

Profile of Nurses Working in Chemotherapeutic Oncology Departments in Sohag Governorate

Ghona Abd El-Nasser

Medical-Surgical Nursing Department,
Faculty of Nursing, Sohag University

ABSTRACT

*The aim of this descriptive study is to determine the individual and professional characteristics of the oncology nurses, their working condition, training status and actual usage of safety measures while handling cytotoxic drugs in their daily work surrounding. **Methods:** A self-evaluation questionnaire divided in three parts developed by the investigator after review of the literature. **Results:** A total of 29 nurses participated in the survey (2 males and 27 females). The mean age of the nurses was (22.0±3.2) in hospital 1, 2 compared with hospital 3 was (25.0±4.3), the majority of nurses (86.2%) were secondary school nursing graduate and the rest had a technical institute of nurses (13.8%). In the 55.2% of all participants had from 1-5 years experience. (72.4%) of participant always preparing and administering of chemotherapeutic drugs, 55.2% of them exposure to needle stick in the last 6 months from 1-3 times. The mean weekly work hours was (55.0) in hospital 1, (72.0) in hospital 2, (44.6) in hospital 3, mean number of patients receiving care at day time and night in hospital 1, 2, 3 were 29.0±2.2; 15.0±1.3; 35.0±11.6 and 25.0±13.0; 5.1±1.1. Mean daily chemotherapy preparation and administration period were 24.4± 12.9, 20.0 ± 7.9; 26.3±6.1, 20.0±7.5, 38.0±12.0 in hospital 1, 2, 3 respectively. **Conclusion:** The result of this study revealed that the level of knowledge of nurses concerning the tumor and antineoplastic hazards was satisfactory. However, the items concerning the skills when handling the drugs and use personal protective equipment while handling and administering antineoplastic agents to prevent occupational hazards was unsatisfactory. **Keywords:** Oncology nurses, tumor, chemotherapeutic agents, hazard, safety precaution.*

INTRODUCTION

All over the world today talk about the use of nursing informatics to assist in the management and processing of nursing data, information and knowledge, support the practice of nursing and the delivery of nursing care with working safety, but we are still far from use of this technology in Egypt, and we stress on the primitive things in nursing work. Cancer is a major cause of morbidity and mortality, and the leading cause of potential years of life lost (Canadian cancer society and the National Institute of Canada 2006). Administration of antineoplastic agents is a complex process fraught with the potential risk for humans (Jacobson et al 2009). The goal of chemotherapy is curative agent or for palliation. Its use within cancer treatment is increasingly being used as a combination therapy in conjunction with surgery, hormones therapy, and radiotherapy (Deery et al 2003; Brechman 2005). Hospital personnel involved in these activities may experience acute and/or

chronic toxicity through direct skin contact, or via the digestive system, respiratory system or contaminated equipment, cigarettes, bed linen, clothing or by patients excreta (Miller 1987; Del Gaudio and Menonna-Quinn 1998). Symptoms may derive from short or long exposure of reproductive system are also likely to develop (Valanis et al 1999; NIOSH 2004; Nies et al 2007). Finally, carcinogenic, teratogenic and mutagenic effects have been reported (Deery et al 2003; Turk et al 2004; Brechman 2005). Safety measures recommended in order to minimize occupational exposure to chemotherapy cytotoxic drugs, identify substance which are of hazard to staff as well who may be exposed, how the drug should be handled and what to do in the event of a spiller accident, special department design and equipment that are necessary for personal protective measure and safety practices, during all procedures (Barhamand 1986; Miller 1987; Del Gaudio and Menonna-Quinn 1998, RCN 1998). Standardization of care can reduce the risk of errors, increase efficiency, and provide a

framework for best practice (Jacobson et al 2009). (Oncology Nursing Society 1999; Goodman 2000; Langhorne et al 2000) In addition to limiting exposure to cytotoxic drugs should only be prepared by skilled knowledge and experienced health care professionals. The nurse at oncology unit have a great role to reduce the risk of exposure to hazard agent for himself and others through compliance with safety precaution during dealing with cytotoxic drug. so the development of oncology nursing should parallel with the development in oncology. Specific education and training is necessary for health care personnel involved in the administration of cytotoxic agent (Cancer Nurses Society of Australia 2003). Previous studies assessing different aspects of working safety conditions and attitudes in relation to chemotherapy have been conducted in countries such as USA (Nieweg et al 1994; Martin and Larson 2003), Netherlands (Fransman et al 2007), Turkey (Turk et al 2004; Kosgeroglu et al 2006), Japan (Yoshida et al 2008) Israel (Ben-Ami et al 2001) and Serbia (Krstev et al 2003).

Significance of the study:

In our country there are two main problems in oncology nursing. The first one is the lack of training programs that will make nurses sufficient and confident, especially since all nurses, working in the Oncology Department are holders a diploma of secondary school nursing and did not receive any training on their field. The second problem is the lack of the job description for oncology nurses and professional standards that will increase the quality of care. In addition to, no information is available about the current situation of chemotherapy handling and the relation of the safety procedure to adverse effects in the Egypt, especially in Sohag. This kind of research has not been performed before **in our district**, so that, evaluation of the status of the oncology nurses is an enough reason. Solutions can be proposed for this problem of oncology nurses and their capability and quality of health service offered to the Sohag community can be increased.

The aim of present study was to determine the individual and professional characteristics of the oncology nurses, their working condition, knowledge, training status and actual usage of safety measures while

handling cytotoxic drugs in their daily work surrounding in Sohag governorate. In addition to the result obtained from the study will aid to develop and propagate the information on the concept of oncology nursing, arrangements regarding working condition and forming clear and written professional standards.

