Knowledge and practice of nurses regarding standard precautions in a tertiary care public hospital, North India

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ABSTRACT

Background: Hospital-acquired infections could occur as a result of lapses in accepted standards of practice on the part of health care personnel (HCP). All individuals, particularly HCPs, are potentially at high risk of infection due to their frequent exposure. This study aimed to assess the knowledge and practices of nurses regarding standard precautions at a tertiary care hospital, North India.

Methods: A cross-sectional study was conducted in a tertiary care hospital, Uttarakhand enrolling 134 nurses purposively from different units of the institute. Data was collected using a pre-structured self-administered questionnaire to seek information on participants’ knowledge and practices regarding standard precautions. SPSS version-23 was used to analyse the findings. Descriptive statistics were applied for the analysis of the results.

Results: The mean age of the participants was 27.52±2.93 years, with more than half of the respondents were males (58.21%) and (41.79%) were females. Almost 60.45% had three or fewer years of work experience. Most respondents preferred hand hygiene (97.01%) and the use of PPE (88.06%). Almost 94.03% of participants favored disinfection of frequently touched surfaces. Regarding the practices, 95.52% answered that the right hand-washing is before wearing gloves, after removing the gloves, and after leaving the patient’s care area. About 98.51% of them answered that bio-medical waste should be discarded in the right type of color-coded bins.

Conclusions: Findings suggested adequate knowledge and compliance among nurses regarding standard precautions. However, specific training programs may be conducted to attain full adherence to standard precautions. These programs can enhance their awareness and can work as a vital tool to achieve the desired improvement in knowledge and practices of standard precautions.

Keywords: Hand hygiene, Infection control, Knowledge, Nurse, Practice, Standard precaution

INTRODUCTION

Health care-associated infections pose a massive risk to health care workers. Many policies and protocols have been framed by various national and international agencies, but compliance with those set standards is still neglected. Non-adherence to standard precautions, either due to lack of knowledge or carelessness, is the reason for the increase in health care-associated infections. Regardless of the confirmed infection or suspected patient’s condition, standard precautions should be applied to all patients. Nurses are among the frontline healthcare workers who are in patient contact for long periods while providing care and are more likely to be exposed to a variety of occupational hazards.¹-³

One of the major factors behind the increase in the rate of HAI (Hospital Associated Infections) is the lack of knowledge and training among health care workers. Several studies have reported lack of knowledge
regarding standard precautions and poor practice among nurses. There are many other reasons behind non-adherence to these protocols such as lack of resources or equipment and limited monitoring of practices in the clinical field.\textsuperscript{4,5} One study aimed to assess the factors influencing nurses’ compliance with standard precautions and the results showed that the reasons behind non-compliance are lack of equipment, PPE (personal protective equipment), hinders patient care, previous exposure to infection, lack of professional training, poor role models, perceived low risk to themselves, etc.\textsuperscript{6} Nursing schools are the cornerstone of imparting knowledge and training to budding nurses and hence their role in implementing standard precautions and preventing HAIs also cannot be ignored.\textsuperscript{7}

Strict adherence to standard precautions, such as proper hand hygiene, use of personal protective equipment, proper disposal of sharps, cough etiquette, careful handling of soiled linens, cleaning and disinfecting equipment used in patient care protects the patients as well as health care workers from exposure to infection.\textsuperscript{8,9}

The recent outbreak of COVID-19 has forced all health care workers to follow hand hygiene practices which has been a main factor in reducing the spread of infection. In contrast, inadequate PPE kits were the main reason health care workers were exposed to infection during the outbreak. There are many studies that reported a number of reasons why nurses find it difficult to follow all standard precautions in health care setting and some of the reasons they cited were that using standard precautions could put the patient at risk in an emergency, wearing gloves makes venipuncture difficult, leaving no time to discard and wear a new pair of gloves for another patient.\textsuperscript{5,10-19}

The purpose of this study was to assess nurses’ knowledge and practice with regard to standard precautions as several studies have recommended the need to know the practices followed by healthcare workers in health care settings in order to improve compliance with standard precautions and appropriate measures can be taken and prevent the spread of infection in the hospital setting.

