International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Enhancing Cranial Nerve Assessment Skills: Effectiveness of A Structured Teaching Program Among B.sc Nursing Students in Maharashtra

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Abstract

Introduction

Neurological assessment, particularly cranial nerve examination, is an essential skill in nursing practice for early identification of neurological deficits. However, nursing students, especially in the early semesters, often struggle to apply theoretical knowledge effectively in clinical settings. This gap can lead to missed signs and delayed interventions, negatively impacting patient outcomes. Structured teaching programmes that integrate theory with practical sessions have shown promise in improving both knowledge and clinical skills. This study evaluates the effectiveness of a structured teaching intervention on cranial nerve assessment among 2nd semester BSc Nursing students in Maharashtra.

Methods

The study employed a pre-experimental one-group pre-test post-test design involving 40 BSc Nursing students from a selected nursing college in Maharashtra. A structured teaching programme comprising theoretical instruction and practical demonstrations was implemented. Baseline and post-intervention data on students' knowledge and practical skills related to cranial nerve assessment were collected using structured tools. Data analysis was carried out using descriptive and inferential statistics, including paired t-tests, with significance set at $p \leq 0.05$.

Results

Pre-test findings revealed that 47.5% of students had average knowledge, with a mean score of 12.68/25 (50.7%), and 75% demonstrated poor practical skills, with a mean score of 57.95/175 (33.11%). Post-test results showed significant improvements: 82.5% scored outstanding in knowledge with a mean of 21.83/25 (87.3%), and 95% achieved outstanding scores in practice, with a mean of 162.93/175 (93.1%). The paired t-test yielded $t = 15.652$ ($p < 0.001$) for knowledge and $t = 56.323$ ($p < 0.001$) for practice, confirming the intervention's effectiveness.

Conclusion

The structured teaching programme was highly effective in improving the knowledge and practical skills of BSc Nursing students in cranial nerve assessment. The statistically significant results indicate that such programmes should be integrated into early nursing curricula to promote clinical competence and enhance the quality of patient care in neurological nursing settings.

Keywords: Neurological assessment, Cranial nerve examination, Structured teaching programme, BSc nursing students

INTRODUCTION

Neurological assessment is a fundamental component of patient care, particularly in settings involving acute and chronic neurological conditions. Accurate evaluation of cranial nerve function is critical for early identification of neurological deficits, monitoring disease progression, and ensuring timely intervention [1]. For Basic BSc Nursing students, acquiring this competency is vital, as they often encounter patients with potential or established neurological impairments during clinical placements. However, many students find the neurological examination intimidating and complex, primarily due to limited clinical exposure and insufficient hands-on practice [2]. Thus, there is a growing need to strengthen foundational training in neurological assessment within the undergraduate nursing curriculum.

Numerous studies have highlighted that nursing students struggle with the theoretical and practical aspects of neurological assessment, especially in evaluating cranial nerves [3]. The abstract nature of neurological functions and the intricacies of testing various cranial nerves demand a level of clinical reasoning and dexterity that students often lack during early training. Factors contributing to these challenges include inadequate teaching resources, lack of simulation-based practice, and the absence of semi- structured assessment checklists[4]. This skill gap not only affects student confidence but also compromises the quality of patient care, especially in neuro-critical units where early detection of subtle changes is essential.

Semi- structured teaching programmes (STPs) are designed educational interventions that offer systematic learning through theoretical instruction, demonstrations, simulations, and guided practice[5]. These programmes have proven effective in enhancing clinical skills among nursing students by bridging the gap between theoretical knowledge and practical application[6]. In the context of neurological assessment, STPs can offer a step-by-step approach to understanding cranial nerve functions, recognizing abnormal findings, and performing appropriate examinations. The integration of visual aids, checklists, and simulation mannequins further facilitates active learning and skill retention.

Evaluating the effectiveness of a semi- structured teaching programme ensures that educational strategies are evidence-based and tailored to meet learner needs. A pre-test and post-test design can be employed to assess improvements in knowledge and skill performance among nursing students[7]. This allows educators to measure learning outcomes objectively and refine teaching approaches accordingly. Additionally, feedback from students can provide valuable insights into the clarity, relevance, and applicability of the training. Such evaluations not only validate the instructional method but also contribute to curriculum development in nursing education.