METHODS

The study population included all nurses working in oncology field (Chemotherapy administration units) in 3 separate hospitals, Sohag university hospital (Hospital 1), Al-Hilal hospital for health insurance (Hospital 2) and Sohag cancer Institute (Hospital 3) formed the target population. Data were obtained via a self-evaluation anonymous and confidential questionnaire divided in three parts developed by the investigator after review of the literature failed to reveal instruments that measured the variability of interest. They were divided into three parts. The first part to elicit information about (age, sex, occupation, educational level, years of experience, training, previous exposure to needle stick last 6 months, work pattern, overall work hours, number of patient receiving care at day and night and number of drugs prepared and administered per day). The second part included specific questions that covered existing knowledge about tumor and hazard of chemotherapeutic agents during reconstitution, administration, storage, and disposing. The third part included specific question about preparation and administration, most common area exposure to the chemotherapeutic drugs, protective measures and the reasons for not adhering to it as adopted by nurses and the hospital in these particular working places. The questioners are revised by 5 professional experts from oncology and Public Health and Community Medicine Department for content and face validity, clarity, feasibility and internal consistency of the questionnaire, accordingly the necessary modification were further included in the final analysis. By the end of this phase, the questionnaire was pilot-tested with 5 chemotherapeutic treatment nurses. As a result of this pilot, minor change in the wording were made. The questionnaire was retested after four weeks interval on the same chemotherapeutic nurses to determine the instrument's reliability. The questionnaire took approximately

15-20 minutes to complete. The research proposal was sent to the 3 area manager that share in the study mentioned previously to approval in order to gain access to the staff. The researcher provided information about the investigation to be conducted to the participant and the anonymity and confidentiality of the responses.

Research question:

There are three primary research questions that will be addressed to fulfill the aim of the study. Research questions this study seeks to answer:

- 1-Is there difference in nurses knowledge, practice and attitude about oncology and treatment.
- 2-The reasons given by nurses for not using safety and security measure.
- 3-The awareness of nurses regarding to the hazards of chemotherapy agents for him and others and the protective working practices or safety procedure adopted by themselves and the hospital.

Statistical analysis:

The collected data was organized, tabulated and statistically analyzed using SPSS 9.0(Statistical Package for Social Sciences). Quantitative data were presented as mean and standard deviation(SD). For qualitative data, the number and percentage distribution was calculated.

RESULTS

Sample characteristics

The sample characteristics are outlined in Table 1. From the 29 participating nurses who actually were working in chemotherapy administration units 27 (93.1%) were females and 2(6.9%) were males. The mean age was 22.0 ± 3.2 in hospital 1,2 while in hospital 3 it was 25.0 ± 4.3 . The majority (86.2%) had a secondary school nursing graduation and fewer had a technical institute of nursing (13.8). Fifty five point two percent of respondent's had 1-5 years experience in the job and all respondents did not receive any training (pre-and in-service) in their field. 55.2 % of respondents had exposure to needle stick from 1-3 times last 6 months. Average of weekly work hours of the nurses working in oncology units, was

55.0 ± 21.5 in hospital 1, 72.0 ± 6.2 in hospital 2 and 44.6 ± 5.0 in hospital 3. According to the mean number of nurses working at day time in all hospitals 1,2,3 were 8.4 ± 0.8 , 8.5 ± 0.7 , 6.0 ± 1.0 but in night shift it was found 2.2 ± 0.4 , 2.0 ± 0.0 in hospitals 1,2 while in hospital 3 nurses working in daytime only. The mean number of patients receiving care at day time in hospitals 1,2,3 were 29.0 ± 2.2 , 15.0 ± 1.3 , 35.0 ± 11.6 but in night shift it was 25.0 ± 13.0 , 5.1 ± 1.1 in hospitals 1,2 respectively, while in hospital 3 patients received chemotherapeutic drugs at daytime only. Mean number of chemotherapy prepared and administered per day, was in hospitals 1,2 were 24.4 ± 12.9 , 20.0 ± 7.9 while in hospital 3 the chemotherapeutic drugs prepared in clinical pharmacy, that of administer per day being 26.3 ± 6.1 , 20.0 ± 7.5 , 38.0 ± 12.0 in all hospitals 1,2,3.

Nurses tumor knowledge

Table 2, illustrated that the answers of the questions related to the knowledge of the nurses about tumor and the dangers of the usage of chemotherapeutic drugs the correct answer of tumor define were reported by 54.5% in hospital 2 compared with hospital 1,3 were 9.1%;14.3%, it was found that the knowledge about the causative factors and the type of tumor was satisfactory in all respondents. In general, signs, symptoms and diagnostic test of tumor were better known by hospital 1,2 compared with hospital 3, especially pain and loss of weight in signs and symptoms. Regarding to type of treatment, most respondents recognized the chemotherapy and radiotherapy are the common treatment, in all hospitals 1,2,3 90.9%,81.8%,85.7% . It was found also that the respondent knowledge about antineoplastic hazards in hospital 1,2 were better compared with hospital 3.

Preparation and administration

The research demonstrates that 72.4% of nurses participating in this study always preparing and administrating the chemotherapeutic drugs, as well as it was found 75.9% of participants receiving chemotherapeutic agent in non prime vials, and 75.9% never use luer-lock fitting or needleless system. Only 55.2% always store the prepared drugs in a dedicated area. 82.8% of respondents stated that leakage or spill occur during handling of drugs, the most important factor leading to accident are the drawing up or

expelling air from syringes in both hospital 1,2 (63.6%;45.4%) compared with hospital 3 ,the reason was bad connection. 42.8% of respondents always report authorized member in emergency situation. The majority of nurses said that the hand and face are the most common area direct contact by drugs in each of hospital 1 ,2 (54.5%,72.7% ;54.4%,36.3. %) compared with hospital 3 it was found hands, wrist and forearm were the most common area contact with antineoplastic agent (85.7%,42.8).Other results are listed in Table (3).

Safety precautions

The result shown in table 4, indicated that the materials used for safety precaution during the preparation and administration of chemotherapy were 31% of participants use guideline for safe handling of antineoplastic drugs. 82.8% took clothes worn during handling chemotherapeutics drugs to home. Only 13.8% always used mask, gown and goggles and 41.4% always wear gloves. Also 41.4% always used safety box and 48.3% always label the contaminated materials.Only 13.8% of nurses always use a plastic-backed absorbent pad under the patient arm.The survey also found(69%) of all respondents always perform activities during handling drugs, from the most common activities were answer the phone and handle files or patient records in all hospital 1,2,3 (72.7%, 45.4%, 100%; 72.7%, 27.3%, 100%). From this study only 62.1% of the respondents always performed washing hands after the dealing with drugs and always were eating in the work places.

