Knowledge and Practice Regarding Precautions of Cytotoxic Drug Administration Among Nurses Working in BPKMCH Chitwan.

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A Research Report
Submitted in Partial Fulfillment of the
Requirement for the Bachelor Degree of Hospital Nursing

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Institute of Medicine
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Maharajgunj, Kathmandu
Nepal
2060 (2003)

APPROVAL SHEET

This is to certify that Ms Archana Dhungana has prepared this research report entitled "Knowledge and Practice Regarding Safety Precautions of Cytotoxic Drug Administration Among Nursing Personnel Working in BPKMCH Chitwan" for partial fulfillment of the requirement for Bachelor of Nursing course under my guidance and supervision.

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ACKNOWLEDGEMENT

I would like to express my gratitude to all people, who gave continue supports for making and upgrading the quality of my report. First of all, I would like to express my gratitude to Maharajgunj Nursing Campus for providing me this opportunity to conduct this study as partial fullfillment of Bachelor of Nursing Program in Hospital Nursing.

I am thankful to Asso. Prof. Ms. Gita Pandey, My research guide, for the constant, expert guidance and encouragement.

I am grateful to Prof. Mrs. Kamala Tuladhar, Prof. Mrs Sarala Shrestha, Lecturer Ms Milan Lopchan, Mr. Prabin Shrestha for their expert knowledge on the theoretical aspect of the research.

I am also thankful to Mrs. Daya Laxmi Joshi, Nursing Chief, BPKMCH, for her kind cooperation, valuable guidance and help during the preparation of the instrument and data collection.

I express my gratitude to the Library staffs, specially Mrs. Kabita Shrestha (NSg Campus), Mrs. Nutan Dhungana (BPKMCHJ, Mr. Limbu (NHRC) for helping me to collect necessary literature.

I am thankful to Mr. Prabin Shrestha for statistical correction, Mr. Subhash Ghimire for English editing and Mr. Shreeram Maharjan for computer typing and designing of this study report. My Sincere thanks goes to those respondents who participated in this study, without their co-operation, this study wouldn't have been successfully accomplished.

My special thanks goes to Nepal Health Research Council for providing me the undergraduate grant support to conduct this research study.

Archana Dhungana

ABSTRACT

Objective: The objective of this study was to assess the knowledge and practices of nursing personnel regarding safety precautions during cytotoxic drug administration.

Method: Cross sectional descriptive study method was used, altogether 50 samples working in BPKMCH were selected through purposive sampling technique. Self administered questionnaire was used to collect data from respondents.

Result: Seventy percent (70%) of nurses had good knowledge and 76% of nurses had good practice in all areas of questionnaire regarding safety precautions of cancer chemotherapy. The most prevalent knowledge deficit was on drug related questionnaire (62% answered correctly) and practice deficit was on spillage management related questionnaire (30% answered correctly).

The mean knowledge score was 15.64 with standard deviation 1.31 and mean practice score was 15.68 with Sd 0.84. Statistically, there was significant difference in nurses' knowledge and practice according to qualification ($P = 0.0032$, $P = 0.0039$ respectively). There was no significant difference found in knowledge ($P = 0.059$) and practice score ($P = 0.34$) between more and less work experienced nurses. There was statistically significant difference in knowledge ($P = 0.0002$) between special trained and untrained nurses but their practices score was not statistically significant difference ($P = 0.098$).

Key Words: Nurse, Knowledge, Practice, Precaution.

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ABBREVIATION

AJN	=	American Journal of Nursing
BN	=	Bachelor of Nursing
BPKMCH	=	BP Koirala Memorial Cancer Hospital
BSC	=	Biological Safety Cabinet.
CDs	=	Cytotoxic drugs
Nsg	=	Nursing
OHSA	=	Occupational Health and Safety Office
OT	=	Operation Theatre
PCL	=	Proficiency Certificate Level
PPE	=	Personal Protective Equipment
RMO	=	Radiation Medical Oncology

CHAPTER - I

INTRODUCTION

1.1 Background of the Study

Oncology is the branch of medical science dealing with the preventive, promotive, curative and rehabilitative aspects of malignant diseases. It also deals with the biological behaviour of the tumor cells.

Cancer is the most prevalent disease all around the world. Epidemiologic data gathered over the past 3 years reveal that it is the 2nd leading cause of death in America. Three out of every 4 families will experience a cancer in one of their members. One in two men and one in 3 women in the US will be diagnosed with cancer at some point in their lives.

In Nepal, a rough estimate shows that about 50 -60 thousand people are suffering from malignant with prevalence of 23 - 28/10,00,00 populations. The hospital based statistics revealed 18% of case in 1989, which increased to 23% in 1993 with higher in men than women.
(Source: Sharma, A.K. Cancer profile of Nepal 2001)

Chemotherapy has acquired definite role in the treatment of malignant diseases. The use of cytotoxic agents either alone or as an adjuvant to surgery has been gaining popularity in our hospitals. Cytotoxic drugs are most often used in specialized cancer hospital; however, their use in other hospital department is increasing day by day.

Cytotoxic drugs (CDs) alter growth and reproduction of tumor cells by directly affecting their genetic material. However, CDs may not distinguish

between a normal and cancerous cells. This can lead to secondary malignancy. The effect that's therapeutic on patients can be toxic to providers handling the drugs. For eg. damage to the reproductive system, teratogenesis and liver damage have been reported in several studies of oncology nurses. Acute symptoms, including dizziness, headache, nausea, allergic reactions, hair loss and shortness of breath have been associated with skin contact with CDs. Since safe exposure levels for workers aren't known, it's essential to avoid exposure to the cytotoxic drug. No matter how therapeutic a drug may be for the patient, nurses have a right to be protected from unintended effects to themselves.

The question as to who should administer chemotherapy has been raised on numerous occasions. The answer is simple because cytotoxic drugs are hazardous; it's generally agreed that only oncology practioners trained specially in chemotherapy administration should perform it. In fact, most health care institutions make this type of training available and will not allow personnel to administer these drugs without it.

The handling of cytotoxic drug differs from other drugs. It requires special precautions. Nurses should be familiar with those drugs and use good protective practices when they are exposed in cancer chemotherapy. The precautions must be employed from the time the drug enters the facility until its disposal.

The administration of cytotoxic drugs first started in Nepal at Bir Hospital around 1984 and TUTH in 1986 and then continued to other hospitals. BP Koirala Memorial Cancer Hospital Bharatpur Chitwan started chemotherapy in 1996 and Bhaktapur cancer care centre in 1994. Nurses at the above hospitals are in the central position in handling cytotoxic drug. Good

knowledge and practice of nurses towards precautions of cancer chemotherapy pertect them from the danger of cytotoxic drug.

1.2 Statement of Problems

- What is the present knowledge of nurses about health hazards of cancer chemotherapy?
- What is the present knowledge and practices of nurses towards precautions of Cytotoxic drug administration?

1.3 Objectives of the Study

General Objective

To assess the knowledge and practices of nursing personnel regarding precautions during cytotoxic drug administration.

Specific Objectives

- To assess the knowledge of nurses regarding health hazards of cytotoxic drugs.
- To assess the knowledge of nurses towards precautions of cancer chemotherapy.
- To give recommendation to concerned authority for the conduction of training about it.
- To find out the actual practices of nurses' regarding precautions of cytotoxic drug administration.

1.4 Rational of the Study

Chemotherapy is one of the important aspects of cancer treatment. Although, many team members, including physicians, nurses, other health workers are involved in cancer chemotherapy, nurses are in the central position to administer the cytotoxic drug. As many research studies show that the

cytotoxic drug is highly hazardous and may have mutagenic, teratogenic, or carcinogenic properties, the nurses are more vulnerable for hazardous effect. Though the nurse should take precautions while exposing in cancer chemotherapy, until now it is a neglected area of nursing practice. Good knowledge and practice of nurses towards precautions of cancer chemotherapy protect themselves, the patients, the visitors and also the environment from the danger of cytotoxic drug.

The number of patients coming to hospitals suffering from various types of malignant diseases has been steadily increasing. Chemotherapy services have also been provided through special cancer hospitals as well as other general hospitals and nursing homes. Staff nurses are mainly concerned with cytotoxic drug administration. A lack of knowledge and practices of nurses towards precautions during chemotherapy may lead harmful effect for the patient as well as themselves also. So researcher wants to assess the knowledge and practices of nurses towards precautions of cancer chemotherapy.

1.5 Significance of the Study

- This study findings will help the curriculum planner of PCL, B.Sc nursing programme for adding and modifying cancer related subject in their curriculum.
- This study will provide recommendation to the concerned authorities of cancer hospital for arranging in service education and training to the nursing personnel to improve their knowledge and practice towards precautions.
- This study will provide recommendation to the nurse manager for the development of protocol about safety precaution regarding cancer chemotherapy.
- This study will be helpful as a baseline study for further research.

1.6 Hypothesis

- The knowledge score on 'Precaution of cancer chemotherapy' of nurses with higher educational background will be significantly higher than those nurses with lower educational background.
- Nurses, who have more working experience will have higher knowledge score on precaution of cancer chemotherapy.
- Nurses who have got special training will have higher knowledge and practice score on precaution of cancer chemotherapy than those who don't have special training.

1.7 Variables of the Study

1.7.1 Dependent variable

- Knowledge and practice

1.7.2 Independent variable

- Special training
- Length of work experiences
- Education level

1.8 Operational Definition

- **Nurses:** Refers to those who are working in hospital with cancer patient after completing PCL nursing and BN nursing.
- **Knowledge:** Refers to the possession of facts on:
  - Occupational health hazards of cytotoxic drug.
  - Precautions during cytotoxic drug administration or cancer chemotherapy.

  More knowledge: - Knowledge score of 15 and more than 15

  Less knowledge: - Knowledge score of less than 15.

- **Practice:** Refers to the application of precautionary measures during cytotoxic drug administration or during cancer chemotherapy.

  Good Practice = Score of 15 and more than 15

  Bad Practice = Practice score less than 15

- **Precautions:** Refers to the personal protective measures during cytotoxic drug administration.

- **'During CDS administration' or cancer chemotherapy.**

  Refers to the time period from the drug enters the facility until its disposal.

  They are following :

  - Preparation of cytotoxic drug.
  - Administration of cytotoxic drug.
  - Storage and transfer of cytotoxic drug.
  - Spill management of cytotoxic drugs.
  - Disposal of utensil, body fluid and excreta.

- **Working experience**

  i) More working experience; the number of working year more than 3 years.

  ii) Less working experience; The number of working years less than 3 years.

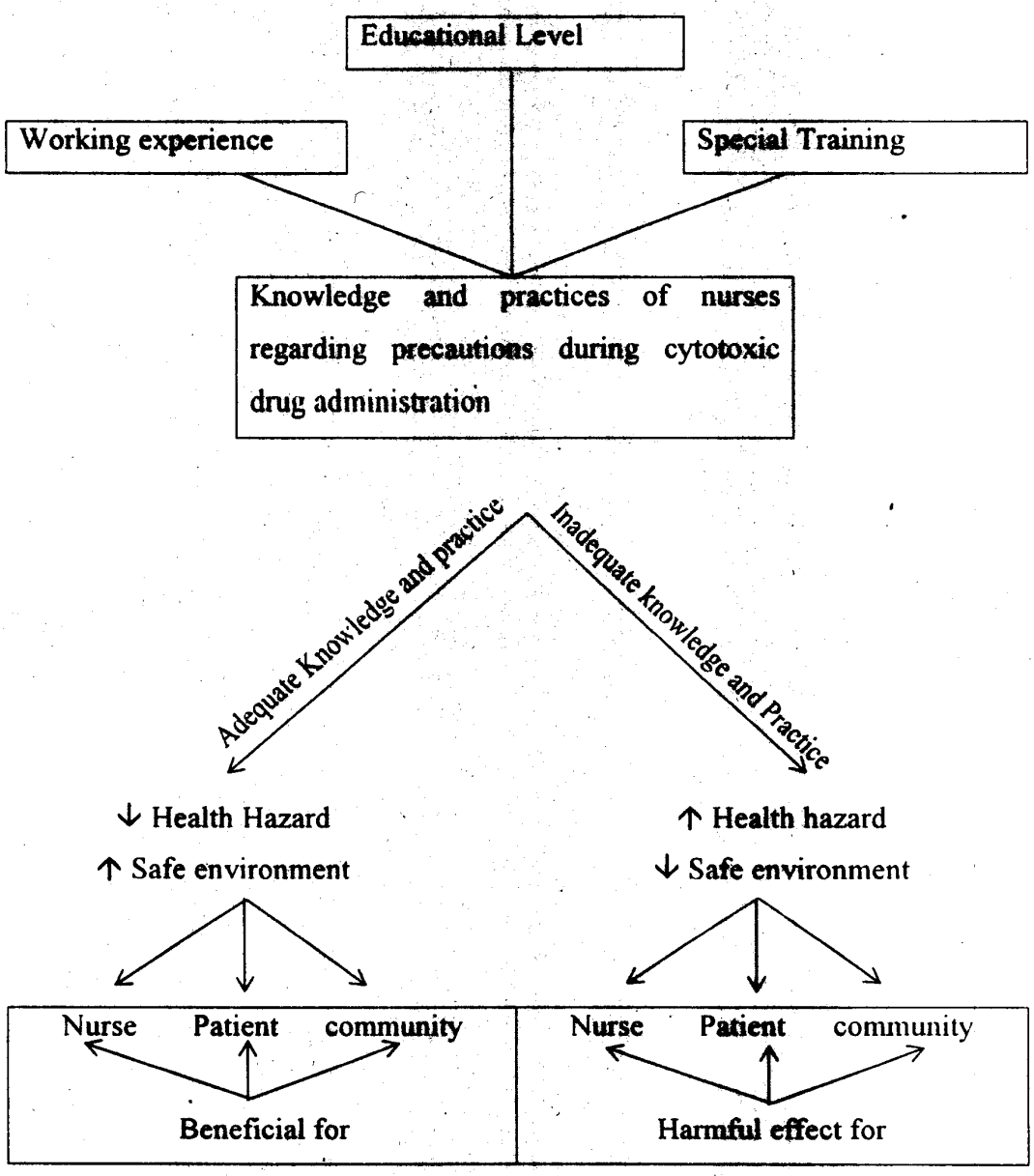
- **Education level**

  i) Higher education level: After completion of BN.

  ii) Lower education level: after completion of PCL nursing.

