# ADDIS ABABA UNIVERSITY
# COLLEGE OF HEALTH SCIENCES
# SCHOOL OF NURSING AND MIDWIFERY

## NURSES KNOWLEDGE AND CARE PRACTICE FOR INFECTION PREVENTION ON CHEMOTHERAPY INDUCED NEUTROPENIA IN ADDIS ABABA GOVERNMENTAL HOSPITALS, ETHIOPIA, 2020.

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| **Full title of the research** | **Nurses Knowledge and Care Practice for Infection Prevention in Patients with Neutropenia in Addis Ababa Government Hospitals, Ethiopia, 2020** |
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# ABBREVIATION AND ACRONYMS

| | |
|---|---|
| AH | Army Forced Hospital |
| ANC | Absolute Neutropenia Count |
| AOR | Adjusted Odd Ratio |
| BSC | Bachelor of Science |
| CI | Confidence Interval |
| CIN | Chemotherapy Induced Neutropenia |
| CME | Continuing Medical Education |
| DCF | Data Collector Facilitator |
| FN | Febrile Neutropenia |
| GLOBOCAN | Global Cancer Incidence Mortality and Prevalence |
| HBM | Health Belief Model |
| HC | Health Center |
| PGS | Post Graduate Students |
| PI | Principal Investigator |
| SD | Standard Deviation |
| SPHMMC | Saint Paul's Hospital Millennium Medical College |
| SPSS | Statistical Package for Social Studies |
| Sup | Supervisor |
| TASH | Tikur Anbessa Specialized Hospital |
| WHO | World Health Organization |

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# ABSTRUCT

**Background:** Neutropenia is one of the most common risk factors of infections in patients with poor immune competency. Sever neutropenia is major causes of morbidity, treatment disturbances and dose reductions in patients taking chemotherapy. Preventing infections is extremely important for a successful chemotherapy outcome. Nurses play an important role in the prevention, detection and management of neutropenia, as well teaching facts to patients for better cancer care.

**Objective:** To assess nurse's knowledge and care practice for infection prevention on chemotherapy induced neutropenia in Addis Ababa governmental hospitals with oncology units, Addis Ababa Ethiopia, 2020.

**Method:** Institutional based cross-sectional study design using quantitative methods was conducted. Neutropenia knowledge questions (developed by Ertem) was used among 134 randomly selected nurses by lottery method. Data analysis was included descriptive statistics, including frequency, percentage, and mean. The statistical association between knowledge and practice and the explanatory variables were tested by binary logistic regression. Multivariable logistic regression was used to control confounding effects. The magnitude of the association between the different independent variables in relation to dependent variable were measured using 95% confidence interval and p-values below 0.05 considered as statistically significant.

**Result:** From the total of 132 respondents 79 (59.8%) were female and 77 (58.3%) were at the age range between 22 to 30 years. The mean age of the participants was 30.6 years old. The nurse's infection prevention care practices need improvement. Taking in service training, being a master's degree holder and having education on neutropenia management were independent predictors of knowledge and practice about chemotherapy induced neutropenia infection prevention**.**

**Conclusion:** nurses working in governmental hospitals of Addis Ababa have poor knowledge and care practice about chemotherapy induced neutropenia infection prevention. **Recommendation:** In service training regarding chemotherapy induced neutropenia infection prevention should be given to nurses who are working in cancer centers.



**Key words;** Care practice, Nurses, Neutropenia, Knowledge, Addis Ababa

# 1. INTRODUCTION

## 1.1. Background

Patients taking chemotherapy are at risk of developing neutropenia, as chemotherapy is acting by killing both normal and cancerous cell of the body (1).Neutropenia occurred when complete neutrophil count is less than 1500 cells/mm3. But in sever conditions it may drop up to 500 cells/ mm3 (2–6). It may also be expected to down below 500 cells/ mm3 in two days. Absolute neutrophil count (ANC) less than hundred cells/ mm3 is also termed as profound neutropenia (7).

White blood cell can be grouped as agranulocytes and granulocytes. Granulocytes are white blood cells with granules in their nucleus. The most prominent granules are neutrophils accounting about 60% (8–10). Neutrophils are the body's first responders to infection by bacteria, viruses, and other pathogens (11).

Bone marrow is the production and maturation site of neutrophils, which takes them 10–14 days to mature and reproduce in inside the bone marrow. Yet once they released from the bone marrow into the blood circulation, they live for only 4-8 hours. Neutrophils that travel to tissues may live for several days (12).

At the time of infection neutrophils move accidentally to the blood circulation to attack foreign pathogens or attackers called chemo taxis, process by which neutrophils attack pathogens in response to the signs released from microorganisms (13). A neutrophil then covers encircling the microorganism then extinguishes the foreign body (14–16).

A constantly bolster quantity of neutrophils moves from the marrow space through the blood to sites of infection. Taking the genitourinary system as an example (17–22), where millions of bacteria reside and serve to create normal flora. Millions of neutrophils continuously travel to the system to keep the local bacteria in check and prevent an overgrowth of bacteria that would result in uninhibited infection (23–25).

Repeated chemotherapy conquers the normal production and availability of neutrophils that fight infection, which harms the body's natural ability to battle foreign invader or infection. Usually, the white blood cell nadir from cyclic combination chemotherapies is 7–14 days from the chemotherapy administration (18). The effect on bone marrow's ability to maintain production of

an adequate amount of neutrophils may result in severe neutropenia with or without fever (8,26–29). This may lead to life-threatening infections that may rapidly lead to sepsis and death. Sever neutropenia and febrile neutropenia (FN) are therefore major causes of morbidity, treatment disturbances and dose reductions in patients taking chemotherapy (14).

Neutropenia is one of the most common risk factors of infections in patients with poor immune competency. Patients with cancer are two- fold prone to immunity decline compared to any other patients, because of the cancer itself and the treatment they take. Chemotherapy is supposed to kill both the cancerous and non-cancerous cells of the body (30).

## 1.2. Statement of the problem

Chemotherapy induced neutropenia (CIN) is a significant phenomenon for adult cancer patients, occurs in approximately 80% of all patients undergoing treatment for cancer (31). Neutropenia is the most encountered defect in patients with cancer that forecasts the overwhelming of bacterial infection (1,32,33).

More than 48 to 60% of patients with neutropenia have developed an recognized or hidden infection, and about 16% to 20% or more of patients with neutropenia have infected by bacteria(34).

Neutropenia1 is a severe impediment of many chemotherapy drugs, chemotherapy induced neutropenia (CIN) has substantial bad drawbacks like; dose decrease, bodily distress, declining patient's quality of life, potential hospitalization, life threaten infection that lead to sepsis, death and healthcare costs. Severe neutropenia and febrile neutropenia (FN) are therefore major causes of indisposition, management disruptions and dose reductions in patients taking chemotherapy (35).

Besides to clinical impact, the economic impact of neutropenia is much higher (36). As the rates of hospitalization for febrile neutropenia are extremely high as well as the durations of such hospitalization are long, subsequently a significant economic burden will lead to over burden on the healthcare system (37).

Preventing infections is extremely important for a successful chemotherapy outcome. Nurses play an important role in the prevention, detection and management of neutropenia, as well teaching facts to patients for ensuring better obedience rates (38–57).

Nurses should better recognize patients who are potentially at risk for emerging chemotherapy induced neutropenia and should monitor patients who already have developed infection. It for better initiation of interventions to improve patient care as well as improving quality of life in patients with cancer receiving chemotherapy (58–60). It is also vital that nurses understand the neutropenia and infection prevention in neutropenic patients that support them to help patients.

Nurses can help patients by involving in caring, using their chemotherapy induced neutropenia management skill. Therefore, the objective of this study is to assess nurse's knowledge and care practices of infection prevention for neutropenia in Addis Ababa government hospitals with Oncology Unit.

## 1.3. Significance of the study

Little is known about nurse's knowledge and care practice for infection prevention in neutropenic patients in the study area. Therefore, result of this study may contribute some importance for the hospital as well as the country in drawing the attention of the policy makers, health care mangers and health care professional's especially nurses so as to stimulate them to take appropriate measures to its management and pointing researchers to view it as one of the area of investigation.

This study benefit to the policy makers by identifying the gaps of nurses for infection prevention on neutropenic patients that helps to influence the higher education to revise nursing curriculum in order to incorporate chemotherapy induced neutropenia and preventive measures content in nursing course. This will help for nurse's educators to give great emphasis on infection prevention due to neutropenia in the hospitals.

It can also benefit the community as nurses can address for those patients of all ages for pre and post occurrence of neutropenia that needs adequate preventive strategy and treatment. Finally, it will benefit the nurses to see themselves and respond accordingly, so that they can put their effort on updating their knowledge through reading or taking short term training.

This benefit the individual patients by improving the quality of their life as nurse's knowledge and care practice gaps identified and corrected.

Further, the result of the study can be used as a baseline data for further related studies.

## 2. LITERATURE REVIEW

Neutropenia as a consequence of systemic cancer treatment or chemotherapy is the most common and potentially series hematological complication of chemotherapy for cancer patients. Neutropenia of chemotherapy origin is commonly known as chemotherapy induced neutropenia (CIN). Twenty to 70 % of cancer patients taking chemotherapy regimens are exposed and experiencing some degree of neutropenia although difference in chemotherapy regimen, dose and cycle administered have different severity of neutropenia. For each episode of CIN cancer patients are highly susceptible to different kinds of infection that could lead to life threating medical complications. The risk of infection ranges between 10 to 50% for patients with solid tumors and more than 80% for hematological malignancies (36,59,61,62).

