pathogenic microscopic agents, ranging from prions to viruses and bacteria, pose significant and

continual threats to human existence.<sup>1-4</sup> They are responsible for diverse infectious diseases, some of which manifest only with mild symptoms while some could result in a severe life-threatening process.<sup>1-4</sup> Scientific research has over the years shaped human approach toward infection prevention and control.<sup>5-8</sup> Through scientific discoveries about the nature, structure, and functions of pathogenic microscopic agents, our way of life, as human beings, had been modified in a

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positive direction.<sup>9,10</sup> For instance, human knowledge of the health risks (e.g. cholera infection) posed by open defecation has made human beings to develop and adopt use of safe toilets for faecal disposal.<sup>11</sup> Similarly, the knowledge of faeco-oral route of transmission of some pathogenic microscopic agents have made man to develop and adopt the habit of frequent hand washing practices.<sup>2</sup> In summary, medical science has shaped our lifestyles and habits when it comes to issues pertaining to the prevention and control of infection.

There are so many personal and communal benefits associated with effective and safe infection control practices, be it hand hygiene, food hygiene, garment hygiene, environmental sanitation, or any other.<sup>12</sup> These benefits range from health benefits to socioeconomic benefits, and they include: protection against diseases and epidemic outbreaks; lowered health system costs; increased work productivity; healthy, strong and vibrant national workforce; and others.<sup>12,13</sup>

However, despite the significant benefits associated with the practice of infection control, so many people are still at very high risk of contracting infectious diseases due to their unsafe behavioural practices.<sup>4,11</sup> Pertinently, scientific research have shown that so many people, including healthcare professionals and trainees, are not practicing some basic infection control practices (including hand and food hygiene) effectively.<sup>14-23</sup> The reasons implicated for these poor infection control practices were poor knowledge/lack of proper training on infection control practices,<sup>15-20,24</sup> poor attitude towards hygienic practices,<sup>18</sup> low level of formal education,<sup>18</sup> inadequate access to water and other resources needed for hygienic practices,<sup>17</sup> and others.

In a developing African country like Nigeria, recent epidemiological surveys had shown that the level of infection control among healthcare professionals is still unsatisfactory.<sup>20,25,26</sup> With this concerning situation, it will be very difficult to completely nib the risk of nosocomial infections among patients and personnel in Nigerian hospitals in the bud.<sup>27,28</sup> Despite several studies that have been conducted on infection control practices in Nigerian healthcare settings, no particular study had deeply explored this thematic area among medical and dental

students (a subset of the population of healthcare trainees in Nigeria).<sup>20,22,25</sup> In order to fill this knowledge gap, this study was conducted to assess the risk profile of medical and dental students in Nigeria regarding hospital-associated infections.

## Methods

This study was a descriptive cross-sectional study conducted among medical and dental students in Nigeria, with focus on 4<sup>th</sup> to 6<sup>th</sup> year students. We focused this study only on the 4<sup>th</sup> to 6<sup>th</sup> year students because they are all in the clinical phase of their academic programs, and they are expected to have some knowledge about the pathogenesis of infectious diseases.<sup>29</sup> This study only surveyed 4 Public universities, which were: University of Ibadan, Ibadan (UI); Obafemi Awolowo University, Ile-Ife (OAU); Ladoke Akintola University of Technology, Ogbomosho (LAUTECH); and Usmanu Dan Fodiyo University, Sokoto (UDU).

The study tool was a piloted anonymous structured questionnaire developed by the authors. The questionnaire obtained information about the participants' socio-demographic characteristics, history of receipt of a comprehensive lecture on infection control, knowledge of infectious diseases, knowledge and practice on hand washing, access and use of personal protective equipment (PPE), access to institution-based immunization programme, and immunization profile. Calculated minimum sample size for the study was 290 participants. All the 4 participating schools were selected based on accessibility to the authors.

Between March 2016 and January 2018, a total of 361 (UI = 125, LAUTECH = 56, OAU = 100, and UDU = 80) selected clinical medical and dental students were approached in their dormitories and classrooms. They were informed about the aims and objectives of the study; they were also assured that their participation was strictly confidential and voluntary, and that they were free to opt out of the study at will. Data was computed and analysed using SPSS version 20 software. Data were presented in frequencies, proportions, means and standard deviations. Continuous variables were summarized in means and standard deviations while categorical variables were summarized in frequencies and proportions and presented in tables and charts. Statistical analysis of continuous

variables was done using Student's T tests while categorical variables were analysed using Chi-square test (with Yate's correction in cases where greater than 20% of expected count is less than 5). Analysed data were presented in words, charts, and tables.