METHODS

Study design

This cross-sectional online survey was conducted using a structured knowledge and practice questionnaire to assess nurses’ knowledge and practice regarding the standard precautions. The online survey was conducted from 25 June 2020 to 25 July 2020.

Ethical consideration

Ethical approval was taken from the ethical committee of institute vide letter no. 207/IEC/IM/NF/2020 dated 11 June 2020. All the participants were well informed on the purpose of online survey and all their obtained information were kept confidential. An informed written consent was obtained electronically from all participants.

Study participants

Nurses working in different departments of intensive care unit (ICU), Medical and surgical units of institute were the part of the study. A total of 134 participants were contacted via online Google Form survey using convenience sampling technique.

Sample size estimation

The sample size was determined using single population proportion formula:

$$n = \frac{z^2p(1-p)}{d^2}$$

Keeping 95% CI and 50% prevalence which is 384.

As the total population was below 10,000, hence the final corrected sample size selected 128 using the population correction formula.

Study tools

A structured questionnaire was prepared to assess the knowledge and practice of participants. The structured questionnaire to be filled online included demographic characteristics of the nurses and questions to assess their knowledge and practice regarding the standard precautions in their institute. The questionnaire had multiple choice questions as well as yes/no type questions. Participants were instructed to choose more than one options in knowledge and practice questionnaire. Validation of the questionnaire was obtained from five expert from department of microbiology and nursing. Reliability of tool was computed by test-retest method and obtained Cronbach’s α coefficient was 0.79.

Data analysis

Data were exported in excel sheet and verified for completeness and analyzed using SPSS version-23 statistical software. Descriptive statistics were used for the analysis of result.

RESULTS

Demographic data

A total of 134 participants completed online form. Among them 58.21% were males and 41.79% were females. The mean age of participants was 27.52±2.93, and one-third were working in medicine departments. Almost 60.45% had three or less years of work experience (Table 1).
Knowledge on standard precautions

A vast number (97.01% and 88.06%) of participants preferred hand hygiene and use of PPE to be included in the standard precautions. In response to when to perform hand hygiene, mostly (94.03%) selected most correct answer for hand hygiene. On asking, when a health care worker should do hand hygiene? Where more than half of the participants 94.03% said that hand hygiene must be performed after coming in contact with blood, body fluids, excreta, and before performing any septic procedure and after removing the gloves. When asked what is the proper way to prevent needle stick and sharp injuries, 91.04% participants selected that needles and sharp instruments should be disposed of properly. On how to maintain environmental hygiene in a health care setting, 94.03% participants favored disinfection of frequently touched surfaces (Table 2).

Table 1: Demographic characteristics of the sample.

| Variables                              | Frequency (n=134) | Percentage |
|----------------------------------------|-------------------|------------|
| Age in years (mean±SD)                 | 27.52±2.93*      |            |
| Gender                                 |                   |            |
| Male                                   | 78                | 58.21      |
| Female                                 | 56                | 41.79      |
| Name of ward/department                |                   |            |
| COVID area                             | 38                | 28.35      |
| CCU                                    | 20                | 14.92      |
| Medicine                               | 44                | 32.83      |
| Surgery                                | 32                | 23.8       |
| Academic qualification                 |                   |            |
| B.Sc. (N) and Post Basic B.Sc. (N)     | 96                | 71.64      |
| GNM                                    | 30                | 22.39      |
| M.Sc. (N)                              | 8                 | 5.97       |
| Work experiences (in years)            |                   |            |
| ≤3                                     | 81                | 60.45      |
| >3-6                                   | 37                | 27.61      |
| >6                                     | 16                | 11.94      |
| Do you have standard precautions for health care policies in your institution? |                   |            |
| Yes                                    | 134               | 100        |
| Don’t know                             | 0                 | 0          |
| Have you ever heard word “standard precautions” |                   |            |
| Yes                                    | 134               | 100        |
| No                                     | 0                 | 0          |
| If yes, mention the source of information |                 |            |
| Colleague/friend, WhatsApp, others     | 22                | 16.42      |
| Formal training                        | 112               | 83.58      |

