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# A Case Study on Infection Prevention Protections among Nursing Trainees in Cape Coast Nursing and Midwifery Training College

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## Abstract

Healthcare professionals including nurses are in recent times exposed to great risk of health care infections throughout their clinical practices. This issue has become tremendous challenge to the Ghana Health service since it poses danger to the life of the hearth practitioners. Full clinical practices of standard precautions, which is very important for all healthcare professional have been given less attention leading to exposure of nurses to the risk of infection. The factors influencing nurse's compliance with standard precautions among student nurses at Cape Coast Nurses' and Midwifery Training College and other health care workers compliance with optimal practices are low. Hence the need to conduct this research to assess the level of student nurses' knowledge and practice of infection prevention and control at the Cape Coast Nursing and Midwifery Training College in other to overcome this challenge. A total population 0f 962 with the sample size of 283 students participated in the study. Students were grouped according to their ages, thus 18-20 years, 20-29, 30-39, 40-49 and 50 years above.

Key words: Healthcare professionals, Ghana Health service, nursing student nurses', Infection Prevention

## INTRODUCTION

Healthcare infections refer to the infection's patients acquire in the course of receiving treatment and to the health personnel or staff in the process of delivering health care which are preventable. Healthcare associated infections can be acquired at any point during care delivery. [1]. Infection is the invasion and multiplication of microorganisms such as bacteria, viruses and parasites that are normally not present in the body. Student nurses as part of Health care professionals are exposed to microorganisms through contact with body fluid and blood, which could be a risk of contracting infections if care is not taken. Student nurses are to protect themselves and their client from infections by the practice of medical and surgical aseptic techniques, before one will encounter blood products, body fluids, spills, soiled linens

and waste a proper protective material such as aprons and mask should be worn. In addition, the same practice should be applied before handling patients with airborne (droplet) infections to protect themselves and other clients, and to make the environment safe for other users. Care must be taken when handling needle sticks and other sharp objects [2]. In this study, the researcher observed staff and student nurses handling contaminated linen and instruments with bare hands, as well as putting needle in patient mattress, keeping cell phones and watch's in-patient bed whiles checking vital signs on several occasions. Students sometimes wear one glove leaving the other hand or may carry soiled linens items and encountering soiled articles and surfaces without any protective measure. Hand hygiene, which is easy to follow and implement, are either not done well or not performed at all by students on clinical practice. Students and patients are often exposed to infections such as eye infections, urinary tract infections and other infections due to poor clinical techniques. Students often sustain sharp object injuries. [3]. Student nurses on clinical practice do not take keen interest to comply with infection prevention practices. Research has identified low compliance of standard of infection prevention practices. Infection prevention is the means of reducing the transmission of blood borne and pathogens from the known and unknown sources [3]. This protect the health worker, patient, the public and the environment. Infection prevention and control is a key factor of practice for health care professional. Increase infections, increase burden on the individual, family, society, health financing of the government of Ghana and World Health Organization budget. It is estimated that 1 in 10 hospitalized patients will acquire an infection after admission [1]. Occupational exposure to pathogens by health care professionals and patients poses burden, additional cost. Patient with hospital acquired infections have their days prolonged and may need additional investigations, diagnosis and treatment and during this time may still occupy the insufficiency hospital bed. By preventing hospital-acquired infection, these resources are saved and at this point little resources are required for the implementation of standard precautions and should be used as minimum for prevention of infection.

Hand hygiene as pretentious and relaxed as it is, can reduce the spread of disease by removing the microorganisms, virus, bacteria and chemical that could have cause infection or diseases from hand by preventing infection which can help save resources which could have been used and expenditure will also be saved. Example, saving of drugs, consumables and some of these savings can be invested in buildings, diagnostic devices and capital equipment. According to World Health Organization [1, 3] the risk of infections is high in developing countries, and number of patients who get hospital acquired infection in the acute hospital is projected to be around 25% [1, 3, 4] estimated 23.6% infections of patient with catheter related and blood stream infection and 29.3% of ventilator associated infections/Pneumonia. According to [1, 5]. Health care workers are exposed to microorganism that are in patients and without strict standard precautions may transfer these from one patient to the other and to the other staff and the public, through contaminated equipment, lining, airdrops and during touch and poor operating techniques of an improper sterilized instruments and care of the wound, phlebitis due to improper handling of