## Results

Out of the 361 students that were approached, only 307 (UI = 118, LAUTECH = 34, OAU = 82, and UDU = 73) agreed to participate in the study by giving a verbal informed consent. All the 307 consenting students (i.e. participants) were issued questionnaires to fill and returned. Only 302 (UI = 118, LAUTECH = 32, OAU = 80, and UDU = 72) participants returned their questionnaires. Hence, 7 questionnaires (UI = 1, LAUTECH = 2, OAU = 1, and UDU = 3), out of the returned 302 questionnaires, were discarded at data cleaning stage because they were unfilled/have a completeness rate of <80%. Finally, only the data from 295 (UI = 117, LAUTECH = 30, OAU = 79, and UDU = 69) participants were analysed with some questionnaires having missing data which ranged from 0.3% (academic level) to 16.6% (immunization history). Since missing data level was <20% overall, a complete case analysis was done for each variable.

### Socio-demographic Characteristics of Respondents

The mean ( $\pm$ SD) age of the respondents was 23.45 ( $\pm$ 2.88) years. The majority (65.1%) of them were males, 82.4% were medical students, 45.4% were in 400 level (4<sup>th</sup> year), 67.4% were residing in the university hostel, 61.7% were living on-campus, and 60.0% have 1 to 3 co-occupants in their room (Table 1).

### Knowledge of Respondents on Infection Control

Only 68% of the respondents reported that they had received a comprehensive lecture on infection control in the course of their training (Figure 1), meanwhile, according to the Nigerian medical and dental educational curriculum<sup>29</sup>, the surveyed respondents are expected to have received at least one lecture on infection control practices.

Bivariate analysis shows that a higher proportion of those respondents with history of receipt of a comprehensive lecture on infection control knew about the infectious diseases they were asked about,

when compared with those without such history (Table 2).

The majority (>70%) of the respondents agreed that hand washing is the most important step in infection control. Also, the majority (>70%) of them believed that it is important to wash the hand: before and after touching a patient; before doing a clean/aseptic procedure; after exposure to body fluid; and after touching patient-exposed surfaces. However, only a minority (<40%) always practice hand washing in accordance with timing (i.e. before and/or after a hand contact). Furthermore, as per the important surfaces of the hand to wash, over 60% agreed that the palm, back of the hand, thumb, inter-digital surfaces, fingernails, and the wrists are important surfaces to wash (Table 3).

### Access to Hand Hygiene Resources among Respondents

In terms of availability to hand hygiene resources, only 85.1%, 55.9%, and 33.6% of the respondents usually have access to running water, liquid soap, and electric hand dryer, respectively. Meanwhile, less than 35% had all-time clinical access to, and use of, hand sterilant, hand gloves, and face masks (Tables 3 & 4).

### Handling, Care and Use of Clinical Apparels among Respondents

The clinical apparels (ward coats, theatre linens, lab coat) of the majority (96.6%) of the respondents were personally sourced (i.e. they were not provided by their institution); of which as few as 9.5% of them (i.e. those with personally sourced clinical apparels) always wash their clinical apparels with disinfectant solution. It is noteworthy that as high as 47.1% and 57.3% of the respondents keep their clinical apparels in their school bag and room wardrobe, respectively. Also, 44.4% had never sourced for clinical apparel to wear through borrowing while 46.1% sometimes wear their clinical apparel to the cafeteria (Table 5).

### Immunization Access and History among Respondents

Regarding the provision of free and relevant immunization services by the institution of learning, less than half of the respondents indicated that their institutions provide free vaccination against tetanus, hepatitis, yellow fever, and cerebrospinal meningitis (Table 6). Finally, many of the respondents reported that they have not being

**Table 1: Sociodemographic characteristics of respondents**

| Characteristics (n=295)     | Frequency / Value | Percentage (%) |
|-----------------------------|-------------------|----------------|
| Age (in years)              |                   |                |
| Mean                        | 23.45             | N/A            |
| SD                          | 2.88              | N/A            |
| Gender                      |                   |                |
| Male                        | 192               | 65.1           |
| Female                      | 99                | 33.6           |
| Not specified               | 4                 | 1.3            |
| Course of study             |                   |                |
| Medicine                    | 243               | 82.4           |
| Dentistry                   | 48                | 16.3           |
| Not specified               | 4                 | 1.3            |
| Level                       |                   |                |
| 400 (4 <sup>th</sup> year)  | 134               | 45.4           |
| 500 (5 <sup>th</sup> year)  | 110               | 37.3           |
| 600 (6 <sup>th</sup> year)  | 50                | 17.0           |
| Not specified               | 1                 | 0.3            |
| Nature of accommodation     |                   |                |
| University hostel           | 199               | 67.4           |
| Private hostel              | 49                | 16.6           |
| Living with family          | 30                | 10.2           |
| Others                      | 10                | 3.4            |
| Not specified               | 7                 | 2.4            |
| Location of accommodation   |                   |                |
| On-campus                   | 182               | 61.7           |
| Off-campus                  | 105               | 35.6           |
| Not specified               | 8                 | 2.7            |
| Number of room co-occupants |                   |                |
| 0                           | 28                | 9.5            |
| 1 – 3                       | 177               | 60.0           |
| 4 – 6                       | 29                | 9.8            |
| 7 – 9                       | 14                | 4.8            |
| >9                          | 23                | 7.8            |
| Not specified               | 24                | 8.1            |

