*Original Research Article*

# Knowledge Regarding Prevention of Infections in Patients Receiving Cancer Chemotherapy among Nursing Students

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## ABSTRACT

Cancer is a public health burden in which there is uncontrolled tissue growth which results from an imbalance between cell division and apoptosis. The therapeutic agents used to treat cancer leads to adverse effects in the body. Most adverse effects of chemotherapeutic agents are caused by either toxic effects on specific organs or by damaging to rapidly dividing normal cell population, including hair roots, the intestine, bone marrow and lining of mouth among which the serious complication-infection-is mainly due to action of chemotherapeutic agents on bone marrow. Infections associated with cancer treatment are increasing and are often serious, highlighting the need for a program to improve infection control and appropriate antibiotic management in these high-risk patients.

**Materials and methods:** It is descriptive study design and data collected from 60 samples by using non probability convenient sampling technique. The subjects were asked to answer a structured knowledge questionnaire with demographic data. The collected data analyzed through the SPSS (Statistical Package for Social Science).

**Results:** Among the study participants maximum number of subjects 50% were in the age group of below 20 years and around 95%were females. Among the 60 subjects 40(66.7%) had moderately adequate knowledge, 20(33.3%) of them had inadequate knowledge and no one had adequate knowledge. Exposure to mass media was significantly associated with their scores.

**Conclusion:** The mean knowledge score of the students are 40.93%. Findings of the study shows an association between the knowledge score of nursing students with demographic variable such as exposure to mass media.

*Keywords:* Knowledge, Prevention, Infections, Cancer, Chemotherapy, Nursing Students

## INTRODUCTION

Cancer is an abnormal uncontrolled growth of tissue that has potential to spread to distant sites of the body. Cancer exerts its deleterious effect on the body by destroying the surrounding adjacent tissues: e.g. compressing nerves, eroding blood vessels, or causing perforation of organs replacing normal functioning cells in distant sites: e.g. replacing blood forming cells in the bone marrow, replacing bones leading to increased calcium levels in the blood, or in the heart muscles so that the heart fails. Even we can use various chemotherapeutic agents for treating and controlling cancer, the side effect of these agents becomes a

challenge in providing nursing care to the cancer patients. [1]

In oncology, drug therapy for cancer also called "chemo" for short. Most cancer chemotherapeutic drugs are given IV (into a vein) or IM (into muscle). Some anticancer agents are taken orally (by mouth). Chemotherapy is usually systemic treatment, meaning that the drugs flow through the bloodstream to nearly every part of the body. Chemotherapy is generally given in cycles that are a treatment period is followed by a recovery period, then another treatment period, and so on. So the side effects of chemotherapy depend mainly on the drugs and the doses the patient receives on each cycles. Most of the anticancer drugs affect cells that divide rapidly, these include blood cells, which fight infection, help the blood to clot, or carry oxygen to all parts of the body. When blood cells are affected by anticancer drugs, patients are more likely to develop infections, may bruise or bleed easily, and may have less energy. The main cause of infections during cancer chemotherapy is neutropenia induced by these drugs. Neutrophil and their precursors called stem cells are constantly being produced and have a short life span. This makes them very sensitive to these treatments. For most chemotherapy agents, patient's blood counts reach their lowest point (called the nadir) 7 – 14 days after the chemo. But this can vary with some drugs causing a later nadir (as long as 63 days) and more prolonged neutropenia. Recovery can range from 8 to 89 days.

Radiation induced neutropenia is related to the amount of exposure, the site that carrying bone marrow such as the sternum or skull and the disease processes that effect the immune system like cancers, HIV infection, or autoimmune disorders. Neutropenia is prolonged or the risk is increased with advanced age, malnutrition, multiple treatments or prolonged treatments, or with concurrent medications like antibiotics or steroids.

**Risk factors of neutropenia**

1. Neutropenia can be predicted in certain chemotherapy agents and protocols and patients age 70 and older.
2. Each time a patient receives a cycle of chemotherapy or radiation their risk of neutropenia increases
3. Patients who have been neutropenic in a previous cycle of chemo or radiation are at high risk for neutropenia in all subsequent treatments. [2]

A survey was conducted in Amgen to find out growing concern about risk of infection in cancer patients. The survey findings showed that one in four chemotherapy patients report having an infection during treatment, with more than a third requiring a second course of antibiotics. Infections associated with cancer treatment are increasing and are often serious, highlighting the need for a program to improve infection control and appropriate antibiotic management in these high-risk patients. Programs to improve infection control in cancer patients, whose immune systems may be compromised by chemotherapy will aid in saving the lives of these high-risk patients. This initiative will bring together experts in oncology and infectious disease to raise awareness of this public health concern, and reduce the risk of infections, and ultimately, related deaths. [3]

