Assess the Nurses Knowledge and Standard Practice Regarding the Prevention of Infection in Neutropenic Patients

Nadeem Khokhar¹  Kausar Parveen²  Muhammad Afzal³  Prof. Syed Amir Gilani⁴
1. Post RN BSc Nursing Student at Lahore School of Nursing, The University of Lahore
2. Assistant Professor, Lahore School of Nursing, The University of Lahore
3. Associate Professor, Lahore School of Nursing, The University of Lahore
4. Dean, Faculty of Allied Health Sciences, The University of Lahore

Abstract

Neutropenia-associated infections can prolong hospitalization, increase re-admission, mortality and morbidity rates. Aim of research is to determine nurses' knowledge and infection control care practices in neutropenic patients. This descriptive study was conducted between January 2020 and April 2020, at tertiary hospital Lahore, Pakistan. Sample consisted of 150 staff nurses. Data were collected by a form included socio-demographic characteristics, neutropenia knowledge questions, and infection control care practices. Each nurse was observed by researcher for infection control care practices. For observation hand hygiene adherence was found low both in medication preparation, administration and vital signs assessment. Sterility disrupted in almost all preparation of parenteral medications. Even nurses' knowledge related with neutropenia and care of neutropenic patient was found above average their infection control care practices were found insufficient. Infected patients are a source of infection transmission to other patients, health care workers and visitors, in health care facilities. Healthcare-related infections have a significant influence on the morbidity and mortality rates in the hospital environment, resulting in an increase in the time spent in hospitalization, and are thus recognized as a serious world public health problem. Neutropenia is one of the most common risk factors of serious infections in immune suppressed patients and can be the result of a variety of consequences, including from certain types of drugs, environmental toxins, vitamin deficiencies, metabolic abnormalities, as well as cancer or infections. In spite of the way that neutropenia bring about contaminations, numerous preventive treatment and care conventions are demonstrated to decrease the disease rates, and improve personal satisfaction. The counteraction and control of diseases are critical for a well-functioning health system. World Health Organization in 2011 defined infection control as infection prevention and control measures that aims to confirm the defense of those who might be susceptible to obtaining an infection both in the general community and in hospitals while obtaining care due to health problems.

Keywords: Nurses, Knowledge, practice, prevention, neutropenic patients.

DOI: 10.7176/JHMN/77-05
Publication date: July 31st 2020

INTRODUCTION

Infected patients are a source of infection transmission to other patients, health care workers and visitors, in health care facilities (Perl T. et al., 2011). Healthcare-related infections have a significant influence on the morbidity and mortality rates in the hospital environment, resulting in an increase in the time spent in hospitalization, and are thus recognized as a serious world public health problem (AFL et al., 2017).

Neutropenia is one of the most common risk factors of serious infections in immune suppressed patients and can be the result of a variety of consequences, including from certain types of drugs, environmental toxins, vitamin deficiencies, metabolic abnormalities, as well as cancer or infections (Maheshwari et al., 2012). Neutropenia associated infections can prolong hospitalization, increase readmission, mortality and morbidity rates (Celik et al., 2017). In spite of the way that neutropenia bring about contaminations, numerous preventive treatment and care conventions are demonstrated to decrease the disease rates, and improve personal satisfaction (Padilla et al., 2005). The counteraction and control of diseases are critical for a well-functioning health system (Bedoya et al., 2017). World Health Organization in 2011 defined infection control as infection prevention and control measures that aims to confirm the defense of those who might be susceptible to obtaining an infection both in the general community and in hospitals while obtaining care due to health problems.

Prevention of Infection:

Most health care infections are transmitted by health care employees who fail to practice proper hand washing procedures and change gloves between client contacts. That is the reason nurses play a critical role in preventing and controlling transmission of an infection through the application of basic precautions of the health care environment. All, medical attendants, can exhibit authority in contamination counteraction and control by utilizing their knowledge, skills, and judgment to initiate appropriate and prompt disease control procedures (Smith et al., 2008). Therefore, infection control strategies from the national and international organization have supported that hand washing remains the most effective measure in reducing the incidence of health care infections (Daniel et al., 2010). Without help for the adequacy of most nursing training in regards to the avoidance of disease, unproved
practices dependent on custom, propensity, and hypothetical contemplations keep on being utilized. Accordingly, varieties exist in what preventive measures neutropenic patients are instructed. What measures are really successful in forestalling contaminations in neutropenic patients?

**Hand Washing:**

Hand washing and individual cleanliness have all the earmarks of being significant systems for the avoidance of disease while thinking about that as an essential capacity of unblemished skin is assurance against microorganisms, that typical human skin is colonized with microorganisms (Boyce et al., 2002), and that a huge extent of contaminations in patients with neutropenia is related with patients’ endogenous greenery or ordinary natural occupants. Upheld by solid proof, ebb and flow intercessions prescribed for patients and guardians in forestalling contamination in patients with malignancy by the PEP Team for Prevention of Infection are reliable and visit hand washing with cleanser and water when hands are obviously dirty or with cleanser and water or liquor based hand rubs when not noticeably filthy. Despite the fact that the checked on understanding training distributions teach patients and parental figures to wash their hands regularly or notice washing them before eating and in the wake of toileting, (Wivelletal., 2003) didn't list hand washing as one of the most widely recognized directions given to patients. Another worry with respect to hand washing is whether to educate patients on to what extent to wash their hands. A rundown of observational examinations on hand washing by medicinal services laborers demonstrated that the span of hand washing ranges from 6.6–24 seconds, with most of studies uncovering normal occasions of 12.5 seconds or less. Besides, easygoing perception of people washing their hands in open offices exhibit that most people don't comply with a 15-second rule. Since unblemished skin secures against contamination, one final concern in regards to quiet training available washing is whether data on applying hand moisturizers or creams to limit the event of aggravation contact dermatitis related with hand washing ought to be incorporated, as is emphatically suggested for human services laborers (Boyce et al., 2002).