Disposal process of clinical waste from antineoplastic drug and cleansing of contaminated equipment

Table5,shows the status of the disposal process of clinical waste from antineoplastic drugs and cleansing of contaminated materials and equipment, it was found (55.2%) always segregate the contaminated material and equipment and (65.5%)of respondent state that the ideal places to store disposable container in the dedicated area far from them to prevent tampering.The survey illustrated that 44.8% of nurses said cleansing contaminated equipment and floor just by water and soap.

Reasons for non using safety measures

This table shows the reason why safety and material precautions were not used. There are several reasons accounting for the lack of compliance of the nurses to international directives according to which the use of all self-protection measures is customary for the handling of chemotherapeutic, according to eating in work places in hospital 1,3 nurses reported related to unavailable or lack of places, potential for exposure to antineoplastic agents is insignificant, exposure to antineoplastic agents is possible but the health hazard is insignificant compared with hospital 2 unavailable or lack of places is the only cause72.7%. The reasons given by the majority of respondent for non wearing mask, gown in hospital 1 ,was not readily or always available in work area ,also 63.6% stated that not require by employer ,and 18.2% stated potential for exposure to antineoplastic agents is insignificant compared with other hospital.

According to reasons for non using a plastic backed absorbent pad under the patients arm in the all hospitals were not readily or always available in work area, not standard practice, not required by employer, and not provided by employer. This study report that nurses' in hospital 2,3 reasons for non washing of hand after work,were cross contamination to other area is not a concern, shortage of nurses, and unavailable sink and soap. Other results are listed in Table (6).

Table legends

Table (1): Characteristic of nurses in the sample by place of work. Result expressed as the number, percentage, mean \pm (SD), n=2 (6.9) male; 27 (93.1) female.

Table (2): Distribution of nurses tumor knowledge by place of work. Result expressed as the number, percentage.

Table (3): Preparation and administration of chemotherapy by nurses. N=29 and values are presented as the number, percentage.

Table (4): Hospitals using safety precautions. Result expressed as the number, percentage.

Table (5): Disposal and cleansing of contaminated equipment and values are presented as the number, percentage.

Table (6): Reasons for non using safety measures and values are presented as the number, percentage.

Table (1): Characteristic of nurses in the sample by place of work.

Characteristics	Hospital(1)	Hospital(2)	Hospital(3)	Total
Sex No %				
Male	0.0	0.0	2(28.6)	2(6.9)
Female	11(100.0)	11(100.0)	5(71.4)	27(93.1)
Education level No %				
Technical institutes of nursing	0.0	4(36.4)	0.0	4(13.8)
Diploma of nursing school	11(100.0)	7(63.6)	7(100.0)	25(86.2)
Experience (years) No %				
<1	0.0	3(27.3)	0.0	3(10.3)
1-5	7(63.6)	6(54.5)	3(43)	16(55.2)
>5	4(36.6)	2(18.1)	4(57)	10(34.5)
Previous training No %	0.0	0.0	0.0	0,0
Previous exposure to needle stick during Last 6 months No %				
<1	1(9.1)	4(36.4)	0.0	5(17.2)
1-3	2(18.2)	7(63.6)	7(100.0)	16(55.2)
>3	8(72.7)	0.0	0.0	8(27.6)
Mean ± SD*				
Age (years)	22.0±3.2	22.0±3.2	25.0±4.3	
Weakly work hours	55.0±21.5	72.0 ± 6.2	44.6 ± 5.0	
The number of nurses working day time	8.4±0.8	8.5 ± 0.7	6.0 ± 1.0	
The number of nurses working in night shift.	2.2 ± 0.4	2.0 ± 0.0	0.0 ± 0.0	
The number of patients receiving care at day time	29.0±2.2	15.0 ± 1.3	35.0 ±11.6	
The number of patients receiving care at night	25.0±13.0	5.1± 1.1	0.0 ± 0.0	
The number of prepared chemotherapies per day	24.4±12.9	20.0 ± 7.9	0.0 ± 0.0	
The number of administered chemotherapies per day	26.3±6.1	20.0 ± 7.5	38.0± 12.0	
* = Stander deviation 1=Sohag University hospital ;2=Al-Hilal hospital for health insurance ;3= Sohag cancer Institute				

Table(2)Distribution of nurses tumor knowledge by place of work

Knowledge variables	Hospital(1)		Hospital(2)		Hospital(3)	
	No	%	No	%	No	%
Definition of tumor **	1	(9.1)	6	(54.5)	1	(14.3)
Etiology of tumor *						
- Genetic & hormonal	8	(72.7)	9	(81.8)	4	(57.1)
-Change life style	8	(72.7)	7	(63.6)	0	0.0
-Precancerous and radiation	7	(63.6)	9	(81.8)	3	(42.8)
-Drug & chemical	9	(81.8)	7	(63.6)	1	(14.3)
Type of tumor						
-Benign	0	0.0	1	(9.1)	0	0.0
-Malignant	0	0.0	0	0.0	1	(14.3)
-Benign& malignant	11	(100.0)	10	(90.9)	6	(85.7)
Sings & symptoms of tumor *						
- Infection, ulceration& inhaling wound	9	(81.8)	8	(72.7)	0	0.0
-Change bowel habits& blood in urine & stool	9	(81.8)	8	(72.7)	1	(14.3)
-Pain & loss of weight	11	(100.0)	7	(63.6)	3	(42.8)
-Nagging cough & hematemesis	8	(72.7)	6	(54.5)	1	(14.3)
- Change in appearance of organ	8	(72.7)	6	(54.5)	2	(28.6)
Diagnostic test of tumor *						
-Tumor image	9	(81.8)	9	(81.8)	2	(28.6)
-Laboratory test	8	(72.7)	9	(81.8)	3	(42.8)
-Needle biopsy & Bone marrow aspiration	9	(81.8)	9	(81.8)	2	(28.6)
- Endoscopies	7	(63.6)	9	(81.8)	1	(14.3)
Type of treatment*						
-Surgical	7	(63.6)	8	(72.7)	1	(14.3)
-Hormonal therapy	7	(63.6)	8	(72.7)	0	0.0
-Chemotherapy & radiation	10	(90.9)	9	(81.8)	6	(85.7)
Hazard of exposure to chemotherapy agents*						
-On reproductive system	10	(90.9)	9	(81.8)	0	0.0
-On GIT	9	(81.8)	8	(72.7)	2	(28.6)
-On skin & eyes	10	(90.9)	8	(72.7)	1	(14.3)
-On immune system	10	(90.9)	7	(63.6)	2	(28.6)
-On respiratory system	10	(90.9)	7	(63.6)	0	0.0