intravenous site and intravenous infection and urinary tract infections as a result of improper care of the catheter and the genitalia. Having adequate knowledge and practice of standard precaution in health delivery, boost patient's satisfaction; reduce cost and bed days and the health care budget on drugs and diagnostic equipment. Several researches have been carried out which have revealed that healthcare professionals, for a number of reasons do not practice or comply with standard precautions, with these many health care professionals are exposed to one or periodic incidence to infections as well as patient to nosocomial infections during health care delivery [6]. According to Sobayo [5], 30% of patient develop urinary tract infection due to improper urethral catheter care WHO as cited in Kondor ,2018 [7] study done in intensive care unit (ICU) in 25 countries recorded catheter related blood stream infections to be 29.3% . According to Allegranzi and Pittet [8], health care worker compliance with optimal practices remains low in most settings. It is in view of this that the research is being conducted to assess the level of student nurses' knowledge and practice of infection prevention and control at the Cape Coast Nursing and Midwifery Training College

## 2.0 RESULTS AND DISCUSSION

### *2.1 Infection Prevention and Control Standard Precautions*

This chapter deals with relevant information related to the study, which include knowledge and practice on infection prevention and control, factors affecting the infection prevention and control practices (IPC), as well as the standard precautions among student nurses at Cape Coast Nurses and Midwifery Training College. The purpose of the literature review was to understand what is currently known about knowledge and practices in infection prevention and control and its impact on the health service delivery. Standard precautions (SP) are a set of measures that reduce the risk of contracting or transmitting infection from known or unknown sources. They are based on the principle that all body fluids have the potential of causing infection [9]. Such body fluids including, blood, body fluid, excretions (except sweat), non-intact skin, and mucous membranes might contain transmissible infectious agent. The standard precautions need to be applied at all times during clinical practice, irrespective of the person, diagnosis or treatment to prevent transmission of infectious agents [10]. This means that all patients, health workers (HW) and visitors should adhere to good hygiene practices [2] (Ministry of Health, 2009).

### *2.2 Components of the Standard Precaution*

The standard precautions include hand hygiene, appropriate use of personal protective equipment (PPE) (that is gloves, gowns/plastic aprons, masks, goggles, face shields, eye protectors. Proper patient placement and transportation and care of shared patient care equipment, Environmental control include cleaning and disinfection (housekeeping, handling of food, drinks, dishes and utensils), handling and disposal of sharp equipment, health care waste management (solid and liquid), safe injection practices, occupational health and safety, handling textiles and laundry, collection, handling and transport of clinical

specimen, respiratory hygiene/ cough etiquette [9]. By adhering to these measures, health workers would prevent the transfer of microorganisms from one patient to another, from staff to patient and vice-versa.

### *2.2.1Transmission -Based Precautions*

Transmission- based precautions are for patient suspected to be infected with highly transmissible pathogens, for which additional precautions beyond the standard precautions (SP) such as Infection Prevention and Control (IPC) measures are needed to reinforce the standard precautions to interrupt the transmission in the hospital. There are three Categories of transmission-based precaution (TBP). These are: Contact based precautions, droplet precautions and air- bore precautions [2].

### *2.2.2 Hand Hygiene*

Hand hygiene had been cited frequently as the most important practice in reducing the transmission of infectious agents in health care setting. It is the single most effective method used in preventing spread of infections, and the commonest vehicle for transmitting infection [11]. Hand hygiene includes hand washing with both plain or antiseptic-containing soap and water and the use of alcohol-based products (gel, foams or rinses), which do not require the use of water. Comprises". Avoiding unnecessary touching of surfaces that are close to the patient to prevent contamination of clean hands by environment surfaces and transmission of pathogens from contaminated hands to surfaces; Hand washing with either a non-antimicrobial soap and water or an antimicrobial soap and water when hands are visible dirty, contaminated with visibly soiled with blood or body fluids; Decontaminating hands in the clinical situations described above if hands are not visibly soiled, or after removing visible material with non-antimicrobial soap and water. The preferred method of hand decontamination is the use of an alcohol-based hand rub. Alternatively, hands may be washed with an antimicrobial soap and water. However, the frequent use of alcohol-based hand rub immediately following hand washing with non-antimicrobial soap may increase the frequency of dermatitis. Hand hygiene should be performed: Before having direct contact with patients; After having contact with blood, body fluids, excretions, mucous membranes, non-intact skin, or wound dressing; After contact with patient's intact skin, e.g. when taking pulse or blood pressure or lifting a patient; if hand would be moving from a contaminated-body site to a clean-body site during patient care; after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patients; and after removing gloves [2]. Hand washing with non-antimicrobial soap and water or with antimicrobial soap and water is recommended if contact with spores. (For example, Clostridium difficile or Bacillus anthraces), as alcohol-based agents have poor activity against spores. Artificial fingernails or extenders should not be worn if duties include direct contact with patients at high risk for infections and associated adverse outcomes for those in the intensive care units (ICUs) or operating rooms. Organizational policy should be developed on the wearing of non-natural nails by healthcare personnel who have direct contact with patients outside of the groups specified above [12] Some factors that put patients at risk of nosocomial infections are inefficient application of standard and

