

A Study to Assess the Effectiveness of a Structured Teaching Programme on Knowledge and Attitude Regarding Universal Precautions among B.Sc. Nursing Third-Semester Students

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Abstract

Background: Universal precautions are fundamental infection-prevention measures intended to reduce occupational and patient exposure to infectious materials. Nursing students encounter patients and potentially infectious materials during clinical training; therefore, adequate knowledge and a positive attitude toward universal precautions are important for safe nursing practice.

Objective: To assess the pre-test and post-test levels of knowledge and attitude regarding universal precautions among B.Sc. Nursing third-semester students, to determine the effectiveness of a structured teaching programme, and to examine the association between pre-test knowledge and selected demographic and academic variables. **Methods:** A quantitative, pre-experimental one-group pre-test and post-test design was used among 78 third-semester B.Sc. Nursing students in a selected nursing college in Madurai. Participants were selected by convenience sampling. Data were collected using a structured knowledge questionnaire and an attitude rating scale. A structured teaching programme on universal precautions was administered after the pre-test, followed by a post-test. Descriptive statistics, paired t-test and chi-square test were used as specified in the study. **Results:** Before the intervention, 55 (70.5%) participants had inadequate knowledge, 14 (17.94%) had moderate knowledge and 9 (11.53%) had adequate knowledge. After the structured teaching programme, 4 (5.12%) had inadequate knowledge, 10 (12.82%) had moderate knowledge and 64 (82.05%) had adequate knowledge. The mean knowledge score increased from 11.46 ± 5.16 in the pre-test to 22.67 ± 4.49 in the post-test, an increase of 11.21 points. The study reports a statistically significant pre-test/post-test improvement ($p < 0.05$). The study narrative also reports improvement in attitude; however, numerical pre-test/post-test attitude scores are not presented in the supplied research document. Gender, area of clinical exposure and source of knowledge were reported as significantly associated with knowledge, whereas several other selected variables were not. **Conclusion:** The findings support the usefulness of a structured teaching programme in improving knowledge regarding universal precautions among the participating nursing students. Regular, reinforced infection-prevention education, practical demonstrations and clinical supervision are warranted in nursing education.

Keywords: universal precautions; infection prevention; nursing students; structured teaching programme; knowledge; attitude; nursing education

1. Introduction

Universal precautions are an important component of infection prevention and control in healthcare. They are based on the principle that blood and certain body fluids, non-intact skin and mucous membranes should be treated as potentially infectious, regardless of a patient's diagnosis. Key measures include hand hygiene, appropriate personal protective equipment, safe handling and disposal of sharps, decontamination of equipment, environmental hygiene and appropriate management of exposure incidents.

Nursing students begin developing professional infection-prevention behaviours during their undergraduate education and clinical postings. Deficiencies in knowledge or inconsistent adherence to precautions may increase occupational exposure and compromise patient safety. The study document identifies gaps in areas such as safe needle disposal and prevention of needle-stick injuries in the reviewed literature and emphasizes the role of continuing education and reinforcement.

The present study therefore evaluated a structured teaching programme intended to strengthen nursing students' knowledge and attitude regarding universal precautions. The research was conducted among third-semester B.Sc. Nursing students in a selected nursing college in Madurai.

2. Problem Statement

A study to assess the effectiveness of a structured teaching programme on knowledge and attitude regarding universal precautions among B.Sc. Nursing third-semester students.

3. Objectives

- To assess the pre-test level of knowledge and attitude regarding universal precautions among B.Sc. Nursing third-semester students.
- To evaluate the effectiveness of the structured teaching programme.
- To assess the post-test level of knowledge and attitude after the teaching programme.
- To determine the association between pre-test knowledge scores and selected demographic and academic variables.

4. Hypotheses

- H0: There is no significant difference between pre-test and post-test knowledge regarding universal precautions.
- H1: There is a significant difference between pre-test and post-test knowledge regarding universal precautions.