**Antiseptic Bathing**

Despite the fact that the proof partner hand cleanliness with a diminished danger of disease is solid, the proof partner germicide washing with a decreased danger of contamination in the neutropenic populace isn't clear (Larson et al, 2001). Essential contaminations of the skin and delicate tissue are basic in neutropenic patients and may scatter by means of the circulatory system. Confined diseases regularly emerge at destinations of minor injury, venipuncture, or vascular catheters. Germ-killers have been appeared to diminish microbial relies on the skin in the careful populace; be that as it may, no investigations of clean washing explicit to the neutropenic populace were found (Larson and Nirenberg, 2004).

**Oral Care**

Patients encountering neutropenia after cytotoxic chemotherapy quite often have penetrates of physical resistance obstructions auxiliary to mucositis. Mucositis, which can include the oropharynx and the gastrointestinal tract, may fill in as an open door for nearby disease or direct intrusion into the circulatory system. Be that as it may, mucositis isn't the focal point of this article and won't be investigated (Rubenstein et al., 2004).

**Significance of the Study**

There are a very few researches about the knowledge and care practices of nurses for infection prevention in neutropenic patients. Using different approaches and epidemiological apparatuses and instruments in determining the effective ways to control and prevent the spread of the infection in neutropenic patients in Pakistan. It therefore, becomes necessary to conduct a baseline assessment for these patients. This study is designed to target nurses to assess their knowledge and care practices for infection prevention. This research will help the health sector create more effective programs to prevent the rampant spread of the disease.

**Objectives of the Study**

The purpose of this study is to investigate knowledge and care practices of nurses for infection prevention. Specific objectives are:

- To determine the nurses knowledge and care practices of nurses for infection prevention in neutropenic patients.

Keywords: Nurses, Knowledge, practice, prevention, neutropenic patients.

**Literature Review**

A cross-sectional study was conducted by Celik et al., 2017 on 51 staff nurses at oncology adult inpatient units of a university hospital in Turkey. The data included socio-demographic characteristics, neutropenia knowledge questions, and infection control care practices. The result of previously mentioned data shows that the mean score of nurses' knowledge was 21.3 ± 2.4. For all three adherence hand, hygiene observance was found low both in medication preparation, administration and vital signs evaluation. Desolation disrupted in almost all research of parenteral prescriptions. The study concluded that even a nurse’s information related to neutropenia and care of the neutropenic patient was found above-average concerning their infection control care practices and was found
insufficient.

Naghdi et al., 2019, conducted a descriptive-analytical cross-sectional study. Two hundred and three (203) individuals of Kerman University of Medical Sciences participated in the study. A demographic questionnaire, a neutropenia knowledge questionnaire, and a checklist of nurses' care practice for infection control in cancer patients were used for data collection. Only 11.8% of the participants had good information of neutropenia. There was no significant relationship between the nurse’s knowledge of neutropenia and their practices for infection control in cancer patients. The study determined that the nurse’s information on neutropenia and their practice for infection control in patients with cancer are not optimum. Therefore, in addition to endorsing educational programs to improve nurse’s information in the field, other factors affecting the elevation of nurse’s practices in controlling infection in patients with cancer should also be identified.

Another cross-sectional study was conducted by Iliyasuwat al., 2016. A total of 200 responses were analyzed of which 152 were nurses while 48 were doctors. A self-administered structured questionnaire was distributed to the study group. Data on knowledge and practice of infection control were obtained and analyzed which demonstrated that about 52% of doctors and 76% of nurses have repetitive hand hygiene in between patient care and the median age and years of performing knowledge of the respondents were 35 years and 7 years, respectively. The study concluded that gaps have been identified in information and practice of infection control among doctors and nurses in the study; hence, it will be helpful for all HCW to obtain formal and periodic enhancement training.

Materials and Methods

Study Design
A descriptive cross-sectional study will be conducted.

Study Technique
It will be a Convenience Sampling.

Study Area and Study Population
The study population will be carried out at tertiary care hospitals of Lahore, Punjab, Pakistan. All nurses who are working in the selected tertiary care hospitals and involved in a direct contact with patients will be invited to participate in this study.

Sample Size
Epidemiological information system (EPI) will be utilized to calculate the sample size of the study. A total number of 150 respondents will be considered to fulfillment of our work.

Research Subjects

Inclusion Criteria
Health professionals who work at least 2 months in the direct care of patients.

Exclusion Criteria
Health workers who were extremely ill and on annual leave during data collection were excluded from the study.

