

Empowering Future Nurses for Safer Cancer Care: Effectiveness of Video-Assisted Teaching on Safe Handling of Chemotherapeutic Drugs

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ABSTRACT

Background: Chemotherapeutic agents are widely used in cancer management and are classified as hazardous due to their mutagenic, teratogenic and carcinogenic effects. Nursing personnel are exposed to these drugs during preparation, transport, administration and disposal. With the increasing global and national cancer burden, the use of chemotherapy has expanded significantly, raising concerns about occupational exposure among healthcare providers.

Methodology: A quantitative approach with a quasi-experimental (one-group pretest post-test control group) research design was used. Study included 60 samples (experimental group 30, control group 30). A non-probability purposive sampling technique was used. Data collection was done using demographic variables, self-structured knowledge questionnaire followed by administration of video assisted teaching programme on safe handling of chemotherapeutic drugs.

Results: Results revealed that during pretest in experimental group majority of students 17 had inadequate knowledge, 9 students had moderately adequate knowledge, 3 had poor level of knowledge and only 1 student had adequate knowledge. In control group 18 students had inadequate knowledge, 7 had poor knowledge and 5 students had moderately adequate knowledge. In experimental group the pretest mean is 11.5, whereas in control group the pretest mean is 9.48, in experimental group the mean post test knowledge score (16.40) was significantly higher than the mean post test knowledge score in control group (11.13). In experimental group SD 3.50 is also less dispersed than SD in control group (4.68). The paired t value 4.87 was found significant at 0.05 level of significance, also the unpaired t value 4.96 was found significant at 0.05 level of significance, which indicated that the video assisted teaching programme regarding safe handling of chemotherapeutic drugs was effective in increasing the knowledge of nursing students in experimental group. Chi-square showed significant association between pretest knowledge scores regarding safe handling of chemotherapeutic drugs with their selected demographic variable source of information – “ χ^2 ” value = 30.6 at 0.05 significant level in the experimental group. Conclusion: The study concludes that the video assisted teaching programme regarding safe handling of chemotherapeutic drugs effectively improved the knowledge of nursing students.

Keywords: video assisted teaching programme, knowledge, safe handling, chemotherapeutic drugs, nursing students.

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INTRODUCTION

Chemotherapy is a systematic treatment used to prevent cancer cells from multiplying, invading, or metastasizing. Chemotherapeutic agents are widely used in cancer management and are classified as hazardous due to their mutagenic, teratogenic and carcinogenic effects¹. Nursing

personnel are exposed to these drugs during preparation, transport, administration and disposal. With the increasing global and national cancer burden, the use of chemotherapy has expanded significantly, raising concerns about occupational exposure among healthcare providers². Exposure to chemotherapeutic agents may

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occur through inhalation, dermal contact, ingestion or accidental needle-stick injuries. Repeated exposure has been associated with reproductive toxicity, chromosomal abnormalities, skin disorders and secondary malignancies among healthcare workers³. Therefore, adherence to safe-handling guidelines is essential to minimize occupational risks.

Nursing students frequently participate in clinical postings within oncology units, where they encounter chemotherapeutic drugs as part of patient care. Despite the potential hazards, several studies have reported inadequate knowledge and unsafe practices among nurses and nursing students regarding the handling of chemotherapeutic drugs⁴. Lack of formal training, insufficient clinical experience and limited availability of personal protective equipment contribute to increased vulnerability among nursing students, who are posted in oncology units during their clinical postings⁵. Video-assisted teaching has emerged as an effective educational approach, offering visual clarity, procedural demonstration, and enhanced learner engagement. Studies indicate that video-based learning improves comprehension, skill retention, and confidence when dealing with clinical procedures, especially those involving safety precautions⁶. The present study aims to evaluate the effectiveness of a structured video-assisted teaching programme in enhancing the knowledge of nursing students regarding the safe handling of chemotherapeutic drugs in selected nursing schools of Varanasi, Uttar Pradesh.

Statement of the problem: “Effectiveness of Video Assisted Teaching programme on knowledge regarding safe handling of chemotherapeutic drugs among nursing students at selected nursing schools, Varanasi, U.P.”

Aim of the study: To enhance knowledge regarding safe handling of chemotherapeutic drugs among nursing students through video assisted teaching programme.

OBJECTIVES

1. To assess the pretest knowledge score regarding safe handling of chemotherapeutic drugs among students at selected nursing schools in experimental and control group.
2. To assess the post-test knowledge score regarding safe handling of chemotherapeutic drugs among students at selected nursing schools in experimental and control group.
3. To evaluate the effectiveness of video assisted teaching programme regarding safe handling of chemotherapeutic drugs among students at selected nursing schools in experimental group.
4. To evaluate the effectiveness of video assisted teaching programme regarding safe handling of chemotherapeutic drugs by comparing the post-test knowledge score between experimental and control group among students at selected nursing schools.

