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Research Protocol

Obstetrics and Gynaecology Section

Evaluating the Impact of Vertical Integration Teaching on Cervical Cancer among MBBS Students: A Research Protocol

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ABSTRACT

Introduction: Vertical integration in medical education bridges basic and clinical sciences, enhancing the relevance and retention of knowledge. Graduate Medical Education Regulations 2019 (GMER 2019) permits up to 20% of content to be delivered through integration, promoting meaningful, application-based learning.

Need for the Study: Cervical cancer requires an understanding of Anatomy, Pathology, Microbiology, and Clinical Management, making it ideal for demonstrating how vertical integration improves the application of basic and clinical knowledge. There are only a few research articles on vertical integration in Indian medical colleges.

Aim: To assess the impact of vertical integration in medical education in a medical college in the northeastern state of Manipur.

Materials and Methods: A quasi-experimental study involving 92 second-year MBBS students will be conducted at Churachandpur Medical College, Imphal campus, Imphal, Manipur, India, from November 2024 to September 2025. The intervention consists of a two-hour vertically integrated teaching module on cervical cancer, combining didactic lectures with a Demonstrate-Observe-Assist-Perform (DOAP) session. Students will undergo pre and post-intervention assessments using validated Multiple Choice Questions (MCQs) and Objective Structured Clinical Examination (OSCE) stations. A paired Student's t-test will be used to compare mean scores, with a p-value <0.05 considered statistically significant.

Keywords: Assist, Demonstrate, Educational intervention, Faculty perspective, Observe, Perform, Student perception

INTRODUCTION

The knowledge and skills gained during the MBBS (Bachelor of Medicine, Bachelor of Surgery) course are directly related to patient care and the overall welfare of the community; learning does not end with the students themselves [1-3]. An integrated curriculum is defined as "education that is organised in such a way that it cuts across subject matter lines, bringing together various aspects of the curriculum into meaningful association to focus upon broad areas of study" [4].

As per the GMER 2019 guidelines of the Medical Council of India, up to 20% of subject content can be delivered through integration. Integration can be implemented in two planes for practical purposes [5]. Horizontal and vertical integration enhance medical education by creating connections within and across phases of the curriculum. Horizontal integration within a single phase combines various disciplines, topics, and subjects, reducing redundancy and fostering interconnectedness among fields studied in the same phase. Vertical integration, spanning across phases, links basic and clinical sciences; in the early phases, it highlights the relevance of basic sciences to clinical concepts, while in later phases, it draws on foundational scientific knowledge for clinical application [3].

Horizontal integration links different subjects within the same phase or level of study, while vertical integration links subjects across different phases or levels of study. Both forms of integration are vital in helping students understand concepts and apply them in real-life scenarios [5]. Vertical integration aims to promote deeper, more connected learning by establishing a correlation between classroom theory and real clinical scenarios. By aligning theoretical content with its practical application in patient care, vertically integrated curricula help students understand the causes, diagnosis, and treatment of various clinical problems encountered in practice. Harden's SPICES (Student-centered, Problem-based, Integrated, Community-based, Electives, Systematic) model (1984) of integration also encourages a unified, cohesive approach to education rather than fragmented teaching [6].

REVIEW OF LITERATURE

The main goal of vertical integration is to align the knowledge and skills acquired by students with real clinical applications. It makes learning more meaningful by linking basic science knowledge to clinical practice and enhances student engagement. This approach also reflects the principles of adult learning theory, which emphasise that adults learn best when they perceive the direct relevance and usefulness of what they study [7].

Studies by Hassan S and by Dornan T and Bundy C, have demonstrated that early clinical exposure through vertical integration provides students with immediate opportunities to apply basic science knowledge in real-world contexts, leading to improved long-term retention and development of analytical clinical reasoning skills [8,9]. In a study conducted by Rajan SJ et al., (2016) in Tamil Nadu among final-year MBBS students, vertically integrated classes were found to improve knowledge, motivate students, and enhance summative assessment scores [10]. Similarly, Mishra AK et al., (2020) reported that vertical integration across different disciplines in medicine improved student engagement and skill development. However, this study, conducted in Puducherry, did not include student and faculty feedback. The present study aims to address this gap by incorporating the perspectives of both students and faculty regarding vertically integrated teaching sessions [11].

Furthermore, in a study conducted by Singh A et al., second-year MBBS students who participated in vertically integrated sessions delivered by multiple departments using a combination of interactive and traditional teaching methods were evaluated. Student competency was assessed using several competency-based tools,

and perceptions were recorded using a Likert scale. Comparative pre and post-testing demonstrated a clear improvement in competency, and students expressed a strong preference for vertical integration. The analysis also indicated meaningful differences between the assessment tools [12]. The current study will help determine whether integrating basic sciences with clinical cases also promotes the development of robust and meaningful knowledge frameworks.

The present study aims to assess the impact of vertical integration in medical education at a medical college in the Northeastern state of Manipur, India.

Study Objectives

- To evaluate improvement in knowledge related to cervical cancer following a vertically integrated teaching module.
- To assess students' perceptions of the vertically integrated teaching approach.
- To assess faculty perspectives on the feasibility and usefulness of vertical integration.

Null Hypothesis (H0): Vertically integrated classes will not significantly improve students' knowledge of cervical cancer compared with traditional didactic lectures.

Alternate Hypothesis (H1): Vertically integrated classes will significantly improve students' knowledge of cervical cancer.