Duration the Study
6 months after approval of synopsis.

Data Collection
A self-administered questionnaire will be used for the purpose of data collection which contains items related to knowledge and practice of regarding the prevention of neutropenic infection. It is divided into the following four sections:

Section I is related to demographic information of the individuals: age, gender, level of education, current position, duration of work, have taken infection prevention training, available infection prevention guidelines, type of shifts.

Section II is related to knowledge of neutropenic infection which consists of 18 questions.

Section III is related to knowledge of prevention neutropenic infection which consists of 9 question

Section IV is related to Practice of prevention neutropenic infection which consists of 15 questions.

Operational Definition of Variable

Outcome Variable
The main outcome variable will be the knowledge and practice of healthcare workers towards infection prevention in neutropenic patients.

Independent Variables
The independent variables include various socio-demographic characteristics (age, sex, religion, level of education, work experience, current position, duration of work, have taken IP trainings, have taken IP guidelines, type of shifts). Knowledge about infection, prevention and practice of the prevention was measured using the cumulative score of questions each with two possible responses.

Statistical Analysis
Statistical package for Social Sciences (SPSS) version 23.0 IBM Corporation Armonk, New York, USA) will be
used for data entry and analysis. Initial analysis will be included; computing frequency distribution for categorical variables, mean values (±standard deviation) and median values (with interquartile range [IQR]) to describe the continuous data with and without normal distribution, respectively. Kolmogorov–Smirnov tests and Skewness–Kurtosis will be used to analyze whether the data is normally distributed. Data obtained will be observed and analyzed using independent two-sample t-tests and differences between observed practices of nurses will be compared using the Cochran’s Q test.

Ethical Considerations
- The approval for the study will be obtained from the educational authorities of University of Lahore.
- The approval for the study will be obtained from the research and ethics committees of the university and the participating hospitals.
- Confidentiality, anonymity and privacy of all participants will be guaranteed at all levels of this study.
- Written informed consent will also be obtained from each participant.

RESULTS
A total of 150 health professionals were interviewed yielding a response rate of 95% and majorities, 93 (62%) were male. More than half of, 82 (54.66%) were in the age group between 26 and 30 years old. The mean age of the respondents was 25.25 (SD ± 4.5) and a higher proportion (47%) of the respondents was diploma and 55.3% of healthcare worker were staff nurses (Table 1).

The mean score of medical caretakers was 21.3 (SD = 2.4), with a base score of 17 and limit of 27. All attendants addressed after things accurately, "Urinary catheterization must be performed to quantify the pee yield" and "Medical caretakers ought to illuminate the patient and family about disease control methods." most of attendants (96.1%) knew the elements of neutrophils and 68.6% of them knew the basic scope of neutrophil checks. In any case, 94.1% of them didn't reply or didn't furnished a right response following the announcement "One of the indications of contamination in patients with neutropenia is glycosuria," 68.6% of them offered wrong response to "Neutropenia is portrayed by an abatement in neutrophils and thrombocytes," and 66.7% of them furnished wrong response to "It is hard to recognize the signs and side effects of disease in patients with neutropenia" (Table 2).

