ORIGINAL ARTICLE

A Study to Assess the Effectiveness of Structured Teaching Program on Knowledge Regarding Cold-Chain Maintenance among Auxiliary Nurse Midwives Students in Era College of Nursing, Lucknow

Preeti Rawat, Samrah Butool Faridi

ABSTRACT

Pre-experimental research study aimed to examine the effectiveness of a structured educational program on understanding regarding cold chain management among Auxiliary Nurse Midwives (ANM) students at Era university, Era college of nursing, Lucknow. The aim included asses pre-test knowledge levels, evaluating effectiveness of the STP, exploring the relationship between pretest scores with selected demographic factors. 92 ANM students were found through non-probabilistic sampling method. Data were collected, via. a structured questionnaire method. Pre-test finding showed that 0% of the students demonstrated insufficient level of knowledge; 97.8% demonstrated moderate level of understanding and 2.2% demonstrated higher level of understanding, with an average score 13.61. Post-test results indicated a substantial improvement: 72.8% achieved higher level of understanding and 27.2% had moderate level of understanding, with an average score rising to 17.53. Statistical analysis using for example paired sampling *t-test* finding revealed that there is significant difference between pretest (before structural educational program) and post-test (after educational program) scores at (p-value < 0.001). *Chi-square* analysis revealed no statistically association between knowledge score with specified demographic factors.

KEYWORDS: *ANM students, Cold chain, Effectiveness, Knowledge, Structured teaching program.*

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INTRODUCTION

The national immunization programs depend on effective cold chain systems that ensure vaccines are stored and transported under recommended temperature conditions (+2°C to +8°C). Proper cold chain management ensures vaccines reach beneficiaries safely, reducing the risk of preventable diseases. Globally, immunization prevents millions of deaths annually. Tools like the WHO and UNICEF's Effective Vaccine Management (EVM) system support this goal. This study addresses the need to enhance Auxiliary Nurse Midwives (ANM) students' understanding of cold chain maintenance to ensure vaccine potency and public health safety.

Since, the Universal Immunization Program began in India in 1985, the quality of cold chain management has remained crucial. Health workers, including ANMs, are key in ensuring vaccines remain effective. Hence, structured education on cold chain processes is vital to improve practice and immunization outcomes

OBJECTIVES

1. A study to determine pre-test score level of understanding on cold chain maintenance among ANM students.

2. A study to examine the effectiveness of structured

Department of Community Health Nursing, Era University Lucknow, UP, India.

Corresponding Author: Preeti Rawat

Email: graterpreeti1997@gmail.com

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educational intervention on understanding regarding proficiency of cold chain management

3. To investigate the association between demographic factors and pre-test understanding scores.

HYPOTHESIS

At a 0.05 significance level

H1: There is a substantial difference in knowledge scores between pre-test to post-test related to cold chain maintenance among ANM students.

H2: There is a significant relationship between pre-test knowledge scores with specified demographic factors.

Null Hypotheses (H0): there is no significant relationship between pre-test knowledge scores with specified demographic factors.

REVIEW OF LITERATURE

Rupal Patel 2020, Conducted study to find the effect of STP related to knowledge on cold chain on ANM at selected health centers. Qualitative research design with one set of participant Pre-Test & post-test research approach used. 40 participant size selected, via non-probability convenience sampling methods. The data was collected by using structured questionnaire tools. The outcome of study was revealed only ANM. (62.5%) had in adequate knowledge, whereas highest percentage of ANM 37.5% used satisfactory knowledge after administration of STP plans. In the result find out the effect of STP regarding knowledge of cold chain maintain among ANM` & there is need to improve the Knowledge of ANM.[1]

The cross-sectional was conducted to assess the implementation of immunization administration & vaccine storage and handling in a tertiary care hospital in Maharashtra qualitative research approach was used and data were collected by interviewing techniques and the result were revealed that total 115 paramedics were enrolled. The result was revealed that knowledge regarding maintenance of refrigerators and vaccine storage (54; 59.34%), temperature recording (54; 59.34%), preferred location of deep freezer (62; 68.13%) was significant satisfactory. However, knowledge regarding the shake test was limited (42: 46.15%). Among paramedics, awareness about shake tests and vaccine storage was moderate; some practices were lacking. These studies underscore the importance of targeted teaching programs for enhance the knowledge.[2]

METHODOLOGY

A pre-experimental, single group pre-test & post-test methodology was used. Ninety-two ANM students participated, selected via convenience sampling. After obtaining consent and institutional permission, students completed a pre-test questionnaire assessing knowledge on cold chain maintenance. The STP included lectures supported by audiovisual aids (PowerPoint, charts, flashcards). The post-test was administered after one week of pretest with the same structured questionnaire tool. The data were analysed with SPSS, applying descriptive statistics, paired sample t-tests, chi-squared tests.