The first sign of suspected infection in patients with CIN is the syndrome usually identified as chemotherapy induced febrile in short febrile neutropenia (FN). Which is defined as a single oral temperature measurement of greater than or equal to 38.3 degree centigrade or a single temperature of greater than or equal to 38$^{o}$Csustained over a period of one hour in patients with an absolute neutrophil count (ANC) of less than 500 cells/mm3 or ANC that is expected decrease to < 500 cells/mm3 during the next 48 hours(35,37).

In this literature review, chemotherapy induced neutropenia is explored from nurses' perspectives to understand their knowledge and care practice towards neutropenia infection prevention. The review is used purposefully in gathering data from previously done researches concerning the nurses' knowledge and care practice towards cancer pain management. The review is summarized under three sub headings.

### 2.1. knowledge about neutropenic patient care

According to a study conducted in one of the biggest adult oncology and accredited hospitals in Turkey, nurses' general knowledge of the neutropenia was above average. In this study the mean score of nurses was 21.3 (SD = 2.4), with a minimum score of 17 and maximum of 27. All nurses answered "Urinary catheterization must be performed to measure the urine output" and "Nurses should inform the patient and family about infection control procedures" Item questions. In

addition, 96.1% of study subjects knew the functions of neutrophils and 68.6% of them knew the critical range of neutrophil counts. However, 94.1% of them did not gave a correct answer

following the statement “One of the signs of infection in patients with neutropenia is glycosuria,” 68.6% of them gave wrong answer to “Neutropenia is characterized by a decrease in neutrophils and thrombocytes,” and 66.7% of them gave wrong answer to “It is difficult to identify the signs and symptoms of infection in patients with neutropenia”(63).

Another quasi experimental study design conducted in Egypt at Assiut University Hospital oncology department indicated that baselines mean scores for total and subtotal nurses’ knowledge were very low before protocol implementation. However, great improvements in the mean knowledge scores were observed immediately after application of protocol. The improvement was partially lost 2 months later. A significant statistical difference was found between nurses’ knowledge in relation to total and subtotal mean knowledge scores in all items during the study period. All nurses (100%) had unsatisfactory knowledge level before intervention however, after intervention, most of them (63.3%) developed satisfactory knowledge level(37).

A cross-sectional descriptive study conducted in Saudi Arabia that assessed nurse’s knowledge and practice of infection control measures within tertiary care hospital revealed that nurses knowledge and practice related to infection control measures during patient care, as regards of hand washing of nurses had fair knowledge(78.3%) while all the nurses’ knowledge about hand washing after had good. Nurses’ knowledge about gloving, disinfection and discarding were good (71.7%, 63.3%, and 93.3%). Generally, 60% of the nurses had good knowledge(13).

Literature showed that nurses’ knowledge about neutropenia and neutropenic patients care is inadequate. Study conducted in Brussels Belgium on knowledge of hematological toxicities of European nurses reported that 37.4% of nurses did not give correct answer to questions related with the absolute neutrophil count at first cycle which is the strongest predictor of neutropenia and only 21.3% of them gave correct answer to the critical range of neutrophil count for neutropenia (62).

According to study conducted on nurses’ knowledge and infection control care practices in neutropenic patients in one university hospital of Turkey, the mean score of nurses’ knowledges

was 21.3 ± 2.4, which is above average. It also revealed that even nurses' knowledge related with neutropenia and care of neutropenic patient was found above average and their infection control care practices were found above sufficient(64).

A descriptive-analytical cross-sectional study design conducted among 203 nurses working in oncology, bone marrow transplantation, and medical wards of teaching hospitals of Kerman University of Medical Sciences revealed that, the mean score of knowledge about neutropenia in nurses was 16.96 ± 2.8 which is moderate. Only 11.8% of the participants had good knowledge of neutropenia (65).

## 2.2. Nurses' care practice regarding infection prevention for neutropenia

According to a study conducted in one of the biggest adult oncology and accredited hospitals in Turkey, infection control practices especially during assessment of vital signs, preparation and administration of medications were inadequate. The rate of disinfection of such devices before using them was also found very low. More than half of the nurses prepared the medications in an inappropriate environment; majority of nurses broke sterile technique during preparation of parenteral medications. However, the hand hygiene rates of those who used gloves during administration of medications were found higher. This indicated even though nurses' knowledge level is above average they are not paying attention and using their knowledge to their care practices (63).

Regarding the nurse's care practices for infection prevention on neutropenic patients, study conducted in Egypt showed that baseline mean scores for total and subtotal nurses' practices were very low before protocol implementation. However, great improvements in the mean practice scores were observed immediately after application of the protocol with significant statistical difference between nurses' practices in relation to total and subtotal mean practices scores with p-value < 0.001 in all items. Nurses' practice improvement was almost maintained at 2-months posttest follow up (37).

A cross-sectional descriptive study conducted in Saudi Arabia that assessed nurse's knowledge and practice of infection control measures within tertiary care hospital revealed that all of the

nurses had poorly practiced of hand washing before and after patient care, and 51.7% had poor practice about infection control measures (13).

Study conducted in Brussels, Belgium showed that nurses' knowledge about neutropenia and neutropenic patients care is inadequate. More than 60 % of nurses did not give correct care practices in their care for neutropenic patients(62).

According to study conducted on nurses' knowledge and infection control care practices'' nurse's infection control practice was insufficient, especially during keeping and using hygienic medical equipment's for neutropenic patients (64).

A descriptive-analytical cross-sectional study design conducted among 203 nurses working in oncology, bone marrow transplantation, and medical wards of teaching hospitals of Kerman University of Medical Sciences, Infection control in cancer patients was 7.88 ± 4.63 which is moderate. Only 19.2% of nurses had a good care practice for infection control in patients with cancer (65).

## 2.3 .Chemotherapy induced neutropenia infection Prevention and associated factors

Quasi experimental study design conducted in the Assiut University Hospital of Egypt showed that correlation between nurses' total knowledge and practice scores. Duration of experience showed significant negative correlations with each of nurses' total knowledge, practice scores. Also age had a negative relationship with total knowledge of nurses and an expected positive correlation with years of experience (37).

A cross-sectional descriptive study conducted in Saudi Arabia that assessed nurse's knowledge and practice of infection control measures within tertiary care hospital identified that there were significant differences between mean scores of nurses' practice and level of education and discarding equipment, current position and doing glove, nationality and mean scores of disinfection procedures. There were significant differences between the nurse's knowledge and level of education in hand washing before and discarding equipment and current position. Nationality and attend training program had significant differences with discarding used equipment(13).

A descriptive-analytical cross-sectional study design conducted among 203 nurses working in oncology, bone marrow transplantation, and medical wards of teaching hospitals of Kerman University of Medical Sciences revealed that, there was no significant correlation between nurses' knowledge of neutropenia and their practices for infection control in cancer patients ($P = 0.05$). Based on this nurses' knowledge of neutropenia and their practice for infection control in patients with cancer were not optimal (65)

## .2.4. Conceptual frame work

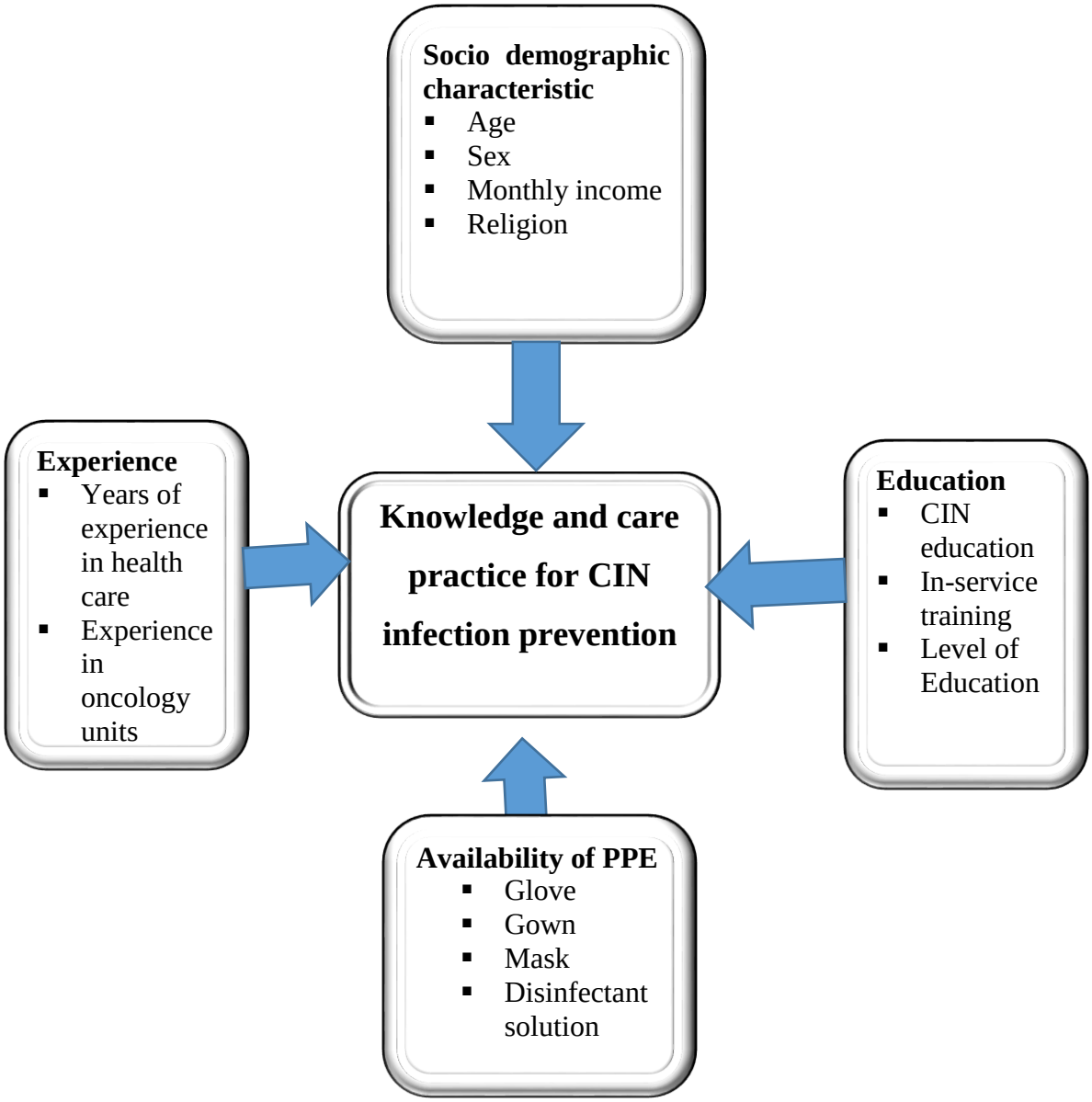


Figure 1: Conceptual framework developed from literature review, to show associations between dependent and independent variables