5. To find out the association between pretest knowledge score regarding safe handling of chemotherapeutic drugs with their selected demographic variables among students of selected nursing in experimental group.

Hypothesis

- **H₁:** The mean post-test knowledge score regarding safe handling of chemotherapeutic drugs is significantly higher than the mean pre-test knowledge score of experimental groups.
- **H₂:** The mean post-test knowledge score of experimental groups regarding safe handling of chemotherapeutic drugs is significantly higher than the mean post-test knowledge score of control group.
- **H₃:** There is significant association between pre-test knowledge score regarding safe handling of chemotherapeutic drugs with their selected demographic variables in experimental group.

Conceptual framework

The modified conceptual framework based on the concept of “Kings Goal Attainment Theory” by Imogene King (1971) was adopted for this study.

METHODS

Research approach

A quantitative research approach was adopted for the study.

Research design

A quasi-experimental research design (pre-test post-test control group design) was selected to assess knowledge of nursing students regarding safe handling of chemotherapeutic drugs.

Research setting

Based on the geographical proximity, feasibility of conducting the study and availability of the samples, main study was conducted in School of Nursing, Varanasi.

Population

The target population for the study was the nursing students in selected schools of Nursing, Varanasi, UP.

Sample

In this study, samples were the 3rd year GNM nursing students.

Sample Size

In this study, researcher selected 60 Nursing students (30 from each group- experimental and control group).

Sampling Technique

In this study, the researcher used non- probability sampling technique in which purposive sampling method was used to draw the samples.

Criteria for selection of sample

- **Inclusion criteria:**

- ✓ 3rd year G.N.M students at Apex Institute of Nursing (Experimental group) and Santushti Nursing College. (Control group)
- ✓ Students who are willing to participate in this study.
- ✓ Student who are present at the time of data collection.
- **Exclusion Criteria:**
- ✓ Students who are studying in the 1st year and 2nd year G.N.M

Variables:

- **Independent Variable:** video-assisted teaching programme regarding safe handling of chemotherapeutic drugs.
- **Dependent variable:** Knowledge of the nursing students regarding safe handling of chemotherapeutic drugs.

Content validity: Content validity of the tool obtained on the basis of opinion from different experts from the different fields comprising of 1 oncologist and 8 nursing experts in Medical surgical nursing.

Reliability of the tool

The reliability of self-structured knowledge questionnaire was $r = 0.77$ was calculated by using Karl Pearson with spearman brown's prophecy technique. Hence structured knowledge questionnaire was found reliable and feasible.

Ethical consideration

Formal permission was obtained from the concerned principals of School of Nursing. After explaining the purpose of the study and about the confidentiality, informed consent was obtained from subjects before collecting the data. There was no ethical issue aroused during study period. The subjects were informed that their participation was voluntary and they had freedom to withdraw from the study.

Pilot study

The pilot study was carried out in order to find the feasibility of the study. Ten sample's data were collected who met the inclusion criteria and exclusion criteria. Pilot study showed that the study was feasible.

Development and description of tool

Tools were prepared on the basis of objective of the study. Socio-demographic proforma, structured knowledge questionnaire, Video CD was prepared using the elements of the lesson plan to assess the knowledge of nursing students, the following steps were carried out in preparing the tool.

Tool consists of three sections as follows:

Section A: It consist of socio-demographic data which includes age, gender, religion, educational stream, ever administered chemotherapeutic drugs, experienced cytotoxic spills in clinical area, any previous knowledge regarding safe handling of chemotherapeutic drugs and if yes, source of information.

Section B: It consists of structured knowledge questionnaire regarding safe handling of chemotherapeutic drugs.

This includes 25 structured questions, which are categorized under 3 headings:

- ❖ General information about chemotherapy (5)
- ❖ Safe handling of chemotherapeutic drugs (6)
- ❖ Drug administration (8)
- ❖ Drug transportation and spill management (6)

Section C: This section consists of lesson plan with construction of video CD on safe handling of chemotherapeutic drugs.