1=Sohag University hospital;2=Al-Hilal hospital for health insurance ;3= Sohag cancer Institute
 *More than answer
 **Correct answer

Table (3) Preparation & administration of chemotherapy

Items	Hospital(1)		Hospital(2)		Hospital(3)		Total	
	No	%	No	%	No	%	No	%
Preparing& administrating chemotherapy								
-Always	10	(90.9)	11	(100.0)	0.0		21	(72.4)
- Sometimes	1	(9.1)	0.0		0.0		1	(3.5)
- Never	0..0		0.0		7	(100.0)	7	(24.1)
Way of receive chemotherapeutic agent from pharmacy								
- Non primed vials	11	(100.0)	11	(100.0)	0.0		22	(75.9)
-Primed with diluted antineoplastic agent	0.0		0.0		7	(100.0)	7	(24.1)
Use luer-lock fitting								
-Always	0.0		0.0		7	(100.0)	7	(24.1)
- Sometimes	0.0		0.0		0.0		0.0	
- Never	11	(100.0)	11	(100.0)	0.0		22	(75.9)
Use of needle-less system								
-Always	0.0		0.0		4	(57.1)	4	(13.8)
- Sometimes	0.0		0.0		3	(42.9)	3	(10.3)
- Never	11	(100.0)	11	(100.0)	0.0		22	(75.9)
Store of prepared chemotherapeutic drugs in dedicated area								
-Always	7	(63.6)	8	(72.7)	1	(14.3)	16	(55.2)
- Sometimes	4	(36.4)	3	(27.3)	6	(85.7)	13	(44.8)
- Never	0.0		0.0		0.0		0.0	
Report the authorized member when emergency situation								
-Always	9	(81.8)	7	(63.6)	0.0		16	(55.2)
- Sometimes	2	(18.2)	4	(36.4)	4	(57.1)	10	(34.5)
- Never	0.0		0.0		3	(42.9)	3	(10.3)
Leak or spill of any amount of chemotherapeutic agent during reconstruction &administrating								
Yes	8	(72.7)	10	(90.9)	6	(85.7)	24	(82.8)
No	3	(27.3)	1	(9.1)	1	(14.3)	5	(17.2)
Factor leading to accident *								
-Leak from syringe while attaching, injecting or detaching from IV line	3	(27.3)	0.0		0.0		-	
-Leak due to a bad connection	1	(9.1)	1	(9.1)	3	(42.8)	-	
- Leak due to excessive in vial	3	(27.3)	1	(9.1)	2	(28.5)	-	
- Leak while drawing up or expelling air from syringe	7	(63.6)	5	(45.4)	1	(14.3)	-	
Use material turn the hazard compound to non-hazardous compound while splash on the floor or workbench								
-Always	0.0		9	(81.8)	1	(14.3)	10	(34.5)
- Sometimes	0.0		2	(18.2)	5	(71.4)	7	(24.1)
- Never	11	(100.0)	0.0		1	(14.3)	12	(41.4)
Way of cleaning contaminated body from antineoplastic agent								

-By water	1(9.1)	1(9.1)	0.0	2(6.9)
- By water& soap	8(72.7)	5(45.4)	7(100.0)	20(69.0)
- By water, soap& consult physician	2(18.2)	5(45.4)	0.0	7(24.1)
Return unused or resident drugs to pharmacy				
-Always	7(63.6)	8(72.7)	1(14.3)	16(55.2)
- Sometimes	2(18.2)	1(9.1)	5(71.4)	8(27.6)
- Never	2(18.2)	2(18.2)	1(14.3)	5(17.2)
Area direct exposure to antineoplastic agents*				
-Face	6(54.5)	4(36.3)	1(14.3)	-
-Neck	1(9.1)	3(27.3)	0.0	-
-Hands	8(72.7)	6(54.5)	6(85.7)	-
-Wrist or forearm	4(36.4)	2(18.2)	3(42.8)	-
-Torso ,legs or feet	2(18.2)	1(9.1)	0.0	-
*More than answer 1=Sohag University hospital ;2=Al-Hilal hospital for health insurance ;3= Sohag cancer Institute				

Table(4) Proportions of hospitals using safety precautions

Safety precautions items	Hospital(1)		Hospital(2)		Hospital(3)		Total	
	No	%	No	%	No	%	No	%