RESULTS

Section A

- According to Age among 92 samples, 72 (78.3%) were from 18-14-year age group, 19 (20.7%) from 25–29-year age group, 1 (1.1%) from 30-34 years age group.

- According to education out of 92 participants, 61 (66.3%) Higher secondary pass 29 (31.5%) Graduation, 2 (2.2%) post –graduation.

- According to Academic year among 92 samples of group, 50 (54.3%) were ANM 1st year, 42 (45.7%) were ANM 2nd year.

- According to previous knowledge regarding cold chain among 92 sample of group, 92 (100%) subjects given the answer of yes.

According to specific source among 92 sample of group, 46 (50.0%) were mass media, 23 (25.0%) was book, 23 (25.0%) were teacher

Section B

The result of pre-test assessment on cold chain maintenance. 0 (0%) students having inadequate knowledge. 90 (97.8%) were students having moderate knowledge, 2 (2.2%) students having adequate knowledge. Hence, concluded that ANM students were having inadequate understanding regarding cold chain maintenance.

Posttests level of assessment on cold chain management. 0 (0%) students having inadequate knowledge, 25 (27.2%) students having moderate knowledge, 67 (72.8%) students have adequate knowledge. The concluded that ANM students were having adequate knowledge regarding cold chain maintenance.

Mean score increased by 3.92. Paired t-test showed t = 18.077, p<0.001, confirming the STP was statistically effective.

Hence, it was concluded that *p-value*-<0.001 is less than the significant level o.o5 that means null hypothesis rejected there is statically. It revealed that there is significant difference in knowledge score before and after intervention on cold chain maintenance among axillaries nurse midwives' students.

Association with Demographics

Chi-square analysis showed no significant differences between assessment scores with identified demographic factors such as age, education, academic year, or source of prior knowledge

DISCUSSION

In our study, we findings demonstrate that structured teaching programs significantly improve ANM students' knowledge of cold chain maintenance, aligning with prior studies (e.g., Cheriyan & Kulal, 2019; Vada *et al.*, 2016). Although students had moderate knowledge in pretest, posttest finding revealed led to increased effectiveness, emphasizing the value of focused educational interventions.

Objective 1

To assess pre-test level of score on cold chain maintenance among ANM students**.** The results showed that, before the intervention, none of the 92 students had inadequate knowledge; 97.8% demonstrated moderate level of understanding, only 2.2% higher-level of understanding about cold chain

Table 1: Frequency and percentage analysis of socio demographic factors.

Demographic factors	Classification	Frequency	%
Age	18–24 year	72	78.3%
	25–29 year	19	20.7%
	30–34 year	1	1.1%
	35–years above	0	0.0%
Education	Higher secondary	61	66.3%
	Graduation	29	31.5%
	Post- Graduation	2	2.2%
Academic year	ANM 1st year	50	54.3%
	ANM 2nd year	42	45.7%
Previous Knowledge	Yes	92	100.0%
	No	0	0.0%
Specify sources	Mass media	46	50.0%
	Book	23	25.0%
	Teacher	23	25.0%

Table 2: Finding relation to pre-test scores on cold chain maintenance within ANM students.

Criteria to measure the pre-test understanding score	
Level of scoring (N= 92)	Pretest F (%)
Low level of score. (1–8)	O (0%)
Moderate level of score. (9–16)	90 (97.8%)
Higher level of score. (17–25)	2 (2.2%)
Max Score = 25 Min Score = 0	

maintenance. Following the structured teaching program (STP), the post-test showed a notable improvement: still no students with inadequate knowledge, but 27.2% moderate level of understanding and 72.8% higher level of understanding. This reflects an increase of 3.92 points in average level of understanding score before and after intervention.

These results align with the findings of Merin Cheriyan and Ravi Kulal (2019), who conducted a descriptive survey among 100 multipurpose health workers in CHC Loni and Bisrakh. Using purposive sampling and a self-structured questionnaire, their study found that only 55% of participants has an average level of understanding, 42% moderate level of understanding, and 41% low level of understanding regarding cold chain maintenance, concluding that overall knowledge among health workers was moderate.[3]
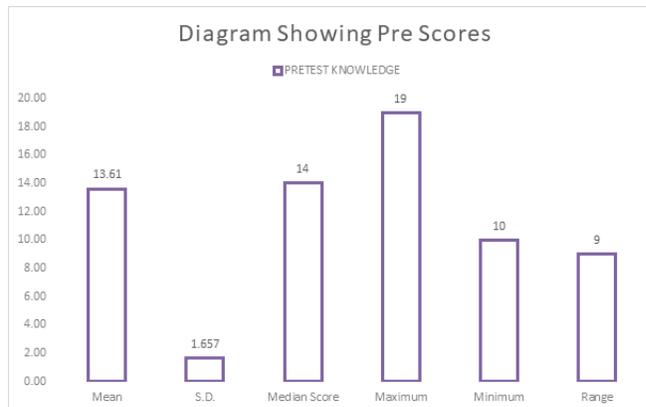