- **Special Training:** Training on cancer chemotheray.

1.9 Conceptual framework



This conceptual framework helps to understand the "nurses with longer working experience, higher educational background, special training have more knowledge and practice towards precautions of cancer chemotherapy which

help to decrease health hazards to herself, to the patients as well as the other people who have to expose in that environment.

1.10 Delimitation of the Study

- Subject - only nursing personnel working in BPKMCH
- Place - BPKMCH
- Period - 7 weeks
- Sample size - 50
- Content - The instrument was developed on the area of safety precautions of cytotoxic drug preparation, administration, storage and transfer, spill management and dispose of drug wastes.
- Method - Non - probability purposive sampling technique was used in this study. This study will be limited only up to exploration of knowledge and practices.
- The data was collected by self-administered questionnaire, so finding of the study depends upon respondents' honesty only.

CHAPTER - II

LITERATURE REVIEW

2.1 Review of Related Literature

a) Definition of Cancer

A malignant disease, has the properties of uncontrolled growth of cells derived from normal tissues, and of being able to kill the host by the spread of cells from the site of origin to distant sites or by local spread (Taber's medical encyclopaedia)

b) Cancer Chemotherapy

It is the treatment of cancer by using the cytotoxic agents. The cytotoxic agents have been playing an important role by interfering at various stages of cell division by specific interaction with DNA/RNA system. The greatest disadvantages with the use of cancer chemotherapy is that it doesn't only affect the tumor cells but also affects the normally rapidly dividing cells of the body e.g. bone marrow, mucous membrane, hair follicles, etc.

c) Classification of cytotoxic drugs

A. According to life cycle of cells.

i) Cell cycle specific agents

ii) Cell cycle non-specific agents

i) Cell cycle specific agents.

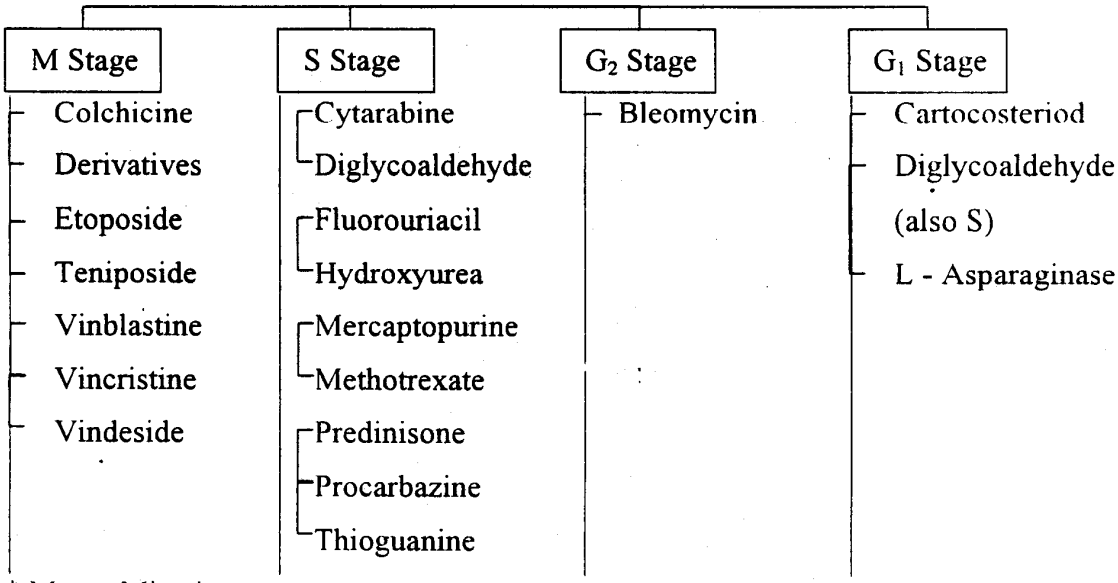
These agents only damage cells which are in the process of cellular reproduction. Cancer cells with a rapid generation time will have a greater potential to be destroyed by cell cycle specific chemotherapeutic agents.

Mitotic Rate of Cells

Bone Marrow stem cells White blood cells Platelets Red Blood cells Lymphatic Tissue Ovary/Testes hair Follicle Epithelial lining of GI tract	Rapid Mitotic Rate
Breast Salivary gland Skin Thyroid Gland Lung	Moderate Mitotic Rate
Pancreas Uterus Cartilage Nerves	Slow Mitotic Rate

The following are the cell c- cycle specific agents

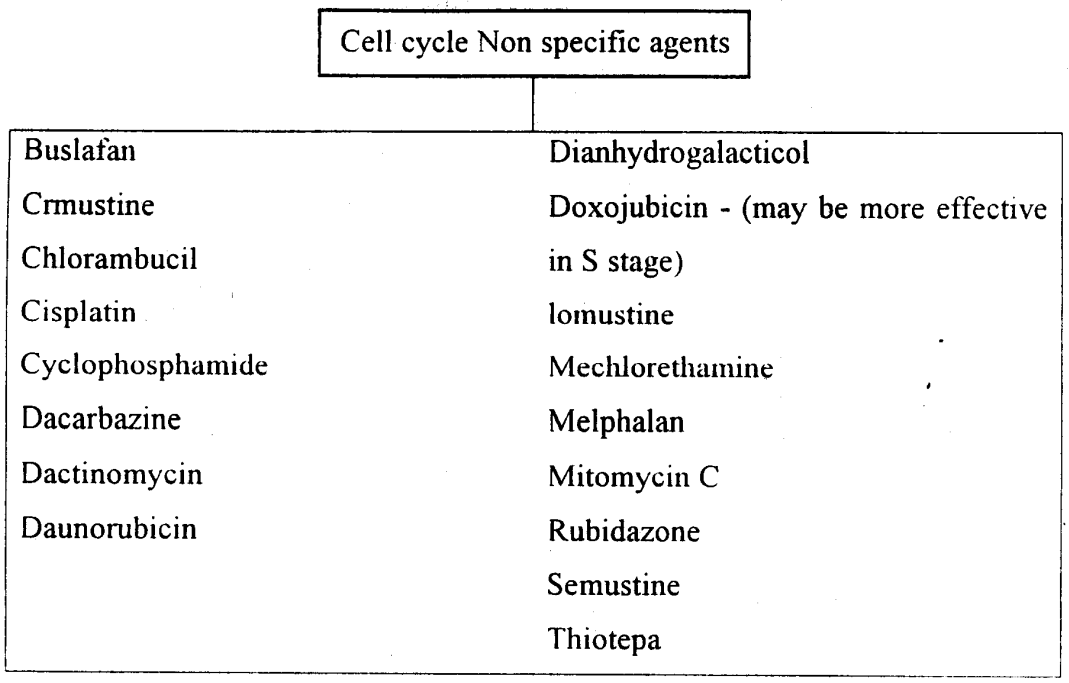
Cell cycle specific agents



* M = Mitosis
* S = DNA synthesis
* G_2 = Postsynthesis, Premitotic } gap
* G_1 = Postmitotic, Presynthesis } gap

ii. Cell - Cycle Non-specific Agents

Drugs capable of causing cellular damage regardless of whether or not the cells are reproducing are called cell cycle non specific agents. The following are the cell cycle non-specific agents.



B. According to physiologic action

The chemical structure and physiologic action of each chemotherapeutic agent differs. However, there are drug similarities that allow these agents to be classified according to their type of antineoplastic action. At present there are 5 main chemotherapeutic classifications.

1) Alkylating Agents

Alkylating agents produce breaks and cross linking in the strands of DNA. They are as follow.

- Busalphan
- Chlorambucil
- Cisplatin
- Ifosfamide
- Lomustine
- Melphalan
- Thiotepa
- Treosulfal

2) Nitrosureas

The nitrosureas are alkylating agents that are frequently categorized separately because they have additional methods of cytotoxicity It inhibit DNA repair. For eg.

- Carmustine
- Lomustine
- Streptozocin

3) Antitumor antibiotic

Antitumor antibiotic produce their tumoricidal effects by binding directly with DNA. For eg.

- Actinomycin D
- Bleomycin
- Daunorubicin
- Doxorubicin
- Mitomycin C
- Plicamycin

4) Antimetabolites

The antimetabolites are chemotherapeutic agents which are chemically similar to the essential cellular Components called metabolites. The cells are "Fooled" by this resemblance and incorporate the chemotherapy into the synthesis of DNA instead of the normal metabolites. This incorporation blocks the production of the nitrogenous bases: example.

- Asparaginage	- Hydroxyurea
- Azathioprine	- 6 mercaptopurine
- Cladribine	- methotrexate
- Cytarabine	- Pentostatine
- Fludarabine	- Procarbazine
- 5 flurourail	- 6 - Thioguanine
- Gemcitabine	

5) Plant Alkaloids

The plant alkaloids are drugs which have been extracted from plants, such as the periwinkle plant. The major antitumor effect of these agents is their ability to bind to microtubular proteins which are essential for the formation for the mitotic spindle of dividing cells. This binding causes mitotic arrest and the cell unable to divide and dies.

Examples:

- Vincristine
- Vinblastine
- VP - 16
- VP - 26
- Vindesine

C. The effect of chemotherapy on the normal cells

Even though the effects of cancer cells in the body are vastly different than the effects of normal cells, these two types of cells, malignant and non-malignant, are very similar in chemical structure. In fact the crucial limiting factor of chemotherapy in the treatment of cancer is its inability to distinguish between normal cells and malignant cells chemotherapeutic agents destroy normal cells by altering or interrupting their cell life cycle in the same way that

they damage cancer cells. Fortunately however, antineoplastic agents have a definite selectivity for malignant cells over their normal cell counterparts. This "selective toxicity" is based on the fact that the percentage of the cancer cell population that is reproducing is greater than that of the normal cell population. The following are the common toxic effects of chemotherapy on normal cells.

i) Bone Marrow Suppression

Toxicity of the bone marrow occurs when marrow stem cells are destroyed or damaged by chemotherapeutic agents. This cellular destruction results in a deficiency of white blood cells, platelets and red blood cells.

ii) Alopecia

Some chemotherapeutic agents can damage or destroy the epithelial cells of the hair follicle causing constriction of the hair shaft (brittle, fragile hair) and atrophy of the hair follicle. Hair follicles of the scalp are comprised of a greater percentage of dividing cells than the hair follicles of other areas of the body. Therefore hair loss on the scalp will be greater that hair loss in areas such as eyebrows, eyelashes, face pubic hair, arms, legs, and trunk.

iii) Gastrointestinal dysfunction

Several forms of gastrointestinal toxicity can occur from the effect of the chemotherapeutic agents on the epithelial cells of the mucosa lining the gastrointestinal tract. for e.g. bleeding, nausea, vomiting, diarrhoea, gastric ulcer etc.

iv) Sexual and Reproductive Dysfunction

The testes and ovaries are tissues comprised of rapidly dividing cells. The effects of the chemotherapeutic agents on these gonadal cells include temporary or permanent sterility, irregularity or cessation of menses, alterations

in libido, mutation of the DNA of Ova and sperm (Mutagenesis), and alternations in the developing fetus (Teratogenesis).

Dysfunction associated with the toxic effects of chemotherapy.

1) Bladder toxicity - Hemorrhagic Cystitis
Bladder scarring
Carcinogenic to bladder

2) Cardiotoxicity - Cardiac arrhythmias
Moderate to severe congestive heart failure.