Use of guideline for safe handling of antineoplastic drugs				
-Yes	0.0	6(54.5)	3(42.9)	9(31.0)
- No	11(100)	5(45.5)	4(57.1)	20(69.0)
Take any clothing worn during drug handling to home				
- Yes	11(100.0)	7(63.6)	6(85.7)	24(82.8)
- No	0.0	4(36.4)	1(14.3)	5(17.2)
Use personal protective equipment as mask, gown, goggle				
-Always	0.0	4(36.3)	0.0	4(13.8)
-Sometimes	0.0	5(45.5)	5(71.4)	10(34.5)
-Never	11(100.0)	2(18.2)	2(28.6)	15(51.7)
Wear latex or chemo gloves				
-Always	4(36.4)	8(72.7)	0.0	12(41.4)
-Sometimes	4(36.4)	3(27.3)	3(42.9)	10(34.5)
-Never	3(27.2)	0.0	4(57.1)	7(24.1)
Use of safety box				
-Always	6(54.5)	6(54.5)	0.0	12(41.4)
-Sometimes	4(36.4)	3(27.3)	7(100.0)	14(48.3)
-Never	1(9.1)	2(18.2)	0.0	3(10.3)
Equipment used label to be source of hazard				
-Always	6(54.5)	8(72.7)	0.0	14(48.3)
-Sometimes	0.0	3(27.3)	3(42.9)	6(20.7)
-Never	5(45.5)	0.0	4(57.1)	9(31.0)
Use plastic- backed absorbent pad under the patients arm				
- Always	0.0	4(36.3)	0.0	4(13.8)
-Sometimes	0.0	4(36.4)	3(42.9)	7(24.1)
-Never	11(100.0)	3(27.3)	4(57.1)	18(62.1)
Perform any activities during handling of antineoplastic drugs				
- Always	8(72.7)	5(45.4)	7(100.0)	20(69.0)
-Sometimes	0.0	3(27.3)	0.0	3(10.3)
-Never	3(27.3)	3(27.3)	0.0	6(20.7)
Activities performed while wearing latex or chemo gloves*				
-Answer the phone	8(72.7)	5(45.4)	7(100.0)	-
-Handle file or patient record	8(72.7)	3(27.3)	7(100.0)	-
-Eat or drink	1(9.1)	1(9.1)	0.0	-
-Smoke	0.0	0.0	2(28.5)	-
Wash hand after dealing with antineoplastic drugs				
- Always	10(90.0)	8(72.7)	0.0	18(62.1)
-Sometimes	1(9.1)	2(18.2)	6(85.7)	9(31.0)
-Never	0.0	1(9.1)	1(14.3)	2(6.9)
Eating ,drinking and smoking in work area				
- Always	8(72.7)	8(72.7)	2(28.5)	18(62.1)
-Sometimes	3(27.3)	2(18.2)	4(57.1)	9(31.0)
-Never	0.0	1(9.1)	1(14.3)	2(6.9)
1=Sohag University hospital ;2=Al-Hilal hospital for health insurance ;3= Sohag cancer Institute				
* More than answer				

Table (5) Disposal and cleansing of contaminated equipment

Items	Hospital (1) (No %)	Hospital (2) (No %)	Hospital (3) (No %)	Total (No %)
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Segregate the contaminated material				
- Always	7(63.6)	9(81.8)	0,0	16(55.2)
-Sometimes	0.0	2(18.2)	5(71.4)	7(24.1)
-Never	4(36.4)	0.0	2(28.6)	6(20.7)
Ideal places to store disposable container				
-In nurse room	0.0	0.0	1(14.3)	1(3.5)
-In patient room	0.0	4(36.4)	5(71.4)	9(31.0)
-In the dedicated area to prevent tempering	11(100.0)	7(63.6)	1(14.3)	19(65.5)
way for decontamination of the equipment& floor when contaminated by cytotoxic drugs				
-By water	4(36.4)	0.0	0.0	4(13.8)
-By water & soap	3(27.3)	3(27.3)	7(100.0)	13(44.8)
-By water, soap and detergent	4(36.4)	8(72.7)	0.0	12(41.4)
1=Sohag University hospital ;2=Al-Hilal hospital for health insurance ;3= Sohag cancer Institute				

Table (6) Why nurses did not use all the safety precautions in dealing with chemotherapeutic agent

Items	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
Eating in work places												
Hospital(1)	4(36.3)	1(9.1)										5(45.4)
Hospital(2)	0.0	0.0										8(72.7)
Hospital(3)	1(14.3)	1(14.3)										2(28.5)
No wearing of mask, gown and goggle												
Hospital(1)	2(18.2)	1(9.1)	7(63.6)		1(9.1)	1(9.1)	9(81.8)					
Hospital(2)	1(9.1)	0.0	0.0		0.0	0.0	3(27.3)					
Hospital(3)	1(14.3)	0.0	0.0		1(14.3)	0.0	0.0					
No wearing of gloves												
Hospital(1)	0.0	0.0	1(9.1)		2(18.2)	1(9.1)	2(18.2)		1(9.1)			
Hospital(2)	0.0	0.0	0.0		0.0	0.0	0.0		0.0			
Hospital(3)	1(14.3)	2(28.5)	0.0		0.0	1(14.3)	1(14.3)		0.0			
No using of plastic pad												
Hospital(1)	0.0	1(9.1)	4(36.4)	4(36.4)	5(45.5)		9(81.8)					
Hospital(2)	0.0	2(18.2)	0.0	1(9.1)	0.0		1(9.1)					
Hospital(3)	1(14.3)	1(14.3)	1(9.1)	0.0	0.0		3(42.8)					
No washing of hand												
Hospital(1)	0.0	0.0						0.0		0.0	0.0	
Hospital(2)	0.0	0.0						1(9.1)		0.0	0.0	
Hospital(3)	0.0	0.0						1(14.3)		1(14.3)	1(14.3)	
Reason1= potential for exposure to antineoplastic agents is insignificant; Reason 2= exposure to antineoplastic agents is possible but the health hazard is insignificant Reason 3=Not require by employer; Reason 4= Not provide by employer; Reason 5=Not stander practice; Reason 6=Too uncomfortable or difficult to use; Reason 7=Not readily or always available in work area; Reason 8=Cross contamination to other area is not a concern; Reason 9=Concerned about raising the patient anxiety; Reason 10=Shortage of nurses ; Reason 11= Unavailable sink & soap ; Reason 12=Unavailable places.												
Notes= Respondents were allowed to give more than one reason												
1=Sohag University hospital;2=Al-Hilal hospital for health insurance ;3= Sohag cancer Institute												

DISCUSSION

The potential occupational hazard of health care workers handling antineoplastic drugs is