RESULTS

Table 1: Frequency and Percentage Distribution of Subjects According to Demographic Variables (N = 60)

S.No.	Demographic Variables	Experimental Group (n1 = 30)		Control Group (n2 = 30)	
		f	%	f	%
1	Age (in years)				
	(a) 17–19 yrs.	6	20.00	3	10.00
	(b) 20–22 yrs.	18	60.00	20	66.66
	(c) 23–25 yrs.	4	13.33	4	13.33
	(d) 26–28 yrs.	2	6.66	3	10.00
2	Gender				
	(a) Male	7	23.33	9	30.00
	(b) Female	23	76.66	21	70.00
3	Religion				
	(a) Hindu	27	90.00	28	93.33
	(b) Muslim	3	10.00	1	3.33
	(c) Sikh	0	0.00	0	0.00
	(d) Christian	0	0.00	1	3.33
4	Stream during intermediate				
	(a) Arts	3	10.00	3	10.00

	(b) Science	24	80.00	25	83.00
	(c) Commerce	3	10.00	2	6.66
5	Ever administered chemotherapeutic drugs				
	(a) Yes	4	13.33	2	6.66
	(b) No	26	86.66	28	93.00
6	Experienced cytotoxic spills in clinical area				
	(a) Yes	5	16.66	8	26.77
	(b) No	25	83.30	22	73.33
7	Any previous knowledge regarding safe handling...				
	(a) Yes	12	40	15	50.00
	(b) No	18	60	15	50.00
8	Source of information				
	(a) Workshop	1	3.33	1	3.33
	(b) Books	12	40.00	17	56.66
	(c) Teachers	13	43.33	11	36.66
	(d) Health personnel	4	13.33	1	3.33

Table:1 Data revealed that in experimental group and control group majority of students (60%) ,(66.6%) belongs to age group 20-22 years, ,in experimental group majority of students (76.66%) and in control group majority of students (70%) were female ,in experimental group majority of students (90%) and in control group majority of students (93.33%) were Hindu,10% were Muslims in experimental group where as in control group 3.33% belongs to muslim and 3.33% belongs to Christian .In experimental group majority of students(80%) had science stream during intermediate,10% from Arts stream and 10% from commerce, whereas in control group majority of students (83%) had science stream during intermediate,10% from arts and 6.66% from commerce stream. In experimental group majority(86.66%) and in control group (93%) of students does not administered chemotherapeutic drugs, in experimental group (13.33%)

and in control group (6.66%) of students had administered chemotherapeutic drugs, in experimental group majority (83.3%),in control group (73.33%) never experienced cytotoxic spills in clinical area, in experimental group (16.66%) and in control group (26.77%) had experienced cytotoxic spills in clinical area , in experimental group (40%) students ,in control group (50%) had previous knowledge regarding safe handling of chemotherapeutic drugs, whereas in experimental group (40%) and in control group (50%) does not had any previous knowledge regarding safe handling of chemotherapeutic drugs, in experimental group majority (43.3%) got previous information from teachers ,40% from books,13.3% from health personnel and 3.33% from workshop whereas in control group majority(56.66%) got previous information from books,36.66% from teachers 3.33% from health personnel and 3.33% from workshop.

Table 2: Baseline Homogeneity Analysis across Groups using Chi-Square Test (N = 60)

Demographic Variable	Chi-Square (χ^2)	df	p-value	Inference
Age	1.305	3	0.728	Not Significant (p > 0.05)
Gender	0.085	1	0.770	Not Significant (p > 0.05)
Religion	2.018	2	0.365	Not Significant (p > 0.05)
Intermediate Stream	0.220	2	0.896	Not Significant (p > 0.05)
Administered Chemo Drugs	0.185	1	0.667	Not Significant (p > 0.05)
Experienced Cytotoxic Spills	0.313	1	0.576	Not Significant (p > 0.05)

Previous Knowledge	0.000	1	1.000	Not Significant (p > 0.05)
Source of Information	2.586	3	0.460	Not Significant (p > 0.05)

Table 2: Data revealed that the Experimental and Control groups are homogenous and statistically comparable prior to intervention.

Table 3: Data on pre-test knowledge score regarding the safe handling of chemotherapeutic drugs between experimental and control group. N=60

Knowledge Score	Level of knowledge	Experimental group			Control group		
		Pre-test score	Mean	SD	Pre-test score	Mean	SD
1-6	Poor	3	11.5	4.25	7	9.48	4.02
7-13	Inadequate	17			18		
14-18	Moderately adequate	9			5		
19-25	Adequate	1			0		

Table 3: Data revealed that In experimental group majority of students 17 had inadequate knowledge ,9 students had moderately adequate knowledge ,3 had poor level of knowledge and only 1 student had adequate knowledge .In control group 18 students had inadequate knowledge ,7 had poor knowledge and 5 students had moderately adequate knowledge. In experimental group the pretest mean is 11.5 , SD 4.25,whereas in control group the pretest mean is 9.48 ,SD 4.02.