# 3.OBJECTIVES

## 3.1. General objective

- To assess nurse's knowledge and care practice on chemotherapy induced neutropenia infection prevention in Addis Ababa governmental hospitals with oncology units, Addis Ababa Ethiopia, 2020.

## 3.2. Specific objectives

- To determine nurse's knowledge about chemotherapy induced neutropenia infection prevention in Addis Ababa government hospitals with oncology units
- To describe nurses care practices of infection prevention for chemotherapy induced neutropenia in Addis Ababa government hospitals with oncology units
- To identify factors associated with nurse's knowledge about chemotherapy induced neutropenia infection prevention.
- To identify factors associated with nurse's care practices of infection prevention for chemotherapy induced neutropenia in Addis Ababa government hospitals with oncology units.

# 4. METHODS

## 4.1. Study area and Period

This study was conducted in Addis Ababa government hospitals with oncology units. Addis Ababa is the capital city of Ethiopia. The city has through recent years seen a robust annual growth rate, and population counts as of 2017 are growing closer to 4 million. Addis Ababa is a chartered city and as such, is considered both a city and a state. It is the largest city in the world located in a landlocked country. Per the population recorded at the last census, the city of Addis Ababa hospitals with oncology units which have cancer center in Ethiopia are selected as study area. These are Tikur Anbessa Specialized Hospital (TASH), Army Forced Hospital, (AFH) Saint Paul's Hospital Millennium Medical College (SPHMMC), and Zewditu Memorial Hospital (ZMH) with a total of about 180 nurses. The study was condacted from march 1 to 30,2020.

## 4.2. Study design

Institutional based cross-sectional study design was used, descriptive cross-sectional study design helps as to assess the knowledge and care practice level of nurses in the selected study areas,. In addition, the study design can provide us prevalence information or nurses current knowledge and care practice level and is comfortable to examine several factors associated with nurse knowledge and care practice towards neutropenia induced infection prevention at one time.

## 4.3. Populations

### 4.3.1. Source population

All nurses working in Addis Ababa government hospitals with oncology unit, which are summed up to 180 nurses.

### 4.3.2. Study population

nurses who were working in oncology unit in Addis Ababa government hospitals and were meeting the eligibility criteria.

### 4.3.3. Inclusion and exclusion criteria

- **Inclusion criteria**: Nurses who were working in Addis Ababa government hospitals with oncology units and willing to participate in the study were included.
- **Exclusion criteria**: Nurses who were seriously sick and unavailable during data collection period.
- Nurses who assigned to work in the oncology wards but never followed a cancer patient.
- Nurses on annual leave and maternity leave were excluded from the study.

## 4.4. Sample size determination

The sample size was determined by using formula for estimating a single population proportion formula. The sample size for this cross-sectional study calculated by assuming knowledge prevalence 50% because there were no studies done before in the study area and in sub Saharan Africa, in addition to this, researches by the same title were unavailable in countries with similar socio-economic status with Ethiopia. Based on the assumption 5% marginal error, 95% confidence interval (CI) and a none response rate of 10%, the actual sample size for the study was.

$$n = \frac{(Z_{\alpha/2})^2 P(1-P)}{d^2}$$

Where n=Sample size

Z=value corresponding to a 95% level of significance=1.96

p= prevalence in previous study for knowledge (0.5)

q= (1-p) = (1- 0.5) = 0.5

d= Margin of error, assumed to be 5%

Therefore, using the above single population proportion formula the sample size Calculated was 384.

Since the study population was less than 10,000, we used population correction formula in order to get the required minimum sample size.

Where;

$$n = \frac{nc}{1+(n/N}$$ n =desired sample size

nc= the calculated sample size

N= total population (nurses in Addis Ababa hospitals with oncology units)

$$n = \frac{384}{1+(384/180)}$$

n = **122**

And then adding 10 % for non-response rate to provide a total sample size of 134nurses.

## 4.5. Sampling technique and Sampling procedure

Addis Ababa hospitals with oncology units that provide in-patient and outpatient cancer care services were included.

To select the study participants, the total sample size allocated proportionally based on the number of nurses. Proportional allocation was done for each hospital in and outpatient department (OPD). Finally, nurses were selected using purposive sampling method.

## 4.6. Proportional allocation

Based on proportionate the total sample size (134) allocated to each department. Then by using purposive sampling method participants were selected.

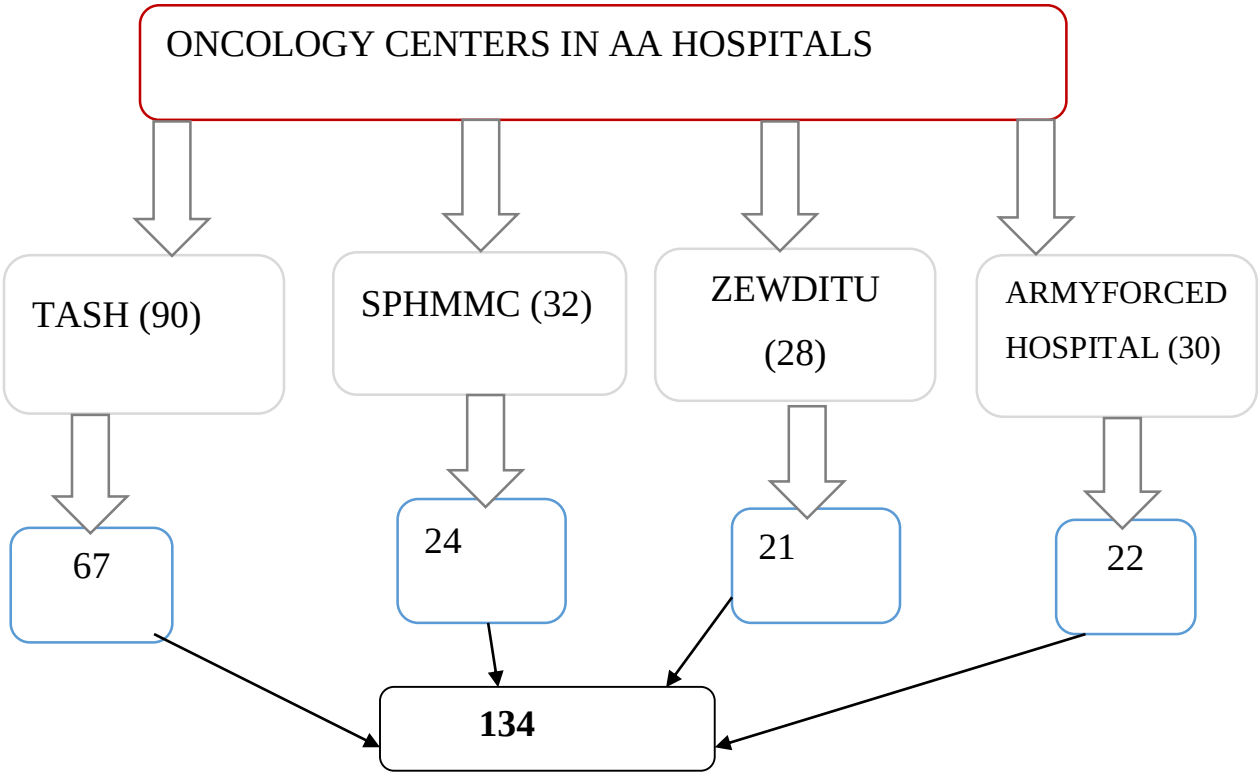


Figure 2; schematic presentation of sampling technique and proportional allocation from respective hospitals**.**

## 4.7. Variables

### 4.7.1. Dependent Variables

- Knowledge of chemotherapy induced neutropenia infection prevention
- Care practice of infection prevention for neutropenia

### 4.7.2. Independent Variables for knowledge and care practices

- Age
- Sex
- Monthly income
- Religion
- In-service training
- Level of education (diploma, degree, MSc)
- Year of experience(service) in nursing
- Experience in care of cancer patient
- department (pediatric oncology, adult oncology, day care, hematology ward)

## 4.8 .Operational definition

**Good knowledge**: Participants responded mean and above to nurse's knowledge about chemotherapy induced neutropenia questions.

**Poor knowledge**: Participants responded below mean to nurses' knowledge about chemotherapy induced neutropenia questions.