SD – Standard deviation; N/A – Not available

vaccinated against some common infectious diseases of importance in clinical practice and public health (Table 7).

### Discussion

This survey revealed that a large percentage of clinical medical/dental students are yet to receive a comprehensive lecture on infection control and prevention. It is advocated that healthcare

associated infections are preventable by following Infection Control protocols which are not often taught to medical student. Poor state of knowledge and practices in medical students about infection control has been shown in various studies.<sup>30-36</sup> The WHO strongly recommends incorporation of Patient Safety Module into the curriculum of medical schools as, the future doctors need to understand these concepts at an early stage to be

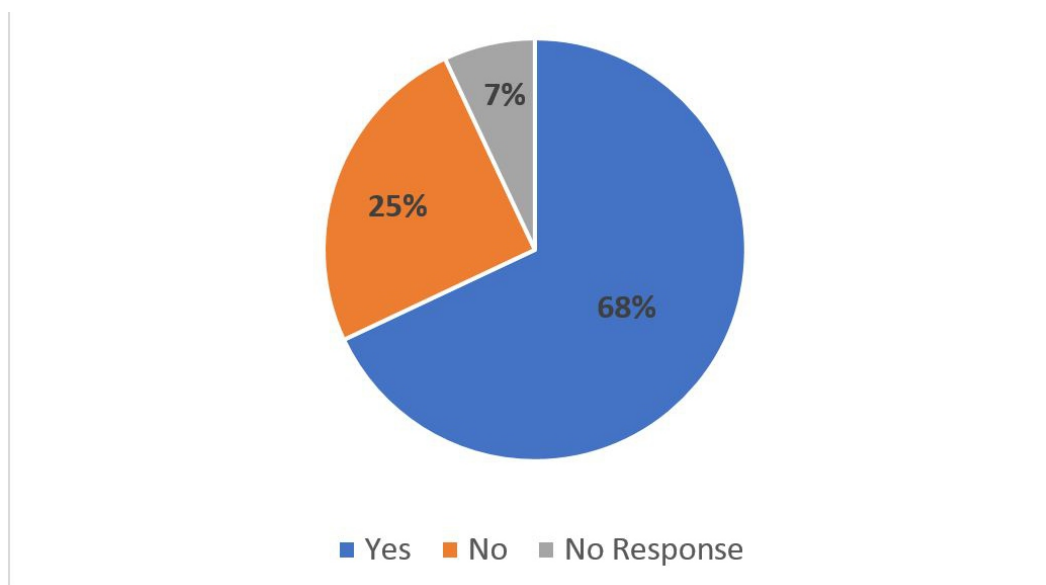


Figure 1: Respondents' history of receipt of a comprehensive lecture on infection control

Table 2: Comparison between respondents' history of receipt of a comprehensive lecture on infection control and their knowledge of infectious diseases