Practice on standard precautions

Participants were also asked some questions on how they practice standard precautions in their areas. When asked what the right time to decontaminate hands is?, majority 95.52% answered that the right time to wash hands is before wearing gloves, after removing the gloves and after leaving the patient’s care area. Regarding method to be adopted for hand hygiene after exposure to patient’s body fluid, more than half 53.73% of the participants answered that the hands should be washed with soap water and disinfectant. On asking what could be the reason for not wearing gloves and coverall while working, about 67.16% participants cited lack of regular access to PPE as the reason, whereas 23.88% of them mentioned that wearing PPE makes them difficult to work. Regarding bio medical waste management, the majority 98.51% of them chose that bio medical waste should be discarded in the right type of color-coded bins. Most 91.04% participants selected that the reusable devices should be thoroughly cleaned, disinfected and reprocessed before using them on any other patient (Table 3).
Table 2: Structured knowledge questionnaire on standard precautions (n=134).

| Statements                                                                 | Frequency | Percentage |
|---------------------------------------------------------------------------|-----------|------------|
| 1. What are the components should be included in the standard precautions? |           |            |
| (a) Hand hygiene                                                          | 130       | 97.01      |
| (b) Use of PPE                                                            | 118       | 88.06      |
| (c) Safe injection practices                                              | 60        | 44.78      |
| (d) Hospital disinfection                                                 | 64        | 47.76      |
| (e) Respiratory etiquettes                                                | 62        | 46.27      |
| 2. What are the advantage of standard precautions?                        |           |            |
| (a) Protects both health worker and patient                               | 128       | 95.52      |
| (b) Reduced spread of communicable disease                                | 118       | 88.06      |
| (c) Looks more professional at work                                      | 30        | 22.39      |
| (d) To fulfill hospital policy                                           | 34        | 25.37      |
| 3. When should a health care provider must perform hand hygiene?          |           |            |
| (a) After contact with blood, body fluids and excreta                     | 46        | 34.33      |
| (b) Before performing any aseptic procedure                               | 42        | 31.34      |
| (c) After glove removal                                                   | 40        | 29.85      |
| (d) All of the above                                                     | 126       | 94.03      |
| 4. Which of the following is/are correct to prevent needle stick and sharp injuries? |       |            |
| (a) Avoiding using sharp items.                                           | 10        | 7.46       |
| (b) Cleaning used articles                                                | 14        | 10.45      |
| (c) Disposing of used needles and other sharp instruments                | 122       | 91.04      |
| (d) Handling needles, scalpels, and other sharp instruments or devices   | 76        | 56.72      |
| 5. What is/are measures to ensure Environmental Hygiene in health care setting? |       |            |
| (a) Disinfection of environmental and other frequently touched surfaces   | 126       | 94.03      |
| (b) Following professional ethics                                         | 14        | 10.45      |
| (c) Provided with health education                                        | 76        | 56.72      |
| (d) Using adequate procedures for the routine cleaning                    | 96        | 71.64      |
| 6. Which of the following is/are correct method for handling, transportation, and processing of used linen in the ward? |       |            |
| (a) Avoids transfer of pathogens to other patients and or the environment | 38        | 28.36      |
| (b) Person feels easy and convenient                                     | 16        | 11.94      |
| (c) Prevents skin and mucous membrane exposures and contamination of clothing | 32    | 23.88      |
| (d) All of the above                                                     | 108       | 80.6       |
| 7. Which of the following statement is/are TRUE for biomedical waste management |       |            |
| (a) Discard single use items properly                                     | 94        | 70.15      |
| (b) Disposal of office waste generated in hospital                       | 38        | 28.36      |
| (c) Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste | 114    | 85.07      |
| (d) Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with local regulations | 90    | 67.16      |
| 8. What is the best way of handling patient care equipment in a hospital? |       |            |
| (a) Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient | 120    | 89.55      |
| (b) Instructing group D workers to clean and replace                      | 44        | 32.84      |
| (c) Preventing skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment | 104 | 77.61      |
| (d) Simply discarding everything in to yellow bin.                       | 8         | 5.97       |