Cancer is a public health burden in which there is uncontrolled tissue growth which results from an imbalance between cell division and apoptosis. The therapeutic agents used to treat cancer also leads to adverse effects in the body. Most adverse effects of chemotherapeutic agents are caused by either toxic effects on specific organs or by damaging to rapidly dividing normal cell population, including hair roots, the intestine, bone marrow and lining of mouth among which the serious complication-infection-is mainly due to action of chemotherapeutic agents on bone marrow. The patient becomes anemic from few red blood cells or bleeds easily-from too few platelets. The third type of blood cells, the white blood cells are instrumental to the body in fighting infections, and when

the white blood cells is low, this can become a problem, among which neutropenia that is reduction in neutrophil count to a stage where body's immune system become unable to fight against infections became most dangerous adverse effect. [4]

Bacterial and fungal infections are considerable cause of death of cancer patients who receiving cancer chemotherapy, but along with which viruses are found to be an agent. Chemotherapy related leucopenia or neutropenia is associated with substantial febrile morbidity. Febrile neutropenia is defined as a single oral temperature measurement of higher than 38.3°c(101°F) or a temperature of 38°c (100.4°F) or higher for longer than 1hr and neutropenia with absolute neutrophil count < 500or < 1,000/µl with predicted rapid decline to fewer than 500/µl. Usually it happens on Nadir'sday-7to10 days after starting chemotherapy. [5]

A study from Department of Medical Oncology, University Hospital Groningen, Netherlands was explained that in a prospective randomized trial, 40 stage IV breast cancer patients undergoing intermediate high-dose chemotherapy (cyclophosphamide, 5-fluorouracil plus epirubicin or methotrexate), received either recombinant human G-CSF or ciprofloxacin and amphotericin B for prevention of febrile leucopenia. In group I, 7of 18 patients developed Febrile leucopenia after 10/108 courses. In group II, 7 of 22 patients developed febrile leucopenia after7/98 courses. [6]

**OBJECTIVES**
- To determine the level of knowledge of 3rd year BSc nursing students regarding the prevention of infections in patients receiving cancer chemotherapy as measured by a structured questionnaire.
- To find out association between mean knowledge score and selected demographic variables

**METHODOLOGY**

It was a descriptive study design. The data collected from 60 samples selected by non probability convenient sampling technique by the researcher. The written informed consent was taken from each sample. Appropriate orientation was given to all the samples about the aim of the study, the nature of tool and adequate care was taken for protecting them from potential risk including maintaining confidentiality, security, identity, etc.

At the end of clarifications, the subjects were asked to answer a structured knowledge questionnaire with demographic data. The collected data analyzed through the SPSS (Statistical Package for Social Science). The study was approved by the Nursing Research Monitoring Committee, and the Institute ethical committee, Human studies.

**DESCRIPTION OF THE TOOL**
Structured questionnaire consists of two sections.
Section A: socio demographic variables.
Section B: Consist of 30 items (structured questionnaire) to assess the knowledge regarding prevention of infections in patients receiving cancer chemotherapy
**SECTION A:**
It contains 9 items such as age, gender, religion, residence, educational status of father, educational status of mother, occupation of father, previous information about prevention of infections in cancer chemo therapy, Exposure to mass media regarding prevention of infections in cancer chemo therapy
**SECTION B:** A structured questionnaire with 30 items was constructed to assess the knowledge of 3rd year BSc nursing students regarding prevention of infections during cancer chemotherapy.
**Score interpretation:** If the mark percentage is <50% - Inadequate, 50- 75- Moderately Adequate, >75% - Adequate.

**RESULTS**
Among the study participants maximum number of subjects 50% were in the age group of below 20 years and around

95%were females. Among the students 40% were Hindus and 53.3% were Christians. Majority of the students parents were finished higher secondary (36.7%, 35% respectively) education. The participants got previous information regarding preventive measures of infections in cancer chemotherapy 16 (26.7%) have clinical experiences, 6(10%) got information from previous histories of life and 38(63.3%) got by other ways. With regard to exposure to mass media 33(55%) read in news paper, 1(1.7%) heard in radio, 8(13.3%) watched in television, 17 (28.3) read in journals and 1(1.7%) exposed to other source.

**TABLE1: THE KNOWLEDGE SCORE ON DIFFERENT ASPECTS OF PREVENTION OF INFECTIONS IN PATIENTS RECEIVING CANCER CHEMOTHERAPY.        N=60**

| Area of Knowledge | No of items | Range | | Pre-test Knowledge | | |
|---|---|---|---|---|---|---|
| | | Min | Max | Mean score | SD | Mean % |
| Infection. | 8 | 2 | 7 | 4.17 | 1.404 | 52.13 |
| Effects of chemotherapeutic agents in body. | 7 | 0 | 6 | 2.88 | 1.748 | 41.14 |
| Clinical features & diagnostic measures of infections during cancer chemotherapy | 3 | 0 | 3 | 0.63 | 0.758 | 21 |
| Preventive measures of infections | 12 | 1 | 8 | 4.6 | 1.554 | 38.33 |

The above tables represents the mean, standard deviation & mean percentage on aspects of knowledge of nursing students regarding prevention of infections during cancer chemotherapy.

The table shows that the highest mean percentage of subjects is 52.13with SD of 1.404 in knowledge on infections .The lowest mean percentage of subjects is 21 with SD of 0.758 for knowledge about Clinical features & diagnostic measures of infections during cancer chemotherapy.