Figure 1: The bar diagram showing pre-test mean (13.61), SD (1.657), Median score (14), Maximum score (19), Minimum score (10), Range (9) regarding cold chain maintenance among ANM students.

Table 3: Finding related to post-test knowledge score level on cold chain maintenance among ANM students.

Criteria to measure the of post-test knowledge score	
Level of scoring (N = 92)	Post test (%)
Low level of score. (1–8)	0 (0%)
Moderate level of score (9–16)	25(27.2%)
Higher level of score (17–25)	67(72.8%)

Objective 2

To examine the effectiveness of structured educational program. Comparison of before (pretest) and after (post-test) intervention mean value confirmed improvement. Before (Pre-test) intervention mean value was 13.61 (S. D = 1.657), while after (post-test) intervention mean value increased 17.53 (Standard deviation=1.537). That means there is statistically significant difference before (pretest) and after (post-test) intervention 3.92, paired *t-test* value was 18.077 (p < 0.001), confirming statistical significance. This demonstrates the STP's effectiveness in enhancing knowledge among ANM students.

These finding are reinforced by a quasi-experimental research study carried out by Sunita R Vada (Chavan) *et al.* (2016), which assessed the effect of a planned teaching program (PTP) on cold chain practices among 100 health personnel at selected PHCs. Their study found that mean knowledge scores increased from 15.64 pre-test to 17.5 post-test (approximately a 2-point improvement, p<0.05). The authors concluded that such educational programs effectively update and improve the knowledge of health workers.

Objective 3

To explore associations between pre-test level of understanding scores with identified demographic factors (Example: age, education, academic year, or previous knowledge & its sources).

Table 4: The comparison between pretest & posttest level of assessment score.

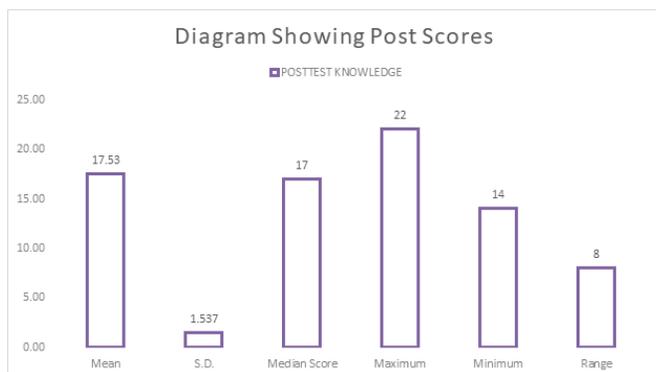| Paired sampling t-test	Average / S.D.	Average %	R	Average Difference	Paired sampling t -test	*p-value*	At table value (0.05)
Pre-test level of score	13.61 ± 1.657	54.40	10–19	3.920	18.077 *significant*	<0.001	1.99
Post-test level of score	17.53 ± 1.537	70.10	14–22				
** Significance Level 0.05 Maxi=25 Mini=0							

Figure 2: The bar diagram showing post-test mean (17.53), SD (1.537), Median score (17), Maximum score (22), Minimum score (14), Range (8) regarding cold chain maintenance among ANM students.

Chi-square analysis showed no significant differences between assessment scores with identified demographic factors such as age, education, academic year, or source of prior knowledge. This indicates students' initial knowledge about cold chain maintenance was independent of these characteristics (NS: P>0.05).

CONCLUSION

The research finding concludes that structured educational program significantly increased within ANM students' understanding of cold chain maintenance. After intervention (post-test) score (17.53) had notably increased than before (pre-test) score (13.61), showing total mean gain of 3.92.

The paired t-test confirmed that statistically difference was significant (t=18.077, P<0.001), that means null hypothesis leading to rejection. Chi-square analysis showed no significant differences between assessment scores with identified demographic factors such as age, education, academic year, or source of prior knowledge. Overall, Study supports that inclusion of structured educational interventions to strengthen cold chain knowledge among nursing students.

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Orcid ID:

Preeti Rawat - https://orcid.org/ 0009-0008-3574-7880

Samrah Butool Faridi - https://orcid.org/0000-0001-9021-2696