3) Hepatic Toxicity- Enzyme abnormalities
Cirrhotic changes
Liver necrosis

4) Nephrotoxicity- Nephron damage
Renal Failure

5) Naurotoxicity- Peripheral nuropathies
Muscular weakness
Loss of deep tendon reflexes
Cranial nerve deficits
Hoarseness.
Paralytic ileus
Hormonal alterations

6) Ocular toxicity- Cataract formation
Blue red vision

7) Ototoxicity- Tinnitus
Hearing loss

8) Pulmonary Toxicity-Pneumonitis
Plumonary fibrosis

D) Literature related to occupational health hazards of CDS.

A current controversial issue in cancer care is the possibility that working with antineoplastic agents may be hazardous for health professionals. There have been several papers in recent health -related journals citing early study reports and anecdotal accounts, of the possibility that the pharmacist, nurse or physician who prepares and or administers certain cytotoxic agents may be exposed to potential hazards. It is suspected that the person preparing or giving chemotherapy may absorbed the drug through inhalation of particles when reconstituting a power in an open ampule and through skin contact. At present, data regarding the health risks for the professional working with chemotherapy are not conclusive. The purpose of this discussion is the alert nurses to the possibility of chemotherapy associated risks so that practical safety measures can become a consistent part of their daily nursing practice.

Falck, et al. (1979), authored a letter to "The Lancet" in which they reported the presence of mutagenic activity in the urine of clients who had received and nurses who had administered a combination of chemotherapeutic agents. In this study, the urine of seven nurses who administer chemotherapy was evaluated for mutagenic activity on two different days: After 4 working days and after a workfree weekend, the results of the two screenings were compared with each other, with a group of clients receiving the some drug combinations, and with a control group of unexposed staff workers. The data demonstrated that the urine of the clients had the highest level of mutagenic activity and the control group had none. The urine of the seven nurses did exhibit mutagenic activity in lower levels than in the urine of the clients. Also, the urine level was lower following the weekend off than the urine tested following the 4 working days.

According to Undeger, I.et al. in 1999, careless handling of antineoplastic drugs may lead to exposure in detectable amounts by means of chemical or biological methods in the body fluids or cell samples but the information about the mutagenic effects of these agents on nurses is limited and inconsistent. DNA damage in peripheral lymphocytes of 30 professional nurses employed in the oncology departments for at least 6 months were examined by the alkaline single cell gel electrophoresis. The results were compared to that of 30 controls with comparable age, sex and smoking habits, not practising in the chemotherapy services, work characteristics of the exposed nurses and the use of personal protective equipment were also investigated. The DNA damage observed in the lymphocytes of the nurses was significantly higher than the controls. The observed DNA damage was found to be significantly lower in nurses applying the necessary individual safety protections during their work. There was no significant association between the duration of occupational exposure to antineoplastic drugs and the DNA damage.

Selevan S.G. et al. (1985), in a case control study, examined the relation between fetal loss and occupational exposure to antineoplastic drugs in nurses in 17 Finish hospitals. The pregnancies studies occured in 1979 to 1980, a statistically significant association was observed between fetal loss and occupational exposure to antineoplastic drugs during the first trimester of pregnancy. The results of this study suggest that caution be exercised in the handling of antineoplastic drugs.

According to Valanis, B.G., et al (1993), Antineoplastic drug handling in the absence of adequate protective measures has been associated with biological uptake of the drugs among pharmacists and nurses. This study investigated the association between occupational exposure to antineoplastics and the presence of acute symptoms in a nation wide sample of 2048 nurses

and nurses' aids. Reported skin contact with the drugs was associated with a small but statistically significant increase in reported symptoms. Although number of doses handled and extent of protection used were significantly associated with number of symptoms, their effect was not independent of skin contact.

Hemminki, K.A. et al (1985), research study suggests that handling of cytotoxic drugs doesn't affect the frequency of spontaneous abortion but is associated with malformations in the offspring.

According to Conor, T.H. (1999), the four glove materials (nitrite rubber, latex, polyurethane and neoprene) was generally impermeable to antineoplastic drugs. Eighteen antineoplastic drugs posing potential health hazards to handlers were prepared at the highest concentrations normally encountered by hospital personnel. 4 glove materials - nitrite rubber, latex, polyurethane, and neoprene - were exposed to the drugs for 30, 60, 90 and 120 minutes. Glove thickness was measured with an electronic digital caliper. The nitrile gloves were the thinnest (0.12mm), and the latex gloves were the thickest (0.18 mm). The research study found that the 4 glove materials were impermeable to 18 antineoplastic drugs in most, but not all, cases.

According to knowles, R.S. and Virden J.E. (1980), - although the clinical toxicity of antineoplastic drugs has been well documented there is little or no information on the problems that may arise on the handling and mishandling of such agents. This paper attempts to highlight the importance of taking precautions to prevent adverse effects resulting from contact with cytotoxic drugs during handling and to suggest a practical guide for the handling of such agents.

According to Worthington K.A., (2002) - Cytotoxic drugs should be prepared in a properly functioning biological safety cabinet by staff who have been trained in safety and handling precautions. All personal protective equipment (PPE) - especially gloves an gowns - should offer proven barrier protection from the hazardous agent being used. Contaminated PPE and other equipment must be disposed of in properly labeled, leak Proof containers; staff members specially trained in such procedures should be assigned to clean up spills. Safe drug administration systems may be one of the most effective ways to curb hazardous drug exposures.

Saurel - Cubizoiles, M.J. et. al.(1993), concluded that there is the relationship between ecotopic pregnancies and occupational exposure to chemotherapy. From the sample of reported pregnancies (n = 734) 2 % (15) were ectopic. The data analysis. Further revealed significant relationships (P - < 0.02) between ectopic pregnancy and exposure to antineoplastic agents, the woman's age, and the number of previous pregnancies.

Shortridge, L.A et al. (1986), concluded that menstrual dysfunction was greatest for women between the ages of 30 and 39 (30.4%) and those between ages 40 to 45 (31.6%) who were mixing or administering chemotherapy agents. These results were statistically significant at P = 0.018 and P = 0.054, respectively.

E) Literature Related to the Study Variables

Denise, D.G. and Denise M. Presented in 1996, the Intravenous Nursing Society stated bluntly that "only physician and registered nurses, who have completed a specialty education program and have validated competency on a continum should administer antineo - plastic agents." As healthcare providers, we need to have an adequate knowledge and understanding of chemotherapy

drugs regimes and their side effects if we are to provide safe, high quality care to our oncology patients without endangering ourselves.

According to Cotton (1996) cytotoxic drugs are themselves inherently carcinogenic and must be handled with respect. Strict policies and guidelines are required wherever such drugs are used and it is an absolute requirement that staff is educated, trained, and skilled in the wide range of required competencies.

Claudetle Varriccho (1997), concluded that the nurses who administer anticancer drugs or care for continuing anticancer receiving patients must have theoretical knowledge base and technical skill necessary to ensure the safety for themselves and for the patients. Therefore the nurses should have knowledge of appropriate self-protection; preparation, transportation and disposal of anticancer drugs contaminated utensil.

The handling of anticancer drugs differs from other drugs, it requires special educational training including more clinical experience. Nurses should be familiar with those drugs and use good protective practices when they are exposed in cancer chemotherapy area (Cancer source book 1997).

F) Literature related to the guidelines of cytotoxic drug administration

i) Precautions during preparation.

- Wear personal protective equipment that is gloves, gown, respirators and goggles while preparing drugs.
- Work with hazadous drugs should be carried out in a BSC (Biological safety cabinet).

- Syringes and I/V sets with luer-lock fittings should be used, and syringes should always be large enough so that they are not full when the entire drug dose is present.
- A covered disposable container should be used to contain excess solution.
- A covered sharp container should be in the BSC. All syringes and needles used in the course of preparation should be placed in the sharps container without being crushed, clipped or capped.
- Use large-bore needles, # 18 or 20 to avoid high pressure syringing of the solutions.

Source: *EHSO- Policies Programs-2001*

ii) Precautions During Administration

- Wear surgical glove or polyvinyl chloride glove when preparing IV tubbing, dispelling air bubbles from syringes or IV tubing, and administering chemotherapy. This prevents any drug from coming in direct contact with your skin.
- For 48 hours after drug administration, wear disposable gloves when handling patient's excreta.
- Dispose of used needles and syringes carefully. To prevent aerosal generation of chemotherapeutic drugs, don't clip needles. Place them intact in a leak proof, puncture - resistant container to be incinerated.
- Dispose of IV bags, bottles, and tubing in a covered trash container. chemotherapy trash should be incinerated.
- Eventhough you've used gloves, you need to wash your hands thoroughly after giving any chemotherapeutic drugs.

Source: *Neoplastic disorders 1985.*

ii) Precautions during storage and Transfer

- The outside of bags or bottles, containing the prepared drug should be wiped with moist gauze.
- Entry ports should be wiped with moist alcohol pads and capped.
- Transport should occur in sealed plastic bags and transported in containers designed to avoid breakage.

iv) Precautions for spillage management

- If spillage is on the skin - soap and cold water should be used immediately
- If the eyes are contaminated immediate irrigation with sodium chloride 0.9% eye wash should be carried out and medical help sought.
- Before cleaning a spillage, gown up with using both pairs of gloves.
- Damp down any powder spill with wet paper towels.
- Mop up the spillage with cold water and paper towels, starting from outside of the spillage and working towards the midline.
- Clean up the area once again with cold water and paper towels.
- All materials must be wrapped in a plastic disposable waste bag, double bagged, tied securely, then disposed of appropriately.
- All spillages must be reported to the ward /unit manager (and pharmacy).
- Any accidient involving skin or tissue contact with a cytotoxic agent must be documented and reported to the Occupational Health Unit.

Source: *Elililly (1997), Guideline for the cytotoxic drug administration.*

v) Prcautions during collection, storage and dispose of hazardous drug waste.

- Should wear gowns and protective gloves when handling waste containers.

- All waste material should be placed in a waste bag labelled with a "hazardous drug".
- Needles, syringes, and breakable items should be placed in a puncture proof box then into the bag.
- Needles should not be clipped or capped nor syringes crushed.
- The waste bag should be kept inside a covered waste container in an isolated area.
- All personnel involved in any aspect of the handling of hazardous drugs (shipment - receiving or employees involved in the transport or storage of drugs) must receive information and training to apprise them of the hazards of the hazardous drugs present in the work area.
- The hazardous waste including empty vials, used containers, syringes, discarded gloves, gowns, goggles and any other disposable material must be disposed through incineration.

Source: *(EHSO - Policies Programs - 2001).*

2.2 Summary of Literature

All these studies and literatures were used by the investigator in conceptualizing the nature and scope of the research study. Most of the literature are about the occupational health hazards of cytotoxic drugs, the preventive measures to decrease the health hazards of anticancer drugs and the need of adequate knowledge, training and skill about the safe handling of anticancer drugs to the nurses. The literature enabled the investigator to gain deeper insights on the problem and to develop the questionnaire used in this study.

After reviewing the above literature, the researcher concluded that, working with antineoplastic agents may be hazardous for health professionals. They may absorb the drug through inhalation of particles and through skin

contact. Many experimental research studies shows that there is statistically significant association between fetal loss and occupational exposure to antineoplastic agent, malformation of offspring and occupational exposure. Research studies also shows that by taking safety precaution during exposing with cytotoxic drugs helps decrease the health hazards for eg. use of personal protective cloths. Many literature suggest that the nurses who administer anticancer drugs should have good knowledge, trained and skill about the safe handling of cytotoxic drugs.

CHAPTER - III

RESEARCH METHODOLOGY

3.1 Research Design

Cross sectional analytic descriptive study was used to find out the present knowledge and practices of nurses about precautions of cancer chemotherapy.

3.2 Study Area

The study was done in BPKMCH. Bharatpur Chitwan among 50 nurses. This area is efficient and accessible for the researcher.

BP Koirala Memorial Cancer Hospital, the first national and referral cancer hospital; located in Chitwan district; was established with the grant aid received from the government of people's Republic of China. It is the only one comprehensive cancer center in Nepal. It has been providing the services since 1995 as day care centre. OPD service was started in June 1999 and indoor service started in July 1999 with 25 beds, Now it has 100 beds and 70 nurses are working altogether and following services are available including OPD and IPD.

- Radiation Oncology
- Surgical Oncology
- Medical Oncology
- Pathology
- Radiodiagnosis & Imaging.
- Operation Theatre
- Endoscopy Services
- Physiotherapy, acupuncture.
- Cancer control, prevention and research.

3.3 Population and Sample

3.3.1 Target population: Staff nurses working in different hospital after completing PCL nursing.

3.3.2 Study population: Nurses working in BPKMCH

3.3.3 Sample population: Nurses working in Medical/Surgical Oncology, Day care and Operation Theatre.

3.3.4 Inclusion criteria

- Nurses who are working with the cancer patient with chemotherapy.
- Nurses after completion of PCL, BN.