The findings from studies evaluating semi- structured teaching programmes in neurological assessment can have significant implications for nursing education. By adopting evidence-based educational interventions, nursing institutions can enhance the clinical competence of their students, preparing them for real-world challenges in diverse healthcare settings[8]. Semi- structured programmes foster critical thinking, confidence, and proficiency in conducting cranial nerve assessments, which are crucial for holistic patient care. Furthermore, incorporating such interventions into routine teaching plans aligns with global trends in competency-based nursing education, ultimately improving patient safety and healthcare quality.

Background

Neurological assessments, particularly cranial nerve evaluations, are fundamental competencies for nursing students, essential for identifying and managing neurological disorders.

In nursing, the process of learning occurs within a framework of influential factors that affect the character, quality and effectiveness of an educational program of an institution. These influential factors include the institutional philosophy, the administrative policy, the learner, faculty, the classroom environment, the A.V aids that are being used, use of simulators, lab demonstration, types of patients, interests and problems of the community and collective beliefs of those involved in the education program. Despite their importance, many nursing students struggle with mastering these assessments due to insufficient practical exposure and semi- structured training. A study by Pandey and Kumar [9] (2020) highlighted that both lecture using PowerPoint and lecture cum demonstration methods were effective in enhancing the knowledge and skills of nursing students regarding cranial nerve assessment, with lecture using PowerPoint being more effective.

Similarly, Divya and Ponchitra [10] (2018) found that a semi- structured training program significantly improved registered nurses' knowledge in comprehensive neuro assessments, with mean scores increasing from 12.7 (SD=2.56) pre-training to 17.41 (SD=1.97) post-training. These findings underscore the need for semi- structured teaching programs to enhance proficiency in neurological assessments. This study aims to evaluate the effectiveness of such a program on Basic BSc Nursing students in Maharashtra, providing insights that could inform curriculum development and improve clinical competencies.

By implementing the best teaching method we as nurse educator can help the students to keep their knowledge up to date as per the demand of the growing technology and help the students to gather latest information and develop clinical practice with regard to the patient care and prevention of any illness. With the help of a well planned teaching method the teacher can draw the attention of the students towards the subject matter, develop interest in the students and help them gain knowledge and improve their skills[11].

Aim

To assess the effectiveness of a semi- structured teaching programme on improving the skill of neurological assessment—specifically cranial nerve examination—among Basic BSc Nursing students in a selected college in Maharashtra.

Objectives

1. To assess the baseline knowledge and skill of BSc Nursing students regarding the neurological assessment of cranial nerves.
2. To evaluate the effectiveness of a semi- structured programme on improving the knowledge and skills of BSc Nursing students in performing cranial nerve assessments.

Operational Definitions

- **Effectiveness:**

The extent to which the semi- structured teaching program improves the skill of neurological assessment of cranial nerves among Basic BSc Nursing students. It will be measured by comparing pre-test and post-test skill scores.

- **Semi- structured Teaching Program:**

A systematically designed educational intervention that includes lectures, demonstrations, audiovisual aids, and hands-on practice sessions to enhance students' knowledge and skills in cranial nerve assessment.

- **Neurological Assessment of Cranial Nerves:**

A systematic clinical examination performed to evaluate the function of the twelve cranial nerves, include ing tests for sensory, motor and reflex responses.

- **Skill:**

The ability of Basic BSc Nursing students to accurately perform a cranial nerve assessment, measured through an objective semi- structured clinical examination (OSCE) or a standardized skills checklist and return demonstration in the form of post-test.

Basic BSc Nursing Students: Undergraduate nursing students enrolled in a Bachelor of Science in Nursing (BSc Nursing) program at a selected college in Maharashtra.

Methodology

Research approach : Experimental study

Research Design : One-group pre-test post-test design

Study Setting : Selected Nursing college of Maharashtra

Study variables

Independent Variable: Semi- structured teaching program on neurological assessment of cranial nerves.

