

Perceived barriers, knowledge and reported practices of infection prevention and control among clinical nursing and medical students of a Nigerian University

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Abstract

Infection prevention and control is a key aspect of clinical teaching, and is critical for clinical nursing and medical students as they will turn out to be future healthcare providers. It is therefore very important for them to be very knowledgeable about infection control practices and comply adequately with them. However, different barriers have been known to hinder the practice of proper infection control among students, hence the need to study the knowledge, self-reported practice and perceived barriers to practice infection control measures among students, with the aim of proffering lasting solutions to them.

A descriptive cross-sectional study design was used for the study. A convenience sampling technique was used to select a total of 239 clinical nursing and medical students who participated in the study. A self-administered questionnaire was used to collect relevant information from the participants. Data collected were cleaned, coded and entered into the SPSS, version 20.0 (IBM Corp., Armonk, NY), which was used to analyse the data. Data were presented using tables, frequencies and percentages.

The greatest proportion of the participants, 91.6%, had adequate knowledge about infection control, with a large proportion, 42.7%, having low compliance to infection control measures. Moreover, participants identified lack of gloves (87.4%), tasking nature of hand washing (74.9%), lack of time (74.1%) and lack of colour codes for waste disposals (72.0%) as major barriers to effective infection control practices.

Infection control is an integral aspect of practice of any clinically oriented profession. It is therefore imperative that students training to become future health care professionals be knowledgeable about proper infection control principles, in order to be able to reduce the burden of infectious diseases in Nigeria. It is also important that barriers to adequate practice of infection control be broken, to enable clinical students to maintain optimal health status while also protecting the patients.

Keywords: knowledge, attitude, behavior, infection control, nursing students, medical students, Nigeria

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Introduction

Healthcare associated infections (HAIs) remain the most frequent adverse event in any healthcare delivery system and affect millions of people each year, leading to significant morbidity and mortality.¹ Evidence throughout the literature shows that a large proportion of healthcare providers and clients had acquired infections within a healthcare facility.²⁻⁴ Some hospitals in developed countries such as the USA demonstrated that HAIs alone account for an estimated 1.7 million infections within a year, with 98,987 HAI-associated deaths.⁵ Although well-established data were not available regarding the burden of HAIs in Africa, a systematic review done in the region revealed that its magnitude would be much higher than in developed nations.⁶ Of every 100 hospitalised patients at any given time, seven in developed and 10 in developing countries will acquire at least one HAI. The endemic burden of HAIs is also significantly higher in low-middle income than in high income countries, of which so many risk factors are responsible, some of which include poor catheter practices, surgery, injections, health care settings that are not properly cleaned and disinfected and communicable diseases passing between patients and healthcare workers.⁷ Reducing preventable HAIs therefore remains an imperative mission and is a continuous opportunity to improve and maximize health care worker and patient safety.⁸

However, despite recommendations by the World Health Organization and the Centers for Disease Control and Prevention, non-adherence remains a recurring issue in healthcare settings and is worrying, as it exposes the workplace to unnecessary occupational hazards, reflected in high incidence rates of occupational accidents by exposure to body fluids and sharp objects.^{9,10} In developing countries, in spite of the demonstrated effectiveness of infection prevention and control practices, studies have shown a very low compliance with professionals and students alike.¹¹ Compliance with infection prevention and control precautions has also been found to be low in many areas, for which factors such as lack of knowledge and lack of positive role models, classroom and in field gaps, inadequate facilities, psychological barriers and lack of information about standard precautions, have

been reported by clinical students.¹² It has also been noted that students are usually reluctant to report poor practice due to fear of failing placements and not wanting to be identified negatively by staff.¹³ With nursing and medical students having the most exposure to infectious agents during their training, it is therefore necessary for measures to be set up to ensure they have a good knowledge of infection prevention and control methods in order to prevent transmission of HAIs. The objective of this study was therefore to identify the knowledge, reported practice and perceived barriers to infection prevention and control among medical and nursing students of a Nigerian University.