| The following are infectious diseases: | Had a history of receipt of a comprehensive lecture on infection control [N=200] | Had no history of receipt of a comprehensive lecture on infection control [N=73] | History status not declared [N=22] | Total [N=295] | p-value (df) |
|--|--|--|------------------------------------|---------------|--------------|
|  | Yes (%)  | Yes (%)  | Yes (%)                            | Yes (%)       |              |
| Cancer                                 | 6 (3.0)  | 1 (1.4)  | 1 (4.5)                            | 8 (2.7)       | 0.614 (2)    |
| Chicken pox                            | 115 (57.5)   | 36 (49.3)  | 10 (45.5)                          | 161 (54.6)    | 0.461 (2)    |
| HIV/AIDS                               | 168 (84.0)   | 63 (86.3)  | 13 (59.1)                          | 244 (82.7)    | 0.031 (2)    |
| Tuberculosis                           | 183 (91.5)   | 69 (94.5)  | 16 (72.7)                          | 268 (90.8)    | 0.031 (2)    |
| Pneumonia                              | 146 (73.0)   | 42 (57.5)  | 9 (40.9)                           | 197 (66.8)    | 0.010 (2)    |
| Lassa fever                            | 176 (88.0)   | 48 (65.8)  | 15 (68.2)                          | 239 (81.0)    | 0.000 (2)    |
| Pertussis                              | 102 (51.0)   | 27 (37.0)  | 8 (36.4)                           | 137 (46.4)    | 0.117 (2)    |
| Tetanus                                | 70 (35.0)  | 20 (27.4)  | 3 (13.6)                           | 93 (31.5)     | 0.120 (2)    |
| Ebola                                  | 179 (89.5)   | 62 (84.9)  | 16 (72.7)                          | 257 (87.1)    | 0.326 (2)    |
| Rubella                                | 56 (28.0)  | 9 (12.3)   | 4 (18.2)                           | 69 (23.4)     | 0.029 (2)    |
| Creutzfeldt-Jakob disease              | 21 (10.5)  | 4 (5.5)  | 1 (4.5)                            | 26 (8.8)      | 0.362 (2)    |
| Influenza                              | 116 (58.0)   | 37 (50.7)  | 9 (40.9)                           | 162 (54.9)    | 0.354 (2)    |
| Hepatitis B                            | 172 (86.0)   | 67 (91.8)  | 17 (77.3)                          | 256 (86.8)    | 0.204 (2)    |
| Haemophilia                            | 17 (8.5)   | 6 (8.2)  | 2 (9.1)                            | 25 (8.5)      | 0.976 (2)    |
| Measles                                | 116 (58.0)   | 42 (57.5)  | 10 (45.5)                          | 168 (56.9)    | 0.744 (2)    |

**Table 3: Comparison between respondents' history of receipt of a comprehensive lecture on infection control and their knowledge and practice on hand washing (Part one)**

| Variables  | Had a history of receipt of a comprehensive lecture on infection control [N=200] | Had no history of receipt of a comprehensive lecture on infection control [N=73] | History status not declared [N=22] | Total [N=295] | p-value   |
|--|--|--|------------------------------------|---------------|-----------|
|  | Yes (%)  | Yes (%)  | Yes (%)                            | Yes (%)       |           |
| Hand washing is the most important step in infection control                     |  |  |                                    |               |           |
| Yes  | 175 (87.5)   | 63 (86.3)  | 18 (81.8)                          | 256 (86.8)    | 0.992 (4) |
| No   | 15 (7.5)   | 5 (6.8)  | 2 (9.1)                            | 22 (7.5)      |           |
| Not sure   | 7 (3.5)  | 3 (4.1)  | 1(4.5)                             | 11 (3.7)      |           |
| Is there a hand washing protocol in your hospital?                               |  |  |                                    |               |           |
| Yes  | 169 (84.5)   | 42 (57.5)  | 17 (77.3)                          | 228 (77.3)    | 0.000 (4) |
| No   | 17 (8.5)   | 22 (30.1)  | 2 (9.1)                            | 41 (13.9)     |           |
| Not sure   | 13 (6.5)   | 7 (9.6)  | 1 (4.5)                            | 21 (7.1)      |           |
| When is it important to wash your hand? <sup>a</sup>                             |  |  |                                    |               |           |
| Before touching a patient  | 179 (89.5)   | 64 (87.7)  | 15 (68.2)                          | 258 (87.5)    | 0.042 (2) |
| After touching a patient   | 185 (92.5)   | 63 (86.3)  | 17 (77.3)                          | 265 (89.8)    | 0.107 (2) |
| Before clean/aseptic procedure   | 152 (76.0)   | 43 (58.9)  | 14 (63.6)                          | 209 (70.8)    | 0.019 (2) |
| After exposure to body fluid   | 164 (82.0)   | 47 (64.4)  | 15 (68.2)                          | 226 (76.6)    | 0.005 (2) |
| After touching patient-exposed surfaces  | 168 (84.0)   | 52 (71.2)  | 14 (63.6)                          | 234 (79.3)    | 0.013 (2) |
| How often do you wash your hand before and after touching a clinical sample?     |  |  |                                    |               |           |
| Never  | 1 (0.5)  | 3 (4.1)  | 1 (4.5)                            | 5 (1.7)       | 0.022 (8) |
| Rarely   | 7 (3.5)  | 4 (5.4)  | 0 (0.0)                            | 11 (3.7)      |           |
| Sometimes  | 43 (21.5)  | 23 (31.5)  | 1 (4.5)                            | 67 (22.7)     |           |
| Usually  | 66 (33.5)  | 17 (23.3)  | 11 (50.0)                          | 94 (31.9)     |           |
| Always   | 83 (41.5)  | 24 (32.9)  | 8 (36.4)                           | 115 (39.0)    |           |
| How often do you wash your hand before and after examining a patient?            |  |  |                                    |               |           |
| Never  | 3 (1.5)  | 1 (1.4)  | 1 (4.5)                            | 5 (1.7)       | 0.405 (8) |
| Rarely   | 8 (4.0)  | 2 (2.7)  | 0 (0.0)                            | 10 (3.4)      |           |
| Sometimes  | 40 (20.0)  | 24 (32.9)  | 7 (31.8)                           | 71 (24.1)     |           |
| Usually  | 72 (36.0)  | 21 (28.8)  | 7 (31.8)                           | 100 (33.9)    |           |
| Always   | 76 (38.0)  | 24 (32.9)  | 6 (27.3)                           | 106 (35.9)    |           |
| How often do you wash your hand before and after touching a laboratory specimen? |  |  |                                    |               |           |
| Never  | 1 (0.5)  | 1 (1.4)  | 0 (0.0)                            | 2 (0.7)       | 0.014 (8) |
| Rarely   | 8 (4.0)  | 8 (11.0)   | 1 (4.5)                            | 17 (5.8)      |           |
| Sometimes  | 40 (20.0)  | 24 (32.9)  | 4 (18.2)                           | 68 (23.1)     |           |
| Usually  | 75 (37.5)  | 10 (13.7)  | 7 (31.8)                           | 92 (31.2)     |           |
| Always   | 75 (37.5)  | 29 (39.7)  | 9 (40.9)                           | 113 (38)      |           |