Dependent Variable: Skill level of BSc Nursing students in neurological assessment of cranial nerves.

Population : 2nd Semester BSc Nursing students enrolled in the selected college.

Sample, Sampling Technique, and Sample Size :

- **Sample**: The study sample consisted of (2nd Semester BSc Nursing students)
- **Sampling Technique**: Convenient **sampling** technique was used to select eligible candidates who met the inclusion criteria. Every consecutive sample meeting the inclusion criteria shall be included in the study.
- **Sample Size**: Sample size for this study will be 40 participants.

Sample Criteria :

Inclusion Criteria

1. 2nd Semester BSc Nursing students willing to participate in the study.
2. Students who have not received prior semi- structured training on cranial nerve assessment.
3. Those who are available during the data collection period.

Exclusion Criteria

1. Students who have already received training or workshops on cranial nerve assessment.
2. Those who are unwilling to participate in the study.

Tool Used for Data Collection

1. Semi- structured Knowledge Questionnaire: A self-administered questionnaire consisting of multiple-choice questions to assess students' theoretical knowledge of cranial nerve assessment.
2. Objective Semi- structured Clinical Examination (OSCE) Checklist: A standardized checklist to evaluate students' practical skills in performing a neurological assessment of cranial nerves. This will include steps such as patient positioning, testing each cranial nerve, and correctly interpreting findings.

Tool Preparation and Validation :

- The tool was prepared based on an extensive literature review**.**

- Content validation was done by a panel of experts
- A pilot study was conducted on 10% of the sample to test clarity, reliability, and feasibility, and the results were included only after refinement.

Data Collection Technique :

1. Pre-Test:

Technique: A knowledge questionnaire and OSCE checklist will be used before the semi- structured teaching program to assess baseline knowledge and skill levels of students.

2. Intervention (Semi- structured Teaching Program):

Technique: The program will include lectures, demonstrations, audiovisual aids, and hands-on practice sessions on cranial nerve assessment.

3. Post-Test:

Technique: The same knowledge questionnaire and OSCE checklist will be administered after the semi-structured teaching program to evaluate improvement in knowledge and skill.

Data Analysis

Analysis and interpretation of data was done according to the objectives using descriptive and inferential statistics. The level of significance chosen was at $p \leq 0.05$. The analyzed data was organized according to the objectives.

The data were analyzed using SPSS version 30. Descriptive statistics, including percentage, mean, and standard deviation, were used to summarize the data. Paired t-test comparing pre- and post-test knowledge scores and practical scores of BSc Nursing students (N=40) regarding neurological assessment of cranial nerves. A p-value less than 0.05 was considered statistically significant.

Results

A total of 40 BSc Nursing students participated in the study. The impact of a semi- structured teaching programme on students' knowledge and practice regarding neurological assessment of cranial nerves was evaluated using pre- and post-test assessments.

Knowledge Scores :

Before the intervention, the mean knowledge score was 12.68 (SD = 3.230), which corresponds to 50.7% of the maximum possible score (25). Most participants fell within the average (47.5%) and below average (30%) categories, with only 22.5% scoring in the good category and none in the outstanding category.