**Good practice**: participants observed performing above mean (7.56) for Infection control care practices checklist

**Poor practice**: participants observed performing below mean (7.56) for Infection control care practices checklist

## 4.9. Methods of data collection

### 4.9.1. Data collection tool

Data was collected using self-administered questionnaire for nurse's knowledge for infection prevention on neutropenia, and observational check list was used to assess care practices for infection control in neutropenic patients. The tool is developed from different literatures. The tool has three parts.

1. Sociodemographic variables include (Age, Sex, Religion, Work experience, Educational level, Salary, etc.…
2. Neutropenia knowledge questions (developed by Ertem as a questionnaire, in 2004 according to literature content of the questionnaire was approved by the nurse experts; will be used to assess knowledge level of nurses; items had "true", "false" or "do not know" choices; scoring will be done as giving "1" point for each correct answer with maximum score of 30).
3. Infection control care practices checklist developed according to the CDC, WHO guidelines and relevant literature; 21 infection control practice/performance steps defined to control nursing care practices especially during assessment of vital signs, medications administration; including nursing practice steps which is vital for prevention of infection; that will be checked as "observed" or "not observed"). Pilot testing will be done by primary investigator with nurses in another hospital. Necessary revisions will be made after pilot testing.

The content of the tool is derived from current standards of CDC and World Health Organization guidelines.

## 4.10. Data analysis

Data analysis contained descriptive statistics, including frequency, percentage, mean and standard deviation (SD). The statistical association between the outcome variable (having good knowledge about chemotherapy induced neutropenia) and having good practice and the explanatory variables

were tested by binary logistic regression. Multivariable logistic regression was used to control confounding effects. The magnitude of the association between the different independent variable in relation to dependent variable were measured using 95% confidence interval and p-values below 0.05 considered as statistically significant.

## 4.11. Ethical consideration

Ethical clearance was obtained from institutional review board of Addis Ababa University, college of health sciences, department of nursing and midwifery research committee. Support letter from department of nursing and midwifery was written to Tikur Anbessa Specialized referral hospital, SPHMMC, Zewditu and Army hospital. Informed written consent was obtained from all study participants. Participants were informed about the objective of the study.

After information was provided about purpose of the study, non- invasiveness of the data collection procedure, confidentiality of the information and respondents were reassured that they would be anonymous (unnamed). Then respondents were given a chance to ask anything about the study and were free to refuse or stop at any moment they want if their choice.

## 4.12. Dissemination and utilization of result

Since the primary objective of this thesis is for partial fulfillment in the requirements to degree of masters of sciences in oncology nursing; it will be presented and submitted to college of health sciences, school of nursing and midwifery, Addis Ababa University. In addition, copies of the result will be given to Addis Ababa city administration health bureau; Addis Ababa hospitals with oncology unit to utilize the information for further development of strategic and educational plan promotion of nurses' knowledge and care practice for infection control in patients with neutropenia. Presentations at professional, local, national and international meetings and publication in peer reviewed national or international journals will be attempted.

# 5. RESULT

## 5.1. Socio demographic characteristics

A total of 134 self-administered questionnaires were distributed to the study participants with a response rate of 98.5% (132).

From the total of 132 respondents 79 (59.8%) were female and 77 (58.3%) were at the age range between 22 to 30 years. The mean age of the participants was 30.6 with standard deviation of 5.7 years old. Majority (68.9%) of the respondents were orthodox Christians and protestant followers were the second largest group (22%). With respect to their respective hospital they work in, 66 (50%) participants were from Tikur Anbessa Specialized Hospital (TASH). Thirteen (9.8%) nurses had Master's degree (MSc) while the largest proportion of nurses (90.2%) were bachelor of science degree (BSc) holders. Regarding to their current working area or place of work, 113(85.5%) nurses were from oncology ward, 19 (14.5%) working in hematology ward. More than half (54.5%) of the nurses had less than 5 years of experience whereas only 19 (14.4%) nurses had more than ten years of work experience.

Of all the study participants, 60 (45.5%) had experience in managing neutropenic cancer patients while 95 (72%) didn't take formal training on managing cancer patients with neutropenia. Forty (30.3%) of them had taken in service training on managing neutropenic cancer patients.

Table 1; Socio demographic characteristics of nurses working at Addis Ababa governmental hospitals, May, 2020.

| Factors | Category | Frequency(n) | Percent (%) |
|---|---|---|---|
| Hospital | TASH | 66 | 50 |
| | SPHMMC | 24 | 18.2 |
| | ZH | 20 | 15.2 |
| | AFH | 22 | 16.7 |
| Age | ≤ 30 years old | 77 | 58.3 |
| | > 30 years old | 55 | 41.7 |
| Gender | Male | 53 | 40.2 |
| | Female | 79 | 59.8 |
| Religion | Orthodox Christian | 91 | 68.9 |
| | Muslim | 9 | 6.8 |
| | Protestant | 29 | 22 |
| | Catholic | 3 | 2.3 |
| Level of education | Master | 13 | 9.8 |
| | BSc | 119 | 90.2 |
| Current working area | Oncology | 113 | 85.5 |
| | Hematology | 19 | 14.5 |
| Year of experience | Less than 5 years | 72 | 54.5 |
| | 5-10 | 41 | 31.1 |
| | >10 years | 19 | 14.4 |
| Experience in MNP | Yes | 60 | 45.5 |
| | No | 72 | 54.5 |
| education on Neutropenia | Yes | 37 | 28 |
| | No | 95 | 72 |
| Training on MNP | Yes | 40 | 30.3 |
| | No | 92 | 69.7 |
| Income | < 4500 | 44 | 33.3 |
| | 4500- 6000 | 27 | 20.5 |
| | ≥ 6000 | 61 | 46.2 |

TASH Tikur Anbessa Specialized Hospital, SPHMMC St. Paul's hospital Millennium Medical College, ZH – Zewditu Hospital, AFH- Armed Force Hospital, MNP- Managing Neutropenic Patient,

## 5.2. Knowledge of chemotherapy induced neutropenia infection prevention

Study participants were asked 30 item questions to assess their knowledge toward chemotherapy induced neutropenia infection prevention. The minimum and the maximum score of respondents to the questions were 11 and 20, respectively. The mean knowledge score was 15.9 with standard deviation of 1.72. The overall knowledge category of the study participants showed that more than half (63.6 %) of the respondents had poor knowledge about chemotherapy induced neutropenia infection prevention (Fig. 3).

As depicted in Table 2, ninety-seven percent of nurses answered correctly. The question asking, Nurses should inform patient and family about infection control procedures" exactly." More than 97% of nurses in the study area distinguished that 'During patient care gowns, masks, and gloves should be worn.' And around 95%of nurse knew "Neutrophils provide the body's defense by phagocytosis of microorganisms and patient skin as well mucosal area must be assessed and documented every day." However, all of the nurse in the study area gave wrong answers to the item "If general condition of patient with neutropenia is stable, his or her vital signs can be assessed every 8 hours". As few as 9% of nurse in the study are gave correct answers to the question "Neutropenia is characterized by a decrease in neutrophils and thrombocytes". Eighty eight percent of the nurses knew that Neutropenic patients must be placed in private rooms. and as few as 12% of them knew "Floor must be cleaned with a damp mop" (Table 2).

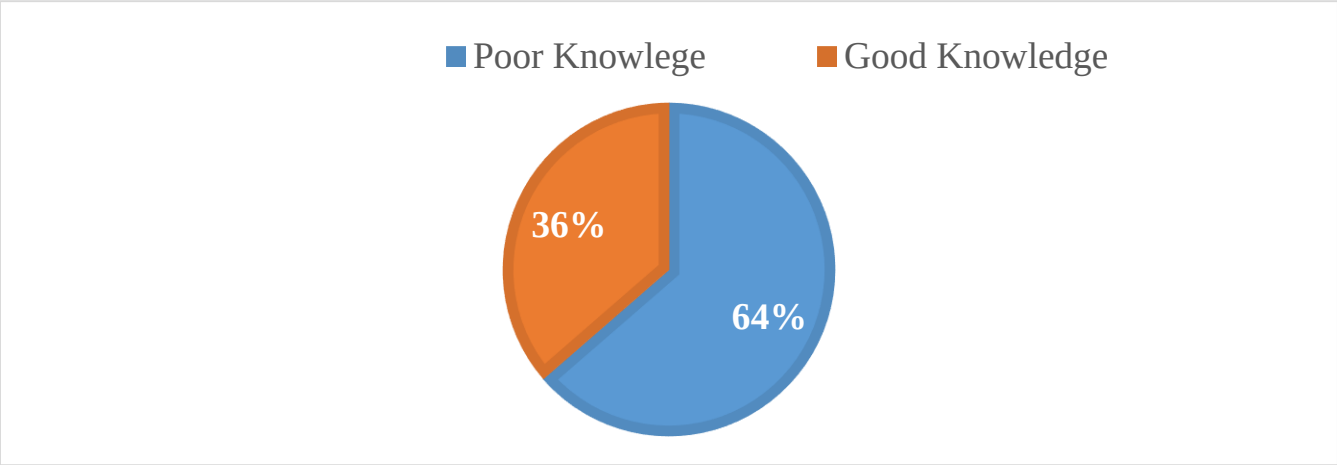


Figure 3. Knowledge of chemotherapy induced neutropenia infection prevention, among nurses in Addis Ababa governmental hospitals, may, 2020.