**Table 3: Comparison between respondents' history of receipt of a comprehensive lecture on infection control and their knowledge and practice on hand washing (Part two)**

|  |            |           |           |            |           |
|--|------------|-----------|-----------|------------|-----------|
| When washing the hand, which of the following surfaces do you consider important? <sup>a</sup> |            |           |           |            |           |
| Palm   | 187 (93.5) | 67 (91.8) | 18 (81.8) | 272 (92.2) | 0.364 (2) |
| Back of hand   | 164 (82.0) | 54 (74.0) | 16 (72.7) | 234 (79.3) | 0.500 (2) |
| Thumbs   | 148 (74.0) | 37 (50.7) | 13 (59.1) | 198 (67.1) | 0.012 (4) |
| Interdigital areas   | 173 (86.5) | 58 (79.5) | 17 (77.3) | 248 (84.1) | 0.541 (2) |
| Finger nails   | 164 (82.0) | 48 (65.8) | 16 (72.7) | 228 (77.3) | 0.041 (2) |
| Wrist  | 139 (69.5) | 36 (49.3) | 11 (50.0) | 186 (63.1) | 0.007 (2) |
| Which soap do you usually use for hand washing in the clinic/lab?                              |            |           |           |            |           |
| Liquid soap  | 122 (61.0) | 32 (43.8) | 11 (50.0) | 165 (55.9) | ***       |
| Non-medicated bar soap   | 5 (2.5)    | 5 (6.8)   | 2 (9.1)   | 12 (4.1)   | ***       |
| Medicated bar soap   | 17 (8.5)   | 8 (11.0)  | 2 (9.1)   | 27 (9.2)   | ***       |
| Medicated liquid soap  | 101 (50.5) | 30 (41.1) | 9 (40.9)  | 140 (47.5) | ***       |
| Detergent  | 13 (6.5)   | 2 (2.7)   | 0 (0.0)   | 15 (5.1)   | 0.068 (2) |
| Soap is rarely available in any form   | 5 (2.5)    | 9 (12.3)  | 2 (9.1)   | 16 (5.4)   | ***       |
| What is the source of water that is usually available for hand washing in the clinic/lab?      |            |           |           |            |           |
| Running tap water  | 175 (87.5) | 58 (79.5) | 18 (81.8) | 251 (85.1) | ***       |
| Scooped water from a reservoir   | 58 (29.0)  | 13 (17.8) | 6 (27.3)  | 77 (26.1)  | ***       |
| Sachet water   | 6 (3.0)    | 5 (6.8)   | 1 (4.5)   | 12 (4.1)   | ***       |
| Water is rarely available  | 7 (3.5)    | 4 (5.5)   | 2 (9.1)   | 13 (4.4)   | ***       |
| After hand washing in the clinic/lab, how do you dry your hand?                                |            |           |           |            |           |
| Paper towel  | 18 (9.0)   | 7 (9.6)   | 1 (4.5)   | 26 (8.8)   | ***       |
| Cloth towel  | 37 (18.5)  | 19 (26.0) | 5 (22.7)  | 61 (20.7)  | ***       |
| Electric hand dryer  | 77 (38.5)  | 16 (21.9) | 6 (27.3)  | 99 (33.6)  | ***       |
| Air drying   | 104 (52)   | 34 (46.6) | 8 (36.4)  | 146 (49.5) | ***       |
| Personal wear/ward coat  | 27 (13.5)  | 11 (15.1) | 3 (13.6)  | 41 (13.9)  | ***       |
| Others   | 3 (1.5)    | 2 (2.7)   | 2 (9.1)   | 7 (2.4)    | ***       |
| How would you rate the availability of hand sterilant for use in clinics and wards?            |            |           |           |            |           |
| Always   | 28 (14.0)  | 4 (5.5)   | 1 (4.5)   | 33 (11.2)  | 0.003 (8) |
| Usually  | 59 (29.5)  | 15 (20.5) | 6 (27.3)  | 80 (27.1)  |           |
| Sometimes  | 77 (38.5)  | 20 (27.4) | 9 (40.9)  | 106 (35.9) |           |
| Rarely   | 27 (13.5)  | 23 (31.5) | 4 (18.2)  | 54 (18.3)  |           |
| Never  | 9 (4.5)    | 8 (11.0)  | 0 (0.0)   | 17 (5.8)   |           |