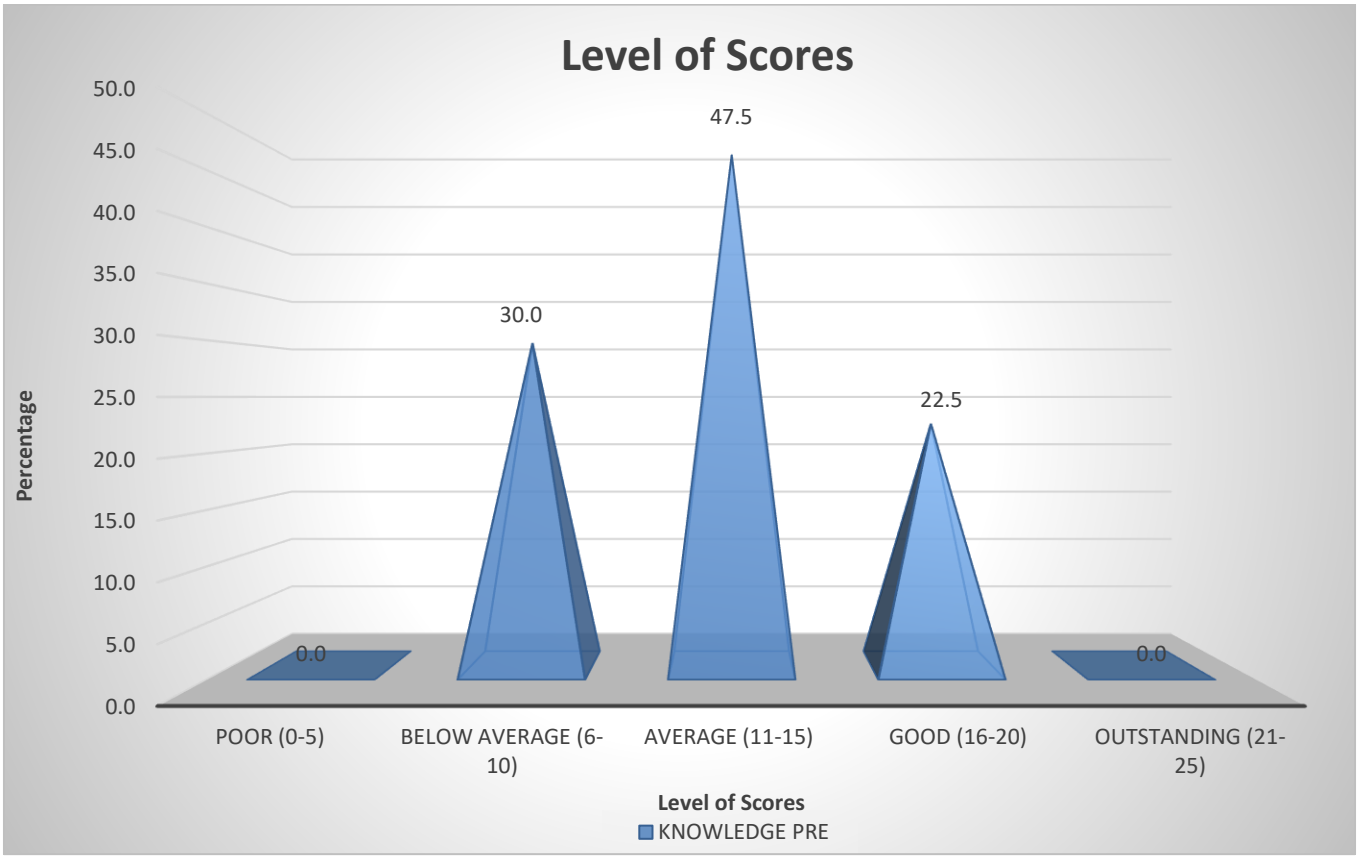
After the semi- structured teaching programme, a substantial improvement was observed. The mean post-test knowledge score increased to 21.83 (SD = 1.933), amounting to 87.3%. A majority of the students (82.5%) achieved outstanding scores, and the remaining 17.5% were in the good category. None of the participants fell into the poor, below average, or average categories in the post-test.

Table 1. Comparison of Pre-test and Post-test Knowledge Levels (N = 40)

Score Category	Pre-test n (%)	Post-test n (%)
Poor (0–5)	0 (0%)	0 (0%)
Below Average (6–10)	12 (30%)	0 (0%)
Average (11–15)	19 (47.5%)	0 (0%)
Good (16–20)	9 (22.5%)	7 (17.5%)
Outstanding (21–25)	0 (0%)	33 (82.5%)

A paired t-test analysis revealed a statistically significant difference in knowledge scores between pre- and post-tests ($t = 15.652$, $p < 0.001$), confirming the effectiveness of the teaching intervention.

Figure 1 : Percentage Distribution of Pre-test Knowledge



Practice Scores

The pre-test mean practice score was 57.95 (SD = 7.049), or 33.11% of the maximum score (175). The majority (75%) of students were classified as poor, and 25% as below average, with none reaching the average, good, or outstanding levels.