Table 1: Demographic Characteristics of Nurse’s Working in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Age        | Frequency | Percentage |
|------------|-----------|------------|
| 21–25      | 58        | 38.7       |
| 26–30      | 82        | 54.7       |
| 31 and above | 10        | 6.7        |
| Sex        |           |            |
| Male       | 93        | 62.0       |
| Female     | 57        | 38.0       |
| Educational status | |        |
| Diploma Degree | 70        | 47.0       |
| Bachelor’s Degree | 60        | 40.0       |
| Masters or Above | 20        | 13.0       |
| Work Experience |        |            |
| < 5 year   | 111       | 74.0       |
| 5–10 year  | 29        | 19.3       |
| > 10 years | 10        | 6.7        |
| Current Position |    |            |
| Head Nurse | 21        | 14.0       |
| Staff Nurse | 129       | 86.0       |
| Had taken IP training | |        |
| Yes        | 53        | 35.3       |
| No         | 97        | 64.7       |
| IP guideline availability | |        |
| Yes        | 68        | 45.3       |
| No         | 82        | 54.7       |
Table 2: Knowledge regarding Neutropenic Infection in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Knowledge                                                                 | Frequency | Percentage |
|---------------------------------------------------------------------------|-----------|------------|
| Neutropenia is characterized by a decrease in neutrophils and thrombocytes. | TRUE: 103 | 68.6       |
|                                                                           | FALSE: 47 | 31.4       |
| Neutrophils provide the body’s defense by phagocytosis of microorganisms. | TRUE: 144 | 96.1       |
|                                                                           | FALSE: 6  | 3.9        |
| A patient is classified as neutropenic when the neutrophil count is       | TRUE: 47  | 31.4       |
| 2500 cells/mm³                                                            | FALSE: 103| 68.6       |
| Lymphoma is one of the diseases that cause neutropenia.                   | TRUE: 124 | 82.8       |
|                                                                           | FALSE: 26 | 17.2       |
| Hypotension, an indicator for sepsis, is an important symptom for        | TRUE: 147 | 98.0       |
| neutropenic patients.                                                     | FALSE: 3  | 2.0        |
| It is difficult to identify the signs and symptoms of infection in        | TRUE: 50  | 33.3       |
| patients with neutropenia                                                 | FALSE: 100| 66.7       |
| Neutropenic patients should avoid coughing and deep breathing             | TRUE: 76  | 51.0       |
| Exercises                                                                 | FALSE: 74 | 49.0       |
| Neutropenic patients’ oral care is provided with sodium bicarbonate      | TRUE: 135 | 90.2       |
| Solution                                                                  | FALSE: 15 | 9.8        |
| Neutropenic patients must be placed in private rooms                      | TRUE: 135 | 90.2       |
|                                                                           | FALSE: 15 | 9.8        |
Table 2 (cont’d): Knowledge among Nurses regarding Neutropenic Infection in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Frequency | Percentage |
|-----------|------------|
| Floor must be cleaned with a damp mop |
| TRUE | 79 | 52.9 |
| FALSE | 71 | 47.1 |
| During patient care gowns, masks, and gloves should be worn. |
| TRUE | 76 | 51.0 |
| FALSE | 74 | 49.0 |
| Urinary catheterization must be performed to measure the urine Output |
| TRUE | 0 | 0.0 |
| FALSE | 150 | 100.0 |
| Drinking tap water is not recommended for neutropenic patients |
| TRUE | 144 | 96.1 |
| FALSE | 6 | 3.9 |
| One of the signs of infection in patients with neutropenia is Glycosuria |
| TRUE | 9 | 5.9 |
| FALSE | 141 | 94.1 |
| Neutropenic patients’ oral care includes rinse of mouth three times a day. |
| TRUE | 59 | 39.2 |
| FALSE | 91 | 60.8 |
| Neutropenic patients’ diet includes plenty of fresh vegetables and fruits to meet vitamins needs. |
| TRUE | 29 | 19.6 |
| FALSE | 121 | 80.4 |
| Nurses should inform patient and family about infection control Procedures |
| TRUE | 150 | 100.0 |
| FALSE | 0 | 0.0 |
| Skin and mucous membranes should be assessed daily and Documented |
| TRUE | 138 | 92.2 |
| FALSE | 12 | 7.8 |

The mean score of the information questions was 5.29 (SD = 1.6). Right now, 127(84.6%) [95% CI: 23.3, 30.5] of the respondents were seen as learned about contamination anticipation. Among the examination respondents dominant part, 140 (93.3) and 141(94%) realized that purification and germicide forestall human services obtained contamination separately. One hundred and thirty-two (88%) human services laborers accepted that each gear needs disinfecting before sanitization. The less part of the respondents (31.4%) haven't known concerning to maintain safe environment (Table 3).
Table 3: Knowledge of Prevention Neutropenic Infection among Nurses in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Knowledge of Prevention | Frequency | Percentage |
|-------------------------|-----------|------------|
| Disinfection prevent health care acquired infections | 140 | 93.3 |
| NO | 10 | 6.7 |
| Antiseptic prevent health care acquired infection | 141 | 94 |
| NO | 9 | 6 |
| Chemical sterilization technique used for every equipment | 58 | 37.3 |
| NO | 92 | 62.7 |
| Physical sterilization (heat/radiation technique used for every equipment) | 50 | 37.3 |
| NO | 84 | 62.7 |
| All microorganisms including spores are destructed by autoclaving | 110 | 82.1 |
| NO | 24 | 17.9 |
| Every equipment need decontamination before sterilization | 132 | 88.0 |
| NO | 18 | 12.0 |
| Protective device minimizes health care acquired infection | 131 | 87.3 |
| NO | 19 | 12.7 |
| Wearing gloves replace the need for hand washing | 55 | 36.7 |
| NO | 95 | 63.3 |
| Maintaining safe environment. | 103 | 68.6 |
| NO | 47 | 31.4 |

