

Effectiveness of the nursing educational program upon nurse's knowledge and practices concerning chemotherapy precautions

Wafaa M. A. Al-Attar¹, Abaul Hassain M. Al-Gannem²

¹Prof. Adult Nursing, Iraq national cancer research center, Baghdad University, Iraq

²Lecturers ,Adult Nursing Faculty of Nursing, Basrah University, Iraq

Abstract:

Objectives: The main aim of the study is to evaluate the effectiveness of the nursing educational program upon nurse s' knowledge and practices concerning chemotherapy precautions.

Methodology: Quiz experimental study was carried out at Al Amal National Hospital for Management Cancer from 1st August 2010 to 29th march 2012. The program and instruments were constructed by the researcher for the purpose of the study. Purposive random sample comprised of (40) nurses was divided into two groups, study group consisted of (20) nurses exposed to the nursing educational program and control group consisted of (20) nurses were not exposed to the program. The measurement of effectiveness of nursing educational program through the nurse s' knowledge questionnaire includes (20) multiple choice questions and observational checklist includes 32 items of nurse's practices which include 3 domains; preparation & handling, administration of chemotherapy and disposal of chemotherapy drugs waste. Reliability of instrument was determined through the use of test and retest and the instrument validity was determined through a panel of experts. The analysis of the data was used of spss ver.11, and descriptive statistics (frequencies, percentages, the arithmetic mean and standard deviations,) and statistical inferential (Z test) .

Results: The study findings indicated that there were highly significant differences between pre and posttest in the experimental group in overall main domains related to nurse s' knowledge and practices concerning chemotherapy precautions

Conclusion: The study concluded that the effectiveness of educational program regarding nurse s' knowledge and practices concerning chemotherapy precautions is a positive.

Recommendation: The study recommended that nurses should be trained on the new methods of dealing with chemotherapy and providing them with personal protective equipment and applying a medical surveillance system to protect the nurses and other health workers from the risk of chemotherapeutic drugs.

Key words: Nursing; Education; Knowledge; Practices; Chemotherapy precautions

I. Introduction

Cancer is a cause death, which can invade adjoining parts of the body and spread to other organs. This process is referred to as metastasis. Metastases are the major cause of death from cancer, leading it to of death worldwide, accounting for 8.2 million deaths in 2012(1,2).Cancer Chemotherapy refers to the wide range of therapeutic options used in the treatment of malignant diseases, including categories such as cytotoxic drugs, biologics, immunotherapies, targeted drug therapies, hormonal treatments, and high dose chemotherapy regimens supported with hematopoietic stem cell transplant. In Iraq 2013s (74%) of patients receiving chemotherapy drugs at Al Amal Hospital for management cancer (3) .The use of the term person or persons will represent both persons living with cancer and their families, unless otherwise specified (4). Cancer chemotherapy encompasses cytotoxic, cytostatic and biologic agents used to modify the body's response to malignant disorders. These agents can be highly toxic and present specific risks for patients, health care providers and care-givers. As such, the care of patients receiving these drugs requires specific knowledge, skill and judgment within an environment that supports quality practice (5).Recommendations for the safe handling of hazardous drugs have been available for more than twenty years. Evidence for continued risk of occupational exposure is abundant; however, nurses' use of the recommended precautions is not universal. This may be related to a lack of information or to a lack of serious concern for the potential hazards (6).Over five and one half million healthcare workers are potentially exposed to hazardous drugs in the workplace. While most drugs defined as hazardous are cytotoxic agents used in the treatment of cancer, many drugs used for other indications and in other patient populations are equally unsafe (7).

According to the National Institute for Occupational Safety and Health [NIOSH](2004), there is documented evidence of contamination of the work environment with hazardous drug HDs, which increases the potential for exposure by nurses, pharmacists and other healthcare workers when these agents are handled inappropriately.

Occupational exposure to HDs has been associated with acute symptoms such as hair loss, abdominal pain, nasal sores, contact dermatitis, allergic reactions, skin injury, and eye injury. Adverse reproductive

outcomes have been identified in many studies of nurses and pharmacists working with HDs, including fetal loss, miscarriage, or spontaneous abortions preterm births and learning disabilities 2 in offspring (7,8).