Table 4: Data on post-test knowledge score regarding the safe handling of chemotherapeutic drugs between experimental and control group. N=60

Knowledge Score	Level of knowledge	Experimental group			Control group		
		Post-test score	Mean	SD	Post-test score	Mean	SD
1-6	Poor	0	16.40	3.50	4	11.13	4.68
7-13	Inadequate	4			18		
14-18	Moderately adequate	20			6		
19-25	Adequate	6			2		

Table 4: Data depicts that in experimental group the mean post test knowledge score (16.40) was significantly higher than the mean post test knowledge score in control group (11.13) .In experimental group SD 3.50 is also less dispersed than SD in control group (4.68) which indicated that the video assisted teaching programme regarding safe handling of chemotherapeutic drugs was effective in increasing the knowledge of the students in experimental group.

Table-5: Data on effectiveness of video assisted teaching programme regarding safe handling of chemotherapeutic drugs among nursing students.

Knowledge score	Level of knowledge	Classification of data				Paired t-test		Unpaired t-test
		Experimental group		Control group		Experimental group	Control group	
		Pre-test	Post-test	Pre-test	Post-test	4.87*	1.46 ^{NS}	
1-6	Poor	3	0	7	4	4.87*	1.46 ^{NS}	4.98*
7-13	Inadequate	17	4	18	18			
14-18	Moderately adequate	9	20	5	6			
19-25	Adequate	1	6	0	2			
Total		30	30	30	30			

Table 5: Data depicts that in experimental group the paired t* value was 4.87 (df 29) was found significant at 0.05 level of significance, also the unpaired t value 4.96 (df-58, table value- 2.00) was significant at 0.05 level of significance, which indicated that the video assisted teaching programme regarding safe handling of chemotherapeutic drugs was effective in increasing the knowledge of nursing students in experimental group

Table-6: Association between pre-test knowledge score on regarding safe handling of chemotherapeutic and demographic variables in experimental group.

S. No.	Demographic variable	Poor Knowledge	Inadequate Knowledge	Moderately adequate Knowledge	Adequate Knowledge	χ^2 Value	P Value	Significant (P<0.05)
1.	Age	0 2 2 0	2 6 2 2	2 5 0 0	2 5 0 0	12.825	0.1707	Not Significant
2.	Gender	0 0	0 23	7 0	0 0	2.892	0.4086	Not Significant
3.	Religion	0 0	10 1	10 0	7 0	1.8909	0.5954	Not Significant
4.	Stream during intermediate	0 10 2	2 5 0	1 9 0	0 0 1	15.572	0.0162	Significant
5.	Ever administered chemotherapeutic drugs	2 1	2 15	0 0	0 10	9.444	0.0239	Significant
6.	Experienced cytotoxic spills in clinical area	0 0	0 10	3 6	3 8	3.862	0.2768	Not Significant
7.	Any previous knowledge regarding safe handling of chemotherapeutic drugs	2 0	6 8	4 3	2 2	3.3481	0.3410	Not Significant
8.	Source of information	0 0 2 0	1 7 5 0	0 3 5 1	0 0 0 2	30.666	0.0034	Significant

Table 6: Data revealed that there was significant association between pretest knowledge scores regarding safe handling of chemotherapeutic drugs with their selected demographic variable **source of information** –“ χ^2 ” value =30.6 at 0.05 significant level in the experimental group. Hence, the knowledge of the students regarding safe handling of chemotherapeutic drugs was dependent on their source of information in the experimental group.

DISCUSSION

The findings of the study were discussed with reference to the objective and with findings from other studied.

1. To assess the pretest knowledge score regarding safe handling of chemotherapeutic drugs among students at selected nursing schools in experimental and control group.

Pethe.P. Rupali et.al. conducted a study to Assess the Effectiveness of Planned Teaching on Knowledge Regarding safe Handling of Chemotherapeutic Drugs among the Student Nurses in Selected Nursing Colleges of Vidarbha Region. In pre-test, 1.67% had very poor knowledge, 26.67% of subjects had poor knowledge, 58.83% had average knowledge, 13.33% had good knowledge and none of them had excellent knowledge.