Table 4 shows the results of practice towards neutropenic infection prevention among nurses. The extent of social insurance laborers who had great practice towards disease counteraction exercises was seen as 86 (57.3%). Concerning hand washing practice, 66 (44%) and 100 (66.7%) of them were washing their hands with cleanser before tolerant consideration, after patient consideration or after contact with blood. Dominant part of the respondents hadn't worn goggle 108 (72%) and 107 (71.3%) doesn't inoculate for the regular pathogen. Concerning accessibility of Infection anticipation supplies, 50 (33.3%) of social insurance laborers doesn't utilize contamination counteractions supplies because of unfit to get accessible supplies. In spite of 38 (25%) of the social insurance supplier who doesn't utilize the accessible supplies due to being lack of regard (70%) and 30% due to don't seeing presentation.
Table 4: Practice towards Neutropenic Infection Prevention among Nurses in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Practice                                                   | Frequency | Percentage |
|-------------------------------------------------------------|-----------|------------|
| Wash hands with soap before patient care                    | YES 66    | 44         |
|                                                           | NO 85     | 56         |
| Wash hands after patient care/contact with fluid           | YES 100   | 66.7       |
|                                                           | NO 50     | 33.3       |
| Wash hands without soap before and after patient care      | YES 70    | 46.7       |
|                                                           | NO 80     | 53.3       |
| Used all type of personal protective equipment (PPE)        | YES 42    | 28.0       |
|                                                           | NO 108    | 72.0       |
| Type of PPE in patient care: Gloves                        | YES 128   | 85.3       |
|                                                           | NO 22     | 14.7       |
| Type of PPE in patient care: Goggles                       | YES 140   | 93.3       |
|                                                           | NO 10     | 6.7        |
| Type of PPE in patient care: Mask                          | YES 42    | 28.0       |
|                                                           | NO 108    | 72.0       |
| Type of PPE in patient care: Gown                          | YES 62    | 41.3       |
|                                                           | NO 78     | 58.7       |
| Changing time of chlorine solutions: Every 24 hours        | YES 85    | 56.7       |
|                                                           | NO 65     | 43.3       |
| Changing time of chlorine solutions: After 2 Days          | YES 45    | 30.0       |
|                                                           | NO 105    | 70.0       |
| Changing time of chlorine solutions: Don’t know            | YES 20    | 13.0       |
|                                                           | NO 130    | 87.0       |
| Used Infection prevention guideline/evidence               | YES 53    | 35.3       |
|                                                           | NO 97     | 64.7       |
| Recap needle before disposing                              | YES 48    | 32.0       |
|                                                           | NO 102    | 68.0       |
| History of contact for blood, fluid or stick injury        | YES 98    | 65.3       |
|                                                           | NO 52     | 34.7       |
Table 4 (cont’d): Practice towards Neutropenic Infection Prevention among Nurses in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Measures used after exposed for blood/stick injury: Taking PEP | Frequency | Percentage |
|---------------------------------------------------------------|-----------|------------|
| YES                                                          | 59        | 60.0       |
| NO                                                           | 39        | 40.0       |

| Measures used after exposed for blood/stick injury: Clean by Alcohol | Frequency | Percentage |
|--------------------------------------------------------------------|-----------|------------|
| YES                                                                | 70        | 71.5       |
| NO                                                                 | 28        | 28.5       |

| Measures used after exposed for blood/stick injury: Washing with water | Frequency | Percentage |
|---------------------------------------------------------------------|-----------|------------|
| YES                                                                 | 85        | 86.7       |
| NO                                                                  | 13        | 13.3       |

| Give health education for patients about Neutropenic Infection | Frequency | Percentage |
|----------------------------------------------------------------|-----------|------------|
| YES                                                            | 97        | 64.7       |
| NO                                                             | 53        | 35.3       |

| Cover wounds on the skin before you start your work            | Frequency | Percentage |
|----------------------------------------------------------------|-----------|------------|
| YES                                                            | 98        | 65.3       |
| NO                                                             | 52        | 34.7       |

| Vaccinated against common pathogen                             | Frequency | Percentage |
|----------------------------------------------------------------|-----------|------------|
| YES                                                            | 43        | 28.7       |
| NO                                                             | 107       | 71.3       |

| Used needles or sharps put on containers                        | Frequency | Percentage |
|----------------------------------------------------------------|-----------|------------|
| YES                                                            | 97        | 64.7       |
| NO                                                             | 53        | 35.3       |

| Containers disposed of when they are three quarters full       | Frequency | Percentage |
|----------------------------------------------------------------|-----------|------------|
| YES                                                            | 60        | 40.0       |
| NO                                                             | 90        | 60.0       |

In the bivariate analysis factors which were altogether connected with information about disease counteraction was: age, instructive status, working experience, sex of the members, calling and consistently taking preparing in contamination avoidance strategies. In the wake of controlling the jumbling in multivariate calculated relapse examination, age, instructive statuses, working experience, sex of the members and consistently taking preparing on disease avoidance were seen as essentially connected with information on contamination counteraction. Thus, those nurses who age 31 and above were around multiple times more knowledgeable about contamination anticipation than when contrasted with those matured 21–25 (AOR = 3.15, 95%, CI = [2.467–5.025]). Those male nurses were multiple times more probable learned than those female nurses laborers (AOR = 2.05, 95%, CI = [2.139–5.816]. This examination uncovered that the working experience was discovered another solid indicator of information towards disease avoidance which shows that Healthcare laborers who had work. experience of over ten years was multiple times almost certain learned on contamination counteraction than those had work understanding of less than five years (AOR = 4.03, 95%, CI = [1.229–5.68]). Nurses with an instructive degree of MSc or above and were multiple times (AOR = 3.034, 95%, CI = [1.856–4.756]) and BSC were multiple times (AOR = 2.15, 95%, CI = [3.245–8.789]) almost certain proficient than Diplomas.

Moreover, numerous relapse appeared, Healthcare experts who haven't taken Infection avoidance preparing were 75% more uncertain educated (AOR = 0.25, 95%, CI = [1.689–3.95] about disease counteraction than those had taken preparing in contamination anticipations (Table-5).
Table 5: Bivariate and Multivariate analysis on associated factors towards knowledge of infection prevention among Nurses in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Knowledgeable | P-value |
|---------------|---------|
|                | Yes  | No  |        |
| Age            |      |     |        |
| 21–25          | 48   | 10  |        |
| 26–30          | 73   | 19  | 0.30   |
| 31 and above   | 6    | 4   | 0.02 **|
| Sex            |      |     |        |
| Male           | 77   | 16  | 0.04 **|
| Female         | 50   | 7   |        |
| Educational status |  |     |        |
| Diploma Degree | 20   | 0   | 0.01 **|
| Bachelor's Degree | 48  | 12  | 0.04 **|
| Masters or Above | 59  | 11  |        |
| Work Experience |      |     |        |
| < 5 year       | 94   | 17  |        |
| 5–10 year      | 23   | 6   | 0.05   |
| > 10 years     | 10   | 0   | 0.00 **|
| Had taken IP training |  |     |        |
| Yes            | 52   | 1   |        |
| No             | 75   | 22  | 0.05 **|
| IP guideline availability |  |     |        |
| Yes            | 55   | 13  |        |
| No             | 72   | 10  |        |

*The p-value cannot obtain from SPSS.