Knowledge is critical to safe nursing practice in all settings, but it is especially significant when a knowledge deficit on the part of the nurse breaches practice and threatens personal safety or the safety of the patient. Past research suggests that chemotherapy may have unintentionally compromised the oncology work setting for more than thirty years (9). Because oncology nurses serve at the point of care for chemotherapy administration in most settings, they serve as the safety net for themselves and their patients. Despite the alarming implications of contamination and the risks they may pose for healthcare workers, there are no mandatory national guidelines for employers or employees. Present guidelines for chemotherapy administration are "voluntary" and only provide suggested recommendations. The Occupational Safety and Health Administration is working on developing standards that would require employers to identify and correct workplace hazards, but these procedures are not mandatory at this time(10).

The American Society of Clinical Oncology (ASCO) and the Oncology Nursing Society (ONS) have developed specific safety standards for the administration of chemotherapy. These standards require that each institution utilize a comprehensive educational program and monitor nursing competency at specific intervals (11). Unfortunately, most chemotherapy centers require initial education and training programs but have not developed a common method to evaluate nursing competency in regard to safe-handling techniques. Given such, it is imperative that institutions dispensing chemotherapy initially engage staff and develop evaluation and safe-handling strategies that continue over time (12).

Aim of study

The aim of the study is to develop the nursing educational program upon nurse s' knowledge and practices concerning chemotherapy precautions.

II. Methodology

2.1 Design of the study: A quasi experimental study

2.2 Sample of the study: Purposive sampling was selected by randomized system which consists of 40 nurse was divided into two groups, experimental group consisted of (20) nurses exposed to the nursing educational program and control group consisted of (20) nurses were not exposed to the program.

2.3 Setting of the study: AL- Amal National Hospital for Management Cancer, collected from 1ST August 2010 to 29th march 2012

2.4 Instruments: The questionnaire was constructed for the purpose of the study. The Instruments consisted two parts:

2.4.1 Part 1: Demographic Data Sheet:

This part concerned with personal information include, the nurses (gender, age, marital status, educational level, years of experience in oncology units , training sessions on chemotherapy precaution and nurses health problems related exposure to chemotherapy).

2.4.2 Part 2: Nurse's knowledge:

The measurement of effectiveness of nursing educational program through the nurse s' knowledge questionnaire includes (20) multiple choice questions concerning chemotherapy precautions. The questionnaire which includes different options questions have been formed to take the list is based on the system of right and wrong those answers were converted statistically to take code (1) for the correct answer and code (0) for the wrong answer

The control group were given pre & posttest of nurses' knowledge at the same time that be given to the study group.

2.4.3 Part 3: Nurse's practices:

Observational checklist of nurse's practices includes 32 questions was divided into three domains:

2.4.3.1 Nurse's practices during preparation and handling of chemotherapy drugs;16 questions.

2.4.3.2 Nurse's practices during administration of chemotherapy drugs;8 questions

2.4.3.3 Nurse's practices during disposal of chemotherapy drugs waste;8 questions.

These question were rated according to the likert scale (always(3) ,sometimes(2) ,never(1))the levels of scale which were scored as total of three episodes of events were observed for each respondent ;practices as mean of data collection (3) or(2) correct practices out of (3) episodes were rated as always.(1) correct practices out of (3) episodes were rated as sometimes and uncorrected practices were rated as never.

2.5 Validity of the instrument: Constant validity determined for questionnaire through the use of (15) panel experts who are faculty members from college of nursing and doctor oncologist. The experts were asked to

review the questionnaire for content with clarity. Such changes were employed according to their suggestions and valuable comments.

2.6 Reliability of the instrument: Ten nurses selected from Al-Amal Hospital National for Management of Cancer by test –retest revealed that (r =0.88) significant at (p<0.01) of the knowledge test and r= 0.086) at the level (p<0.01) of observational checklist at the same time with graduated.