Table 3: Structured practice questionnaire on standard precautions (N=134).

| Statements                                                                 | Frequency | Percentage |
|---------------------------------------------------------------------------|-----------|------------|
| 1. What is the right time to wash or decontaminate hands in health care setting? |           |            |
| (a) After removal of gloves                                               | 2         | 1.49       |
| (b) Before leaving the patients care area                                 | 2         | 1.49       |

Continued.
Statements | Frequency | Percentage
--- | --- | ---
(c) Before wearing gloves | 2 | 1.49
(d) All the above | 128 | 95.52

2. Which of the following method for hand hygiene should be performed, after a recent contact with patient’s body fluid?

| Method | Frequency | Percentage |
|--- | --- | --- |
|(a) Wash with soap water and disinfectant | 72 | 53.73 |
|(b) Wash with soap and water alone | 50 | 37.31 |
|(c) Use only an alcohol based sanitizer | 10 | 7.46 |
|(d) Wash with only water | 2 | 1.49 |

3. What are the PPE should be worn before entering into a infectious disease ward?

| PPE | Frequency | Percentage |
|--- | --- | --- |
|(a) Gloves or coveralls | 56 | 41.79 |
|(b) Gloves only | 4 | 2.99 |
|(c) Gown only | 0 | 0 |
|(d) Glove and coveralls | 74 | 55.22 |

4. What could be a reason for not wearing both gloves and coveralls while working?

| Reason | Frequency | Percentage |
|--- | --- | --- |
|(a) Do not have regular access to PPEs | 90 | 67.16 |
|(b) Do not have time to wear them | 4 | 2.98 |
|(c) Wearing them make it difficult to do my work | 32 | 23.88 |
|(d) Do not believe they are really protective | 8 | 5.97 |

5. What is the standard method of disposing a used needles and syringes?

| Method | Frequency | Percentage |
|--- | --- | --- |
|(a) By recap needle and discard both syringe and needle | 14 | 10.45 |
|(b) By discard both syringe and needle into the safety box without recapping | 114 | 85.07 |
|(c) By discard only needle and replace with new needle for next usage on the same patient | 6 | 4.48 |
|(d) By telling patient attender to discard safely | 0 | 0 |

6. How can you practice respiratory hygiene and cough etiquette?

| Method | Frequency | Percentage |
|--- | --- | --- |
|(a) Covering and Hand hygiene, both should be done | 74 | 55.22 |
|(b) Covering mouth and nose when coughing or sneezing | 46 | 34.33 |
|(c) Hand hygiene after contact with respiratory secretions | 12 | 8.96 |
|(d) No hand hygiene necessary, only covering will work | 2 | 1.49 |

7. Which of the following is correct option for biomedical waste (BMW) management?

| Method | Frequency | Percentage |
|--- | --- | --- |
|(a) Discard biomedical waste in right colour coded bins | 132 | 98.51 |
|(b) Choose any colour of bins for all the biomedical waste | 0 | 0 |
|(c) No colour code just normal bin | 0 | 0 |
|(d) All of the above | 2 | 1.49 |