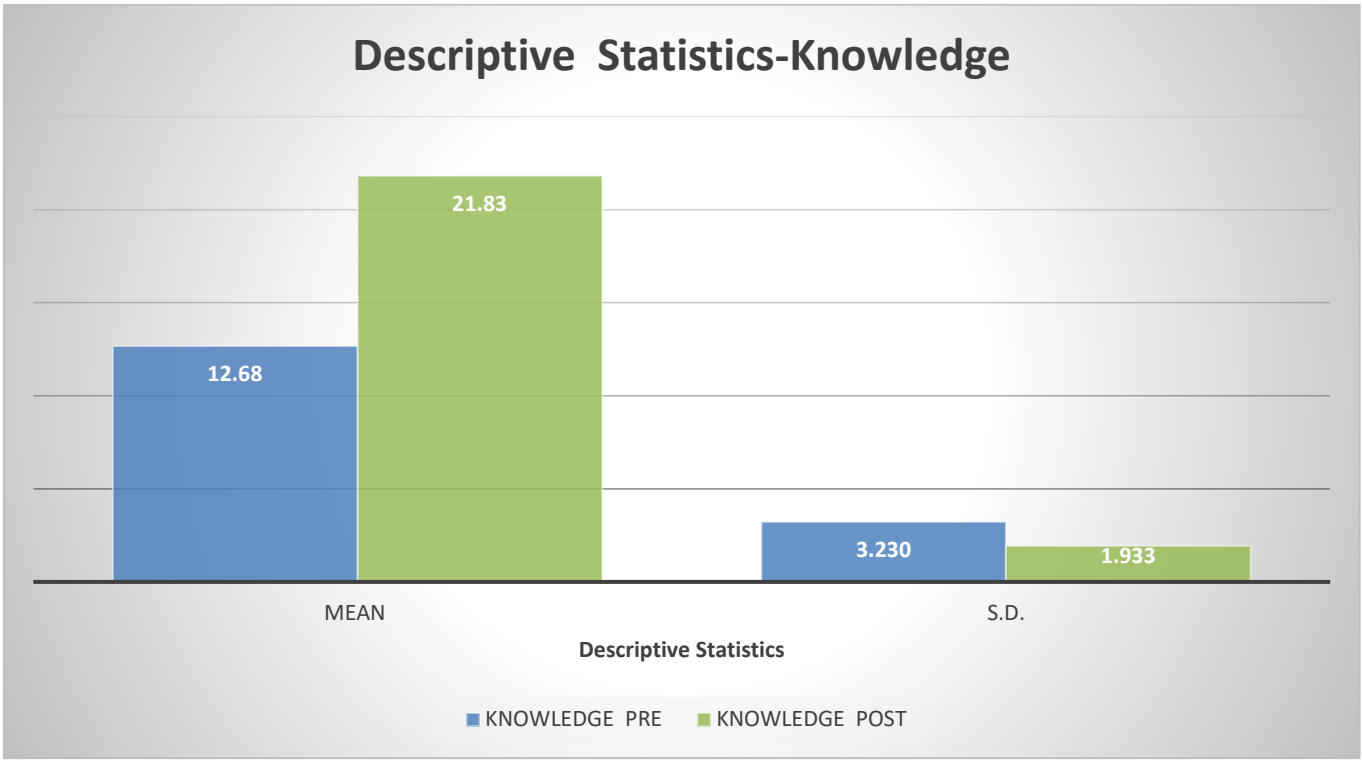
Following the intervention, the mean practice score rose dramatically to 162.93 (SD = 8.365), equivalent to 93.10%. A total of 95% of the students reached the outstanding level, while 5% achieved good scores. No students fell in the lower performance categories post-test.

Table 2. Comparison of Pre-test and Post-test Practice Levels (N = 40)

Score Category	Pre-test n (%)	Post-test n (%)
Poor (35–62)	30 (75%)	0 (0%)
Below Average (63–90)	10 (25%)	0 (0%)
Average (91–118)	0 (0%)	0 (0%)
Good (119–146)	0 (0%)	2 (5%)
Outstanding (147–175)	0 (0%)	38 (95%)

The paired t-test for practice scores also indicated a statistically significant improvement ($t=56.323$, $p < 0.001$), demonstrating that the semi- structured teaching programme had a highly positive impact on students' clinical skill performance.