Methods

Study design

The descriptive cross-sectional research design was used to determine the perceived barriers and reported practice of infection prevention and control among clinical nursing and medical students of a Nigerian university.

Study settings

The research study took place in the University of Ibadan and University College Hospital, Ibadan.

University of Ibadan

University of Ibadan is a federal tertiary institution situated along Ibadan-Oyo express road, and under the Akinyele local government of Oyo state. It has a total of thirteen faculties, of which Faculty of Clinical Sciences, housing the departments of medicine, nursing and physiotherapy is a part. Department of Nursing is domiciled in the University of Ibadan, with the students going for clinical placements in the University College Hospital.

University College Hospital, Ibadan

The University College Hospital (UCH) Ibadan is located in Ibadan north local government area of Oyo State. It is a public and tertiary care system that is also involved in teaching and research. It houses the College of Medicine of which the Faculty of Clinical Sciences is a part. The Department of Medicine is located in UCH, and medical students transfer to clinical areas in the hospital, after their third year in the University of Ibadan as pre-clinical students.

Study population

The study population included year two to year five nursing students from the University of Ibadan and year four to year six medical students, from University College Hospital who are all clinical students.

Sampling techniques

There is a total of 563 medical and nursing clinical students in the University College Hospital and the University of Ibadan, out of which 239 were selected using the convenience sampling method.

Instrument for data collection

The questionnaire that was used to collect data for this study was developed by the researchers from previous studies on clinical nursing and medical students' reported practice of infection prevention and control. The questionnaire contained four sections. Section A collected information about the socio-demographic variables of the participants; Section B collected information about knowledge and self-reported practice of infection control methods; Section C collected information about self-reported

compliance with infection control methods; while Section D collected information about perceived barriers to the practice of infection control methods. The questionnaire was pre-tested by the researchers among 20 clinical nursing and medical students of the Obafemi Awolowo University, using the test-retest method, after which a reliability score of 0.85 was found indicating that the instrument is strongly reliable.

Data collection procedure

A self-administered questionnaire was used to collect relevant information from the participants. The participants were told briefly about the research, how to fill the questionnaires and the period of time needed to complete it, after which informed consent was taken. Participation in the study was voluntary. The questionnaires were administered to those who were willing to participate in the Department of Nursing, University of Ibadan and the Department of Medicine, University College Hospital, and were collected at the spot after completion. Participants were asked not to write their names or attach any kind

Table I. Demographic characteristics of participants

| Variable (N=239) | Frequency | Percentage |
|------------------------|-----------|------------|
| Gender | | |
| Male | 125 | 52.3 |
| Female | 114 | 47.7 |
| Age | | |
| 18-22 years | 152 | 63.6 |
| 23-27 years | 75 | 31.4 |
| 28-32 years | 12 | 5.0 |
| Course of Study | | |
| Nursing | 56 | 23.4 |
| Medicine | 183 | 76.6 |
| Religion | | |
| Islam | 68 | 28.5 |
| Christianity | 171 | 71.5 |
| Marital Status | | |
| Single | 192 | 80.3 |
| Married | 47 | 19.7 |

Table II. Knowledge of infection control measures

| Statements | Yes | | No | | I Don't Know | |
|---|-----|------|-----|-------|--------------|------|
| | No. | % | No. | % | No. | % |
| It prevents the spread of infection | 228 | 95.4 | 11 | 4.6 | - | 0 |
| It ensures protection of immune compromised patients | 211 | 88.3 | 24 | 10.0 | 4 | 1.7 |
| It is only needed in clinical settings | 33 | 13.8 | 206 | 86.2 | - | 0 |
| Hand washing is the most effective infection control method | 64 | 26.8 | 165 | 69.0 | 10.0 | 4.2 |
| The use of personal protective equipment is incumbent in the care of all patients irrespective of the type of illness they present with | 221 | 92.5 | 15 | 6.3 | 3 | 1.3 |
| Personal protective gown should be worn while attending to infectious patients only | 64 | 26.8 | 165 | 69.0 | 10 | 4.2 |
| Personal protective gown should be worn during wound dressing only | 27 | 11.3 | 211 | 88.3 | 1 | .4 |
| Face mask must be used when sneezing or coughing only | 41 | 17.1 | 198 | 82.9 | - | 0 |
| It is important to use a face mask during surgical operations | 214 | 89.5 | 24 | 10.0 | 1 | .4 |
| The use of face mask is not compulsory during wound dressing | 81 | 33.9 | 111 | 46.4. | 47 | 19.7 |
| Improper use of infection control techniques can predispose the health worker to infection | 224 | 93.7 | 15 | 6.3 | - | 0 |
| Personal protective gown should be worn before every procedure | 209 | 87.4 | 29 | 12.1 | 1 | .4 |