<sup>a</sup> – Multiple responses apply; \*\*\*No statistics was computed because the cross-tabulated variables were constant

**Table 4: Availability and use of hand gloves and face masks among respondents**

| Variable   | Responses  |            |               |             |            |                 |
|--|------------|------------|---------------|-------------|------------|-----------------|
|  | Never (%)  | Rarely (%) | Sometimes (%) | Usually (%) | Always (%) | No response (%) |
| How would you rate the availability of hand gloves for patient management? | 2 (0.7)    | 14 (4.7)   | 53 (18.0)     | 126 (42.7)  | 98 (33.2)  | 2 (0.7)         |
| How would you rate the availability of face masks for patient management?  | 14 (4.7)   | 63 (21.4)  | 100 (33.9)    | 75 (25.4)   | 40 (13.6)  | 3 (1.0)         |
| How often do you use hand gloves when attending to a patient?              | 2 (0.7)    | 21 (7.1)   | 102 (34.6)    | 107 (36.3)  | 57 (19.3)  | 6 (2.0)         |
| Do you use one pair of hand gloves for more than one patient?              | 232 (78.6) | 27 (9.2)   | 24 (8.2)      | 6 (2.0)     | 3 (1.0)    | 3 (1.0)         |
| How often do you use face mask when attending to a patient?                | 55 (18.6)  | 112 (38.0) | 84 (28.5)     | 27 (9.2)    | 14 (4.7)   | 3 (1.0)         |
| Do you use one face mask for more than one patient?                        | 110 (37.3) | 47 (15.9)  | 63 (21.4)     | 51 (17.3)   | 11 (3.7)   | 13 (4.4)        |

able to incorporate them into their practice. This module includes a topic on minimizing infection through improved infection control which should focus on standard precautions including hand hygiene, sterilisation and disinfection, spillage, biomedical waste management, sharp injuries, use of personal protective equipment and vaccination.<sup>37</sup> Combinations of teaching methods should be used to ensure that students participate actively in the sessions, suggested methods include

interactive/didactic lectures, video show, small group discussion sessions, simulation exercises and demonstration.<sup>38</sup>

The spread of infection in health-care settings today affects hundreds of millions of people worldwide. In a WHO sponsored prevalence survey study conducted in 55 hospitals of 14 countries representing four WHO regions (South-East Asia, Europe, the Eastern Mediterranean and the Western Pacific) it was found that, on average, 8.7% of