Figure 2 : Comparison of Descriptive Statistics of Pre-test and Post-test Knowledge Scores



Item-wise Analysis

An item-wise analysis of knowledge revealed improved performance on nearly all individual questions. For instance, correct response rates for Question 2 rose from 50% to 100%, Question 13 from 10% to 87.5%, and Question 25 from 20% to 97.5%. Only one question (Q22) showed minimal change.

Practice-related skills also improved markedly across all evaluated items. The mean scores for specific clinical steps (e.g., 3A, 3B, 4D, 5A, 6C, and 7D) increased from baseline scores around 1.2–1.9 to post-test scores of 4.5–4.9 (out of 5), indicating consistent enhancement in technical performance across all skill components.

Discussion

The present study aimed to assess the effectiveness of a semi- structured teaching programme in enhancing the knowledge and practical skills of BSc Nursing students regarding the neurological assessment of cranial nerves. The findings clearly demonstrate that the intervention had a significant and positive impact on both cognitive and psychomotor domains.

Before the intervention, the majority of students had only moderate understanding of the subject. Nearly half (47.5%) scored in the average range on the knowledge test, and 30% fell into the below average category. Post-intervention, however, a striking shift was observed, with 82.5% of students achieving outstanding scores and the remainder classified as good. The improvement in the mean knowledge score from 12.68 to 21.83 was statistically significant ($p < 0.001$), confirming the effectiveness of the semi- structured teaching programme in enhancing conceptual understanding.

Practical skills showed even more dramatic improvement. At baseline, 75% of students were categorized as having poor skill levels in cranial nerve assessment, with a mean practice score of just 57.95 out of 175. Following the teaching intervention, the mean score increased significantly to 162.93, and 95% of students

reached the outstanding category. The p-value of less than 0.001 indicated a highly significant improvement in practice performance. These results suggest that the semi- structured teaching approach was not only effective in delivering theoretical content but also in building the students' clinical competence.

The item-wise analysis further supports these findings. Knowledge questions that had low pre-test accuracy, such as those related to specific cranial nerve functions, showed substantial post-test gains. Similarly, practical items that were initially poorly performed, such as components of sensory and motor testing, demonstrated near-maximal post-intervention scores. This comprehensive improvement implies that the teaching strategy addressed both simple and complex components effectively.

These results are consistent with existing literature, which emphasizes the importance of semi- structured, interactive, and skill-oriented teaching in nursing education. The use of demonstration, guided return demonstration, and immediate feedback likely contributed to the significant improvements observed in this study. Moreover, the focused nature of the intervention allowed students to concentrate on a single clinical skill area, facilitating deeper learning and greater retention.

Conclusion

The findings of this study demonstrate that a semi- structured teaching programme significantly improved the knowledge and practical skills of BSc Nursing students in the neurological assessment of cranial nerves. The post-test scores showed a marked increase in both cognitive understanding and clinical competence, with statistically significant differences between pre- and post-intervention results. These outcomes highlight the effectiveness of semi- structured, targeted educational interventions in enhancing learning outcomes for nursing students. Incorporating such programmes into routine nursing education can play a crucial role in preparing students for accurate and confident neurological assessments, ultimately contributing to better patient care.

Implications of the Study

The results of this study carry important implications at multiple levels—individual, community, and policy.

Individual :

At the individual level, this study has significant implications for the development of clinical competence among 2nd semester BSc Nursing students. The semi- structured teaching programme on cranial nerve assessment enables students to acquire foundational neurological assessment skills, thereby improving their confidence, accuracy, and readiness to apply these skills in real clinical settings. This early exposure helps bridge the gap between theoretical learning and practical application, fostering a deeper understanding and greater interest in clinical neurology. As a result, students are more likely to engage actively in clinical learning and take greater responsibility for patient assessment tasks.