3.3.5 Exclusion criteria

- Nurses who have never exposed in chemotherapy

3.3.6 Sample Size: 50 nurses working in BPKMCH.

3.3.7 Sampling Technique

Purposive sampling technique will be used in this study because of the efficiency of researcher for availability, and accessibility of the sample.

3.4 Measurement

3.4.1 Measuring instrument

Self administered questionnaire will be used to collect data from the respondents.

3.4.2 Validity and reliability of the instrument

Pretesting the research instrument and conducting the pilot study are important to the success of an investigation. Pretesting of the instrument and pilot testing was done to maintain the validity and reliability of the instrument.

Pretesting of the Instrument:

It is a process of checking the instrument to evaluate such factors as its length, its wording and its validity. The instrument was shown to the colleagues, advisor, experts on cancer nursing, to maintain the content, construct and concurrent validity and modification of the questionnaire was done as necessary.

Pilot Study:

A pilot study is a small preliminary investigation of the same general character as the major study. Pilot study was done in 10% population of sample size working in Bhaktapur cancer Hospital to findout the reliability of the instrument.

3.4.3 Measures to Reduce Bais

- There was no discrimination on ethnicity, socioeconomic condition of the subject.
- Each respondents was oriented regarding the administration of tool.

3.5 Procedure of Data Collection

Self - administered questionnaire was used to collect data by taking formal permission from authority of study area by submitting an official letter. The researcher made them (subjects) read written consent agreement than verbal consent was taken.

3.6 Ethical Consideration

The permission for data collection was obtained from concerned authority of study area after submitting an official letter from campus. Verbal consent was taken from all respondents before data collection. The subject's anonymity and confidentiality was maintained during as well as after data collection. Nobody was forced for participating in the study.

3.7 Data Analysis and Presentation

All collected data was analysed and categorized on the basis of research objectives and hypothesis, which is presented on table, pie cart, bar graphs and frequency polygon.

3.8 Statistical Procedures

- Percentage
- Mean, median, mode standard deviation
- Hypothesis test

CHAPTER - IV

ANALYSIS AND INTERPRETATION OF THE DATA

This chapter deals with the analysis and interpretation of raw tabulated data obtained from questionnaire. The data were collected from nursing personnel working in different wards of BPKMCH regarding knowledge and practices towards safety precautions of cytotoxic drug administration. The total number of respondents was fifty. The collected data was compiled and tabulated in dummy table manually, then analysis and interpretation were done on the basis of statistical tools. e.g. number, frequency, percentage, mean, standard deviation and was presented on table, pie chart, bar diagram and frequency polygon.

4.1 Demographic Characteristics

Table No. 1

Distribution of Respondents According to Age, Sex and Marital Status

	Variables	No.	Percentage
Age	20 - 24	33	66.00
	25 - 29	9	18.00
	30 - 34	5	10.00
	35 - 39	3	6.00
Total		50	100.00
Sex	Male	1	2.00
	Female	49	98.00
Total		50	100.00
Marital	Married	28	56.00
Status	Unmarried	22	44.00
Total		50	100.00

Mean age = 24.8 yrs.

Above table shows that

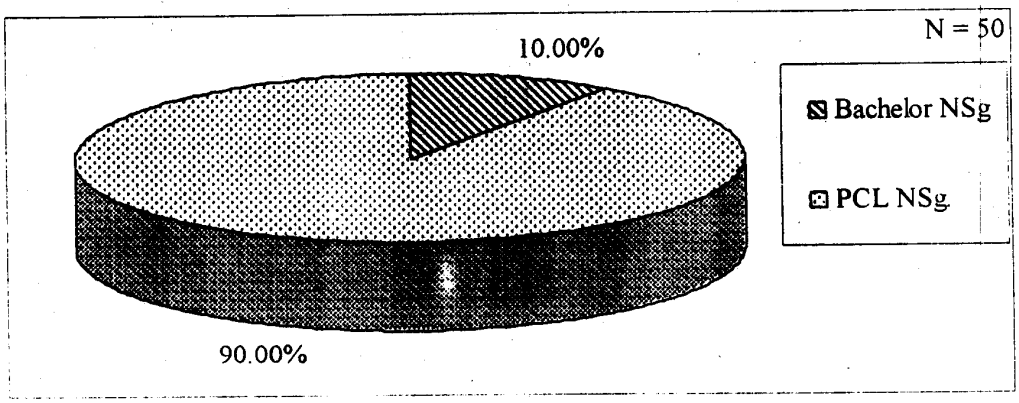
Majority of respondents 66% (33) were from the 20- 24 age group and minority, only 6% (3), were from the age group of 35 to 40.

In this way majority of respondents 49 (98%) were female and only 1 respondent was male.

Out of 50 respondents, 56% (28) were married and 44% (22) were unmarried.

Figure No. 1

Distribution of Respondents According to their Level of Education



Above pie charts shows that majority of respondents, 90% were PCL nursing passed and only 10% were bachelor nursing passed.

Table No. 2

Distribution of Respondents According to their Working Experience in Years

S.N.	Working ex.	Number (f)	Percentage %	Mid value (x)	fx
1.	0 - 2 year	19	38.00	1	19
2.	2 - 4 years	10	20.00	3	30
3.	4 - 6 years	10	20.00	5	50
4.	6 - 8 years	7	14	7	49
5.	8 - 10 years	4	8	9	36
		N= 50			Σfx=184

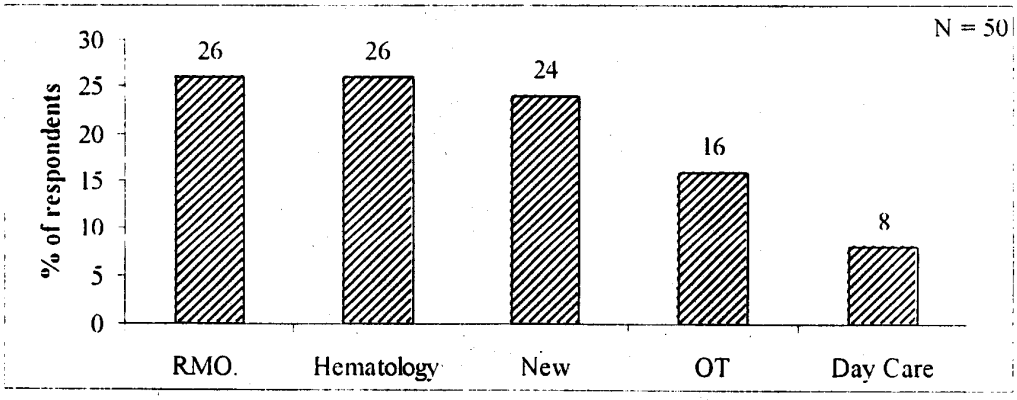
$$\bar{x} = \frac{\in fx}{N} = \frac{184}{50} = 3.68 \text{ years}$$

Above table shows that

- Majority of respondents has 0 - 2 years working experience
- Only 8% respondents had 8 - 10 years working experience.
- The mean working experience ($\bar{x}$) year was 3.68 years.

Figure No. 2

Distribution of Respondents According to their Working Area



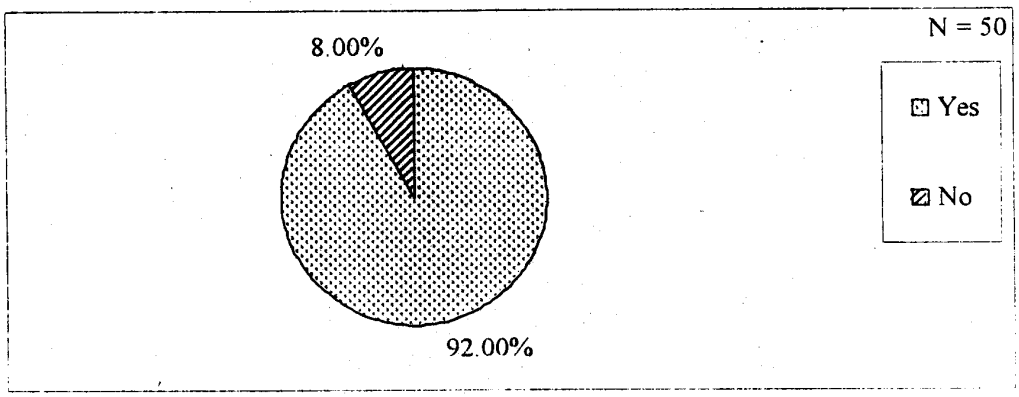
The above bar diagram shows that:

- Majority of respondents were from RMO, Hematology and New ward where chemotherapy was given. Only few respondents were taken from OT and day care because in day care, Chemotherapy was given but only 4 staffs in total. In OT; chemotherapy was not given, but only those respondents were included who were previously exposed in RMO ward.

Figure No. 3

Distribution of Respondents According to their Special Course

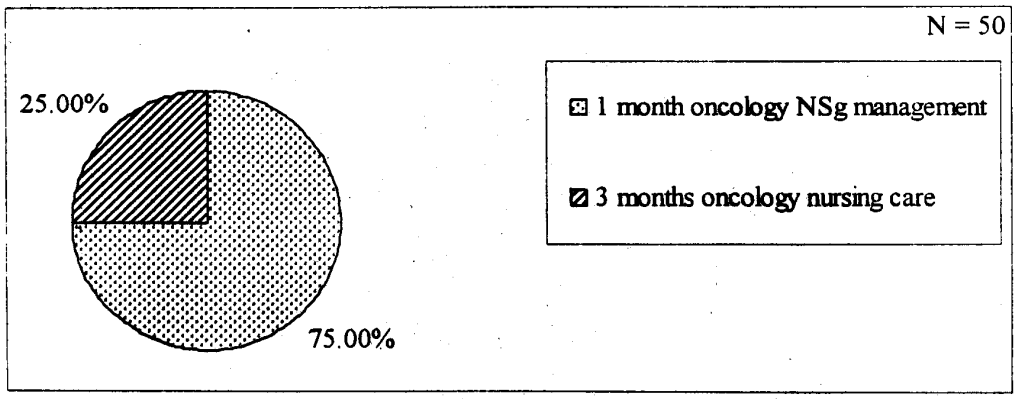
(Training on Cancer Chemotherapy)



The above chart shows that only 4 (8%) respondents had got training on cancer chemotherapy and the rest 46 (92%) didn't have any training regarding cancer.

Figure No. 4

In the question "If yes, what type of training was given."

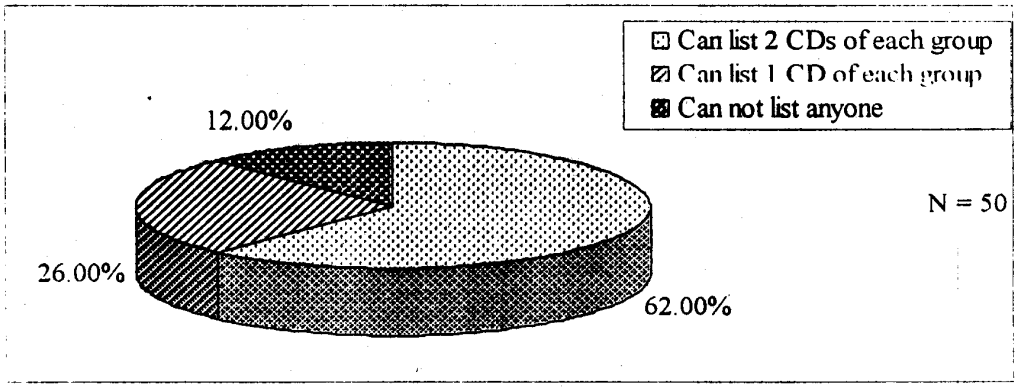


Above chart shows that among 4 respondents, 3 got 3 months of oncology nursing training in Tata memorial hospital, Bombay in 1998; 1 got 1 month of oncology nursing management in BPKMCH.

4.2 Knowledge Regarding Safety Precaution of cytotoxic drug administration

Figure No. 5

Distribution of Respondents According to their Knowledge Regarding Listing the name of CDs

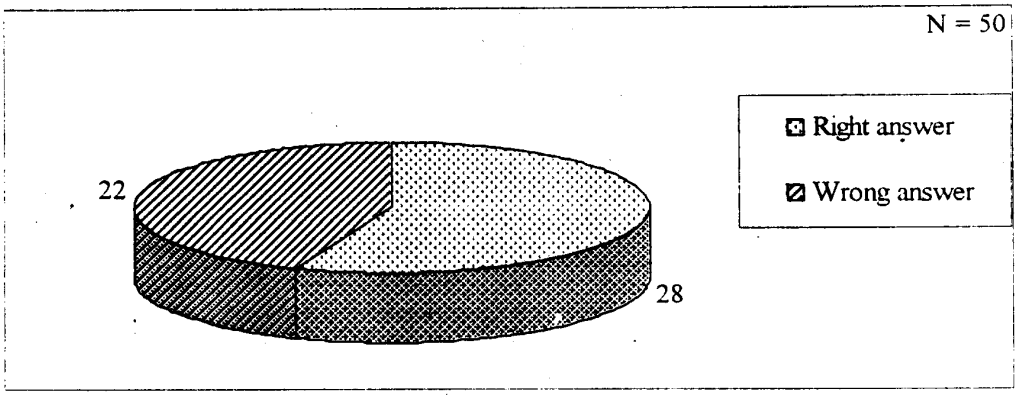


Above pie chart shows that:

Out of 50 respondents, 31 (62%) can list 2 CDs of each group, that is alkylating agent, antitumor antibiotic and antimetabolities. Thirteen (26%) respondents could list one CD of each group and 6(12%) respondents could not list any name of cytotoxic drugs of any group. Majority of respondents have knowledge related to the name of cytotoxic drugs.