The minimum score was 4, maximum score was 15 and mean score was 9.95 ± 2.281 . Whereas in post-test 45% had good and excellent knowledge, 8.33% had average knowledge, 1.67% had poor knowledge and none were there in the group of very poor. The minimum score was 5 and maximum score was 20, the mean score was 16.05 ± 2.620 . It is statistically interpreted that posttest knowledge score was higher than the pretest knowledge score. There is significant increase in knowledge of student nurses regarding safe handling of chemotherapeutic drugs. After the completion of the study it is revealed that before the planned teaching knowledge of student nurses was not adequate but after the planned teaching knowledge of student nurses improved tremendously.⁸

2. **To assess the post-test knowledge score regarding safe handling of chemotherapeutic drugs among students at selected nursing schools in experimental and control group.** Jisha Sreekumaran et.al. conducted a study on Educational intervention program regarding safe administration of chemotherapy. The overall mean of pretest knowledge score regarding safe administration of chemotherapy among nursing personnel was 16.21 ± 3.82 , and the post-test knowledge score was 20.49 ± 2.00 . The educational intervention was beneficial in enhancing the knowledge score ($P < 0.001$). Moreover, after the educational intervention, 68% of the respondents had very good knowledge, 11% had excellent knowledge, and 21% had good knowledge ($P < 0.001$). The educational intervention program was beneficial in meliorating the knowledge of nursing personnel on safe administration of chemotherapy.⁹
3. **To evaluate the effectiveness of video assisted teaching programme regarding safe handling of chemotherapeutic drugs among students at selected nursing schools in experimental group.**

Patil. S. Sneha et.al. conducted a Study to Assess the Effectiveness of Video Assisted Teaching Programme on Knowledge about Safety Measures Regarding Handling of Chemotherapy Drugs among Undergraduate Nursing Student from Selected Colleges of Chandrapur. Calculated t-value was found to be 10.25 for overall knowledge regarding handling of chemotherapy drugs, which is greater than table 't' value at 0.05 level of significance. Post test knowledge score has shown significant association with selected demographic variable. The study was concluded that video assisted teaching programme on knowledge about safety measures regarding handling of chemotherapy drugs among undergraduate nursing students was effective method to improve knowledge regarding safety measures of chemotherapy drugs.¹⁰

4. **To evaluate the effectiveness of video assisted teaching programme regarding safe handling of chemotherapeutic drugs by comparing the post-test knowledge score between experimental and control group among students at selected nursing schools.**

Singh Bhoori et.al. conducted a Pre-Experimental Study to Assess the Effectiveness of Planned Teaching Programme on Knowledge towards Safe Handling of Chemotherapeutics Drugs among Staff Nurses in C.H.R.I Gwalior. It revealed that in pre test staff nurse had poor knowledge as compare the post test. the mean post-test scores of 16.6 was higher than the mean pre-test scores of 12.95 which was significant at P-value of 0.00001 level which showed Significant increase in knowledge and thus it proves the effectiveness of the planned teaching programme. Hence it was concluded that the planned teaching programme was effective in improving the knowledge of staff nurses on prevention of safe handling of chemotherapeutic drugs.¹¹

5. **To find out the association between pretest knowledge score regarding safe handling of chemotherapeutic drugs with their selected demographic variables among students of selected nursing in experimental group.**

K.V Saranya et.al. conducted a study Effectiveness of Structured Teaching Program on Knowledge regarding Chemotherapy and Chemotherapy Administration Protocol among Final Year General Nursing and Midwifery Students at selected schools of Nursing Sciences Bengaluru. The investigator assessed final year general nursing and midwifery student's knowledge using structured knowledge questionnaire regarding chemotherapy and chemotherapy administration protocol. After the pre-test was conducted, structured teaching programme was introduced to the final year general nursing and midwifery students. post- test was conducted on seventh day using the same research tool. It is found that the calculated t value is greater than table value. There is significant difference between pre-test and post-test scores of knowledge of final year general nursing and midwifery students. There is significant association between the pre-test knowledge scores and demographic variable source of information and there is no significant association between selected demographic variables like age, religion, family member with cancer and previous knowledge. The finding of the study suggests that structured teaching program is effective in increasing the knowledge of final year general nursing and midwifery students regarding chemotherapy and chemotherapy administration protocol.¹²

CONCLUSION

The primary responsibility of a healthcare professional is to create awareness and to provide necessary information through continuous education which will help in developing a positive attitude. In this study, majority of the students had average knowledge after the structured teaching more than half of the students gained good knowledge. The study found that video assisted teaching program on safe handling of chemotherapeutic drugs has helped to develop additional knowledge and skills about the same. Hence, video assisted teaching helps the students to be aware of the hazardous effects of

chemotherapy so they may protect themselves as well as the patients.

RECOMMENDATION

- A similar study can be replicated on large sample to generalize the findings.
- A similar study can be conducted by influencing, addition demographic variables that may influence the level of knowledge of female school student.

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