isolation precautions, lack of knowledge of injection and blood transfusion safety, inadequate environmental hygienic conditions and waste disposal, [12]. Although standard precautions have proved effective in IPC, studies show that compliance of hearth workers to these measures is very low with consequent. It is for this reason that WHO stated that one of the solutions to the problem of nosocomial infections, is the implementation of standard precautions, especially best hand hygiene practices [1].

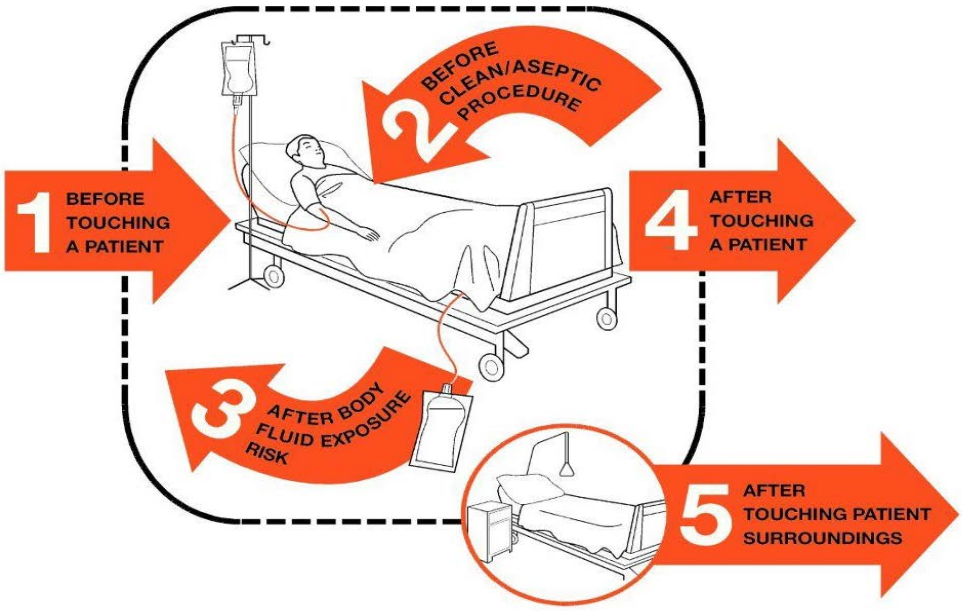


Figure: 1 The five moments of hand hygiene according to WHO

Source: WHO Guidelines on hand hygiene in health-care facilities (2009)

| | | |
|---|---|---|
| 1 | Before touching a patient | Perform hand hygiene before touching a Patient |
| 2 | Before clean/Aseptic procedure | Perform hand hygiene before a clean/sterile Procedure. |
| 3 | After body fluid exposure risk | Wash hands with soup and water immediately after exposure risk to body fluids |
| 4. | After touching a patient | Perform hand hygiene after touching a patient |
| 5. | After touching a patient surrounding | Perform hand hygiene after touching any object or furniture in the patient's immediate surroundings. |

## 3.0 Personal Protective Equipment (PPE)

Personal protective equipment/clothing (PPE) or (barrier protection items) are used to prevent blood and other and potentially infectious material from coming in to direct contact with clothing and the body of the health staff, patient and relatives. The item can be used alone or in combination to provide protection.

The selection of PPE depends on the task to be performed and the anticipated exposure [2] The following are observed principles of PPE:

PPE should be worn when the nature of the anticipated patient interaction indicates that contact with blood or body fluids may occur.

Prevent contamination of clothing and skin during the process of removing PPE

PPE should be removed and discarded before leaving the patients room or cubicle.