**TABLE 2: DISTRIBUTION OF SUBJECTS ACCORDING TO THE LEVEL OF KNOWLEDGE. N=60**

| Level of Knowledge | Frequency | Percentage |
|---|---|---|
| Moderately adequate | 40 | 66.7 |
| Inadequate | 20 | 33.3 |
| **Total** | **60** | **100** |

The above table depicts that in the pre test, out of 60 subjects 40(66.7%) had moderately adequate knowledge, 20(33.3%) of them had inadequate knowledge. This indicates the necessity of a teaching section regarding preventive aspect of infections during cancer chemotherapy among nursing students.

Exposure to mass media (Chi-Square value=10.013 p=0. 014) was significantly associated with their scores. There was significant differences in scores according to age (F-TEST=3.963 P=0.024), educational status of mother (F-TEST=2.875 P=0.031), occupational status of father (F-TEST=2.893 P=0.043) with mean score.

## DISCUSSION

The study shows that the students were having a mean percentage score of 40.93 % regarding prevention of infections in patients receiving cancer chemotherapy in overall aspects. Student's level of knowledge shows that 66.7% of students have moderately adequate knowledge and 33.3% of students have inadequate knowledge.

This study was supported by a Cross-sectional descriptive study conducted to examine the knowledge and practice, as well as factors influencing universal precautions practices amongst health care workers in Nigeria. The practice of universal precaution was inadequate among health care workers. [7]

Another study conducted in Department of Medical Oncology, Greece, on prophylactic and therapeutic strategies in chemotherapy induced neutropenia revealed that neutropenia poses a serious threat to patients on chemotherapy. It exposes them to the risk of infection- including potentially fatal infections- and also leads to delays in treatment and reductions in dose intensity, which can compromise the possibility of a favourable outcome. [8]

Department of Medicine, University of East Anglia, Norwich conducted a study on epidemiology, management and economic impact of febrile neutropenia in oncology patients receiving routine care at a regional cancer centre. The annual incidence of FN was 19.4 per 1000 oncology admissions. The most common patient groups were those with breast (27%), lung (16%), ovarian (13%) and oesophageal (13%) cancers. The mean length of stay was 9.2 days with an average cost of £2353 for an FN episode per patient. [9]

A study conducted in Cancer Care Clinic, USA, regarding pre chemotherapy assessment of neutropenic risk described that chemotherapy-induced febrile neutropenia (FN) predisposes patients to life-threatening infections and typically requires hospitalization. Oncology nurses applied the new risk assessment tool to all patients initiating chemotherapy or a new regimen. Patients at risk for FN received prophylactic colony-stimulating factor. Charts for 189 patients receiving chemotherapy in fiscal year 2005 (FY05) were compared with charts of 155 patients receiving chemotherapy in FY04, before the tool was implemented. The incidence of FN-related hospitalization declined by 78%, from 9.7% in FY04 to 2.1% in FY05 (P = .003). Total hospital days decreased from 117 to 24. Routine systematic evaluation by oncology nurses improves recognition of patients at risk of FN and substantially reduces FN-related hospitalization. [10]

A study conducted in Clatterbridge Centre for Oncology, UK, regarding management of febrile neutropenia. The researcher sent questionnaires to cancer clinicians to determine clinicians' routine management of FN, including use of risk stratification, antibiotic regimen and criteria for hospital discharge. In all, 128 clinicians responded, representing 50 cancer departments (83%). Only 38% of respondents stratify patients according to risk and with substantial variation in the criteria defining 'low-risk'. [11]

The findings of the study reveal that out of several demographic variable exposures to mass media is significantly associated with the knowledge scores.

Similar type of association was found in a study conducted in Orissa among staff nurse regarding knowledge about intravenous catheter related infections. The results showed that the staff nurse with BSc Nursing qualification had more knowledge about the treatment of thrombophlebitis ($\chi^2$=5.82, df=1, p<0.02). [12]

## CONCLUSION

Cancer is a group of emerging disorders with special aetiology on lifestyle changes. If the primary prevention is not done in time, cancer chemotherapy is a must. Even cancer chemotherapy provides complete cure from the disorder, the side effect of them are capable of producing adverse reactions in the body including death. The main side effect producing death consequences is bone marrow suppression as it produces severe infections in various systems of the body. Nursing students are the unique persons who are always with the patient. They will definitely get enough time to educate their clients about the necessity of prevention of infections during cancer chemotherapy. It also helps the nursing students to build a competent carrier in the area of cancer chemotherapy. So the investigator selects nursing student as the study target.

In the present study the mean knowledge score of the students is 40.93%. Based on the findings of the study there is an association between the knowledge score of BSc Nursing students with demographic variable such as exposure to mass media.

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How to cite this article: Vijayan A, Ghosh RUA, Sarika ML. Knowledge regarding prevention of infections in patients receiving cancer chemotherapy among nursing students. Int J Health Sci Res. 2019; 9(12):104-109.

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