Figure No. 6

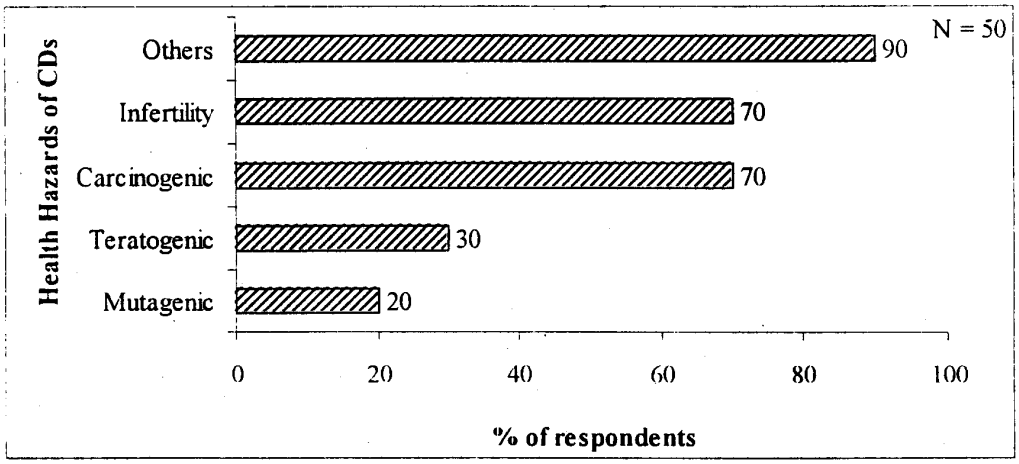
Distribution of Respondents According to their Knowledge on the Action of Cytotoxic Drugs



Above pie chart shows that majority of respondents 28 (56%) encircled the right answer that is CDs alter growth and reproduction of cancerous cells as well as some rapidly dividing cells. The others 26 (44%) encircled the wrong answer that is CDs selectively destroy cancer cells without damaging the normal cells.

Figure No. 7

Distribution of Respondents according to their knowledge on Occupational Health Hazards of CDs.



Above bar diagram shows that out of 50 respondents, mutagenic effect was answered by 20% (5) respondents, teratogenic 30% (15), carcinogenic and infertility - 70% (35) and the others (alopecia, nausea, vomiting, diarrhoea) were answered by 90% of respondents.

***One respondent could choose more than one answer**

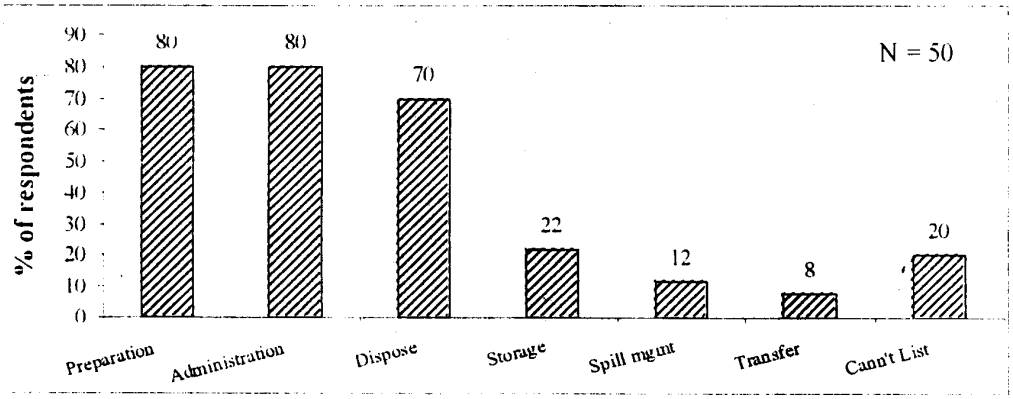
Distribution of respondents according to their knowledge on safety precautions of CDs administration.

Total respondents 50 (100%) answered that hazardous effects can be minimized by taking safety precautions.

In reference question if yes, at what time you should take safety precautions

Figure No. 8

Areas where safety precautions must be taken



Above bar diagram shows that:

Majority of respondents said, precautions must be taken during preparation (40), administration (40), and disposal (35). Only few respondents said that it must also be taken during storage (12), spill management (6), and transfer (4). It indicates that only few respondents had knowledge that precautions must be taken not only in preparation, administration and disposal

but also during storage, spillage management and transfer of cytotoxic drugs. Twenty percent of (10) respondents didn't have any knowledge about it.

*** One respondent answered more than one answer.**

Table No. 3

Distribution of Respondents According to their Knowledge on Safety Precautions During Chemo Preparation

Variables		No.	Percentage
The nurse must wear	- Gown, gloves, masks, goggles	50	100.00
CDs must be prepared in	- Biological safety cabinet	48	96.00
	- Well ventilated separate room	2	4.00
Total		50	100.00

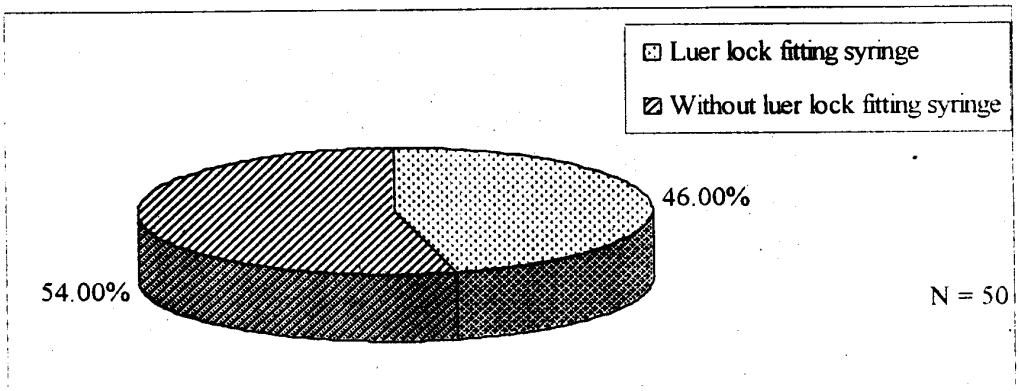
Above tables shows

Hundred percent respondents said that the nurse must wear gown, gloves, masks and goggles during chemo preparation.

Out of 50 respondents, 48 (96%) respondents said that CDs must be prepared in biological safety cabinet and only 2 (4%) said that it can be prepared in well ventilated separate room.

Figure No. 9

Distribution of Respondents According to their Knowledge about the Type of Syringe



Above pie chart shows:

Out of 50 respondents, 27 (54%) said that luer lock fitting syringe must be used during cytotoxic drug administration. The others (46%) said that without luer lock fitting syringe is used during cytotoxic drug administration.

Table No. 4

Distribution of Respondents According to their Knowledge about the Place where Air of the Syringe with Full CDs should be Expelled.

Variable	No.	Percentage
Right answer	49	98.00
Wrong answer	1	2.00
Total	50	100.00

Above table shows:

Out of 50 respondents, 49 (98%) gave the right answer that is air should be expelled in safety cabinet. Only 2% of respondents gave wrong answer that is "in patients' bed side."

Table No. 5

Distribution of Respondents According to their Knowledge about the Storage of Cytotoxic Drugs

Variable	No.	Percentage
In Preparation room	6	12.00
In Cool, Dark, Separate Place	44	88.00
Total	50	100.00

Above table shows

Out of 50 respondents, (12%) answered that the CDs is stored in preparation room where 44 (88%) of respondents answered "in cool dark separate Place," Which is the correct answer.

Table No. 6

Distribution of Respondents According to their Knowledge on spillage Management

Variables		No.	Percentage
If Siplls on the skin	- Wipe with any cloth immediately	1	2
	- Wipe with tissue paper & dispose	5	10
	- Use soap and cold water immediately	44	88
	- Use spirit to wipe the skin	-	-
Total		50	100
If spills on the eye	- Report to the occupational Health Unit	3	6
	- Immediate rinse with tap water	43	86
	- Immediate irrigation with sodium chloride o.9.% eye wash	4	8
Total		50	100

Above table shows

The majority of respondents 44 (88%) gave the right answer. That is "use soap and cold water immediately if spills on the skin," 5(10%) of respondents answered, "wipe with tissue paper and dispose," 1(2%) of respondents answered "wipe with any cloth immediately."

Out of 50 respondents, 3 (6%) respondents answered, "report to the occupational health unit," 43 (96%) respondents answered, "immediately rinse with tap water" and 4 (8%) respondents answered, "immediately irrigation with sodium chloride 0.9% eye wash" to the response of question what would you do if spills on the eye.

Table No. 7

Distribution of Respondents According to their Knowledge on Management of Spillage if an IV Bottle of CDS is Broken Accidentally.

Responses	No.	Percentage
Right answer	46	92
Wrong answer	4	8
Total	50	100

Above table shows:

Majority of respondents, 46 (92%) gave right answer that is "the area should be dried up immediately and washed out three times with detergent and water". Only 4 (8%) respondents gave wrong answer.

Table No. 8

Distribution of Respondents According to their Knowledge on Handling of Body Wastes

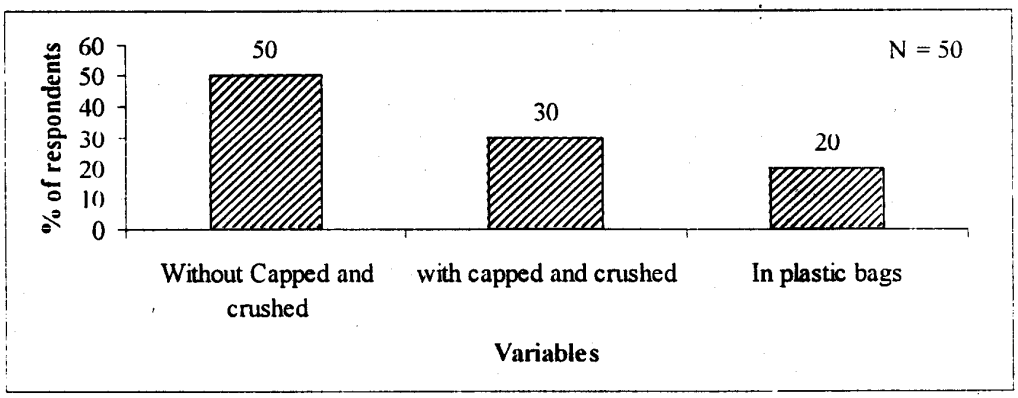
Responses	No.	Percentage
Right answer	45	90
Wrong answer	5	10
Total	50	100

Above table shows:

Out of 50 respondents, 45 (90%) gave right answer that is body wastes of CDs receiving patients should be handled precautionarly for 48 hours. The others (10%) gave wrong answer that is 24 hours.

Figure No. 10

Distribution of Respondents According to their Knowledge on Disposal of Needle and Syringes



Above bar diagram shows

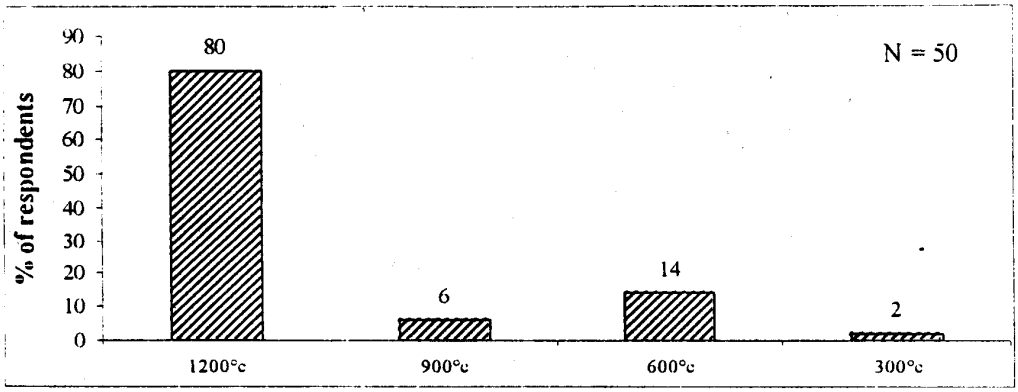
Out of 50 respondents, 25 (50%) answered 'the used needle and syringe must be disposed 'in puncture proof container without capped and crushed' which is right answer, 15 (30%) answered 'in puncture proof container after caped and crushed', 10 (20%) answered, 'in plastic bags labelled with 'hazardous wastes', Nobody said in bucket under the patient's bed.