great concern. So that in most countries there are of regulations for handling of antineoplastic. But in Sohag governorate, there is no specialist nurse certificate programs. Moreover, nurses graduating from any of the school offering general nursing education work in oncology department without any special training in this field. One of the most important criteria of nurses in the study is being graduate of diploma secondary school 86.2%, 13.8% holders of technical institutes of nursing and all respondents had not received any training programs in this field, that will make them more confident. They lack job description of oncology nurses and professional standard and depend on basic knowledge which was obtained from school. In this study, the mean age of hospitals 1,2 were 22 ± 3.2 compared with hospital 3 was 25 ± 4.3 , and the majority of nurses were females 93.1% and 6.9% was males. More than half of nurses 55.2% had from 1-5 years of experience and the previous exposure to needle stick from 1-3 times was 55.2% during last 6 months. These results are in agreement with (Ziegler et al 2002) who reported that the majority of staff was female with a mean age 31 years. Roughly half of the staff studied was specifically trained nurses with an average of 3.5 years experience of administering cytotoxic drugs. Given et al 1980 and Pierce 1992 added that nursing was in a transition from the 3- years hospital affiliated diploma program to the 4- year bachelor's degree. By 1875, 70% of the nursing programs were college-based. However, preparation of nurses at these basic levels of education does not make them experts in cancer care and the time devoted to oncology nursing in the undergraduate curriculum is minimal. Karadag et al 2004 stated that the development of oncology nursing is parallel to the development in oncology. The present results were contradicting with Oncology Nursing Society 1995 that reported that at the present time most oncology nurses have either a bachelor's degree 38% or a master's degree 15%, with a smaller number having a diploma 19%. More than one author Falck et al 1979; Infusion Nursing Society position paper 2002, Administration of antineoplastic agents 2002; Hessig et al 2004 reported that the new education needs of the oncology nurse began to be addressed. Short courses and formalized continuing education programs to assist nurses in acquiring new skills and knowledge. Lack of knowledge and skill is a common barrier to

application of nursing intervention and conclusively indicates an occupation risk for those who mix and administer these treatments. However, some retrospective studies have suggested that nurses who handle antineoplastic have an increased risk of fetal loss Selevan et al 1985; Rogers 1987. Kulbily et al 1996 stated that 75% of nurses preparing and administering chemotherapy have not received any education on chemotherapy and their basic information and experience in the preparing and administering of cytotoxic drugs and in protective measures is not sufficient. Infusion Nursing Society 2002 added that the employees exposed to hazardous agents receive additional chemotherapy competency education every other year and were monitored through random observations and audits for compliance. The study revealed that the average of weekly work hours was 55.0 ± 21.5 in hospital 1 72.0 ± 6.2 in hospital 2, and 44.6 ± 5.0 in hospital 3. The mean number of nurses working at day time in hospital 1,2,3 were 8.4 ± 0.8 , 8.5 ± 0.7 , 6.0 ± 1.0 but in night shift it was found 2.2 ± 0.4 , 2.0 ± 0.0 in hospitals 1,2 while in hospital 3 nurses working in daytime and the mean number of patients receiving care at day in hospital 1, 2, 3 were 29.0 ± 2.2 , 15.0 ± 1.3 , 35.0 ± 11.6 but in night shift it was found in hospitals 1,2 were 25.0 ± 13.0 , 5.1 ± 1.1 respectively while in hospital 3 patients receiving chemotherapeutic drugs at daytime only. In the study by Karadag et al. it was found that nurses were working more than the above average, there is even a nurse who stated that she works 88 hours. We found the number of nurses working at night shifts is half of those working at day shifts (night:1.6, day mean :3.7). While it may be expected that the number of patients offered care should be lower in parallel to the decrease in the number of nurses but the present study demonstrates just the opposite, namely, the number of patient offered care at night time (mean :20.4) is twice those offered care at day time (mean:9.5). The chemotherapy preparation and administration activities are usually being conducted at day time, and administrator nurses working at day time may be seen as factor causing the number of day nurses to be higher. In addition, high number of patient at night may be interpreted as an indicator of the uneven arrangement and distribution of nurses (Karadag et al 2004). According to preparing and administering of antineoplastic drugs, the research revealed that 72.4% of nurses always supposed that to prepare

and administer of chemotherapeutics drugs without provide of any safety degree, and 75.9% of respondents receive this drugs in the form of non primed vials and the mean number of chemotherapy prepared per day were 24.4 ± 12.9 , 20.0 ± 7.9 in hospital 1,2 while in hospital 3 the drugs were prepared in clinical pharmacy, as to the mean number of drugs administration were 26.3 ± 6.1 , 20.0 ± 7.5 , 38.0 ± 12.0 in all hospitals 1,2,3 respectively. Kulbily1996; Ben-Ami et al 2001; Ziegler et al 2002 revealed that 81.4% of drugs are prepared by pharmacist's and 88.4% are administered by nurses, and are main group that are exposed to antineoplastic drugs. In the present study, it has been establish that 55.2% of nurses in the 3 hospitals were exposure to needle stick from 1-3 times during last 6 months. These results are in agreement with Kabbash et al 2007, it was found almost half of working nurses had a history of previous exposure to needle puncture during last year. Similar result was reported by Yoshida et al 2008. (Tanberg et al 1991; Patterson et al 1998) added that the true incidence of needle-stick is not known, this is due to an under-reporting of such injuries and exposure. The improper disposal of used sharp objects and needles is known to cause needle stick injuries. More than author stressed on policies and procedure essential to promoting patient's and nurse's safety. Open information and constant tutoring of personnel to avoid the hazards when working with anticancer drugs is absolutely necessary (ASHP 2002; DesRoches 2003; Griffin 2003; Schulmislser 2005; Sorsa et al 2006). As seen in table(2), the nurses knowledge percentage was significantly better in both hospital 1,2 compared with hospital 3 in many aspects, such as causes ,type, signs and symptoms, diagnostic test ,treatment ,and hazards of antineoplastic drugs.(Ben-Ami et al) reported that a gap was found between the nurses knowledge and their actual behavior concerning the potential risks of cytotoxic drugs and their use of protective measures. Several authors have reported that almost all of the nurses have stated that specialization is required in nursing to increase the quality of care and self confidence and will provide professional satisfaction and motivation (Baltzer et al 1994; Kapikiran et al 2000; Guler et al 2001). More than half 75.9 % (n=22) of respondents were not using luer-lock fitting, also 75.9% (n=22) never used needle-less system. Eighty two point eight percent (n=24) of respondents said that the most important factors