of identifiers to the questionnaires as the responses were anonymous. The questionnaires were cross checked for completeness before leaving the field.

Statistical analysis

Data collected were cleaned, coded and entered into spread sheet. Analysis was done using SPSS, version 20.0 (IBM Corp., Armonk, NY). Descriptive statistics such as frequency, percentage, mean and standard deviation were used to present the knowledge, perceived barriers and practice of infection prevention and control measures. The dependent variables were the reported practice of and barrier to practice of infection prevention and control measures, which

were dependent on knowledge of infection prevention and control measures. Each correct knowledge answer was assigned 1, while an incorrect answer was assigned 0, after which it was summed and the mean score calculated. For knowledge, participants who scored above the mean (≥ 6), were rated as having adequate knowledge, while participants who scored below the mean were rated as having inadequate knowledge (≤ 6). For compliance, each correct answer was scored 1 and each incorrect answer was scored 0, after which a mean score was calculated. Participants that scored above the mean (≥ 8) were rated as having high compliance, while participants scoring below the mean (≤ 8) were rated as having low compliance.

Table III. Availability of facilities for infection control

| Equipment | Available and sufficient for a shift | % | Available but not sufficient for a shift | % | Not available at all at a shift | % |
|---------------------------------------|--------------------------------------|------|--|------|---------------------------------|------|
| Hand washing basin | 230 | 96.2 | 3 | 1.3 | 6 | 2.5 |
| Soap for hand washing | 194 | 81.2 | 45 | 18.8 | - | 0 |
| Towels or paper for drying hands | 187 | 78.2 | 52 | 21.8 | - | 0 |
| Disinfectant solution | 211 | 88.3 | 28 | 11.7 | - | 0 |
| Mask | 124 | 51.9 | 55 | 23.0 | 60 | 25.1 |
| Sterile gloves | 112 | 46.9 | 121 | 50.6 | 6 | 2.5 |
| Gown | 72 | 30.1 | 162 | 67.8 | 5 | 2.1 |
| Disposable gloves | 49 | 20.5 | 136 | 56.9 | 54 | 22.6 |
| Eye protection | 38 | 15.9 | 194 | 81.2 | 7 | 2.9 |
| Overhead cap | 119 | 49.8 | 113 | 47.3 | 7 | 2.9 |
| Sterile surgical instruments | 70 | 29.2 | 155 | 64.9 | 14 | 5.9 |
| Special container for sharps disposal | 72 | 30.1 | 163 | 68.2 | 4 | 1.7 |

Results

Table I shows the socio-demographic characteristics of the participants. Results from the study indicate that the greatest proportion of the participants (63.6%) were within the age of 18-22, and more than half of the participants (76.6%) were from Department of Medicine and Surgery, and were mostly single (80.3%). Results also indicate that 54% of the students heard about infection control from school lecturers.

Table II shows the reported level of knowledge of infection control measures. Results from the study indicate that 95.4% of the participants know that use of personal protective equipment prevents the spread of infection, with 92.5% of them believing that the use of personal protective equipment is incumbent in the care of all patients irrespective of the type of illness they present with. However, 69% of them stated that hand washing is not the most effective infection control method, while 26.8% of them believe personal protective gowns should only be worn while attending to infectious patients only. An analysis of the summary of knowledge of infection control measures shows an inadequacy of knowledge among 8.4% of the participants.