**Table 5: Usage and handling of ward coat, theatre linen, and lab coats among respondents**

| Variables  | Frequency (%) |
|--|---------------|
| How do you get your ward coat/theatre linen/lab coat? [N=295]  |               |
| Personally sourced   | 285 (96.6)    |
| Institutionally sourced  | 8 (2.7)       |
| No response  | 2 (0.7)       |
| If personally sourced, how often do you wash your ward coat? [N=285]   |               |
| Daily  | 41 (14.4)     |
| Twice, weekly  | 137 (48.1)    |
| Once, weekly   | 92 (32.3)     |
| When visibly soiled  | 13 (4.6)      |
| No response  | 2 (0.7)       |
| If personally sourced, how often do you wash your ward coat/theatre linen/lab coat with disinfectant solution? [N=285] |               |
| Never  | 72 (25.3)     |
| Rarely   | 70 (24.6)     |
| Sometimes  | 65 (22.8)     |
| Usually  | 49 (17.2)     |
| Always   | 27 (9.5)      |
| No response  | 2 (0.7)       |
| How do you wash your ward coat/theatre linen/lab coat? <sup>a</sup> [N=295]  |               |
| Hand washing by myself   | 254 (86.1)    |
| Personal washing machine   | 18 (6.1)      |
| Institutional laundry services   | 3 (1.0)       |
| Private laundry services   | 32 (10.8)     |
| Others   | 1 (0.3)       |
| Do you have lockers to stow away personal belongings in the clinics or wards? [N=295]                                  |               |
| Yes  | 51 (17.3)     |
| No   | 230 (78.0)    |
| No response  | 14 (4.7)      |
| Where do you keep your ward coat/theatre linen/lab coat? <sup>a</sup> [N=295]  |               |
| My room wardrobe   | 169 (57.3)    |
| School locker  | 29 (9.8)      |
| In the car   | 13 (4.4)      |
| Outside my room  | 18 (6.1)      |
| In my school bag   | 139 (47.1)    |
| Others   | 28 (9.5)      |
| How often do you borrow ward coat/theatre linen/lab coat? [N=295]  |               |
| Never  | 131 (44.4)    |
| Rarely   | 102 (34.6)    |
| Sometimes  | 49 (16.6)     |
| Usually  | 3 (1.0)       |
| Always   | 0 (0.0)       |
| No response  | 10 (3.4)      |
| I sometimes wear my ward coat/theatre linen/lab coat to the following places <sup>a</sup> [N=295]                      |               |
| Cafeteria  | 136 (46.1)    |
| Market   | 5 (1.7)       |
| Bank   | 46 (15.6)     |
| Lecture theatre  | 187 (63.4)    |
| Toilet   | 86 (29.2)     |
| Offices  | 75 (25.4)     |
| Cinema   | 2 (0.7)       |
| Public transportation vehicles   | 24 (8.1)      |
| Others   | 4 (1.4)       |

<sup>a</sup> – Multiple responses apply; N – Total number of eligible respondents

**Table 6: Free vaccination programmes, provided at school, available to the respondents**

| Are there free vaccination programmes against the following infectious diseases in your school? | Responses  |            |                 |
|---|------------|------------|-----------------|
|   | Yes (%)    | No (%)     | No response (%) |
| Tetanus   | 125 (42.4) | 124 (42.0) | 46 (15.6)       |
| Hepatitis   | 114 (38.6) | 140 (47.5) | 41 (13.9)       |
| Yellow fever  | 60 (20.3)  | 172 (58.3) | 63 (21.4)       |
| Cerebrospinal meningitis  | 70 (23.7)  | 151 (51.2) | 74 (25.1)       |

**Table 7: Vaccination status of respondents, according to them**

| Infectious disease           | Vaccination status |            |                  |                 |
|------------------------------|--------------------|------------|------------------|-----------------|
|                              | Yes (%)            | No (%)     | I don't know (%) | No response (%) |
| Tetanus                      | 183 (62.0)         | 34 (11.5)  | 56 (19.0)        | 22 (7.5)        |
| Hepatitis B                  | 146 (49.5)         | 80 (27.1)  | 44 (14.9)        | 25 (8.5)        |
| Yellow fever                 | 129 (43.7)         | 54 (18.3)  | 79 (26.8)        | 33 (11.2)       |
| Meningitis                   | 116 (39.3)         | 73 (24.7)  | 74 (25.1)        | 32 (10.9)       |
| Anthrax                      | 8 (2.7)            | 122 (41.4) | 118 (40.0)       | 47 (15.9)       |
| Human papillomavirus         | 12 (4.1)           | 150 (50.8) | 86 (29.2)        | 47 (15.9)       |
| Diphtheria                   | 120 (40.7)         | 56 (19.0)  | 81 (27.4)        | 38 (12.9)       |
| Hepatitis A                  | 38 (12.9)          | 125 (42.3) | 92 (31.2)        | 40 (13.6)       |
| Haemophilus influenza type b | 59 (20.0)          | 81 (27.5)  | 108 (36.6)       | 47 (15.9)       |
| Influenza                    | 48 (16.2)          | 81 (27.5)  | 121 (41.0)       | 45 (15.3)       |
| Measles                      | 164 (55.6)         | 31 (10.5)  | 71 (24.1)        | 29 (9.8)        |
| Mumps                        | 72 (24.4)          | 72 (24.4)  | 110 (37.3)       | 41 (13.9)       |
| Pertussis                    | 111 (37.6)         | 54 (18.3)  | 94 (31.9)        | 36 (12.2)       |
| Pneumococcal infection       | 55 (18.6)          | 78 (26.4)  | 117 (39.7)       | 45 (15.3)       |
| Polio                        | 191 (64.7)         | 28 (9.5)   | 48 (16.3)        | 28 (9.5)        |
| Rabies                       | 32 (10.8)          | 100 (33.9) | 120 (40.7)       | 43 (14.6)       |
| Rotavirus                    | 29 (9.8)           | 95 (32.2)  | 122 (41.4)       | 49 (16.6)       |
| Rubella                      | 43 (14.6)          | 86 (29.2)  | 118 (40.0)       | 48 (16.2)       |
| Herpes zoster                | 21 (7.2)           | 101 (34.2) | 126 (42.7)       | 47 (15.9)       |
| Typhoid                      | 30 (10.2)          | 105 (35.6) | 114 (38.6)       | 46 (15.6)       |
| Chicken pox                  | 68 (23.1)          | 73 (24.7)  | 108 (36.6)       | 46 (15.6)       |