Table 6 shows that the age, conjugal status, instructive status, working experience, sex of the members, accessibility of individual defensive hardware and consistently taking preparing on disease counteraction techniques were factors which were fundamentally connected with training about contamination anticipation. Although, age, instructive statuses, working experience, consistently taking preparing on contamination avoidance and accessibility of disease counteraction supplies were seen as fundamentally related in the multivariate investigation. In regard to the period of social insurance laborers, with the age scope of 31 and above were around multiple times bound to rehearse contamination avoidance exercises than those matured 21–25 (AOR = 2.04, 95%, CI = [1.279–4.5793]).

Nurses at instructive level expands the act of contamination avoidance is expanded dependent on this investigation. Different calculated relapse of this investigation uncovered that medicinal services laborers with an instructive degree of MSc or above were multiple times (AOR = 4.15, 95%, CI = [1.381–7.41]) almost certain training contamination counteraction exercises than those human services works with recognition experts and BSC holders were multiple times (AOR = 1.959, 95%, CI = [1.970–4.685]) more probable rehearsed disease avoidance exercises than those social insurance works with certificate experts in individually. What's more, Healthcare laborers who had work understanding of over ten years had the most noteworthy chances of achieving disease counteraction practice/exercises than the individuals who had work understanding of less than five years (AOR = 3.17, 95%, CI = [1.98–5.674]). Social insurance laborers who had taken contamination anticipation preparing were multiple times bound to rehearse disease avoidance than those haven't taken preparing on contamination counteraction (AOR = 3.97, 95%, CI = [2.576–5.457]).

As per different relapse investigation of this examination, accessible inventory of disease anticipation expands the use of those provisions for the counteraction of Hospital-procured contaminations, Heath care works who get an accessible stock of contamination avoidance (as cleanser, cover, and contamination counteraction rule) had higher chances of rehearsed contamination anticipation exercises (AOR = 2.156, 95%, CI = [1.90–4.357]) than those social insurance works can't get disease anticipation supplies. Moreover, adherence in IP rule-proof was another huge factor related with the act of contamination anticipation of infection. Nurses who cling to IP rules were multiple times more probable rehearsed disease anticipation exercises (AOR = 4.02, 95%, CI = [2.45–6.359]) than the individuals who doesn't cling to the rule (Table 6).
Table 6: Bivariate and Multivariate analysis on associated factors towards practice of infection prevention among Nurses in Tertiary Care Hospitals, Lahore, Pakistan (N = 150).

| Knowledgeable | P-value |
|---------------|---------|
| Yes           | No      |         |
| **Age**       |         |         |
| 21–25         | 33      | 25      | *       |
| 26–30         | 47      | 35      | *       |
| 31 and above  | 6       | 4       | 0.02 ** |
| **Sex**       |         |         |
| Male          | 52      | 41      | *       |
| Female        | 34      | 23      | *       |
| **Educational status** |         |         |
| Diploma Degree| 42      | 28      | 0.001 **|
| Bachelor’s Degree | 30     | 30      | 0.0038**|
| Masters or Above | 14    | 14      | *       |
| **Work Experience** |         |         |
| < 5 year      | 54      | 64      | *       |
| 5–10 year     | 20      | 9       | *       |
| > 10 years    | 9       | 1       | 0.02 ** |
| **Had taken IP training** |         |         |
| Yes           | 42      | 11      | *       |
| No            | 44      | 53      | 0.008 **|
| **IP guideline availability** |         |         |
| Yes           | 38      | 15      | 0.005** |
| No            | 48      | 49      |         |

*The p-value cannot obtain from SPSS.
** Shows statistical significance at p-value < 0.05

Discussion

Knowledge about neutropenic patient’ care

To facilitate discussion of the results regarding to knowledge form, items were categorized as knowledge about nursing practice (Table 2, 3), and nursing care of neutropenic patients (Table 4).