5. Conceptual Framework

The study was based on the concept that planned education improves knowledge, which may influence attitude and support safer infection-control practices among nursing students. The structured teaching programme was treated as the independent variable, while knowledge and attitude regarding universal precautions were treated as dependent variables.

6. Materials and Methods

6.1 Research Approach and Design

A quantitative research approach was adopted. The study used a pre-experimental one-group pre-test and post-test design. The intervention sequence was: pre-test → structured teaching programme → post-test.

6.2 Setting, Population and Sample

Item	Description
Study setting	Selected nursing college, Madurai, Tamil Nadu
Target population	B.Sc. Nursing students
Participants	Third-semester B.Sc. Nursing students
Sample size	78
Sampling technique	Convenience sampling

6.3 Eligibility Criteria

Inclusion criteria included B.Sc. Nursing students studying in the selected college, willing to participate, present during data collection, and having completed at least one clinical posting. Students who were absent, unwilling, or submitted incomplete questionnaires were excluded.

6.4 Data Collection Instruments

The data-collection tool consisted of three sections: Section A, demographic and selected academic variables; Section B, a self-structured knowledge questionnaire on universal precautions; and Section C, an attitude rating scale. The knowledge score was categorized in the study as inadequate (1–10), moderate (11–20), and adequate (21–30). The study reports that reliability of the structured knowledge questionnaire was established by the split-half method and was considered highly reliable.

6.5 Data Collection Procedure

Formal permission was obtained from the concerned authority. Written informed consent was obtained from participants. The pre-test was administered, the structured teaching programme was delivered, and a post-test was subsequently conducted. Confidentiality and anonymity were maintained.

6.6 Statistical Analysis

Frequency, percentage, mean and standard deviation were used for descriptive analysis. The paired t-test was used to compare pre-test and post-test mean scores, and the chi-square test was used to examine associations between knowledge level and selected variables. The level of significance was set at 0.05.

6.7 Ethical Considerations

The study document specifies institutional ethical approval, permission from the college authority, informed consent, voluntary participation, confidentiality, anonymity and the right to withdraw as ethical considerations.

7. Results

7.1 Participant Characteristics

Characteristic	n	%
Age 19 years	55	70.5
Female	57	73.1
Hindu	60	76.9
Urban residence	36	46.2
Rural residence	36	46.2

Received formal infection-control/universal-precaution training	61	78.2
Hostel residence	67	85.9
Previous clinical exposure	70	89.7
General ward as previous clinical area	49	62.8
Classroom teaching as source of knowledge	40	51.3
Always use standard precautions during clinical practice	44	56.4
Aware of needle-stick injury	65	83.3
Infection-control classes as source of needle-stick injury information	39	50.0

7.2 Knowledge Level Before and After the Intervention

Knowledge level	Pre-test n (%)	Post-test n (%)
Inadequate	55 (70.5)	4 (5.12)
Moderate	14 (17.94)	10 (12.82)
Adequate	9 (11.53)	64 (82.05)
Total	78 (100)	78 (100)

The proportion with adequate knowledge increased from 11.53% before the structured teaching programme to 82.05% after the intervention. The proportion with inadequate knowledge decreased from 70.5% to 5.12%.

7.3 Comparison of Mean Knowledge Scores

Measure	Pre-test	Post-test	Mean change
Knowledge score, Mean $\pm$ SD	11.46 $\pm$ 5.16	22.67 $\pm$ 4.49	11.21

The post-test mean was 11.21 points higher than the pre-test mean. The study reports that the paired t-test demonstrated a statistically significant pre-test/post-test difference at $p < 0.05$.