Community :

From a community health perspective, the enhancement of nursing students' skills in neurological assessment can contribute to improved healthcare outcomes at the grassroots level. Nurses are often the first point of contact in community health centers and primary care settings, where early recognition of neurological deficits can lead to timely referrals and interventions. By training students to perform accurate cranial nerve assessments, the study indirectly supports the early detection of neurological disorders, especially in underserved areas. This can reduce delays in diagnosis, prevent complications, and strengthen the role of nurses in delivering quality community-based care.

Policy Making :

At the policy-making level, the findings of this study can inform nursing regulatory bodies, academic councils, and health education authorities about the importance of incorporating semi- structured, skill-based teaching interventions into nursing curricula. It highlights the need for competency-based education that goes beyond theoretical instruction to ensure practical skill mastery. Policymakers may consider using this evidence to mandate periodic clinical skill evaluations and the integration of standard teaching protocols across nursing institutions. Additionally, the study underscores the value of investing in faculty development, infrastructure for skill labs, and learning resources to support hands-on training.

Implications In Nursing

The findings of the present study have several implications on nursing profession i.e.in nursing practice, nursing administration, nursing education and nursing research

A. Nursing Practice :

- Enhances the clinical competency of nursing students in performing cranial nerve assessments accurately and confidently. Promotes early identification of neurological deficits, leading to timely interventions and improved patient care outcomes.
- Strengthens nurses' role in multidisciplinary teams by enabling them to contribute effectively to neurological evaluations.
- Reduces the risk of clinical errors through better skill preparedness in real-time patient care settings.

B. Nursing Education :

- Encourages the incorporation of semi- structured, skill-based teaching modules in the nursing curriculum for effective skill development.
- Promotes active learning through demonstrations, return demonstrations, simulations, and use of skill labs.
- Helps educators align teaching methods with student learning needs, improving knowledge retention and performance.
- Supports curriculum revision to emphasize the importance of practical skills alongside theoretical learning

C. Nursing Administration:

Emphasizes the need for administrative support in providing resources such as well-equipped skill laboratories and trained faculty.

- Advocates for regular workshops, skill development sessions, and continuous monitoring of teaching effectiveness.
- Encourages leadership to implement systems for evaluating student performance in clinical skills.
- Supports the establishment of institutional policies to promote semi- structured and standardized clinical teaching practices.

D. Nursing Research :

- Provides a foundation for future studies on the effectiveness and long-term retention of semi- structured teaching programmes.
- Encourages research on various teaching methodologies and their impact on skill acquisition and clinical competence.

- Highlights the importance of evidence-based teaching strategies in nursing education.
- Opens avenues for interdisciplinary research linking nursing education, practice outcomes, and patient safety.

Limitations of the Study

- The study was restricted to 2nd Semester BSc Nursing students with limited clinical exposure.
- It was conducted in a single nursing college in Maharashtra, limiting the generalizability of results
- The focus was solely on cranial nerve assessment, excluding other neurological examination components
- Assessment measured only immediate outcomes; long-term retention and clinical application were not evaluated.
- Practical skills were assessed in simulated settings, not in actual clinical environments.
- The teaching and evaluation were based on the specific curriculum and language of the selected college.

Recommendations

For Nursing Education Institutions :

- Integrate semi- structured neurological assessment training early in the BSc Nursing curriculum.
- Conduct regular skill-based sessions using simulations and return demonstrations.
- Train faculty in modern, evidence-based teaching methods.
- Ensure access to well-equipped skill labs for hands-on practice.

For Nursing Students :

- Actively engage in demonstrations and supervised clinical sessions.
- Utilize peer learning to enhance skill confidence and accuracy.
- Seek regular feedback to improve assessment techniques.

For Nursing Administrators :

- Provide necessary resources like models, videos, and checklists.
- Promote continuous improvement through reviews and audits.
- Schedule semi- structured clinical training within the academic plan.

For Regulatory Bodies and Policy Makers :

- Mandate competency-based teaching and assessment in nursing curricula.
- Develop national-level skill checklists for uniformity.
- Enforce regular faculty training and curriculum updates.

For Future Researchers :

- Study long-term skill retention and real-world clinical application.
- Compare semi- structured teaching with traditional methods.
- Explore the impact of enhanced assessment skills on patient care outcomes.

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