Table III shows availability of facilities for infection control. Results from the study show that a large proportion of the participants (25.1%) complained of unavailability of face masks, while 22.6% complained of unavailability of disposable gloves.

Table IV shows the reported level of compliance to infection control measures. Result from the study depicts that 52.7% of the participants do not wash their hands before procedures and 41% do not wash their hands after procedures. Moreso, 34.3% do not wear gloves to perform procedures and comply with infection control measures. In addition, 62.8% of them have been exposed to a needle prick, while 70.3% recap needles after use and 39.7% and 34.7% respectively have not been vaccinated against tetanus and hepatitis B virus. In summarizing the reported level of compliance with infection control measures, results from the study depict that 43.4% of the participants do not comply with infection control measures.

Table V shows the barriers to practice of good infection control measures. Results from the study indicate that unavailability of gloves (88.9%), non-use of colour

Table IV. Self-reported level of compliance to infection control measures

| Statements | Yes | % | No | % | I don't know | % |
|---|-----|------|-----|------|--------------|------|
| I wash my hands before every procedure | 51 | 21.3 | 126 | 52.7 | 62 | 26.0 |
| I wash my hands after every procedure | 118 | 49.4 | 98 | 41.0 | 23 | 9.6 |
| I don gloves before performing any procedure on the ward | 87 | 36.4 | 82 | 34.3 | 70 | 29.3 |
| I have been vaccinated against tetanus before starting clinical posting | 109 | 45.6 | 118 | 49.4 | 12 | 5.0 |
| I wear my face masks only when I am dealing with infectious patients | 147 | 61.5 | 91 | 38.1 | 1 | .4 |
| I wash my hands only when I came in contact with body fluid | 141 | 60.0 | 97 | 40.6 | 1 | .4 |
| I recap needle after use | 168 | 70.3 | 71 | 29.7 | - | 0 |
| I made sure I completed my tetanus vaccine before starting clinical posting | 129 | 54.0 | 110 | 46.0 | - | 0 |
| I wear my gown always on the ward | 163 | 68.2 | 73 | 30.5 | 3 | 1.3 |
| I remove my gown before leaving the hospital environment | 121 | 50.6 | 118 | 49.4 | - | 0 |
| I wash my hands after removing my gloves | 59 | 24.7 | 180 | 75.3 | - | 0 |
| I have been vaccinated against tetanus | 140 | 58.6 | 95 | 39.7 | 4 | 1.7 |
| I have been vaccinated against hepatitis B virus | 151 | 63.2 | 83 | 34.7 | 5 | 2.1 |
| If yes, I received the complete dosage of vaccines | 140 | 58.6 | 99 | 41.4 | - | 0 |
| I have been exposed to a needle prick | 150 | 62.8 | 89 | 37.2 | - | 0 |
| I have been exposed to body fluid of an infectious patient | 215 | 90.0 | 23 | 9.6 | 1 | .4 |

codes for waste disposals (73.2%), insufficient time to wash hands (75.3%) and tasking nature of hand washing (76.2%) as major barriers to the practice of infection control measures.

Discussion

Findings from this study reveal that the greatest proportion of the participants have adequate knowledge about infection control practices. This finding agrees with a research conducted in eight general hospitals in Italy, which evaluated the knowledge, attitudes and compliance with standard precautions among emergency professionals, where high levels of knowledge of preventive measures

were noted.¹⁴ This finding is however contrary to that found in a 2007,¹⁵ where many students lacked adequate knowledge of infection control measures regarding the common clinical procedures. Also, in other international studies, low knowledge and professional adherence to standard precautions were also observed,^{16,17} indicating that there are still differences in participation rates between developed countries and developing ones. This therefore presents a need for further strengthening of clinical students' education about utilizing infection control measures in practice in order to prevent contraction and spread of nosocomial infections among themselves and to patients.