8. What is the correct method of sterilization and disinfection of patient-care devices?

| Method | Frequency | Percentage |
|--- | --- | --- |
|(a) Washing with plan running water | 8 | 5.97 |
|(b) Cleaning, disinfecting, and reprocessing reusable equipment appropriately before use with another patient | 122 | 91.04 |
|(c) No cleaning and disinfecting is required | 0 | 0 |
|(d) Wait for 24 hours to reuse the same devices | 4 | 2.99 |

**DISCUSSION**

This cross-sectional online survey was conducted to assess the knowledge and practice of nurses regarding standard precautions to be followed during coronavirus disease at a tertiary care hospital, North India. Findings revealed that most participants believe that hand hygiene and personal protective equipment (PPE) should be included in standard precautions. Further, they mentioned that hand hygiene must be performed before coming to contact with the patients. These study findings align with the earlier work conducted by Hammoud et al on nurses reporting that hand hygiene should be done before and after touching a patient, and standard precautions will help protect the patient and health care workers (HCWs). Further findings emphasized that an alcohol-based hand rub is better than a traditional hand-wash to cut down the infection rate. These findings are consistent with the work on health care workers by Duarte et al conducted for standard precautions as a chief strategy to prevent the transmission of occupation-related infection in patients and health care workers.

Further, nurses reported that infected needles and sharp instruments should be disposed of properly. These opinions matched the work of Jahangiri et al, in which nurses emphasized on one hand recapping technique, use
of adequate safety box for disposing of needle and receiver to carry sharp instruments. However, it cannot be denied that most needle stick injuries in nurses fail to show compliance to biomedical safety checklist, higher workload and lack of sensitization on disposal waste management. Many nurses believed that environmental hygiene should be managed by disinfecting the frequently touched surfaces. These findings are in accordance with the guidelines for disinfection and sterilization in healthcare facilities.

A more significant number of nurses responded that using a correct method for handling, transportation, and processing of used linen in the ward help to prevent further infection in the area. Similar close findings mentioned in work conducted by Baharom et al reported a fair knowledge on safe handling and disposal and patient care equipment processing. Conversely, nurses reported poor awareness of safe linen handling in the same work. More than two-thirds of the nurses show knowledge on handling human tissues and laboratory waste in the present study. Similarly, nurses show a better understanding of safe disposal of blood and blood products and managing human tissue remains than other health care workers. Such difference in knowledge among nurses might be due to changes in education and training on infection prevention and control policies and level of in-service education as highly educated nurses shows better awareness on the issue.

In terms of the practice of nurses towards standard precautions while working with the patient, it has been found that a reasonable number of nurses reported good practices to hand washing, methods of hand-washing, wearing personal protective equipment, cough etiquettes, disposing of used needles, and disinfection and sterilization of patient care services. The above aspect of standard precautions is similar to the earlier studies from India and Turkey, which reported a desirable level of hand-washing practices; however, these studies mentioned sore hands, insufficient resources, and dense working conditions as barriers to hand-washing. Further, nurses showed higher compliance to use personal protective equipment and disposing sharp instruments correctly. However, this compliance was reported high in the research of Shang et al, which might be the use of a different measuring device for observation. Further, the findings on cough etiquettes to prevent infection transmission and personal protective equipment to avoid cross-infection were reported sensible in our study. These findings are in line with the work of Ibrahim et al, which noted a greater number of nurses are sensitized on a protocol to cough and sneeze on a napkin and wash hands; however, a less number of nurses said the use of shoulder or elbow to sneeze in case of napkin unavailability.

CONCLUSION

In conclusion, this study has shown that there is a reasonably good level of knowledge and practice of standard safety precautions among nurses working in the tertiary care hospital. However, based on the need of desired improvement, it is recommended to conduct tailored interventions to achieve higher adherence to these practices. Specifically designed interventions will help sensitizing on appropriate knowledge and practices of standard precautions and their needs in health care system. Also, a constant and regular supply of resources is required to maintain the safety standards along with a strict supervision, standard operational guidelines and regular courses and orientation.

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