Distribution of respondents according to their knowledge on method of disposing the hazardous wastes.

Hundred percent(100%) respondents answered that the best method of disposing hazardous wastes is incineration.

Figure No 11

In reference question if incineration, under which temperature?

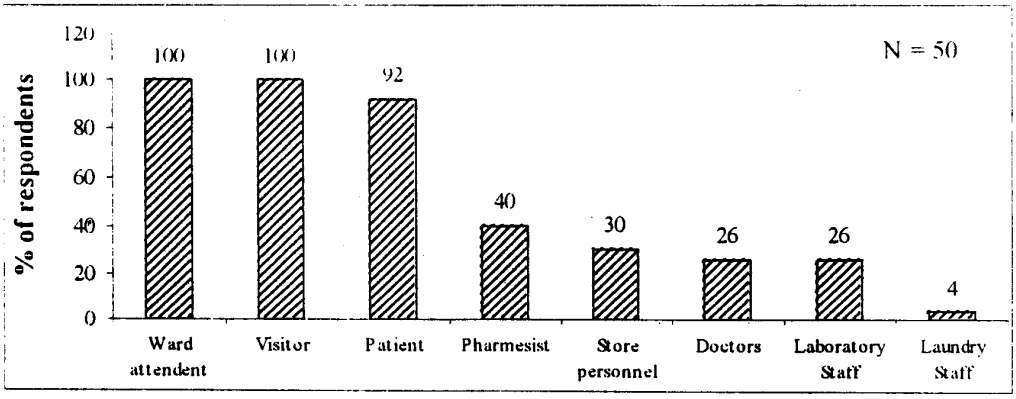


Above bar diagram shows

Out of 50 respondents, 40 (90%) answered, under 1200°c that is right answer, 3 (6%) answered 900°c, 7(14%) answered 600°c and 2% answered 300°c.

Figure No 12

Distribution of respondents According to their Knowledge on "Who should be included in Receiving Information. Education and Training about the Safe Handling of CDs and their Wastes except Nurses?"



Above bar diagram shows

Majority of respondents answered, ward attendants visitors and patients should have knowledge about the safe handling of CDs wastes. Only few respondents answered that the pharmesist (40%), store personnel (30%) doctor (26%), laboratory staff (20%), and laundry staff (4%) should also have knowledge on safe handling or anticancer drugs and their wastes.

4.3 Practice Regarding Safety Precautions of CDs administration

Table No. 9

Distribution of Respondents According to their Practices on Different Areas

S.N.	Statements	Always		Sometimes		Never	
		No.	%	No.	%	No.	%
1.	Wears protective clothings during exposure with CDs	48	96	2	4	-	-
2.	Doesn't take similar precautions for all CDs while handling them	15	30	13	26	22	44
3.	Prepares CDs in vertical safety cabinet	50	100	-	-	-	-
4.	Prepares CDs in nursing station	-	-	-	-	50	100
5.	Prepares CDs in patient's beside	-	-	-	-	50	100
6.	Drinks coffee in CDs preparation area	-	-	-	-	50	100
7.	Expels air from syringe containing CDs in an open area before giving to the patients.	2	4	4	8	44	88
8.	Doesn't wear protective cloths at the time of changing I/V fluid containing CDs.	5	10	21	42	24	48
9.	Uses needles as venting devices in I/V bottle	35	70	12	24	3	6
10.	Uses luer lock fitting syringe	19	38	26	52	5	10
11.	Transfers prepared CDs from one place to another with bare- hand	4	8	20	40	26	52
12.	Wipes out the small spills on the skin with tissue paper immediately.	15	30	16	32	19	38

13.	Uses damp cloth for managing spillage of powdered form of CDs	15	30	7	14	28	56
14.	Teaches the patient as well as visitors about the safe handling of body wastage of the patient receiving CDs.	25	50	24	48	1	2
15.	Disposes the contaminated needle in puncture proof container	46	92	1	2	3	6
16.	Stores the hazardous drug waste together with other wastes	-	-	1	2	49	98
17.	Guides the ward attendants for taking safety precaution while collecting the hazardous waste.	26	53	21	42	3	6
18.	Stores the hazardous drug wastes in a covered container	46	92	4	8	-	-
19.	Hazardous waste receiving personnel take precautions while transferring wastes from ward till incineration.	45	90	5	10	-	-
20.	The hazardous wastes are disposed through incineration	50	100	-	-	-	-

Above table shows

Out of 50 respondents, 100% of respondents had good practice in the area of preparation of CDS. In this way the lowest practice score was in the area of spillage management. Only 30% respondents had good practice in the management of spillage of powdered form of CDs. In average, more than 50% of respondents had good practice in all area of questionnaire.

4.4 Knowledge and practice score regarding safety precautions of cytotoxic drug administration.

Knowledge:

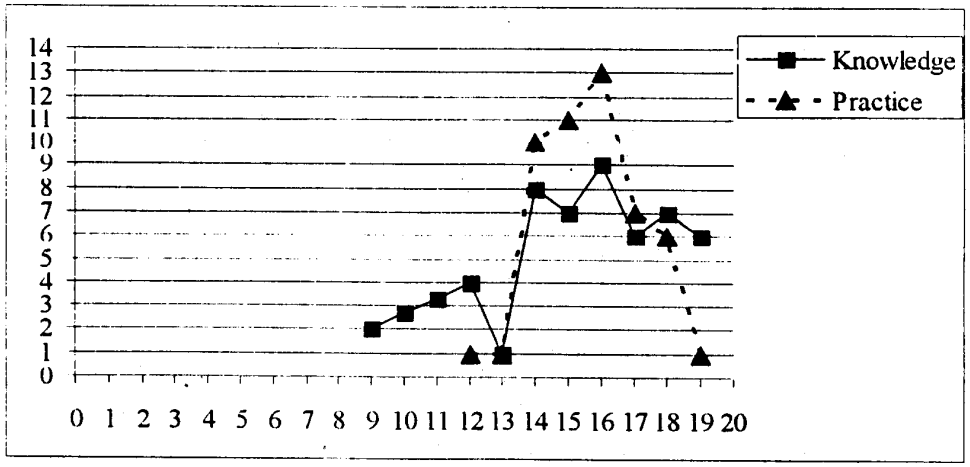
There were altogether 16 open and close ended questionnaire. Twelve questions were close ended, which had only one correct response. For a correct response score 1 was graded. Four questions were open ended, 5 points were expected in each questions. Two (2) marks were graded for more than 3 points and 1 mark was graded for less than 3 points. 'O' was graded for incorrect response. The maximum score was '20' and the lowest score was 'O'

Practice:

There were altogether 20(10 positive and 10 negative) practice Statements to which it was possible to respond in three ways 'always', 'sometimes', and 'never'. the most correct answer might be " always" or "never" which were graded 1. If someone practices sometimes, it is better than never or always. so it was graded '0.5' and the all- incorrect answers were graded 'o' . Therefore the maximum possible practice score was 20 and the minimum lowest score was '0'.

Figure No. 13

Frequency polygon of over all knowledge and practice score obtained by the nurses.



Above frequency polygon shows:

1) Knowledge score of respondents ranged between 9-19. out of maximum score of 20, 19 was the highest score. Six (6) respondents achieved the 19 score. Majority of respondents(.9) obtained the score of 16, seventy percent (70%) of respondents have more than 15 knowledge score.

2) Practice score of respondents ranged between 12-19. Out of maximum score of 20, 19 was the highest score. 1 respondent obtained the score of 19. majority of respondents (13) obtained score of 16, seventy six (76%) of respondents have more than 15 practice score.

Table No. 10

Overall knowledge and practice score obtained by nurses.

	Mean score $\bar{x}$	SD
Knowledge	15.64	1.13
Practice	15.68	0.84

Above table shows that overall mean knowledge score of nurses is 15.64 with standard deviation of 1.31 and mean practice score is 15.68 with standard deviation of 0.84.

Table No. 11

The mean knowledge and practice score according to variables .

Variables	Number	Mean k. Score	S.d	Mean p. score	S.d
Professional Qualification					
Bachelor in Nursing	5	18.2	0.36	16.8	1.03
PCL Nursing	45	15.35	1.35	15.5	0.9
Length of work experience					
Longer	21	16.2	1.98	15.8	0.92
Shorter	29	15.20	1.67	15.5	1.3
Special Training					
Trained	4	18.75	0.15	16.75	1.08
Untrained	46	15.16	1.3	15.9	0.96

Above Table shows

Nurses with bachelor of nursing, longer work experience and special training had higher mean knowledge and practice score than certificate level of nursing, shorter work experience and the nurses who hadn't got special training on cancer chemotherapy.

4.5 Testing of Hypothesis

Hypothesis No. 1

The knowledge and practice score of nurses with higher educational background will be significantly higher than those nurses with lower educational background.

Table No. 12

Nurses' Knowledge and Practice Score According to Educational Background

Items	PCL Nursing N=45		Bachelor Nursing N=5		Z Test
	$\bar{x}$	Sd	$\bar{x}$	Sd	
Knowledge	15.35	1.35	18.2	0.36	P= 0.0032
Practice	15.5	0.9	16.8	1.03	P=0.0039

Where $\bar{x}$ = mean score

Sd = Standard deviation

N = Number

The above table explain that:

1. The bachelor of nursing had higher knowledge 18.2(91%) with standard deviation 0.36 and practice score 16.8(84%) with standard deviation 1.03 than PCL nurses' mean knowledge scores 15.35(76.75) with standard deviation 1.35 and practice scores 15.5(77.5) with standard deviation 1.03.
2. Since the P value is < 0.05, the above stated hypothesis is accepted. There is statistically significant difference in knowledge and practice according to educational background.

Hypothesis No. 2

Nurses who have more working experience will have higher knowledge and practice score than those nurses with less work experience.

Table No. 13

Nurses' Knowledge and Practice Score According to Wok Experience

N = 50

Item	Length of work experience				Z test
	Longer, N= 21		Shorter, N=29		
	$\bar{x}$	Sd	$\bar{x}$	Sd	
Knowledge	16.2	1.98	15.20	1.67	P= 0.059
Practice	15.8	0.92	15.5	1.2	P= 0.34

Above table shows :

1) The longer work experienced nurse had higher knowledge score 16.2(81%) with standard deviation 1.98 and practice score 15.8(79%) with standard deviation 0.92 than the shorter work experienced nurses' knowledge scores 15.20(75%) with standard deviation 1.67 and practice scores 15.5 (77.5%) with standard deviation 1.2.

2) The hypothesis is rejected because P value is > 0.05. statistically the knowledge and practice score of the nurses with longer work experience is not significantly higher than those nurses with shorter work experience.

Hypothesis 3

Nurses who have got special training will have higher knowledge and practice score than those who don't have special training.

Table No. 14

Nurses' Knowledge and Practice Score According to Special Course and Training

N = 50

Items	Special training				Z test
	Yes N= 4		No N=46		
	$\bar{x}$	Sd	$\bar{x}$	Sd	
Knowledge	18.75	0.15	15.36	1.3	P= 0.0002
Practice	16.75	1.08	15.9	0.96	P= 0.098

Where $\bar{x}$ = mean score

Sd= Standard deviation

N=Number

About table shows:

1. The nurses who had got special training on cancer chemotherapy had higher knowledge score 18.75(93.75%) with Sd of 0.15 and practice score 16.75(83.75%) with Sd of 1.08 than the nurses who hadn't got any training that is knowledge score 15.36(76.8%) with Sd of 1.3 and practice score 15.9(79.5%) with Sd of 0.96.
2. As the P value of knowledge is < 0.05, the stated hypothesis special trained nurses will have higher knowledge score is accepted. But the practice is rejected because the P value of practice is > 0.05.

CHAPTER - V

FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter presents the brief accounts of the present study, which include finding of the study, summary of the study, conclusion, implications and recommendation for future study, and comparison of findings with literature reviewed. Besides these, strength and limitations of the study, difficulties faced during study, plan for dissemination have also enclosed in this chapter.

5.1 Finding of the Study

All the obtained data were tabulated, and thoroughly analysed and interpreted according to objectives and hypothesis of the study. The major findings of the study are as follows.

Demographic Characteristics

1) Among 50 respondents, majority of respondents 66%(33) were from the of 22-24, only one respondent was male and the others (49) were female. Fifty six percent (56%) of respondents were married and 44% were unmarried.
2) Regarding work experience, out of 50 respondents; 38% (19) had less work experience that is below 3 years and 62%(31) had more work experience that is above 3 years.
3) Regarding qualification, out of 50 respondents; 90%(45) had completed PCL nursing and 10%(5) respondents had completed B.N.
4) Regarding special training on cancer chemotherapy, only 4(8%) had special training of various duration.