Table 2. Knowledge about chemotherapy induced neutropenia infection prevention among nurses working at Addis Ababa governmental hospitals, May, 2020.

| No | Answer | Statement | Correct answers | | Incorrect answers | |
|---|---|---|---|---|---|---|
| | | | n | % | N | % |
| 1 | F | Neutropenia is characterized by a decrease in neutrophils and thrombocytes | 12 | 9.1 | 120 | **90.9** |
| 2 | T | Neutrophils provide the body's defense by phagocytosis of microorganisms | **125** | **94.7** | 7 | 5.3 |
| 3 | F | A patient is classified as neutropenic when the neutrophil count is 2500 cells/mm3 | 67 | 50.8 | 65 | 49.2 |
| 4 | T | Lymphoma" is one of the diseases that cause neutropenia | 105 | 79.5 | 27 | 20.5 |
| 5 | T | Hypotension, an indicator for sepsis, is an important symptom for neutropenic patients | 108 | 81.8 | 24 | 18.2 |
| 6 | F | If general condition of patient with neutropenia is stable, his or her vital signs can be assessed every 8 hours. | **0** | **0** | **132** | **100** |
| 7 | T | It is difficult to identify the signs and symptoms of infection in patients with neutropenia. | 84 | 63.6 | 48 | 36.4 |
| 8 | T | Radiotherapy leads to neutropenia by suppressing bone marrow function. | 117 | 88.6 | 15 | 11.4 |
| 9 | T | Patients' own flora is the most likely source of microorganisms in neutropenic patients. | 122 | **92.**4 | 10 | 7.6 |
| 10 | F | IV catheter dressings should be changed every 4 hours in neutropenic patients. | 89 | 67.4 | 43 | 32.6 |
| 11 | F | Neutropenic patients should take a shower/bath or be given a bed bath daily. | 89 | 67.4 | 43 | 32.6 |
| 12 | T | IV injections should be preferred rather than subcutaneous or intramuscular injections. | 92 | 69.7 | 40 | 30.3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | F | Neutropenic patients should avoid coughing and deep breathing exercises. | 92 | 69.7 | 40 | 30.3 |
| 14 | T | One of the signs of infection in patients with neutropenia is glycosuria. | 101 | 76.5 | 31 | 23.5 |
| 15 | F | Enemas can be used in neutropenic patients' constipation. | 86 | 65.2 | 46 | 34.8 |
| 16 | T | Gastrointestinal system infections likely develop frequently in neutropenic patients. | 92 | 69.7 | 40 | 30.3 |
| 17 | T | Stomatitis may occur often in neutropenic patients' oral mucosa. | 119 | **90.2** | 13 | 9.8 |
| 18 | T | Neutropenic patients' oral care is provided with sodium bicarbonate solution. | 119 | **90.2** | 13 | 9.8 |
| 19 | F | Neutropenic patients' oral care includes rinse of mouth three times a day. | 124 | **93.9** | 8 | 6.1 |
| 20 | T | Drinking tap water is not recommended for neutropenic patients. | 74 | 56.1 | 58 | 43.9 |
| 21 | F | Neutropenic patients' diet includes plenty of fresh vegetables and fruits to meet vitamins needs. | 114 | 86.4 | 18 | 13.6 |
| 22 | F | Respiratory isolation is used with neutropenic patients. | 118 | 89.4 | 14 | 10.6 |
| 23 | F | Nobody should get in neutropenic patient's room except health care providers. | 99 | 75 | 33 | 25 |
| 24 | T | Neutropenic patients must be placed in private rooms. | 117 | 88.6 | 15 | 11.4 |
| 25 | F | Neutropenic patient rooms should be cleaned after other ward areas by the cleaning staff. | 112 | 84.8 | 20 | 15.2 |
| 26 | T | Floor must be cleaned with a damp mop. | 16 | 12.1 | 116 | **87.9** |
| 27 | F | During patient care gowns, masks, and gloves should be worn. | 128 | **97** | 4 | 3 |
| 28 | F | Urinary catheterization must be performed to measure the urine output. | 117 | 88.6 | 15 | 11.4 |
| 29 | T | Skin and mucous membranes should be assessed daily and documented. | 126 | **95.5** | 6 | 4.5 |
| 30 | T | Nurses should inform patient and family about infection control procedures. | **128** | **97** | 4 | 3 |

T: True, F: False

## 5.3. Prevention practice of chemotherapy induced neutropenia infection

Nurses were observed during practice using check list designed for this purpose. The check list items were about assessment of vital sign, medication preparation and medication administration. The outcomes of the observational checklist specified that only 27.3% of the nurse were shown to conduct hand hygiene before patient contact. But about 56.8% of the nurses were shown to conduct hand hygiene practice after patient contact. Seventy eight percent and 74.2% of the nurses did not use patient specific stethoscopes and patient specific sphygmomanometers respectively. Near to 56% of the nurses prepare parenteral medications without breaking sterility. Only 50% of the nurse were observed in administering of oral medications without hand contact (Table 3).

The mean care practice of nurse for neutropenia related infection prevention from the observational checklist is that 7.56 $\pm$ 3.5. Nearly 44% of the nurse working in the current study area were observed to perform good infection prevention care practices.

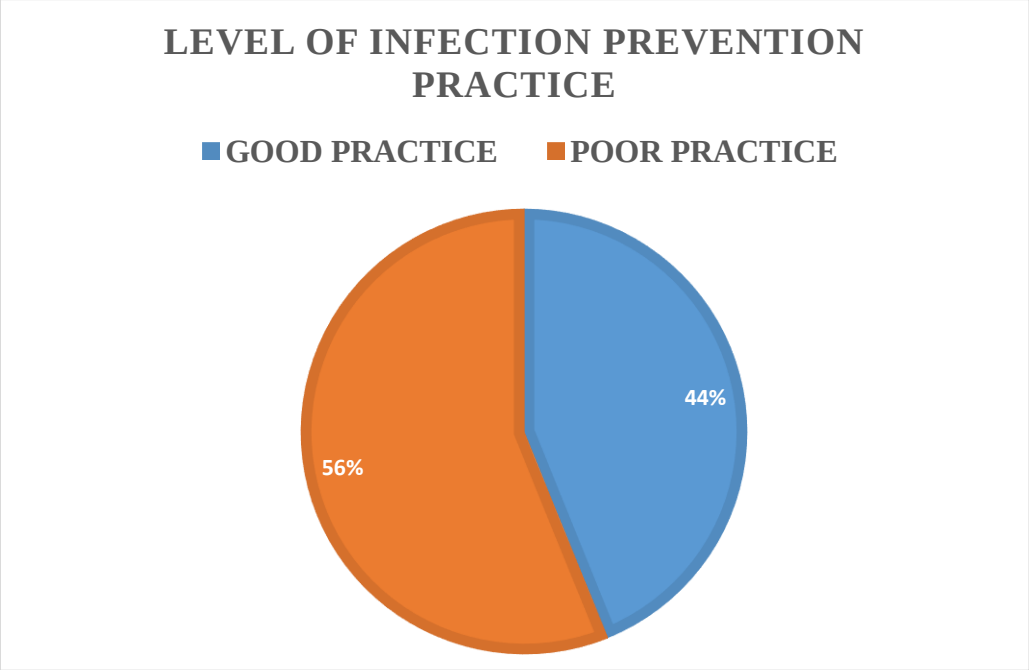


Figure 4. Level of infection prevention practice of chemotherapy induced neutropenia among nurses working in governmental hospitals of Addis Ababa, may ,2020

Table 3. Infection prevention practice among nurses working at Addis Ababa governmental hospitals, May, 2020.

| A. Assessment of vital sign | Observed | | Not observed | |
|---|---|---|---|---|
| | n | % | n | % |
| Hand hygiene before patient contact | 36 | 27.3 | 96 | **72.7** |
| Patient-specific sphygmomanometer use | 34 | 25.8 | 98 | **74.2** |
| Patient-specific stethoscope use | 29 | 22 | 103 | **78** |
| Probe change of tympanic membrane thermometer | 46 | 34.8 | 86 | 65.2 |
| Disinfection of mercury-in-glass thermometer before use | 56 | 42.4 | 76 | 57.6 |
| Hand hygiene after patient contact | **75** | **56.8** | 57 | 43.2 |
| Disinfection of non-patient specific devices before use | 61 | 46.2 | 71 | 53.8 |
| **B. Medication preparation** | | | | |
| Hand hygiene before withdrawing medications from medication system | 53 | 40.2 | 79 | 59.8 |
| Maintaining safe environment | 50 | 37.9 | 82 | 62.1 |
| Hand hygiene before preparing medications | 63 | 47.7 | 69 | 52.3 |
| Sterility check for drugs and other equipment before use (Syringes/needles/mini fluid bags, plastic bags, etc.) | 61 | 46.2 | 71 | 53.8 |
| Preparation of parenteral medications without breaking sterility | 74 | **56.1** | 58 | 43.9 |
| Preserving sterility during insertion of infusion set's spike into the solution bag | 63 | 47.1 | 69 | 52.3 |
| **C. Medication administration** | | | | |
| Hand hygiene before administration of medications | 61 | 46.2 | 71 | 53.8 |
| Administration of oral medications without hand contact | 66 | **50** | 66 | 50 |
| Administration of parenteral medications with preserving sterility | 58 | 43.9 | 74 | 56.1 |
| Hand hygiene after administration of medications | 62 | 47 | 70 | 53 |
| Gloves removal and hand hygiene | 28 | 21.2 | 104 | 78.8 |

## 5.4 Factors associated with nurse's knowledge about chemotherapy induced neutropenia infection prevention

To identify factors associated with knowledge about infection prevention, logistic regression model was fitted. On binary logistic regression analysis, level of education, taking education on neutropenia, taking training on neutropenia infection management and experience in managing neutropenic patient were associated with knowledge of nurses about chemotherapy induced neutropenia infection prevention.