2.7 Statistical methods: The analysis of the data was used of spss ver.11,and descriptive statistics (frequencies, percentages, the arithmetic mean and standard deviations,) and statistical inferential (Z test) in order to find the differences between the experimental group and the control group

III. Results

Table (1): Distribution of nurses by their socio-demographic

| Variables | Study Group | | Control Group | |
|---------------------------------------|------------------|-------|-----------------|-------|
| | Freq. | % | Freq. | % |
| Age(years) | | | | |
| 21 – 30 | 4 | 20 | 7 | 35 |
| 31 – 40 | 11 | 55 | 8 | 40 |
| >40 | 5 | 25 | 5 | 25 |
| Total | 20 | 100 | 20 | 100 |
| mean \pm S.D. | 35.65 \pm 6.21 | | 35.7 \pm 6.40 | |
| Gender | | | | |
| Male | 11 | 55 | 11 | 55 |
| Female | 9 | 45 | 9 | 45 |
| Total | 20 | 100.0 | 20 | 100.0 |
| Educational level | | | | |
| Nursing school | 7 | 35 | 5 | 25 |
| secondary Nursing School | 5 | 25 | 6 | 30 |
| Nursing Institute | 8 | 40 | 9 | 45 |
| Total | 20 | 100.0 | 20 | 100.0 |
| Marital status | | | | |
| Single | 3 | 15 | 6 | 30 |
| Married | 17 | 85 | 14 | 70 |
| Total | 20 | 100.0 | 20 | 100.0 |
| Years of Experience at oncology Units | | | | |
| 1 – 5 | 10 | 50 | 8 | 40 |
| 6 – 10 | 6 | 30 | 6 | 30 |
| \leq 11 | 4 | 20 | 6 | 30 |
| Total | 20 | 100.0 | 20 | 100.0 |
| Training Courses | | | | |
| None | 19 | 95 | 19 | 95 |
| yes | 1 | 5 | 1 | 5 |
| Total | 20 | 100.0 | 20 | 100.0 |
| Health problems | | | | |
| Skin irritation | 5 | 25 | 3 | 15 |
| Menstrual disorder | 8 | 40 | 7 | 35 |
| Infertility | 0 | 0 | 1 | 5 |
| None | 7 | 35 | 9 | 45 |
| Total | 20 | 100 | 20 | 100 |

Table (1) revealed that the majority (55%) of nurses in study group are within the age of (31-40) (mean 35.65 \pm 6.21) while(40%) of nurses are in control group(mean 35.7 \pm 6.40) within the same age, most of groups were male and were nursing institute graduate. In relation to years of experience (50%) of nurses in study group were (1-5) years of experience and (40%) of control group are in the same range. Concerning to the marital status most of nurses (85%) in study and (70%) in control group were married. Most of nurses in both groups did not attend training sessions regarding chemotherapy precautions in oncology units (95%). The table also presented that (65%) of nurses in study group and (55%) in control were had health problems due to contact with chemotherapy agents.

Table (2): Comparison significant between the study and control groups related to nurses' knowledge in post test

| No. | Nurse's knowledge | Study group post test | | Control group post test | | Z test | P.value | S.C |
|-----|--|-----------------------|-------|-------------------------|-------|--------|---------|-----|
| | | M.S. | S.D. | M.S. | S.D. | | | |
| 1. | Definition of chemotherapy | 1.00 | 0.000 | 0.40 | 0.503 | 1.265 | 0.082 | N.S |
| 2. | Types of chemotherapy | 0.75 | 0.444 | 0.35 | 0.510 | 0.949 | 0.329 | N.S |
| 3. | Physical and health risks that lead to deal with chemotherapy drugs | 0.60 | 0.503 | 0.30 | 0.470 | 0.949 | 0.329 | N.S |
| 4. | chemotherapy drugs that enter the body pathogen | 0.90 | 0.308 | 0.25 | 0.444 | 2.055 | 0.000 | S |
| 5. | Chemotherapy drugs that are given to the patient | 1.00 | 0.000 | 0.60 | 0.224 | 0.158 | 1.000 | N.S |
| 6. | Side effects of chemotherapy directly to the digestive system for nurses. | 0.70 | 0.470 | 0.10 | 0.366 | 1.739 | 0.005 | S |
| 7. | Protective measures for the treatment of chemotherapy drugs | 0.70 | 0.470 | 0.15 | 0.366 | 1.739 | 0.005 | S |
| 8. | Place to prepare chemotherapy drugs. | 0.85 | 0.366 | 0.15 | 0.366 | 2.214 | 0.000 | S |
| 9. | Give chemotherapy during pregnancy and lactation | 0.70 | 0.470 | 0.15 | 0.410 | 1.581 | 0.013 | S |
| 10. | Ways to give chemotherapy to the patient. | 1.00 | 0.000 | 0.50 | 0.366 | 0.474 | 0.978 | N.S |
| 11. | A adhesive by advice and protective clothes when giving chemotherapy drugs | 0.60 | 0.503 | 0.30 | 0.470 | 0.949 | 0.329 | N.S |
| 12. | The transfer of chemotherapy to the unit. | 0.80 | 0.410 | 0.10 | 0.308 | 2.214 | 0.000 | S |
| 13. | The use of chemotherapy doses | 0.75 | 0.444 | 0.10 | 0.308 | 2.055 | 0.000 | S |
| 14. | How to deal with the eye in the case of exposure to drops of chemotherapy drugs. | 0.65 | 0.489 | 0.35 | 0.444 | 1.265 | 0.082 | N.S |
| 15. | Health surveillance system through the examination of kidney function and liver function and physical examination. | 0.85 | 0.366 | 0.10 | 0.308 | 2.372 | 0.000 | S |
| 16. | Exposure to chemical treatment by nurse and signed in incidents record incidents documented. | 0.80 | 0.410 | 0.15 | 0.366 | 2.055 | 0.000 | S |
| 17. | How to get rid of the secretions of a patient who eat chemotherapy | 0.85 | 0.366 | 0.10 | 0.308 | 2.372 | 0.000 | S |
| 18. | How to get rid of the disposable waste after the completion of given chemotherapy drugs. | 0.70 | 0.470 | 0.10 | 0.366 | 1.739 | 0.005 | S |
| 19. | How to deal with contaminated sheets patient with chemotherapy drugs. | 0.75 | 0.444 | 0.25 | 0.444 | 1.581 | 0.013 | S |
| 20. | How to deal when he broke a bottle of chemotherapy in the unit | 0.85 | 0.366 | 0.25 | 0.470 | 1.739 | 0.005 | S |