Knowledge Regarding Precautions of Cytotoxic Drug Administration

1) In response to knowledge of respondents about the cytotoxic drugs, 62% of respondents had good knowledge about the name of CDs of each group. In this way 56% of respondents had good knowledge about the action of CDs.

2) In regard to knowledge of respondents about the occupational health hazards of CDs, mutagenic effect was answered by 20% of respondent, teratogenic 30%, carcinogenic 70%, infertility 70% and others, which includes nausea, vomiting, alopecia, was answered by 90% of respondents.

3) Cent percent of respondents said that hazardous effects of CDs can be minimized by taking safety precautions.

4) Regarding knowledge of respondents about the areas where precautions must be taken strictly, 76% of respondents said that precautions must be taken only during preparation, administration and dispose. Only 14% of respondents had knowledge that precautions must also be taken during storage, spillage management and transfer where as 20% had no knowledge about this.

5) As regard to knowledge of respondents about the precautions during CDs preparation, 100% of respondents answered that the nurse must were gown, gloves, mask, goggles and 96% of respondents answered that it must me prepared in biological safety cabinet.

6) Regarding knowledge of respondents about the precautions during administration, 54% of respondents answered that air of the syringe with full CDs should be expelled in safety cabinet while administering the CDs.

7) In response to the knowledge of respondents about the precautions during storage of CDs, 88% of respondents gave right answer that is in cool, dark, separate place, 12% of respondents gave incorrect answer.

8) Regarding knowledge of respondents about precautions during management, 88% respondents gave right answer on the management of spills on the skin, 86% of respondents gave correct answer on 'the management of spills on the eye' and 92% gave right answer on 'the management of spills on the floor'.

9) As regard to knowledge of respondents about precautions during handling of body wastes, 90% of respondents answered that body wastes of CDs receiving patients' must be handled precautionarly for 48 hours while the others (10%) answered 24 hours.

10) Regarding knowledge of respondents about precautions during dispose of needles and syringes, 50% respondents had good knowledge about it. They said it must be disposed in puncture proof container without capped or crushed 50% of respondents had no knowledge about it.

11) Cent percent of respondents said that the best method of disposing CDs wastes is incineration.

12) Seventy percent (70%) of respondents had good knowledge about the precautions of CDs administration.

13) The range of knowledge score was 9 to 19. Mean knowledge score was 15.64 and standard deviation was 1.31 mode was 16.

14) Statistically, there was significant difference in nurses' knowledge according to educational background i.e. BN nurses have higher knowledge than PCL nurses. (P value is 0.0032 that is < 0.05.)

15) Statistically, there was not significant difference in knowledge according to work experience. ($P = 0.059$ i.e. > 0.05).

16) Statistically, there was significant difference in knowledge in relation to training i.e. nurses with special training have higher knowledge than others who haven't got special training. ($P = 0.0002$, i.e. < 0.05)

Practice Regarding Precautions of CDs Administration

1) The mean practice score (15.68) was slightly higher than mean knowledge score (15.64).
2) Seventy six (76%) of respondents had good practice in all area of questionnaire regarding safety precautions of CDs administration.
3) The range of practice score was 12 - 19. mean practice score was 15.68, standard deviation was 0.84 and mode was 16.
4) All respondents had correct response on preparation of CDs and only 30% respondents had correct response on spillage management.
5) Statistically, there was significant difference in nurses' practice according to educational background i.e. BN nurses have higher practice score than PCL nurses. ($P = 0.0039$ i.e. < 0.05).
6) Statistically, there was no significant difference in practice according to work experience. ($P = 0.34$, i.e. > 0.05).
7) Statistically, there was no significant difference in practice in relation to training. ($P = 0.098$ i.e. > 0.05).

5.2 Comparison of Finding to Literature Review

1) Baral, Indira (2001) concluded that there is statistically significant difference in knowledge according to educational background i.e. BN Nurses have significantly higher knowledge than PCL nurses ($P = 0.04$). Similarly, in this study, BN nurses have significantly higher knowledge than PCL nurses. ($P = 0.0032$ i.e. < 0.05).
2) Claudetle varrichio (1997) concluded that it requires special training in handling of anticancer drugs. But in this study, only 4 (8%) respondents had special training on cancer chemotherapy who were handling anticancer drugs.
3) Baral, Indira (2001) concluded that there is not significant difference in practice according to educational background ($P = 0.32$, i.e. > 0.05), but

in this study, BN nurses have significantly higher practice score than PCL nurses. (P = 0.0039, i.e. < 0.05)

5.3 Discussion

The present study findings revealed that the overall nurses' knowledge and practice regarding safety precautions of CDs administration are better than expected. It may be due to the well equipped specialized cancer hospital. Seventy percent (70%) of respondents had good knowledge about the precautions of CDs administration. The mean score of knowledge is 15.64 and practice is 15.68. In all area of knowledge questionnaire, more than 50% nurses responded correctly, of the 6 areas of questionnaire, the highest correct response in knowledge is preparation of CDs (98%) and the lowest is drugs (62%).

Seventy six percent (76%) of respondents had good practice in all areas of questionnaire regarding safety precautions of cancer chemotherapy. The highest practice score was preparation of CDs (100%) and the lowest practice score was spillage management (30%). The practice score was slightly greater than knowledge score.

Hypothesis 1: Statistically, the first hypothesis was accepted. It shows that the educational background affects the knowledge and practice of nurses. So qualification is one of the most important part for the quality of Nursing care.

Hypothesis 2: Statistically, the 2nd hypothesis was rejected. It shows that there is no relationship between period of work experience and knowledge and practice regarding safety precautions of CDs administration. The possible reason of rejection might be that they copied the answer from each other or consult book and there were no equal samples in two groups.

Hypothesis 3: There is significant relationship between the knowledge of nurses and the special training they have but not in practice of nurses. It shows that the nurses with special training have good knowledge but they don't put the knowledge into practice. It might be due to their attitude. Therefore, the training should instill the attitude.

5.4 Conclusion

On the basis of the findings and discussion of this small study, this conclusion has been drawn. The overall knowledge and practices of nurses' were better than expected. It may be due to the specialized cancer hospital. The most prevalent knowledge deficit was on spillage management The higher education directly influenced the knowledge and practice, the training directly influenced in knowledge but not in practice and the work experience hadn't any significant in the promotion of knowledge and practice. So this study concluded that the nursing (Specially PCL) curriculum should have specific content on cancer, special training/course should be conducted for nurses before exposure in cancer chemotherapy but the training should instil the attitude required to putting the knowledge into practice. Which will help to increase knowledge and practices regarding precautions of cancer chemotherapy so that they will be able to provide safe, high quality care to oncology patients without endangering themselves.

5.5 Summary of the Research Study

The present study was undertaken by the investigator to find out the existing level of nurses' knowledge and practices regarding safety precautions of cytotoxic drug administration.

Cross sectional analytic method research design was used to explore actual current knowledge and practice regarding safety precautions of cytotoxic drug administration. The subject of this study was the nursing staff of BPKMCH Chitwan. Non-probability purposive sampling technique was used to select sample. BN and PCL nurses, who were exposed to cancer chemotherapy were included in this study and the study excluded the ANM, MN and the nurses who have never been exposed in cancer chemotherapy.

After instrumentation, the questionnaire validity and reliability was maintained through pretesting and pilot testing. Pretesting was done by colleagues, subject experts and research guide. Pilot testing was done in Bhaktapur Cancer Care Center. Then some modification were made. The actual data were collected through self administered questionnaire. 50 samples were taken. The questionnaire included 3 parts. The first part was demographic information, included. Study variables, professional qualification, length of work experience and special training. The second part included knowledge and third part included practice regarding safety precautions of CDs administration in the following areas.

- Drugs and preparation of CDs drugs.
- Administration
- Storage and transfer
- Spill management
- Disposal of utensil, body fluid and excreta.

The obtained data were analysed and interpreted according to objectives and hypothesis. The data were presented in graphs, chart, table and frequency polygon.

The overall mean knowledge score and practice score of nurses was 15.64 and 15.68 respectively. The knowledge score ranged between 9-19 and

practice ranged 12-19. out of maximum score of 20, 19 was the highest score . In knowledge portion, 6 respondent achieved score 19 where as in practice portion 1 respondent achieved 19 score. The mode was 16 both in knowledge as well as in practice.

BN nurses had statistically significant higher knowledge (P= 0.0032) and practice score (0.0039) than PCL nurses.

There was not significant difference found in knowledge (P = 0.059) and practice score (0.34) between more and less work experienced nurses.

There was statistically significant difference in knowledge (P = 0.0002) between special trained and untrained nurses but their practices score was not statistically significant difference (P = 0.098).

5.6 Implications of the Study

In spite of the limitations of this small scale study. It has numerous implications They are as follow:

1) For curriculum planner: This findings suggests curriculum planner to add and modify the content of cancer nursing especially in PCL curriculum.
2) For hospital staff: They will be able to find out their knowledge deficit area so that they could improve it by self directed learning.
3) For Hospital: The findings of the study help to plan further training on cancer and cancer chemotherapy for nurses to improve their knowledge and practices. This will enable nurses to provide safe, high quality care to oncology patients without endangering themselves.

4) For hospital nurse administrator: It will be helpful for the development of protocol or guideline about safety precautions regarding cancer chemotherapy.

5) For nursing research: It will be helpful as a baseline study for further research.

5.7 Recommendations

1) For curriculum Planner: On the basis of research findings the investigator recommends the curriculum planner to add the content of cancer nursing specially in PCL curriculum.

2) For hospital administrator

- Lack of knowledge and wrong practices of nurses may cause harmful effect to the patients and themselves as well so every nurse should be exposed in cancer chemotherapy only after special training on cancer chemotherapy. The training should also instil the attitude required to put the knowledge into practice.
- An educational package (Manual) should be given for every ward so that nurses can study and handle any difficult situation.
- A protocol or guideline about the safety precautions of cytotoxic drug administration can be prepared.

3) For further researcher

- A comparative study can be carried out between
  - Specialized and non specialized hospital's nurses.
  - Urban and rural hospital nurses.
  - Doctors and nurses
  - Before and after educational package.
- A study can be conducted on patient's knowledge about home care after chemotherapy.

- This type of study can be done in large scale in different hospitals in order to draw generalization.

5.8 Strengths of the Study

1) The study was conducted among the nurses working in only one specialized and referral cancer hospital of Nepal, BPKMCH.
2) This study tried to explore the actual knowledge and practice regarding safety precautions of CDs administration which is very necessary to prevent nurses from hazards of CDs.
3) The investigator has gained confidence from this study to do large scale research.
4) The study protected the right of the respondents by maintaining anonymity.

5.9 Limitations

1) The study was conducted in specialized hospital so it can not be generalized in other general hospitals.
2) This study was limited to the sample size up to 50. Thus it was difficult to generalize in large population.
3) The investigator wasn't able to observe practices. The study was limited only up to exploration of knowledge and practices.
4) The data was collected by self-administered questionnaire, so findings depend upon respondent's honesty only.
5) Non-probability purposive sampling was adopted to select required samples. There could be biases in sampling selection.

5.10 Difficulties Faced During the Study

1) The investigator didn't get sufficient literature in the context of Nepal.
2) The investigator found some difficulties during instrument development and computer work.
3) Some of the respondents lost the questionnaire and it was difficult to reprint the lost questionnaire.

5.11 Learning from the Study

1) Gained knowledge on research study process or method.
2) Gained more confidence on instrument development and data analysis.
3) Developed confidence on report writing.
4) Developed skill in communication and coordination with different persons for completion of the study.
5) Gained experience on how to review the literature.

5.12 Plan for Dissemination

The investigator has planned to disseminate the research report as follows:

1) Advisor; Ms Gita Pandey, of this research Study.
2) Library of nursing Campus, Maharajgunj
3) Library of BPKMCH, Chitwan.
4) Nepal Health Research Council.

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Appendices

CONSENT AGREEMENT

Title of the study

"Knowledge and practices regarding safety precautions of cytotoxic drugs administration among nurses in BPKMCH."

This is Archana Dhungana and studying BN second year in Maharajgunj Nursing Campus. I am going to do small research study on nurses' knowledge and practices about the safety precautions of cytotoxic drug administration. I would like to ask you to participate as a subject in my research . If you agree to participate, I will give you some questionnare; it will take 10-15 minutes of your time.

You will be entirely anonymous and your name won't be linked with any of your answer. Your participation will be entirely voluntarily . Nobody will be forced . There will not be any direct benefits to you from this study but it will help to understand nurses' knowledge and practices towards safety precautions of cytotoxic drug administration and provides baseline for educational intervention / in services education / Training package for nurses.