hospital patients suffer health care-associated infections. At any time, over 1.4 million people worldwide suffer from infectious complications acquired while in hospital being treated for a medical condition.<sup>39</sup> It must be emphasised to the students that handwashing is the single most important infection control intervention before and after patient contact. Every health-care worker is required to act responsibly and without fail to apply the techniques for handwashing at every patient encounter. Students need to be instructed on how to clean hands, the rationale for choice of clean hand practice, techniques for hand hygiene, how to protect hands from contaminants and how to promote adherence to hand hygiene guidelines.<sup>37</sup>

It is widely reported that there could be a disparity hand washing knowledge and behaviour,<sup>21,31,32,34,40,41</sup> medical educators can have a major influence on the hygiene behaviours of their trainees, mainly because of the imitation of the behaviours of the medical educators.<sup>42</sup> Medical students and junior doctors were reported to have been influenced by their seniors.<sup>33</sup> It is therefore pertinent that the culture of handwashing is institutionalised to ensure that the right behaviour is copied.

The availability of hand washing facility has a direct effect on hand hygiene measures. Availability of the handwashing station is reportedly low in the participating institution. This is similar to the findings of Onyedibe et al (2020) who reported poor availability of hand hygiene facilities in a large tertiary hospital in Nigeria.<sup>43</sup> Similarly, WHO stated that 1 in 4 health facility had no running water and 1 in 3 had no hand washing facility at point of care,<sup>44</sup> this has led to a recommendation issued to all member states of the WHO on 1 April 2020 to provide universal access to public hand hygiene stations and make their use obligatory, and to improve access to and the practice of hand hygiene in health care facilities.<sup>45</sup> Improved access to hand hygiene facility will encourage the use of same.<sup>43</sup>

The use of portable hand hygiene stations have been studied and found to be cost effective in the immediate deployment of hand hygiene facility in resource limited areas.<sup>46,47</sup> In situation where water and soap is not feasible, other options for hand hygiene are alcohols, Chlorhexidine, Chloroxylenol, Hexachlorophene, Iodine and iodophors, Quaternary ammonium compounds and

Triclosan.<sup>44</sup>

Clinical apparel is an important vector for transmission of nosocomial infections.<sup>48,49</sup> Many of our participants wear their ward coats (clinical apparel) to cafeteria, banks, lecture theatre, and other public places; this is an unsafe practice that can facilitate the rate of spread of infectious diseases at the community level. Also, majority of them acquire and process their ward coats and scrubs (clinical apparel) personally with most of them returning the ward coats to their hostel rooms. However, the standard practice is the processing of such apparel by the sanitation unit/department of the teaching hospitals where medical and dental students are receiving their clinical training.<sup>50,51</sup>

Hence, we recommend that all Nigerian teaching hospitals should ensure that workable policies are formulated and implemented regarding safe and proper handling and processing of all clinical apparels used by all students undergoing training in such hospitals.

Another important finding in this study is the uptake of vaccination. Vaccination has been shown to be effective in protecting against a variety of diseases. The most commonly reported vaccination was against polio and tetanus while vaccination against HBV, HPV and influenza was quite low. This is similar to reports from previous studies from Nigeria,<sup>52</sup> Cameroon,<sup>53</sup> Iran,<sup>54</sup> and Poland.<sup>55</sup> It is important that clinical medical/dental students are routinely vaccinated against common viral diseases by the institution. The vaccination should be provided free of charge via the institutional health insurance system and should be a requirement before deployment for clinical postings.

## Conclusion

The present study shows that there is a need for improvement in the attitude and practice of medical students towards hand hygiene use and vaccination. There is also a need for advocacy in institutionalization of preventive measures control of nosocomial infections.

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