* S.: significant ;N.S: not significant; M.S: Mean of score ;S.D: standard deviations

Table (2) presented that there was significant differences of nurse's knowledge questions (post test) between study and control groups except questions (1,2,3,5,10,11 and 14) are not significant.

Table (3): Comparison significant between the study and control groups related to nurses' practice concerning preparation and handling of chemotherapy drugs in post test

| No. | Nurse's practices | Study group Post test | | Control group Post test | | Z test | P.value | S.C |
|-----|--|-----------------------|-------|-------------------------|-------|--------|---------|-----|
| | | M.S. | S.D. | M.S. | S.D. | | | |
| 1. | Bring medicine dedicated to the patient by the doctor order | 3.00 | 0.000 | 3.00 | 0.000 | 0.000 | 1.000 | O.C |
| 2. | Hand washing with soap and water | 2.30 | 0.657 | 1.75 | 0.75 | 1.107 | 0.172 | N.S |
| 3. | Wearing a disposable coat with long sleeve | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 4. | Wearing a nylon above the coat | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 5. | Wearing glasses to protect the eyes | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 6. | Wearing sterile mask | 2.45 | 0.688 | 1.50 | 0.754 | 0.000 | 0.035 | S |
| 7. | Wearing surgical gloves | 2.65 | 0.489 | 1.65 | 0.671 | 1.423 | 0.005 | S |
| 8. | Cover sleeves by surgical gloves | 1.00 | 0.000 | 1.00 | 0.000 | 1.739 | 1.00 | O.C |
| 9. | Cabin safety biogenic used in the preparation of chemotherapy | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 10. | Cover the preparation table by nylon and attends therapy on it | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 11. | Preparing the drug in chemotherapy room | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 12. | Large syringes used to withdraw liquid solvent | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |
| 13. | Avoid full bottles of treatment when deluded. | 2.25 | 0.786 | 1.20 | 0.523 | 2.055 | 0.00 | S |
| 14. | Add chemotherapy to intravenous fluid bag | 3.00 | 0.000 | 3.00 | 0.000 | 0.000 | 1.00 | O.C |
| 15. | Write the patient's name and the name of the medication and the dose and time of administration of intravenous fluid and clear handwriting bag | 2.30 | 0.801 | 1.00 | 0.000 | 2.530 | 0.00 | S |
| 16. | Put the bag of intravenous fluid in a special bag put the patient's name and number of the bed and take them to the unit | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.00 | O.C |

*O.C: out of comparison; S.: significant; N.S: not significant; M.S: Mean of score; S.D: standard deviations Table(3) that shows that was significant differences of the nurse's practices for post test items (6,7,13,&15) between study and control groups concerning preparation and handling of chemotherapy drugs while most of remaining items out of comparison.