The level of education had statistically significant association with the knowledge about infection prevention. Those nurses who hold MSc degree were 2.63 times more knowledgeable about infection prevention than those who had BSc degree [COR: 2.63; 95% CI (1.4-4.5)].

Nurses who had experience in managing chemotherapy induced neutropenia were 2.1 times more knowledgeable about infection prevention than those who did not have experience [COR: 2.1; 95% CI (1.32-4.36)].

Nurses who had taken in service training for chemotherapy induced neutropenia infection prevention were 2.88 times more knowledgeable than those who did not have taken in service training [COR: 2.88; 95% CI (1.54-2.43)].

Nurses who had learned chemotherapy induced neutropenia infection prevention course before starting job, in college or university were two times more knowledgeable than those who did not have learned [COR: 2.00; 95% CI (7.10-.9.07)].

Finally, after obtaining statistically significant variables at $p<0.05$ in binary logistic regression analysis, multiple logistic regression analysis was carried out to see the independent predictors of knowledge about chemotherapy induced neutropenia infection prevention. The multi variable logistic regression was carried out by taking knowledge about chemotherapy induced neutropenia infection prevention as a covariate in addition to those variables where significant association was obtained in binary logistic regression. After adjusting potential confounders, having in service training on neutropenia infection prevention [AOR: 2.12; 95% CI (1.20-4.44)], being a master's degree holder[AOR: 1.1; 95% CI(0.26-0.906)], and having education on neutropenia management [AOR: 3.1; 95% CI (1.7-4.11)] were independent predictors of knowledge about chemotherapy induced neutropenia infection prevention (Table 4).

Table 4. Knowledge about chemotherapy induced neutropenic infection prevention and its associated factors among nurses working at Addis Ababa governmental hospitals, May, 2020.

| Characteristics | Category | NIPK | | P value | COR | P value | AOR |
|---|---|---|---|---|---|---|---|
| | | Poor % | Good % | | | | |
| Age | ≤30 years | 36.4 | 22 | 0.714 | 0.13(.32-1.23) | | |
| | >30 years | 27.3 | 14.4 | 0.5.2 | 0.36(0.69-2.36) | | |
| Gender | Male | 28.8 | 11.4 | .117 | 0.59(0.36-1.32) | | |
| | Female | 34.8 | 25 | .145 | 0.332(0.69-1.9) | | |
| | Oncology | 53.8 | 31.8 | 0.642 | 0.24(0.82-1.41) | | |
| Working area | Hematology | 9.8 | 4.5 | .773 | .17(.812-4.12) | | |
| Year of experience | ≤ 5 years | 33.3 | 21.3 | 0.502 | .241(.32-2.34) | | |
| | > 5 years | 30.3 | 15.2 | .704 | .211(.612-2.51) | | |
| Level of education | Master | 5.3 | 4.5 | **0.042** | **2.63(1.4-4.52)** | **0.05*** | **1.1 (0.26-0.906)** |
| | BSc | 58.3 | 31.8 | 0.642 | 0.45(.62-3.21) | | |
| Experience in MNP | Yes | 27.3 | 18.2 | **0.006** | **2.1(1.32-4.36)** | | |
| | No | 36.4 | 18.2 | .469 | .236(0.35-1.91) | | |
| Training on neutropenia | Yes | 19.7 | 10.6 | **0.002** | **2.88(1.54-2.43)** | **0.003*** | **2.12 (1.20-4.44)** |
| | No | 43.9 | 25.8 | 0.61 | 1.1(.83-9.8) | | |
| Education on neutropenia | Yes | 16.7 | 11.4 | **0.003** | **2.0(7.10-9.07)** | **0.021*** | **3.1 (1.7-4.11)** |
| | No | 47 | 25 | 0.53 | 0.321(.52-1.38) | | |
| Monthly income | ≤ 5000 | 23.5 | 14.4 | .632 | .321(.81-3.9) | | |
| | >5000 | 40.2 | 22 | 0.523 | 0.231(.92-4.35) | | |

***** p value is significant at 0.05,

## 5.5 Factors associated with nurse's care practice about chemotherapy induced neutropenia infection prevention

Binary logistic regression illustrated that gender, knowledge on neutropenia, taking education on neutropenia and in-service training after started working and experiencing in managing neutropenic patient were significantly associated with care practice of nurses in neutropenia infection prevention.

Being female was associated with higher odds of chemotherapy induced neutropenia infection prevention care practice than male nurses [AOR: 0.63; 95% CI (0.48- 0.98)].

Nurse who scored above mean to the nurse knowledge for chemotherapy induced neutropenia infection prevention questionnaire had shown better care practice than nurse who scored below mean [AOR: 0.789; 95% CI (1.32- 2.34)].

Nurses who had experience in managing chemotherapy induced neutropenia had two more folds good chemotherapy induced neutropenia infection prevention care practices than those who didn't have experience [COR: 2.1; 95% CI (1.32-4.36)].

Nurses who had taken in service training for chemotherapy induced neutropenia infection prevention had 2.08 folds more care practice than those who did not have taken in service training [COR: 2.08; 95% CI (1.45-2.34)]. Nurses who had learned chemotherapy induced neutropenia infection prevention course before starting job, in college or university had 1.23 times more care practice than those who did not have learned [COR: 1.23; 95% CI (1.70-2.700)].

In the multiple logistic regression analysis only taking in service training and having good knowledge on neutropenia infection prevention remained significantly associated with good infection prevention for neutropenia care practice. However, gender, taking education on neutropenia infection prevention and experience in managing neutropenic patient care did not associate with better neutropenia infection prevention care practice. Participants who take in service training on neutropenia infection prevention were 1.8-fold good care practice than participants who didn't. [AOR: 1.80; 95% CI (2.1-5.33)]. Nurses who had taken education on college or university about chemotherapy induced neutropenia infection prevention had higher odds of care practice than those who did take education on neutropenia [AOR: 4; 95% CI (0.007-0.792)].

Table 5: Chemotherapy induced neutropenia infection prevention practice and its associated factors among nurses working in Addis Ababa governmental hospitals, May 2020.

| Characteristics | **Category** | **Practice** | | P value | COR | P value | AOR |
|---|---|---|---|---|---|---|---|
| | | **Good %** | **Poor %** | | | | |
| Gender | Male | 17.4 | 22.7 | **.047** | 0.37(0.48-0.94) | .68 | .32(.32-2.34) |
| | Female | 26.5 | 33.3 | .145 | 0.63 (0.69-1.9) | 0.91 | 0.65(.68-4.61) |
| Knowledge on neutropenia | Good | 18.2 | 18.2 | **0.040** | .789(1.32-2.34) | .782 | 0.491(.38-2.15) |
| | poor | 25.8 | 37.9 | .704 | .211(.612-2.51) | .498 | .107(.93-3.11) |
| Experience in MNP | Yes | 23.5 | 22 | **0.006** | **2.1(1.32-4.36)** | .752 | .229(.21-1.44) |
| | No | 20.5 | 34.1 | .469 | .236(0.35-1.91) | .348 | .710(.25-2.30) |
| Training on neutropenia | Yes | 15.9 | 14.4 | **0.002** | **2.08(1.45-2.34)** | **0.003*** | **1.8 (2.1-5.33)** |
| | No | 28 | 41.7 | 0.61 | 1.1(.83-9.8) | **.587** | 1 |
| Education on neutropenia | Yes | 13.6 | 14.4 | **0.003** | **1.23(1.7-2.70)** | **0.02*** | **4(.007-0.792)** |
| | No | 30.6 | 41.7 | 0.53 | 0.321(.52-1.38) | **.537** | 1 |

***** p value is significant at 0.05,

# 6. DISCUSSION

The current study examined the knowledge and practice of nurses about chemotherapy induced neutropenia infection prevention at governmental hospitals of Addis-Ababa (Tikur Anbessa Specialized Hospital, St Paul's Hospital, Armed Force Hospital and Zewditu Memorial Hospital). One hundred thirty-four participants were involved in the study.

The overall percentage of correct answers for the nurse knowledge about chemotherapy induced neutropenia infection prevention questionnaire was 15.9 (SD = 1.7), with a minimum score of 11 and maximum of 20 out of 30 true false items. Generally, the nurses Knowledge and care practices for chemotherapy induced neutropenia infection prevention was below average. This is comparable with a descriptive-analytical cross-sectional study design conducted among 203 nurses working in oncology, bone marrow transplantation, and medical wards of teaching hospitals of Kerman University of Medical Sciences in which, nurse mean score of knowledge regarding neutropenia was 16.96 ± 2.8.

But the current study is very low compared to studies conducted on nurses' knowledge and infection control care practices in neutropenic patients in one university hospital of Turkey, the mean score of nurses' knowledges was 21.3 ± 2.4, which is above average and nurses' knowledge related with neutropenia and care of neutropenic patient (23.2±45) which was found above sufficient (64). This may be due to difference in educational system, curriculum development and nurse's initiation towards reading different guide lines relatively.

The overall knowledge category of the study participants in the current study showed that more than half (63.6%) of the respondents had poor knowledge about chemotherapy induced neutropenia infection prevention. This is congruent compared to the study conducted in Egypt at Assiut University Hospital oncology department which indicated that baselines mean scores for total and subtotal nurses' knowledge were 45% although it was before protocol implementation (37).