7.4 Association with Selected Variables

Variable	χ^2	df	Study-reported interpretation
Age	0.132	6	Not significant
Gender	3.532	2	Significant
Religion	0.594	4	Not significant
Type of residence	0.265	4	Not significant
Place of study	1.730	6	Not significant
Formal training	0.61	2	Not significant
Clinical exposure	0.23	2	Not significant
Area of clinical	2.11	6	Significant

exposure			
Use of universal precautions	1.383	6	Not significant
Source of knowledge	3.234	6	Significant
Awareness of needle-stick injury	0.64	2	Not significant
Source of information	0.988	6	Not significant

According to the supplied study report, gender, area of clinical exposure and source of knowledge were significantly associated with knowledge, whereas the other listed variables were reported as not statistically significant.

7.5 Attitude Findings

The research study states that attitude toward universal-precaution practice improved following the structured teaching programme and identifies attitude as a dependent variable. However, the supplied report does not provide the numerical pre-test and post-test attitude means, standard deviations, category frequencies, or a complete attitude-specific test statistic. Therefore, these values are not reproduced or estimated in this article.

8. Discussion

The major finding was a marked improvement in knowledge after the structured teaching programme. At baseline, 70.5% of students had inadequate knowledge and only 11.53% had adequate knowledge. After the intervention, 82.05% had adequate knowledge and only 5.12% remained in the inadequate category. The mean knowledge score increased from 11.46 ± 5.16 to 22.67 ± 4.49 .

These findings are consistent with the educational rationale presented in the study's literature review: nursing students may possess basic awareness of infection-control measures while still having gaps in safe sharps handling, needle-stick injury prevention, personal protective equipment and other standard precautions. The reviewed literature also emphasizes that regular education, practical demonstration and reinforcement can strengthen knowledge and compliance.

The association analysis identified gender, area of clinical exposure and source of knowledge as significant variables in relation to knowledge in the study sample. Because the study used a single-group pre-experimental design and convenience sampling, these associations should be interpreted as findings within the study population rather than as evidence of causal effects or broad population relationships.

The study also reports improvement in attitude after the intervention. Because the supplied document does not provide the corresponding numerical attitude results, the magnitude and statistical strength of that improvement cannot be independently quantified from the available study report.

9. Implications for Nursing

- Nursing education: Universal-precaution content should be reinforced throughout undergraduate nursing education using structured teaching, demonstrations and simulation-based learning.
- Nursing practice: Students should receive regular supervision during clinical postings for hand hygiene, PPE use, sharps safety, biomedical waste segregation and exposure prevention.
- Nursing administration: Clinical and academic units can coordinate periodic infection-control teaching and monitoring.

- Nursing research: Future studies can use larger samples, control groups, longitudinal follow-up and direct observation of clinical practice.

10. Limitations

- The study was conducted in one selected nursing college.
- Only third-semester B.Sc. Nursing students were included.
- The sample size was limited to 78 participants.
- The study assessed knowledge and attitude during the study period.
- Convenience sampling limits generalizability.
- Self-reported responses may introduce response bias.
- Numerical attitude outcomes are not reported in the supplied study document.

11. Recommendations

- Conduct similar studies with larger samples.
- Undertake comparative studies in government and private nursing colleges.
- Conduct similar interventions among staff nurses and other healthcare professionals.
- Use controlled experimental designs to strengthen evidence for intervention effectiveness.
- Conduct long-term follow-up to assess retention of knowledge.
- Incorporate regular structured teaching programmes into undergraduate nursing curricula.
- Use workshops, demonstrations and simulation-based training to reinforce infection-control practices.
- Assess actual compliance with universal precautions during clinical practice.
- Evaluate different educational approaches, including simulation, e-learning and blended learning.

12. Conclusion

In this study of 78 third-semester B.Sc. Nursing students, knowledge regarding universal precautions improved substantially after implementation of a structured teaching programme. The proportion with adequate knowledge increased from 11.53% in the pre-test to 82.05% in the post-test, while the mean knowledge score increased by 11.21 points. The study reports a statistically significant pre-test/post-test difference ($p < 0.05$). The report also describes improvement in attitude, although numerical attitude outcomes are not supplied. The findings support continued, structured and reinforced infection-prevention education as part of undergraduate nursing preparation.

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