Table (4): Comparison significant between the study and control groups related to nurses' practice concerning administration of chemotherapy drugs in post test

| No. | Nurse's practices | Study group Post test | | Control group Post test | | Z test | P.value | S.C |
|-----|--|-----------------------|-------|-------------------------|-------|--------|---------|-----|
| | | M.S. | S.D. | M.S. | S.D. | | | |
| 1. | The nurse prepares the patient and notes the cannula in his hand | 2.60 | 0.681 | 1.90 | 0.718 | 1.581 | 0.013 | S |
| 2. | Open the bag and examine the chemotherapy drugs and make sure there are no leaks | 1.00 | 0.000 | 1.00 | 0.000 | 0.000 | 1.000 | O.C |
| 3. | Linking the intravenous fluid tube tightly in the cannula | 3.00 | 0.000 | 3.00 | 0.000 | 0.000 | 1.000 | O.C |
| 4. | Notes device administration and places of contact and ensures zero leaks | 2.50 | 0.761 | 1.00 | 0.759 | 1.581 | 0.013 | S |
| 5. | Open valve device administration and ensure the flow of intravenous fluid | 2.70 | 0.470 | 1.65 | 0.671 | 1.897 | 0.001 | S |
| 6. | Tend surgical gloves | 2.65 | 0.489 | 1.50 | 0.754 | 0.739 | 0.005 | S |
| 7. | Tend mask | 2.75 | 0.444 | 1.30 | 0.470 | 2.372 | 0.000 | S |
| 8. | Demonstrate dose treatment with administration time and the name of the nurse with her signature | 2.40 | 0.883 | 1.30 | 0.587 | 1.897 | 0.001 | S |

*O.C: out of comparison; S.: significant; M.S: Mean of score; S.D: standard deviations Table (4) that shows that was significant differences of the nurse's practices for post test towards administration of chemotherapy drugs between study and control groups except items (2&3) which were out of comparison.

Table (5): Comparison significant between the study and control groups related to nurses' practice concerning disposal of chemotherapy drugs waste in post test

| No. | Nurse's practices | Study group Post test | | Control group Post test | | Z test | P.value | S.C |
|-----|---|-----------------------|-------|-------------------------|-------|--------|---------|-----|
| | | M.S. | S.D. | M.S. | S.D. | | | |
| 1. | After the end of treatment wearing surgical sleeves. | 2.15 | 0.851 | 1 | 0.000 | 2.72 | 0.000 | S |
| 2. | Wearing surgical gloves | 2.45 | 0.759 | 1 | 0.000 | 2.688 | 0.000 | S |
| 3. | Intravenous fluid stops | 3 | 0.000 | 3 | 0.000 | 0.000 | 1.00 | O.C |
| 4. | Separating the administration of the device in the patient's hand cannula. | 3 | 0.000 | 3 | 0.000 | 0.000 | 1.00 | O.C |
| 5. | Gathers remnants of intravenous therapy in a special bag | 1 | 0.000 | 1 | 0.000 | 0.000 | 1.00 | O.C |
| 6. | The nurse to take off PPE | 2.65 | 0.671 | 1 | 0.000 | 2.846 | 0.000 | S |
| 7. | Protective clothing and disposable waste collected and placed in bags, mounted by a chemical contaminated materials are sent to the Holocaust | 2.65 | 0.000 | 1 | 0.000 | 0.000 | 1.000 | O.C |
| 8. | Wash hands with soap and water | 1 | 0.768 | 1.95 | 0.759 | 1.265 | 0.82 | N.S |

*O.C: out of comparison; S.: Significant; N.S: not significant

Table(5) that shows that was significant differences of the nurse's practices for post test items (1,2,&6) between study and control groups concerning disposal of chemotherapy drugs waste while the remaining items out of comparison.