leading to leakage during preparing and administering are drawing up or expelling air from syringe 63.3%, 45.5% in hospital 1,2 while in hospital 3 stated that most common reason was due to a bad connection (42.8%). This result is supported by American National Standards Institute 1968; American Society of Hospital Pharmacists 1990; Yoshida et al 2008 reported that extremes of positive and negative pressure in medication vials should be avoided. The use of large-bore needles, 18 or 20, avoid high-pressure syringing of solutions. Venting devices such as filter needles or dispensing pins permit outside air to replace the withdrawn liquid. Although the majority of the respondents are aware of the dangers of their work in this field, guideline for safe handling had been adopted by 31% of the hospitals surveyed, with the rate being higher for hospital 2 than hospitals 1,3. These findings are in agreement with Carmignani and Raymond 1997; Martin and Larson 2003 who said that historically, nurses adherence to chemotherapy-handling guidelines has been poor. Therefore, all nurses do not give any attention to the dangers of chemotherapeutic agents, on themselves or on others, is attributed to not receiving any training in their field and they depend on basic general nursing education offered by school, as well as no requirement from the part of the hospital administration to supply and ensure usage of protective material. Because many antineoplastics are mutagenic, teratogenic, carcinogenic in animals and humans, professionals handling these agents must exercise prudence and follow the Occupational Safety and Health Administration (OSHA). These guidelines address drug preparation, preparation area, the handling of drug spills, the use of protective equipment and drug administration procedures, procedures for caring for patients after drug administration, guidelines on the disposal of material used in drug handling (Yodaiken 1986; Sessink and Bos 1999). Barhamand 1986 added that many nurses do not perceive themselves to be at risk of adverse effects from handling antineoplastics. However, compliance regulation varies considerably in different places, reflecting the general perceptions, and culture regarding occupation protection of both the employees and the employers (Ben-Ami et al 2001; McDiarmid and Condon 2005). In the present study it was found that the majority of nurses 62.1% were always eating something in the work places and only

55.2% always store the prepared drugs in dedicated area. From the researcher explanation are related to lack of ergonomically designed unit, shortage of the places and indifference in nurses. This result congruent with Karadag et al 2004 said that 39.1% of nurses have stated that they use the chemotherapy room for procedure of the patient, 20.4% said they used it for resting and 15.4% for eating something. On the same line Del Gaudio and Menonna-Quinn 1998 said that all hazardous drugs are stored and compound in an Iso class 7 clean room with a negative pressure gradient of 0.02 inch water column in comparison to the surrounding environment, and all compounding personnel should use NIOSH and USP <797>, including hair bonnet, shoe booties, a polyethylene gown, face mask and double-gloving with hazardous-drug-related nitrile gloves, and clinical parameters designated by the patient's oncologist are also necessary. In addition Del Gaudio and Menonna-Quinn 1998 said that, if a biologic safety cabinet (BSC) is not available, a plastic face shield or splash goggles should be worn. Eating, drinking, smoking, applying cosmetics, storage of food in or near the preparation area should not be allowed, and the waste of antineoplastic drugs should be disposed of in separate covered chemotherapy waste containers. Similar results were reported by American National Standards Institute 1968; American Society of Hospital Pharmacists 1990; Occupational Health and Safety Administration 2001; Yoshida et al 2008. Del Gaudio and Menonna-Quinn 1998; Yoshida et al 2008 recommended that the workbench for mixing antineoplastic drugs should be separated from the space used by other health care workers with limited to authorized personal with signs restricting entry. The study revealed that 69% of respondents always perform more activities during handling the drugs such as answer the phone and handle file or patient records. The most important causes are shortage of nurses, workload and lack of pre-and in-service training program in this field. In the present study it was revealed that the hand, face, wrist and forearm are most common sites directly exposed to antineoplastic drugs. This result is supported by Sessink et al 1992; Connor et al 1999; Weinstein 2000 the hands or gloves of health care worker who handle antineoplastic drugs have been reported to be contaminated by antineoplastic drugs. All worker should therefore wear suitable personal protective

equipment. In the same line Undeger et al 1999; Ben-Ami et al 2001 said that the use of personal protective material during chemotherapy handling is of vital significance, with the increase in cancer cases and its treatment, the development of oncology as a specialty in medicine, the health personnel may be exposed to high concentration of antineoplastic drugs during their storage, preparation, administration and disposal. Exposure mostly result from direct contact via dermal absorption, ingestion, skin, eyes, reproductive system, inhalation of droplets by aerosolization of powder or liquid during reconstitution, contaminated equipment, food, cigarettes, bed linen or clothing and mainly because of inappropriate hygienic behaviors Del Gaudio and Menonna-Quinn 1998; Fishman and Mrozeck -Orlowski 1999; Ben-Ami et al 2001; Occupational Health and Safety Administration 2001. Eighty two point eight percent of respondents have stated that they take work clothing to home for laundering. An explanation may be due to, strategy of cleansing nurses work clothes in the hospital laundry is not practiced in Egypt. Ayliffe et al 2000 said that uniform and other protective clothing should not be taken home from laundering unless it is unavailable. The results related to protective equipment for personal wear, such as mask, gown and goggles, it was found that more than half 51.7% were not used and when asked the reason for not wearing, it was found that the most common reasons are not readily or always available in the work area and not required by employer. The study also revealed that only 41.4% always wear latex gloves during handling or administrating antineoplastic drugs. The findings of Karadag et al 2004 are in keeping with study result, it has been found that the rate of nursing using latex unpowered gloves during preparation is 14.2% and that of nurses using unpowered latex gloves during administrations 13.8%. National Institute for occupational Safety and Health 2004; Kitada et al 2005; Wallemacq et al 2006; Sadoh et al 2006 added that goggles were not used in more than 60% of the hospital. With respect to gloves, as some antineoplastic drugs have been reported to permeate through them, wearing double gloves and changing them within a specified time (30 to 60min) are recommended. Martin and Larson 2003; Motamed et al 2006 reported that to encourage their use, protective barriers must be readily available, easy to use effective and