The current study is very low compared to studies conducted in Saudi Arabia that assessed nurse's knowledge and practice of infection control measures within tertiary care hospitals which found that 60% of the nurses had good knowledge (13), Turkey nurses' general knowledge of the

neutropenia was above average (63), neutropenia was above average (63), and far more very low compared with the study conducted in Brussels Belgium on nurse which report that only 37.4% nurses didn't give correct answers (62).
This much difference may be due to nurses' behavioral difference due to cultural difference, lack of educational motivations, and lack of access to evidence-based nursing on the current study.

In the current 97% of nurses answered the question asking, Nurses should inform patient and family about infection control procedures" exactly." More than 97% of nurses in the study area distinguished that 'During patient care gowns, masks, and gloves should be worn.' And around 95%of nurse knew "Neutrophils provide the body's defense by phagocytosis of microorganisms and patient skin as well mucosal area must be assessed and documented every day." as few as 12% of them knew "Floor must be cleaned with a damp mop.

This is congruent with studies conducted in Saudi Arabia (13) in which 95% of nurses answered the question asking, Nurses should inform patient and family about infection control procedures" exactly." All of the % of nurses in the study area distinguished that 'During patient care gowns, masks, and gloves should be worn.' And around 100 %of nurse knew "Neutrophils provide the body's defense by phagocytosis of microorganisms and patient skin as well mucosal area must be assessed and documented every day." as few as 12% of them knew "Floor must be cleaned with a damp mop and Turkey (63) as more than 90% of nurses answered the question asking, Nurses should inform patient and family about infection control procedures" exactly." More than 92% of nurses in the study area distinguished that 'During patient care gowns, masks, and gloves should be worn.' And around 94% of nurse knew "Neutrophils provide the body's defense by phagocytosis of microorganisms and patient skin as well mucosal area must be assessed and documented every day. But far from good knowledge compared to study conducted in Iran Kerman University Hospital (65) in which 50 % of nurses answered the question asking, Nurses should inform patient and family about infection control procedures" exactly." Less than 56% of nurses in the study area distinguished that 'During patient care gowns, masks, and gloves should be worn.' And around 64 % of nurse knew "Neutrophils provide the body's defense by phagocytosis of microorganisms and patient skin as well mucosal area must be assessed and documented every day. this may be due to level of education of participants in the current study is BSc and above and there may be difference in contents of the instrument. This may be due to poor education on

chemotherapy induced neutropenia infection prevention, ineffective or lack of training and lack of concern or awareness regarding neutropenic patients care needs.

Regrading nurses care practice of chemotherapy induced neutropenia infection prevention, the check list items were about assessment of vital sign, medication preparation and medication administration. The outcomes of the observational checklist specified that only 27.3% of the nurse were shown to conduct hand hygiene before patient contact. But about 56.8% of the nurses were shown to conduct hand hygiene practice after patient contact. Seventy eight percent and 74.2% of the nurses did not use patient specific stethoscopes and patient specific sphygmomanometers respectively. Near to 56% of the nurses prepare parenteral medications without breaking sterility. Only 50% of the nurse were observed in administering of oral medications without hand contact.

This is congruent with the study conducted in one of the biggest hospitals in Turkey (63) in which around 30% of the nurse were shown to conduct hand hygiene before patient contact. Nearly 70% of the nurses did not use patient specific stethoscopes and patient specific sphygmomanometers respectively.

In the current study hand hygiene rates after patient contact were found higher. More than half of the nurses prepare parenteral medications without breaking sterility. Half of the study participants (50%) of the nurse were observed in administering of oral medications without hand contact.

This is a bit higher compared to studies conducted in Turkey (63), and Egypt (37) where 35% from Turkey and 27% from Egypt were observed in administering of oral medications without hand contact This may be due to nurses in the current study might have better information in preventing cross contamination, or have taken education on chemotherapy induced neutropenia infection prevention in university or college.

The mean care practice of nurse for neutropenia related infection prevention from the observational checklist is that 7.56 $\pm$ 3.5. Only 43.9% of the nurse were observed to perform good infection prevention care practices. This is comparable with the study conducted in Saudi Arabia (13)in which 49% of nurse had good practices and Brussels Belgium with only 40% of nurse had good infection prevention practice (62). However nurses in the current study show slightly higher poor practice rates than compared to studies conducted in Egypt (37), 31% Iran (64), 36% and

Turkey(65) 27%. This may be due to lack of on work trainings and inadequate chemotherapy induced neutropenia infection prevention and management guide lines and limited lectures on chemotherapy induced neutropenia infection prevention in under graduate nursing courses in the current study area.

According to a study conducted in Egypt duration of experience showed significant negative correlations with each of nurses' total knowledge, practice scores. Age had a negative relationship with total knowledge of nurses and an expected positive correlation with years of experience (37). This un likely congruent with the current study. This may be due to difference in population demography with higher younger study participants in the current study.

In the contrary having in service training on chemotherapy induced neutropenia infection prevention, being a master's degree holder and having education on neutropenia management were independent predictors of knowledge about chemotherapy induced neutropenia infection prevention and taking in service training and having good knowledge on neutropenia infection prevention remained significantly associated with good infection prevention for neutropenia care practice. This is congruent with the study conducted in Saudi Arabia (37)and Iran (64) but contradicting with study conducted in Turkey (65%). This may be due to the more the younger the nurses are the more motivated and initiated to conduct nursing care practices in the current study.

# 7. STRENGTH AND LIMITATIONS

## Strength

- Many different variables were considered if they can associate with chemotherapy induced neutropenia infection prevention knowledge and practice and analyzed to illustrate their relative influence.
- Standard and valid questionnaire used in other studies was adopted and adapted for this study.
- Pretest was done before actual administration of the prepared tool at actual subjects.

## Limitation

- The respondents might not provide accurate information.
- Cross sectional study makes determining causality impossible.

# 8.CONCLUSION AND RECOMMENDATION

## Conclusion

Based on the findings of the study the principal investigator made the following major conclusions

- The investigator revealed that nurses working in governmental hospitals of Addis Ababa have poor knowledge 63.6% and poor care practice 56% about chemotherapy induced neutropenia infection prevention.
- Having in service training on neutropenia infection prevention, level of education (being a master's degree holder) and having education on neutropenia management were independent predictors of knowledge about chemotherapy induced neutropenia infection prevention.
- Participants who take in service training on neutropenia infection prevention and nurses who had taken education on college or university about chemotherapy induced neutropenia infection prevention had higher odds of care practice than those who did taken education on neutropenia.

## Recommendation

Based on the findings of the current study the following recommendations are forwarded to concerned bodies

- Quality improvement projects about chemotherapy induced neutropenia infection prevention need to be conducted, supervision and monitoring of daily activities of nurses must be done, ensuring that chemotherapy induced neutropenia infection prevention is assessed and documented.
- In service training regarding chemotherapy induced neutropenia infection prevention should be given to nurses who are working in cancer centers
- Chemotherapy induced neutropenia infection prevention should be incorporated and reinforced in to nursing and other health related professions curriculums.
- Guidelines and protocols must be designed to improve the nurse's knowledge and practice regarding chemotherapy induced neutropenia infection prevention for good outcomes and wellbeing of cancer patients.
- Unit managers and matrons in collaboration with training and research center and director of nursing should encourage and organize continues professional development, provide in service training about chemotherapy induced neutropenia infection prevention and promote for upgrading nurse's education levels.
- The hospitals should make sure of development and implementation of chemotherapy induced neutropenia infection prevention documentation policies and standard guide line and setup measures to monitor the implementation through regular clinical audit quality improvement projects about chemotherapy induced neutropenia infection prevention.
- The hospitals should make effective committee of chemotherapy induced neutropenia infection prevention involving all domains of health care providers included and setup the ways of reporting and follow up of chemotherapy induced neutropenia infection prevention activates.

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## ANEX I. Information sheet and consent form

### Information sheet

Hello dear?

Dear respondent my name is _____ I am here to collect data for a study entitled, "Nurses knowledge and care practices for infection control in neutropenic patients' in Government hospitals, Addis Ababa, Ethiopia." The study is being conducted by Alemkanchi who is MSC Oncology nursing student at Addis Ababa University College of health sciences, school of nursing and midwifery. For this study you are selected as a participant and before getting your consent or permission of your participation, you need to know all necessary information related to the study.

Thus, this information will be detailed as the objective of this study is to assess nurse's knowledge and care practices for infection control in neutropenic patients' in 2020.You are being asked to take part in this study and to respond sincerely. You are selected to be involved by chance. This questionnaire focuses on assessing your knowledge care practice for infection prevention in neutropenic patients. Your cooperation and willingness is greatly helpful in identifying problems in the mentioned area. This questionnaire may take 30 to 40 minutes to complete.

There is no possible risk with participating in this study. Your name will not be written in this form and for all the information you give us will be kept confidentially. Your participation is voluntary and if you feel discomfort with any of the questions it is your right to drop or stop filling the questionnaire. If you have questions regarding this study or if you wish to know the result after its completion, its pleasure to give you our phone number. Please contact the principal investigator

Sister Alemkanchi Ayele

Tell no -0910070009 email: alemayele734@gmail.com

Are you willing to participate in this study?