Study results indicated that nurses’ mean score of their answers to items was high. The rates of correct answers, including the functions of neutrophils (statement 2), nursing practice for patients and signs and symptoms of infection in neutropenic patients were also found high. Ertem (2004), who used the same knowledge form also reported high scores consistent with our results and interpreted these results as satisfactory. Study of Nirenberg, Reame, Cato, and Larson (2010) revealed that 86.0% of nurses answered more than 70.0% of the questions related with care of neutropenic patients correctly. These results are important because it implies that nurses transfer their knowledge acquired through both formal and in-service education to their working environment. It is believed that nurses who are highly knowledgeable, particularly in critical care fields (e.g. intensive care, emer-gency, and oncology units), generally provide better nursing care and patients feel safe and secure when cared by nurses with this competency (Kvale & Bondevik, 2010). On the other hand limited study results showed that, nurses’ knowledge of infections (Aytac, Naharci, & Oztunc, 2008; Cox, Simpson, Letts, & Cavanagh, 2014) and preventive measures for infection control (Atasoy, 2009, Observation of nurses’ practice

We found that hand hygiene adherence in nurses were low. Nurses’ hands can transfer microorganisms to patients either through direct contact or via contact with the patient’s immediate environment. Hand hygiene is the simplest method for preventing the transmission of infection, and is among the highest priority of universal precautions (de Wandel, Maes, Labeau, Vereecken, Blot, 2010; Yuceer & Bulut, 2010). Studies on nurses’ knowledge of hand hygiene revealed that their level of knowledge ranged from 12.0% to 87.0% (Atasoy, 2009, pp. 67–75; Demirdal et al., 2007; Katherason et al., 2010; de Wandel et al., 2010), whereas the rate of good hand washing was nearly 73.2% (Magnus et al., 2015). Hence, it must be major focus when educating patients with neutropenia and their families about infection control. Even though the hand hygiene facilities (sinks for hand washing) at the study settings were not suitable, alcohol-based hand rubs were available in all patient rooms. However, our observations revealed that nurses preferred not to use alcohol-based hand rubs because these products may have irritated their skin. Demirdal et al. (2007) also found that skin irritation is the main reasons for nurses’ lack of adherence to hand
washing (22.7%). In the institution where this study was conducted, patients and families were educated on hand washing; however, as our observations indicated, nurses were not convincing in educating patient and their families for effectiveness of hand washing because nurses themselves did not comply with hand hygiene protocols.

**Conclusion**

The results of this study indicated that the nurses’ general knowledge of the neutropenia was above average, but their infection control practices, especially during the assessment of vital signs, preparation, and administration of medications, were inadequate. This result indicated even nurses’ knowledge level above average they are not paying attention and transfer this knowledge to their care practices. According to these results, we recommend further studies to investigate the reasons for the difference or gap between knowledge and practice in-depth.

**REFERENCE**

Bedoya, G., Dolinger, A., Rogo, K., Mwaura, N., Wafula, F., Coarasa, J., …& Das, J. (2017). Observations of infection prevention and control practices in primary health care, Kenya. Bulletin of the World health Organization, 95(7), 503.

Daniel, R., Grendell, R. N., & Wilkins, F. R. (2010). Nursing fundamentals, caring & clinical decision making, and medication administration.

Desta, M., Ayenew, T., Sitotaw, N., Tegegne, N., Diros, M., &Getie, M. (2018). Knowledge, practice and associated factors of infection prevention among healthcare workers in Debre Markos referral hospital, Northwest Ethiopia. BMC health services research, 18(1), 465.

Iliyasu, G., Dayyab, F. M., Habib, Z. G., Tiamiyu, A. B., Abubakar, S., Mijinyawa, M. S., & Habib, A. G. (2016). Knowledge and practices of infection control among healthcare workers in a Tertiary Referral Center in North-Western Nigeria. Annals of African medicine, 15(1), 34.

Mathur, P. (2011). Hand hygiene: back to the basics of infection control. The Indian journal of medical research, 134(5), 611.

Naghd, H., Forouzi, M. A., &Dehghan, M. (2019). Iranian Nurses’ Knowledge of Neutropenia and Their Practice for Infection Prevention in Patients with Cancer. Journal of Cancer Education, 1-9.

Ohls, R. K., &Maheshwari, A. (2012). Hematology, Immunology and Infectious Disease: Neontology Questions and Controversies: Expert Consult-Online and Print. Elsevier Health Sciences.

Smith, P. W., Bennett, G., Bradley, S., Drinka, P., Lautenbach, E., Marx, J., …& Stevenson, K. (2008). SHEA/APIC guideline: infection prevention and control in the long-term care facility. Infection Control & Hospital Epidemiology, 29(9), 785-814.

Sousa AFL, Matos MCB, Matos JGNF, Sousa LRM, Moura MEB, Andrade D. Prevention and control of infection in professional nursing training: a descriptive study. Online Braz j nurs. 2017;2:199-208.

Sydnor, E. R., & Perl, T. M. (2011). Hospital epidemiology and infection control in acute-care settings. Clinical microbiology reviews, 24(1), 141-173.

TarakciogluCelik, G. H., &Korkmaz, F. (2017). Nurses’ knowledge and care practices for infection prevention in neutropenic patients. Contemporary nurse, 53(2), 143-155.

Assess the Nurse’s Knowledge and Standard Practices regarding Infection Prevention in Neutropenic Patients

Dear sir/ madam,

Assalam-o-Alaikum!

We are conducting a research to assess the knowledge and care practices for infection prevention in neutropenic patients who would help us to promote and plan the better health strategy for neutropenic infected patients. Hence, to decrease the morbidity and mortality due to neutropenic patients. This will take about 15 minutes of your time. Your participation is voluntary. This is an anonymous research and all the information you provide will be kept strictly confidential. The results will be presented in aggregate form while preserving the identity of individuals and the institution where they get treatment. We request you to participate in this study.