**The following PPE are recommended for implementing infection prevention and control standard precaution**.

Gloves: glove protect both patient and staff by acting as a barrier against infectious microorganisms. Hence, there is the need of the health workers especially nurses and doctors to select the appropriate glove and size for the right procedure. Disposable medical examination gloves should be worn for procedures involving intact skin mucosal membranes (unless otherwise indicated) whiles sterile surgical gloves should be worn for procedures involving procedures such as wound dressing, phlebotomy and setting up intravenous infusion or other sterile procedures and sterile. For cleaning the environment or medical equipment, disposable medical examination gloves or re-usable utility gloves should be worn. Gloves should be removed after contact with a person and the surrounding environment (including medical equipment) using proper techniques to prevent hand contamination and should be discarded to prevent re-use. The same pair of gloves should not be worn for the care of more than one patient. Gloves should be changed during patient care if it is observed to be contaminated, before touching other body part [11, 12] Gowns: Gowns are recommended to prevent soiling of clothing when taking care of patients and to prevent transmission of infection from clothing and body. It should be appropriate for protecting the skin and preventing soiling or contamination of clothing during procedures when contact with blood, body fluids, secretions is anticipated. A gown should be removed after contact with secretions, excretions or completion of procedure and hand hygiene performed before leaving the patient's environment. Gowns should not be re-used even for repeated contacts with the same patient.

### *3.1 Mouth, Nose, and Eye Protection*

According to WHO Report, 2016, PPE should be worn to protect the mucous membranes of the eyes, nose and mouth during procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions. Select masks, goggles, face shields, or combinations of each according to the need anticipated by the task to be performed. A face shield that fully covers the front and sides of the face or a mask and goggles (in addition to gloves and gown) should be worn during aerosol-generating procedures. For example, bronchoscopy, suctioning of the respiratory tract (if not using in-line suction catheters), and endotracheal intubation in patients who are not suspected of being

infected with an agent for which respiratory protection is otherwise recommended, e.g. mycobacterium and hemorrhagic fever viruses.

### *3.2 Respiratory Hygiene/ Cough Etiquette*

Healthcare personnel should be educated on the importance of source control measures in containing respiratory secretions to prevent droplet and fomite transmission of respiratory pathogens, especially during seasonal outbreaks of viral respiratory tract infections in communities, e.g. influenza, adenovirus, par influenza virus. The following measures should be implemented to contain respiratory secretions in patients and accompanying individuals who have signs and symptoms of a respiratory infection, beginning at the point of initial encounter in a healthcare setting. For patients seeking care for a respiratory infection, offer masks to coughing patients and other symptomatic persons, e.g. persons who accompany ill patients, upon entry into the facility or medical office, they should be encouraged to maintain special separation, ideally a distance of at least three feet (3 ft) from others in common waiting areas [12].

### *3.3 Patient Care Equipment and Instruments or Devices*

Transmission of infection from instrument or equipment depend on the presence of microorganisms. Care equipment and instruments/devices that may be contaminated with blood or body fluids should be decontaminated and Organic materials removed from critical and semi-critical instruments/devices using recommended cleaning agents before high-level disinfection and sterilization to enable effective disinfection and sterilization processes [2]. PPE should be used according to the level of anticipated contamination when handling patient care equipment and instruments/devices that are visibly soiled or may have been in contact with blood or body fluids [2].

## 4.0 Socio-demographic Background of respondents

The background characteristics of students of Cape Coast Nurses and Midwifery Training College (CCNMTC) for the data collection and analysis has been discussed. A total population 0f 962 with the sample size of 283 students participated in the study. Students were grouped according to their ages, thus 18-20 years, 20-29, 30-39, 40-49 and 50 years above. It was discovered that students with ages between 20-29 recorded the highest population of 183 representing 68% of the total population. Additionally, level 300 students also recorded the highest population representing 51.8%. After the data collection is was discovered that majority of the respondents were level 300 students between age 20-29 years representing 51% of the respondents whereas 59% were midwives. This support the observation that the nursing profession is predominately made up of females, as in our Ghanaian settings, males are not allowed to practice midwifery.

### *4.1 Knowledge of infection prevention and control (IPC) among student Nurses*

**Table 1: Distribution of Knowledge of infection prevention and control (IPC) among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC)**

| Indicator | Number of Student Nurses | | | Total |
|---|---|---|---|---|
| | Yes N (%) | No N (%) | I don't know N (%) | |
| Heard of infection prevention and control | 247 (100.0) | 0 | 0 | 247 |
| Aware of an IPC committee in the hospital where you do your clinical | 197 (79.8) | 50 (20.2) | 0 | 247 |
| Have access to the IPC policy guidelines in the facility where you practice | 199 (81.6) | 45 (18.4) | 0 | 244 |
| Ever had any tutorials/lectures on IPC | 218 (89.0) | 27 (11.0) | 0 | 245 |
| Ever had any training in IPC | 186 (75.9) | 59 (24.1) | 0 | 245 |
| Can a health worker transmit infections to a patient within the hospital? | 238 (96.8) | 4 (1.6) | 4 (1.6) | 246 |
| Can patient transmit infection to a health worker whiles receiving health care within the hospital? | 233 (95.9) | 6 (2.5) | 4 (1.6) | 243 |
| Most effective infection prevention practice | | | | |
| Hand washing | 241 (98.8) | | | |
| Use of gloves | 3 (1.2) | | | |
| Items needed to practice the single most effective IPC precaution | | | | |
| Soap and clean water | 222 (93.3) | | | |
| Gloves | 12 (5.0) | | | |
| Mask | 2 (0.8) | | | |
| Apron/gown | 2 (0.8) | | | |