comfortable. Other authors have stated similar recommendations Connor et al 1984; Laidlaw et al 1984; American Society of Hospital Pharmacists 1990; Labuhn et al 1998; Fishman et al 1999; Singleton & Connor 1999; Occupational Health and Safety Administration 2001; Occupational Health and Safety Administration 2001; Worthington 2002. The study showed that less than two-thirds of respondents 62.1% had never used a plastic-backed absorbent pad under the patient arm and the reason in hospital 1,2 were not readily or always available in the work area compared with hospital 3 was exposure to antineoplastic agent is possible but the health hazard is insignificant. Baired et al 1991 stressed that the work surface is protected with a disposable absorbent pad. According to a way of cleansing contaminated body, the study showed that 69% of respondents stated cleaning by water and soap. Del Gaudio and Menonna-Quinn 1998; Dougherty and Lister 2004 recommended that, if the chemotherapy has come in contact with the patient skin, mucous membranes and eye, immediately wash the area vigorously with soap for approximately 2 minutes to copious amount of tap warm water or sodium chloride to avoid any local damage to tissue. As for compliance of respondents by hand washing after dealing with drugs 62.1% of respondents always wash hand after handling. Del Gaudio and Menonna-Quinn 1998 reported that hand washing is critical in reducing contamination and potential ingestion of droplets, if the skin some-how does come in contact with a chemotherapeutic agent, washing vigorously with soap and warm water is recommended to prevent a skin reaction. Chan et al 2002, Colombo et al 2002; Ofili et al 2003; Sridhar et al 2004 added that absence of enabling environment in the health institution, such as a lack of constant running water or a shortage of personal protective equipment, can be improved through targeted teaching. According to disposing and cleansing contaminated equipment, the study show that 65.5% of respondent stated that the container should be placed in dedicated area to prevent tampering, 55.2% stated that always segregate the contaminated materials and equipment, 48% always labelling the waste container. The way to clean contaminated floor 44.3% of respondents said by water and soap. More than author American National Standards Institute 1968; Del Gaudio and Menonna-Quinn 1998; Nevidjon and Sowers 2000 reported that all

gown, gloves, and disposal materials used in preparation should be disposed of according to the hospital's hazardous drug waste procedure and as described under this review's section with a "Warning: Hazardous material". If a spill occurs on a carpeted or upholstered surface, it should be blotted with absorbent sheet and washed with detergent, followed with a clean water rinse and hard surfaces at least twice with copious amounts of cold, soapy water and dried with proper towels. Baired et al 1991; Del Gaudio and Menonna-Quinn 1998; Griffin 2003 stressed that only physicians and registered nurses who have completed a specialty education program and have validated competency on a continuum should administer antineoplastic agent.

The most important limitation of this study is limited number of nurses working in oncology department and fear of most nurses from authorized member to talk about the availability of resources in the department or hospital.

Conclusion and recommendation:

The result of this study revealed that the level of knowledge of nurse concerning the tumor and antineoplastic agents was satisfactory in both hospital 1,2 compared with hospital 3. However, the items concerning the skills when handling the drugs and use personal protective equipment while handling and administering antineoplastic agents to prevent occupational hazards was unsatisfactory. The defect in practice were attributed to: defect of recourses; defect in high qualification nurses; absence of a written policy or standards for procedures; absence of a written copy of the OSHA guideline for handling hazardous drugs, and lack of continuous and in-service training. These findings indicate the following recommendation.

1. Employing only qualified and trained personnel in oncology units especially when handling chemotherapeutic agents.
2. The nurses need an obligatory training programs (pre- and in-service) in guideline for safe handling and systems for monitoring the appropriate use of equipment to avoid exposure to hazards through regular scientific meetings and training courses for development of oncology nurses as a special branch and for increasing security measures in

environment where chemotherapy being handled.

3. Continuous evaluation for their practice and correction of poor practices.
4. Design a protocol for safety handling and precautions as well as chart and handout.
5. Produce nurses to work in the service of patients only and away from administrative work as well as providing a sufficient number of nurses in shifts to prevent emergency situation.
6. Maintain adequate supplies, equipment and facilities to encourage the nurses to comply with the principles of safety measures.

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لمحة مختصرة عن ممرضى الأورام اللذين يعملون في وحدات الحقن بالعلاج الكيميائي في محافظة سوهاج

عُني عبد الناصر علي

قسم التمريض الباطني والجراحي (تمريض بالغين) كلية التمريض- جامعة سوهاج

يعتبر العلاج الكيميائي مفيد بشكل واضح بالنسبة لمرضى الأورام ولكنه مصحوب بمخاطر عديدة بين العاملين في مجال الرعاية الصحية. ولذلك تهدف هذه الدراسة إلى تقييم الاحتياطات اللازمة والمتبعة من قبل ممرضى الأورام لتقليل المخاطر الناتجة عن التعرض المباشر للعلاج الكيميائي أثناء الحقن. واشتملت هذه الدراسة علي كل الممرضين والممرضات اللذين يعملون في أقسام العلاج الكيميائي وحدة الأورام وكان عددهم 29 ممرضا و ممرضة. وقد تم استخدام وسيلتان لجمع المعلومات اللازمة منهم. وهما استمارة استبيان مقابلة شخصية واستمارة جمع معلومات عن الأورام ومضاداته والاحتياطات المتبعة لمنع التعرض لهذة المخاطر أثناء التحضير أو الإعطاء أو التخلص من النفايات. أوضحت نتائج هذه الدراسة أن أغلبية ممرضى الأورام عينة الدراسة معلوماتهم عن الأورام ومخاطر العلاج الكيميائي مرضية إلي حد ما ولكن علي العكس وجدنا أن إتباعهم للاحتياطات والإجراءات الوقائية اللازمة لمنع التعرض لمخاطر العلاج الكيميائي غير مرضية وكان السبب وراء ذلك يرجع إلي عدة أسباب منها مرتبط بمرضى الأورام أنفسهم وأسباب أخرى ترجع إلي المستشفيات وعدم توافر إمكانيات بها. وقد أوصي بالتالي: (1) تعيين فقط كل من الممرضين الممرضات المدربين والمؤهلون علي التعامل مع العلاج الكيميائي (2) يجب تصميم برتوكول عن الاحتياطات والإجراءات الوقائية وإعطائهم كتيبات تثقيفية في هذا المجال (3) يجب أن يكون التعليم المستمر لمرضى الأورام عن الاحتياطات والإجراءات الوقائية المتبعة لمنع التعرض لمخاطر العلاج الكيميائي الزاميا (4) يجب توافر الأجهزة والأدوات والمستلزمات اللازمة لتشجيع ممرضى الأورام للامتثال إلي مبادئ احتياطات الأمان والإجراءات الوقائية لمنع التعرض لهذة المخاطر.