Table V. Perceived barriers to practice of infection control method

| | Yes | % | No | % |
|--|-----|------|-----|------|
| Inadequate supply of hand washing equipment | 112 | 46.9 | 127 | 53.1 |
| Gloves are too expensive | 110 | 46.0 | 129 | 54.0 |
| Non availability of gloves | 209 | 87.4 | 30 | 12.6 |
| Non availability of sharp boxes in procedure rooms | 113 | 47.3 | 126 | 52.7 |
| Ignorance of the use of colour codes as regards waste disposal | 66 | 27.6 | 173 | 72.4 |
| The hospital policy does not necessitate the use of colour codes for waste disposals | 172 | 72.0 | 67 | 28.0 |
| Hepatitis B vaccines are very expensive | 119 | 49.8 | 120 | 50.2 |
| Non exposure to infectious patients | 122 | 51.0 | 117 | 49.0 |
| Not enough time to get vaccinated | 95 | 39.7 | 144 | 60.3 |
| Not enough time to wash hands | 177 | 74.1 | 62 | 25.9 |
| Washing hands is too tasking | 179 | 74.9 | 60 | 25.1 |

Furthermore, a good number of the participants have low level of self-reported compliance to infection control measures, despite their adequate knowledge of infection control measures. This finding agrees with findings from a study where low compliance of professionals and students alike were noted.¹¹ In tandem with this study also, a study in five general hospitals in the Republic of Cyprus pointed out that only 9.1% of nurses adopt the standard practice as recommended.¹⁶ The low level of compliance to infection control measures among clinical students is a source of great worry as this will encourage further spread of infections among and within the students and patients alike. Strategies have to be put in place therefore, to encourage utilization of adequate and proper infection control measures. This will ensure that the students and patients alike are protected from hospital acquired infections in order to boost their productivity.

Finally, findings from this study identified various perceived barriers to compliance with infection control methods to include unavailability of infection control materials. This finding is in agreement with a 2015 study that listed inadequate supply of facilities and equipment as the major barrier to compliance.¹² This can be solved by ensuring adequate provision of infection control materials such as aprons, face

masks, gloves etc. to the students. More so, other barriers such as the ineffectiveness of hospital policy (especially as regards the use of colour codes for waste disposals), tasking nature of some infection control measures, the cost of vaccines and time constraints were agreed upon as barriers to the practice of infection control measures. Other obstacles in following standard precautions observed in literature were the tasking nature, unavailability of equipment as well as time constraints, which support findings from this study.¹⁸ Also, an obstacle identified by nurses for non-adherence to standard precautions include lack of time in emergency situations, where the professional considers patient care first, and then their own safety.¹⁶ A Nigerian study also found that the main factors influencing non-adherence to preventive measures among professionals were: lack of PPE, carelessness, lack of informative pamphlets on standard precautions, low perception of risk for blood borne pathogens, lack of time, loss of the technical ability to use PPE and uncooperative patients.^{19,20,21} These findings therefore present the need for the students in clinical practice to be adequately protected from hospital acquired infections by provision of materials to help protect them from common infections and also to prevent spread of such to admitted patients.

Conclusion

Having identified an adequate knowledge of infection control measures, and yet a low compliance to same, it is therefore imperative that measures be put in place to teach clinical medical and nursing students how to effectively protect themselves and invariably, their patients from exposure to infectious agents. It is also necessary to find solutions to the barriers militating against adequate practice of infection control, especially among students, so that they can be able to perform proper infection control measures.

Recommendations

Based on findings from this study, the following recommendations are therefore put forward:

- Strategies should be put in place to ensure that adequate knowledge of infection control measures are impacted especially on clinical postings on the wards.
- Hospital policies should be made in such a way that it is effective in ensuring that infection control measures are complied with among all staff in order to enable students to have good role models
- Adequate facilities should be put in place to increase the rate of compliance with infection control measures especially among students
- Vaccinations for infectious diseases such as hepatitis B virus should be made available at subsidized rates for the students.

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Ethical consideration

An ethical approval was obtained from Ethical Review Board of University of Ibadan/ University College Hospital Ibadan by submission of a copy of the proposal to the Review Committee. Also, informed consent was taken from the participants and participation was on voluntary basis. The questionnaire was explained to the participants before data collection. The collected information was kept confidential and also no form of identification was included in the questionnaire.

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