Table (6): Comparison Nurses' knowledge and practices differences between study and control groups in pre and post test

| Groups | Study group | | Control group | | Z test | P.value | S.C |
|-----------|-------------|-------|---------------|-------|--------|---------|-----|
| | Mean | S.D. | Mean | S.D. | | | |
| knowledge | | | | | | | |
| Pretest | 0.285 | 0.131 | 0.240 | 0.256 | 0.632 | 0.819 | N.S |
| Posttest | 0.79 | 0.256 | 0.243 | 0.243 | 3.162 | 0.000 | S |
| practices | | | | | | | |
| Pretest | 1.490 | 0.810 | 1.400 | 0.750 | 1.107 | 0.172 | N.S |
| Posttest | 2.009 | 0.766 | 1.490 | 0.728 | 2.372 | 0.000 | S |

* S.: significant ;N.S: not significant

Table (6) shows that there were significant differences between study and control groups of nurse's knowledge and practices in the post test at level (p<0.001) while there were no significant differences in pre test.

IV. Discussion

The sample consists of 40 nurses who were randomly selected to either a control group (n=20) or study group (n=20). The average age of the nurses was (mean 35.65±6.21) years in the study group and the average age of the nurses was (mean 35.7±6.40) years in the control group ranged. Most of the sample in both groups were males, married and graduated from nursing institute, (50%) of nurses in the study group with years of experience at oncology units and (33.3%) in the control group were within the group (1-5) .All nurses in both groups did not attend training sessions regarding chemotherapy precautions in oncology units . The table also presented that (65%) of nurses in study group and (55%) in control were had health problems due to contact with chemotherapy agents (table 1). Polovich 2010 mentions that, the majority of nurses were female and middle-aged, although ages ranged from 23-70 years. Most nurses were very experienced in nursing, oncology nursing and chemotherapy (7). In a recent study of outpatient nurses, participants reported significant unintended skin and eye exposure to chemotherapy (13)

The data analysis of questionnaire item had indicated that pretest responses for nurse's knowledge comparing between study and control groups presented that there were no significant differences in nurse's knowledge between both groups, while the post test nurse's knowledge in study group revealed more advances after the implementation of the program. Our study revealed that there was highly significant differences between study and control groups at post-test related to nurse's knowledge (table 2&6). A lack of education and the inconvenience of safety equipment may prevent many nurses from taking appropriate precautions for themselves (14).One study mention that, the sample of nurses who were knowledgeable about hazardous drug (HD) use, experienced in handling chemotherapy, confident in how to use safe handling precautions, and who perceived HD exposure to be a risk to their health, use of HD safe handling precautions was low (7). Our study revealed that there was highly significant differences between study and control groups at post-test in overall main domains related to nurse's practices (table 3,4,5&6). According to Fuller and colleagues, only 54% of

surveyed nurses were aware of safe handling programs available in their workplace and only 30% of them actually read the information that was offered. This suggests a potential knowledge deficit and possible lack of compliance with the National Institute for Occupational Safety and Health (NIOSH) recommendations (Fuller et al., 2007) identifying a significant safety concern for employees of oncology centers who administer chemotherapy and the general public. Most nurses reported that they administered HDs (99%, n = 164) and disposed of HDs (93%, n = 154), but only 73% (n = 120) handled excreta and 19% (n = 32) prepared HDs(15). In study found that only 31% wore protective gowns during the administration of chemotherapy despite the availability of personal protective equipment (16). This study also suggests the enforcement of protective equipment use through means of medical surveillance is not occurring in a manner consistent with national recommendations. In fact, recent studies suggest that although hazardous drug policies are in place in many workplaces, existing practices may not reflect current recommendations for safe chemotherapy handling and are not enforced or monitored by managerial staff. The major issue of concern is that although these policies are in place and personal protective equipment (PPE) is available, nurses are not consistently taking appropriate action for their protection(7).

V. Conclusion

The study concluded that the effectiveness of educational program regarding nurses' Knowledge and practices concerning chemotherapy precautions is a positive and clear.

VI. Recommendations

- A special continuation in service education program should be established in and outside of Iraq applied for oncologist nurses concerning chemotherapy drugs risk and precautions.
- Farther studies should be carried out for nurse's assessment about their health problem due to chemotherapy drugs contact.
- Wearing personal protective equipment should be considered as very important practice to protect nurses from the risk of exposure chemotherapy drugs.
- Applied medical surveillance system and medical records for exposure events should be stated the nurse's name and time, chemotherapy drugs name and quantity
- Provide book let was enhancing the nurse's knowledge and practices concerning chemotherapy drugs risk and precautions.

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