If yes, please proceed to consent form. Thank you

## Annex II Questionnaire

**Code _____**

| R. | I. Socio- demographic questions | |
|---|---|---|
| 101 | Age | In_____ years |
| 102 | Gender | ☐ 1. Male<br>☐ 2. Female |
| 103 | Religion | ☐ 1. Orthodox Christian<br>☐ 2. Muslim<br>☐ 3. Protestant<br>☐ 4. Other |
| 104 | what is your level of education? | ☐ 1. Diploma<br>☐ 2. BSc nurse<br>☐ 3. MSc nurse<br>☐ 4. Other |
| 105 | Current working area ( ward) | ☐ 1. Oncology<br>☐ 2. Hematology<br>☐ 3. Medical<br>☐ 4. Surgical<br>☐ 5. Other (specify ) |
| 106 | Year of experience in care provision (years) | In _____years |
| 107 | Do you have experience in managing cancer patients with neutropenia? | ☐ 1. True<br>☐ 2. False |
| 108 | Have you learned formal education in your university about infection prevention for chemotherapy induced neutropenia? | ☐ 1. True<br>☐ 2. False |
| 111 | Have you taken in service trainings on chemotherapy induced neutropenia infection prevention after you start working? | ☐ 1. True<br>☐ 2. False |
| 112 | Monthly income | _____Ethiopian birr |

**II. Nurses knowledge for Infection prevention in neutropenic patients**

| | | |
|---|---|---|
| 200 | Neutropenia is characterized by a decrease in neutrophils and thrombocytes | ☐ 1. True<br>☐ 2. False |
| 201 | Neutrophils provide the body's defense by phagocytosis of microorganisms | ☐ 1. True<br>☐ 2. False |
| 202 | A patient is classified as neutropenic when the neutrophils count is 2500 cells/mm3 | ☐ 1. True<br>☐ 2. False |
| 203 | Lymphoma" is one of the diseases that cause neutropenia | ☐ 1. True<br>☐ 2. False |
| 204 | Lymphoma" is one of the diseases that cause neutropenia. | ☐ 1. True<br>☐ 2. False |
| 205 | Hypotension, an indicator for sepsis, is an important symptom for neutropenic patients | ☐ 1. True<br>☐ 2. False |
| 206 | If general condition of patient with neutropenia is stable, his or her vital signs can be assessed every 8 hours. | ☐ 1. True<br>☐ 2. False |
| 207 | It is difficult to identify the signs and symptoms of infection in patients with neutropenia. | ☐ 1. True<br>☐ 2. False |
| 208 | Radiotherapy leads to neutropenia by suppressing bone marrow function. | ☐ 1. True<br>☐ 2. False |
| 209 | Patients' own flora is the most likely source of microorganisms in neutropenic patients. | ☐ 1. True<br>☐ 2. False |
| 210 | IV catheter dressings should be changed every 4 hours in neutropenic patients. | ☐ 1. True<br>☐ 2. False |
| 211 | Neutropenic patients should take a shower/bath or be given a bed bath daily. | ☐ 1. True<br>☐ 2. False |
| 212 | IV injections should be preferred rather than subcutaneous or intramuscular injections. | ☐ 1. True<br>☐ 2. False |
| 213 | Neutropenic patients should avoid coughing and deep breathing exercises. | ☐ 1. True<br>☐ 2. False |
| 214 | One of the signs of infection in patients with neutropenia is glycosuria. | ☐ 1. True |

| | | |
|---|---|---|
| | | 2. False |
| 215 | 15 Enemas can be used in neutropenic patients' constipation. | ☐ 1. True<br>☐ 2. False |
| 216 | Gastrointestinal system infections likely develop frequently in neutropenic patients. | ☐ 1. True<br>☐ 2. False |
| 217 | Stomatitis may occur often in neutropenic patients' oral mucosa. | ☐ 1. True<br>☐ 2. False |
| 218 | Neutropenic patients' oral care is provided with sodium bicarbonate solution. | ☐ 1. True<br>☐ 2. False |
| 219 | Neutropenic patients' oral care includes rinse of mouth three times a day. | ☐ 1. True<br>☐ 2. False |
| 220 | Drinking tap water is not recommended for neutropenic patients. | ☐ 1. True<br>☐ 2. False |
| 221 | Neutropenic patients' diet includes plenty of fresh vegetables and fruits to meet vitamins needs. | ☐ 1. True<br>☐ 2. False |
| 222 | Respiratory isolation is used with neutropenic patients. | ☐ 1. True<br>☐ 2. False |
| 223 | Nobody should get in neutropenic patient's room except health care providers. | ☐ 1. True<br>☐ 2. False |
| 224 | Neutropenic patients must be placed in private rooms. | ☐ 1. True<br>☐ 2. False |
| 225 | Neutropenic patient rooms should be cleaned after other ward areas by the cleaning staff. | ☐ 1. True<br>☐ 2. False |
| 226 | Floor must be cleaned with a damp mop. | ☐ 1. True<br>☐ 2. False |
| 227 | During patient care gowns, masks, and gloves should be worn. | ☐ 1. True<br>☐ 2. False |
| 228 | Urinary catheterization must be performed to measure the urine output. | ☐ 1. True<br>☐ 2. False |

| | | |
|---|---|---|
| 229 | Skin and mucous membranes should be assessed daily and documented. | ☐ 1. True<br>☐ 2. False |
| 230 | Nurses should inform patient and family about infection control procedures. | ☐ 1. True<br>☐ 2. False |

**III. care practice observational check list of Infection prevention In neutropenic patients**

**A. Assessment of vital sign**

| | | |
|---|---|---|
| 300 | Hand hygiene before patient contact | ☐ 1. observed<br>☐ 2. Not observed |
| 301 | Patient-specific sphygmomanometer use | ☐ 1. Observed<br>☐ 2. Not observed |
| 302 | Patient-specific stethoscope use | ☐ 1. 0bserved<br>☐ 2. Not observed |
| 303 | Probe change of tympanic membrane thermometer | ☐ 1. Observed<br>☐ 2. Not observed |
| 304 | Disinfection of mercury-in-glass thermometer before use | ☐ 1. Observed<br>☐ 2. Not observed |
| 305 | Hand hygiene after patient contact | ☐ 1. Observed<br>☐ 2. Not observed |
| 306 | Disinfection of non-patient specific devices before use | ☐ 1. Observed<br>☐ 2. Not observed |
| | B. Medication preparation | |
| 307 | Hand hygiene before withdrawing medications from medication system | ☐ 1. Observed<br>☐ 2. Not observed |
| 308 | Maintaining safe environment | ☐ 1. Observed<br>☐ 2. Not observed |
| 309 | Hand hygiene before preparing medications | ☐ 1. Observed<br>☐ 2. Not observed |

| | | |
|---|---|---|
| 310 | Sterility check for drugs and other equipment before use (Syringes/needles/mini fluid bags, plastic bags, etc.) | ☐ 1. Observed<br>☐ 2. Not observed |
| 310 | Sterility check for drugs and other equipment before use (Syringes/needles/mini fluid bags, plastic bags, etc.) | ☐ 3. Observed<br>☐ 4. Not observed |
| 311 | Preparation of parenteral medications without breaking sterility | ☐ 1. Observed<br>☐ 2. Not observed |
| 312 | Preserving sterility during insertion of infusion set's spike into the solution bag | ☐ 1. Observed<br>☐ 2. Not observed |
| | C. Medication administration | |
| 313 | Hand hygiene before administration of medications | ☐ 1. Observed<br>☐ 2. Not observed |
| 314 | Administration of oral medications without hand contact | ☐ 1. Observed<br>☐ 2. Not observed |
| 315 | Administration of parenteral medications with preserving sterility | ☐ 1. Observed<br>☐ 2. Not observed |
| 316 | Hand hygiene after administration of medications | ☐ 1. Observed<br>☐ 2. Not observed |
| 317 | Gloves removal and hand hygiene | ☐ 1. Observed<br>☐ 2. Not observed |

**APPROVAL SHEET**

**ADDS ABABA UNIVERSITY**

**COLLEGE HEALTH SCIENCE**

**SCHOOL OF NURSING AND MIDWIFERY**

I, the undersigned MSc student, declare that I have submitted my original work on a title "Nurses knowledge and care practices for infection control in neutropenic patients' in Government hospitals, Addis Ababa,Ethiopiafor the examination.

**Submitted by: Alemkanchi Ayele----------**

Name of student Signature Date

This proposal work has been submitted for examination with my approval as an advisor.

Approved by:

1. Yosief Tsige _____ _____

   Name of Advisor Signature Date

2. Abdissa Boka _____ _____

   Name of Co-Advisor Signature Date

APPROVAL BY THE BOARD OF EXAMINATION

This thesis by ALEM KANCHI AYELE is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of masters in oncology nursing.

Examiner:

| _____ | _____ | _____ | _____ |
|---|---|---|---|
| Name | Rank | Signature | Date |

Research advisors:

| Professor Yosief Tsige (MSc) | _____ | _____ | _____ |
|---|---|---|---|
| Name | Rank | signature | Date |
| Mr._AbdissaBoka_ | _____ | _____ | _____ |
| Name | Rank | signature | Date |

Department Head

| _NiguseGetahune | _____ | _____ | _____ |
|---|---|---|---|
| Name | Rank | signature | Date |

## STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis.

This thesis is submitted in partial fulfillment of the requirement for a graduate degree from the Addis Ababa University at College of Health Sciences, School of Allied Health Sciences department of Nursing and Midwifery. The thesis is deposited in the Addis Ababa University Digital Library and is made available to local, national and international scientific community. I solemnly declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

**STUDENT**

NAME: **ALEM KANCHI AYELE** SIGNATURE: _____ DATE: _____

RESEARCH ADVISORS:

| | | | |
|---|---|---|---|
| PROFESSOR.YOSIEF TSIGE | _____ | _____ | _____ |
| NAME | RANK | SIGNITURE | DATE |
| AbdissaBoka_ | _____ | _____ | _____ |
| NAME | RANK | SIGNITURE | DATE |