Data are presented as frequencies and percentages. N – Number of respondents

Source: Field data, 2019

Table 1 shows the distribution of knowledge of infection prevention and control practices among the student nurses of CCNMTC. All the respondents (100%) indicated that they have heard of IPC, and as students' nurses, they needed to practice IPC measures at their workplace and in daily life to avoid exposure to microorganisms. Majority of the respondents were aware of IPC guideline199 (81.6%) and 218 (89%), and 75.9% (186) had received lessons or training on IPC respectively. Almost all the respondents 238 (96.8%) noted that it is possible for a health worker to transmit infection to patient, and 241 (98.8%) indicated that the most effective of IPC practices is hand washing with soup and water.

**Table 2: Distribution of Knowledge of infection prevention and control (IPC) among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC)**

| Indicator | Number of Student Nurses N (%) | | | | | Total |
|---|---|---|---|---|---|---|
| | Strongly Agree | Agree | Disagree | Strongly Disagree | Neither agree/ disagree | |
| Needles and syringes can be reused after disinfection | 4 (1.6) | 181 (74.2) | 26 (10.7) | 13 (5.3) | 20 (8.2) | 244 |
| Needle-prick injury can transmit infections such as Hb and HIV | 1 (0.4) | 12 (4.9) | 8 (3.3) | 55 (22.5) | 168 (68.9) | 244 |
| Use of 0.5% chlorine for cleaning infected blood spills and soiled linen | 2 (0.8) | 9 (3.8) | 12 (5) | 86 (35.8) | 131 (54.6) | 240 |
| Personal protective equipment's ( PPEs ) usage are critical in nurse compliance with standard precaution | 4 (1.7) | 16 (6.6) | 23 (9.5) | 106 (43.8) | 93 (38.4) | 242 |
| Easily access to water and soap are critical in nurse compliance with standard precaution | 4 (1.7) | 18 (7.5) | 37 (15.5) | 75 (31.4) | 105 (43.9) | 239 |
| Easily access to alcohol rub are critical in nurse compliance with standard precaution | 4 (1.7) | 18 (7.4) | 40 (16.5) | 106 (43.8) | 74 (30.6) | 242 |

Data are presented as frequencies and percentages. N – Number of respondents

Source: Field data, 2019



Table 2 shows the distribution of Knowledge of infection prevention and control (IPC) among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC). On modes of transmission of nosocomial infections, only 39 (16.0%) respondents disagreed that needle and syringe be reused after disinfection, whilst the remaining either agreed 185 (75.8%) or did not know (20, 8.2%). This means that majority of the student nurses do not know that re-used syringe and needle can transmit infectious agents such as HIV and HB among patients, as evidenced by only 13 (5.8%) noting that needle prick injury can transmit infectious agents. Interestingly, only 20 (8.9%) respondents agreed that personal protective equipment usage is critical in nursing care. On accessibility, few respondents agreed that readily available water and soap or alcohol rub are critical in nurse compliance with standard precaution.

## 5.0 Conclusion

This study focuses on determining and analyzing the factors influencing nurse's compliance with Standard Precaution in order to prevent occupational exposure to microorganisms among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC). The study was conducted using questionnaire for data correction with SPSS Excel and other software's for data analysis. Based on the

purpose and research question. The population compromised of all student nurses. The student nurse's awareness of standard precaution was high but the level of compliance was average due to individual and working environment factors that hinders them from practicing standard precaution. Some of the research questions used for data collection in this study include:

What is the knowledge of standard precaution among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC)?

What is the level of compliance with standard precaution specifically hand hygiene and use of Personal Protective equipment's among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC)?. What factors affect the practice of standard precautions among student Nurses of Cape Coast Nurses and Midwifery Training College (CCNMTC)?

After analyzing the results, it was discovered that Majority of the student Nurses of Cape Coast Nurses and Midwifery Training College are aware of the standard precautions that need to be followed in the performing of their duties. In addition, most of the participants of this study affirmed the assertion that the usage of PPE is critical in the nurse's compliance with standard precaution and as well identified gloves, aprons and nose mesh as the most commonly used Personal Protective Equipment used at the clinical area.



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