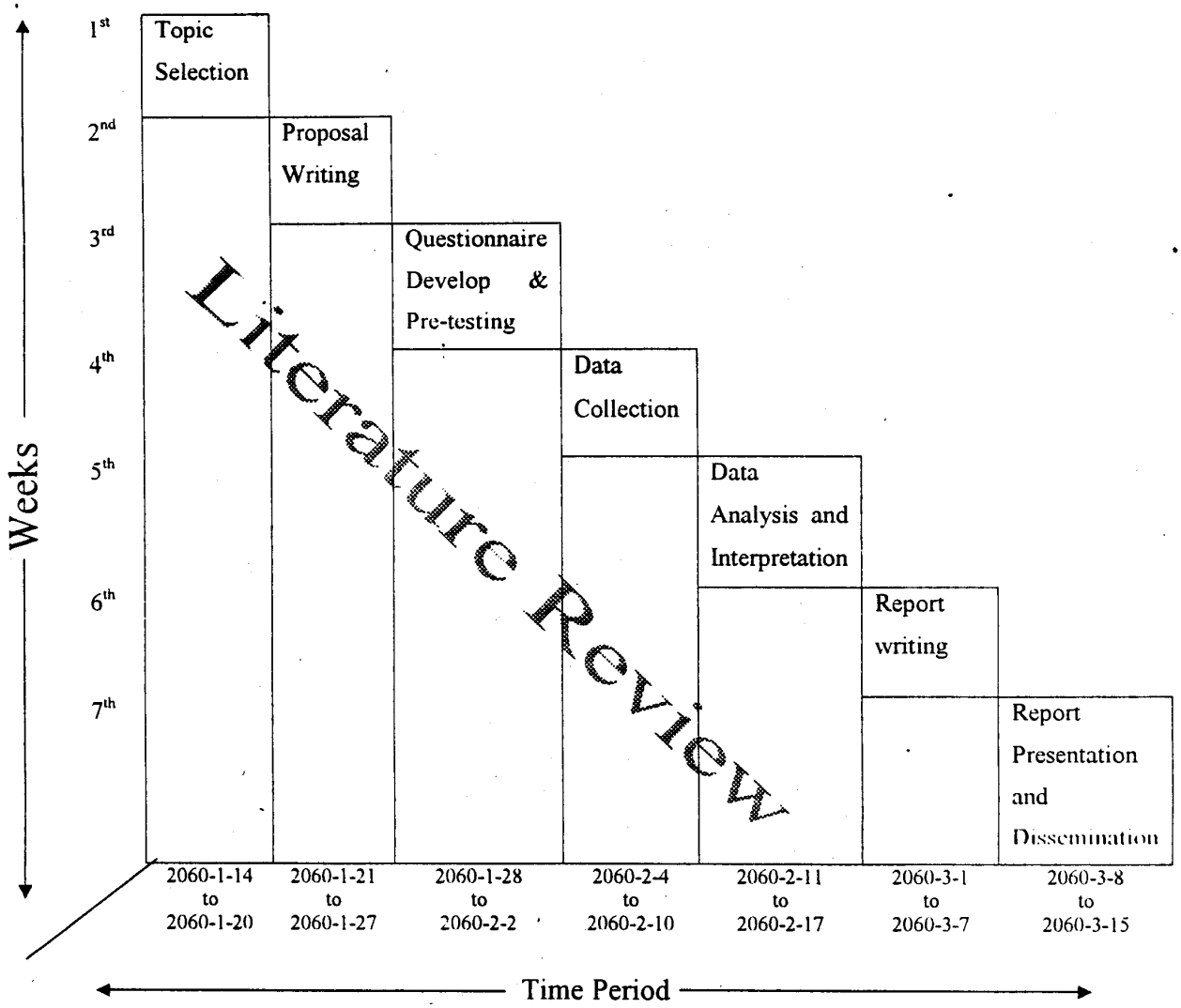
Respondents written agreement

I understand what this research is about. I will participate in your study voluntarily

Date :

Signature :

Work Plan of Study Period:



Note:-

- Literature Review will also be done throughout the research period.
- The necessary works will be done during the researchers period of vacation i.e. 060-2-15 to 060-2-31

INSTITUTE OF MEDICINE

NURSING CAMPUS MAHARAJGUNJ

Self-administered Questionnaire for Data Collection.

Research Topic: "Knowledge and practice regarding safety precautions during cytotoxic drug administration among nurses.working at BPKMCH"

Objective: To determine the nurses' knowledge and practices regarding safety precautions of cytotoxic drug administration.

Instruction: You are requested to answer following questions. The obtained information will be used for study purpose only and it will be kept confidential with anonymity.

PART – I

Demographic Information.

1) Age 20-25 ☐ 25-30 ☐ 30-35 ☐
35 - 40 ☐ above 40 ☐

2) Sex:

3) Education Level
   a) PCC Nursing ☐
   b) Bachelor Nursing ☐

4) Marital Status
   a) Married ☐
   b) Unmarried ☐
   c) Other ☐ Specify if any.

5) Work Experience in Years

6) Working Institute.
   a) BPKMCH ☐
   b) Bhaktapur Cancer Hospital ☐

7) Working Ward .....

8) Have you had any special course\training on cancer chemotherapy?

a) Yes ☐ b) No ☐

If yes topic

Duration Place When?

PART – II

Questionnaire related to Knowledge.

1) Have you heard about the cytotoxic drugs?

Yes ☐ No ☐

If yes list the name of 2 cytotoxic drugs of each group.

a. Alkylating agent :-

b. Antitumor Antibiotic:-

c. Antimetabolite:-

2) Please tick (√) in the right statement.

i) Cytotoxic drug selectively destroy cancer cells without damaging the surrounding normal cells.

ii) Cytotoxic drugs alter growth and reproduction of cancerous cells as well as some rapidly dividing cells.

iii) Cytotoxic drugs alter growth of tumour cells with distinguish between normal and cancerous cells.

3) Is cytotoxic drugs are hazardous to health?

Yes ☐ No ☐

If yes, what type of hazardous?

1. 4.

2. 5.

3.

4) Can we minimize the hazardous effects of CDs by taking safety precaution?

Yes ☐ No ☐

If yes at what time you should take safety precaution

1. 4.
2. 5.
3.

5) During chemo preparation, the nurse must wear.
   i) Latex or polyvinyl gloves
   ii) Gown, gloves, masks, goggles
   iii) Gown, gloves, masks but not goggles
   iv) Gown, gloves and cap
6) Cytotoxic drugs must be prepared in
   i) Nursing station
   ii) Patient's bed side
   iii) Biological safety cabinet
   iv) Well ventilated separate room
7) What kind of Syringe must be used during cytotoxic drug administration?
   i) Glass Syringe with large size
   ii) Luer luck fittings with large enough than solution
   iii) Disposable syringe without luer luck fittings
   iv) Glass syringe without luer luck fittings
8) Air of the Syringe with full of CDs should be expelled
   i) In an open area
   ii) In patient's bed side at the time of administration
   iii) Safety cabinet
   iv) No need to expel
9) Cytotoxic drugs should be stored in
   i) Patient's bedside.
   ii) In nursing station.
   iii) In Preparation room.
   iv) In cool, dark, separate place.

10) If CDs (less then 5 ml) spills on the skin, what should you do?

i) Wipe it out with any cloth immediately and wait for drying

ii) Wipe it out with tissue paper then dispose it precautionarly

iii) Use soap and cold water immediately

iv) Use sprit to wipe the skin.

11) If CDs Contaminate your eyes, what will you do as the 1st action?

- Call for help
- Report to the occupational health unit.
- Immediate ringe with tap water.
- Immediate irrigation with sodium chloride 0.9% eyewash.

12) If an I\V bottle with CDs is broken accidentally, what will you do?

i) Report ward/ unit manager and pharmacy.

ii) The area should be cleaned immediately.

iii) The area should be dried up immediately and washed out three times with detergent and water.

iv) All ward staffs should wear personal protective cloths and leave spills showing the ward in charge.

13) Urine, Stool and vomit of CDs receiving patients should be handled precautionarly for

i) 24 hour of chemo administration.

ii) 12 hour of chemo administration.

iii) 48 hour of chemo administration

iv) Can be handled without any precautions.

14) Needle and syringe should be disposed

i) In puncture proof container after capped or crushed.

ii) In puncture proof container without capped or crushed.

iii) In plastic bags labelled with ' hazardous wastes'

iv) In bucket under the patient's bed.

15) The best method of disposing hazardous waste is

i) Burning

ii) Incineration

iii) Dumping

iv) Composting

If incineration, under which temperature?

a) 300^0c b) 600^0c c) 900^0c d) 1200^0c

16) Is it necessary to give information and training about handling of CDs to other personnel except nurses?

Yes ☐ No ☐

If yes who all must be included?

1.

2.

3.

4.

5.

6.

PART – III

Questions related to practice

Please tick the following statement whatever you are practicing in reality.

Finding depends upon your honesty in ticking.

A = **A**lways, S = Sometimes, N = Never

CDs = **C**ytotoxic **D**rugs

S.N	Statement	A	S	N
1.	You wear protective clothings during exposing with cytotoxic drugs.			
2.	You take similar precautions for all CDs while handling them.			
3.	You prepare CDs in vertical safety cabinet.			
4.	You prepare CDs in nursing station.			
5.	You prepare CDs in patient's bedside.			
6.	You drink coffee in CDs preparation area.			
7.	You expel air from syringe containing CDs in an open area before giving to the patient.			
8.	You wear protective cloths at the time of changing I\V fluid containing CDs.			
9.	You use needles as venting devices in I\V bottle.			
10.	You use luer lock fitting syringe.			
11.	You transfer prepared CDs from one place to another with bare-hand.			
12.	You wipe out the small spills on the skin with tissue paper immediately.			
13.	You use damp cloth for managing spillage of powered form of CDs.			

14.	You teach the patient as well as visitors about the safe handling of body wastage of the patient receiving CDs.			
15.	You dispose the contaminated needle in puncture proof container.			
16.	You store the hazardous drug waste together with other wastes.			
17.	You guide the ward attendants for taking safety precaution while collecting the hazardous waste.			
18.	You store the hazardous drug wastes in a covered container.			
19.	Hazardous waste receiving personnel take precautions while transferring wastes from ward till incineration.			
20.	The hazardous wastes are disposed through incineration.			

Nepal Health Research Council

NHRC

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Letter of Approval for Research Proposal

Date: 1st July, 2003

PI: Ms. Archana Dhungana

Title: Knowledge and practices regarding safety precautions of cyto-toxic drug administration among nursing personnel working in BPKMCH

Dear Ms. Dhungana,
We are pleased to inform you that above mentioned proposal submitted by you has been approved by NHRC Executive Board on 27th June, 2003 (13th Aasad, 2060) after proper recommendation of Ethical Review Board (ERB). This also certifies that there is no ethical objection.

As per NHRC law you have to strictly follow the protocol stipulated in your proposal. Any changes in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit here the details of such changes intended or desired with justification prior to instituting actual change.

Moreover, you are directed to strictly abide by the National Ethical Guidelines published of NHRC during the implementation of your research proposal.

Lastly, you are obliged to submit periodic progress reports every 3 months and three copies of the final research report with brief presentation of the findings and the financial statement of expenditure if funded by NHRC. If an article based upon that research is likely to be published, you must take prior permission of NHRC if funded for the same.

If you have any question, please contact our research officers. You are requested to follow the terms and conditions stipulated by NHRC as per the attached letter, if any.

Thank You,

Yours Truly,

Dr. Anil K. Mishra
Member-Secretary

Tel. (977-1) 254220, 227460, Fax: 977-1-262469, 268284, Email: nhrc@nhrc.org.np, Ramshah Path, P. O. Box 7626, Kathmandu, Nepal.

त्रिभुवन विश्वविद्यालय
चिकित्सा शास्त्र अध्ययन संस्थान
नर्सिङ क्याम्पस
क्याम्पस प्रमुखको कार्यालय

चिकित्सा शास्त्र अध्ययन संस्थान
२०२९

पो.ब.नं:
महाराजगन्ज
काठमाडौं, नेपाल ।
फोन .नं: ४१९२६६,४११७२३

पत्र संख्या — च नं. ६०४।२०४४।०१०

मिति: ०६०।१।११

विषय: आवश्यक सहयोग बारे ।

श्रीमान निर्देशकज्यू,
वी.पी. कोईराला मेमोरियल क्यान्सर, अस्पताल,
.... ।

महोदय,

यस क्याम्पसको स्नातक तह (बि.एन.) ब्दितिय वर्षमा अध्ययनरत श्री अर्चना ढुंगानालाई अनुसन्धानको लागि त्यस अस्पतालमा डाटा कलेक्सनको लागि मिति २०६०।१।१४गते देखि५ हप्ताका लागि आउँदै छन् । अत: निज विद्यार्थीलाई आवश्यक सहयोग गरी दिनु हुन अनुरोध गर्दछु ।

वोधार्थ:
श्रीमान मेट्रोनज्यू,
वी.पी. कोईराला मेमोरियल क्यान्सर, अस्पताल,
.... ।

०/८

श्रीमती गंगा चित्रकार