Thank you!

Form Number #________________  Date: ________/_________/ 2020

Demographic Information of the Subject

Age (in years) : ____________________

Gender:  □ Male  □ Female  □ Change

Level of Education  □ Diploma Degree  □ Bachelor’s Degree  □ Master’s Degree

Current Position  □ Staff Nurse  □ Head Nurse

Duration of Work  □< 5 years  □ 5 – 10 years  □> 10 years

Have taken IP training  □ Yes  □ No
**Available IP guideline** □ Yes □ No

**Type of shift** □ Rotating □ Fixed

**Knowledge of Neutropenic Infection**

| Sr. No | Statements                                                                 | TRUE | FALSE |
|--------|-----------------------------------------------------------------------------|------|-------|
| 1.     | Neutropenia is characterized by a decrease in neutrophils and thrombocytes. | T    | F     |
| 2.     | Neutrophils provide the body’s defense by phagocytosis of microorganisms.  | T    | F     |
| 3.     | A patient is classified as neutropenic when the neutrophil count is 2500 cells/mm³. | T    | F     |
| 4.     | “Lymphoma” is one of the diseases that cause neutropenia.                   | T    | F     |
| 5.     | Hypotension, an indicator for sepsis, is an important symptom for neutropenic patients. | T    | F     |
| 6.     | It is difficult to identify the signs and symptoms of infection in patients with neutropenia. | T    | F     |
| 7.     | Neutropenic patients should avoid coughing and deep breathing exercises.    | T    | F     |
| 8.     | Neutropenic patients’ oral care is provided with sodium bicarbonate solution. | T    | F     |
| 9.     | Neutropenic patients must be placed in private rooms.                      | T    | F     |
| 10.    | Floor must be cleaned with a damp mop                                      | T    | F     |
| 11.    | During patient care gowns, masks, and gloves should be worn.               | T    | F     |
| 12.    | Urinary catheterization must be performed to measure the urine output.     | T    | F     |
| 13.    | Drinking tap water is not recommended for neutropenic patients.             | T    | F     |
| 14.    | One of the signs of infection in patients with neutropenia is glycosuria.  | T    | F     |
| 15.    | Neutropenic patients’ oral care includes rinse of mouth three times a day.  | T    | F     |
| 16.    | Neutropenic patients’ diet includes plenty of fresh vegetables and fruits to meet vitamins needs. | T    | F     |
| 17.    | Nurses should inform patient and family about infection control procedures. | T    | F     |
| 18.    | Skin and mucous membranes should be assessed daily and documented.         | T    | F     |

**Knowledge of Prevention Neutropenic Infection**

| 19.    | Disinfection prevent health care acquired infections                        | Yes  | No    |
| 20.    | Antiseptic prevent health care acquired infection                           | Yes  | No    |
| 21.    | Chemical sterilization technique used for every equipment                   | Yes  | No    |
| 22.    | Physical sterilization (heat/radiation technique used for every equipment) | Yes  | No    |
| 23.    | All microorganisms including spores are destructed by autoclaving           | Yes  | No    |
| 24.    | Every equipment need decontamination before sterilization                   | Yes  | No    |
| 25.    | Protective device minimizes health care acquired infection                  | Yes  | No    |
| 26.    | Wearing gloves replace the need for hand washing                           | Yes  | No    |
| 27.    | Maintaining safe environment.                                               | Yes  | No    |

**Practice of Prevention Neutropenic Infection**

| 28.    | Wash hands with soap before patient care                                   | Yes  | No    |
| 29.    | Wash hands with soap after patient care/contact with fluid                 | Yes  | No    |
| 30.    | Wash hands without soap before and after patient care                       | Yes  | No    |
| 31.    | Used all type of personal protective equipment (PPE)                        | Yes  | No    |
| 32.    | Type of PPE in patient care:                                                | Yes  | No    |
|        | Gloves                                                                      | Yes  | No    |
|        | Goggles                                                                     | Yes  | No    |
|        | Mask                                                                        | Yes  | No    |
|        | Gown                                                                        | Yes  | No    |

| 33.    | Changing time of chlorine solutions:                                        | Yes  | No    |
|        | Every 24 Hours                                                              | Yes  | No    |
|        | After Two Days                                                              | Yes  | No    |
|        | Don’t Know                                                                  | Yes  | No    |

| 34.    | Used Infection prevention guideline/evidence                                 | Yes  | No    |
| 35.    | Recap needle before disposing                                               | Yes  | No    |
| 36.    | History of contact for blood, fluid or stick injury                         | Yes  | No    |
| 37.    | Measures used after exposed for blood/stick injury:                         | Yes  | No    |
|        | Taking PEP                                                                  | Yes  | No    |
|        | Clean by Alcohol                                                            | Yes  | No    |
|        | Washing with Water                                                          | Yes  | No    |

| 38.    | Give health education for patients about Neutropenic Infection              | Yes  | No    |
39. Cover wounds on the skin before you start your work  
Yes  
No
40. Vaccinated against common pathogen  
Yes  
No
41. Used needles or sharps put on containers  
Yes  
No
42. Containers disposed of when they are three quarters full  
Yes  
No

Thank You!