MATERIALS AND METHODS

A quasi-experimental study will be conducted involving 92 second-year MBBS students at the Imphal campus of Churachandpur Medical College, Imphal, Manipur, India from November 2024 to September 2025. Ethical clearance was obtained from the Institutional Ethics Committee (IEC) in December 2024 (Registration No. 5/2/CMC-ETHICS/COMM/2024/03/03/2024). Informed consent will be obtained from all participants prior to the study.

Inclusion criteria: Consenting second-year MBBS students currently studying at the Imphal campus of Churachandpur Medical College, Manipur, India.

Exclusion criteria:

- Students who do not complete all questionnaires
- Students who are absent on the day of the study.

Sample size calculation: As the total number of available students is 92 (finite population), the entire cohort will be included to maximise statistical power.

The assessment questions will be validated by a separate group of Assistant Professors from the respective departments. The questionnaire will be developed and administered in English using Google Forms.

Study Procedure

After informing all stakeholders, faculty members from the participating departments and second-year MBBS students will be sensitised to the project plan. Data will be collected using a self-designed questionnaire that will be validated and revised based on expert feedback. Four faculty members -one each from the departments of Anatomy, Microbiology, Pathology, and Gynaecology each holding at least the rank of Assistant Professor, will develop a total of 20 questions: four from Anatomy, four from Microbiology, four from Pathology, and eight from Gynaecology. The tool will be validated by six subject experts using item-level and scale-level Content Validity Index (CVI) (Annexure 1).

Before commencement of the study, both faculty and students will receive an orientation session explaining the project objectives and the importance of evaluating vertical integration in medical education. Pre-tests in the form of MCQs will be administered prior to the vertically integrated teaching session on topics related to cervical cancer, including anatomy of the cervix, pathophysiology, screening methods, and treatment (Annexure 1). Following this, a two-hour vertically integrated teaching session will be conducted on a single day, comprising three didactic lectures and one interactive DOAP session [Table/Fig-1]. The sessions will be delivered by faculty from Anatomy, Microbiology, Pathology, and Gynaecology departments, each holding at least the rank of Assistant Professor.

For the DOAP session, students will be divided into four groups of 23 to ensure effective interaction. Each group will be taught the five basic steps of Pap smear collection [Table/Fig-2], and skill acquisition will be assessed using OSCE stations.

Students' and faculty members' perceptions of the vertically integrated teaching approach will be evaluated using a Likert scale questionnaire. The research timeline for the study has been presented in [Table/Fig-3].

Outcomes: The impact of the vertically integrated lectures will be assessed using post-test scores, and the effectiveness of the

S. no.	Name of the department	Topic covered	Duration (in minutes)
1.	Anatomy	Anatomy and histology of cervix	30 minutes
2.	Pathology	Pathophysiology of cancer cervix	30 minutes
3.	Microbiology	Aetiology of the cancer cervix	30 minutes
4.	OBG	Screening of the cancer cervix (DOAP Session)	30 minutes

[Table/Fig-1]: Teaching activities by faculties members from different departments. OBG: Obstetrics and Gynaecology

S. no.	Basic steps of Pap smear collection
1.	Taking of verbal consent
2.	Introduction of the speculum
3.	Visualisation of the cervix
4.	Taking a sample from both the endo and ecto cervix using an Arye spatula
5.	Removal of the speculum

[Table/Fig-2]: Steps for collecting a Pap smear specimen as demonstrated in the DOAP training session.

Activity	24-Nov	24-Dec	25-Jan	25-Feb	25-Mar	25-Apr	25-May	25-Jun	25-Jul	25-Aug	25-Sep
Initial planning of project											
Protocol submission											
IEC clearance approval											
Review of literature											
Data collection tool validation											
Lecture preparation											
DOAP session-checklist preparation and validation											
Vertical integration class											
Data collection											
Data Analysis											
Final project report and publication											

[Table/Fig-3]: Research timeline.

interactive session will be evaluated through OSCE following the DOAP session. The perceptions of participating students and faculty members will be assessed using a Likert scale questionnaire.

STATISTICAL ANALYSIS

All data will be kept confidential. Data will be entered into Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS) version 2021. Pre and post-test scores will be compared using the paired Student's t-test, with a p-value <0.05 considered statistically significant.

Implications of proposed study: The present project will help identify the impact of vertical integration in medical education and provide insights into students' and faculty members' perspectives on this innovative teaching approach for cervical cancer. It will also offer an opportunity to evaluate the effectiveness of the time and effort invested in implementing this method.

REFERENCES

[1] Miller G, Abrahamson S, Cohen IS, Graser HP, Harnack RS, Land A. Teaching and learning in medical school. Cambridge (MA): Harvard University Press; 1961.
[2] EL-Bab MF, Sheikh B, Shalaby S, EL-Awady M, Allam A. Evaluation of basic medical sciences knowledge retention among medical students. Ibnosina J Med BS. 2011;3(2):45-52.
[3] ten Cate O, Snell L, Mann K, Vermunt J. Orienting teaching toward the learning process. Acad Med. 2004;79(3):219-28.
[4] Shoemaker BJE. Integrative education: A curriculum for the twenty-first century. OSSC Bulletin. 1989;33:n2.
[5] Medical Council of India. Alignment and Integration Module for Undergraduate Medical Education Program New Delhi: Medical Council of India; 2019.
[6] Brauer DG, Ferguson KJ. The integrated curriculum in medical education: AMEE Guide No. 96. Med Teach. 2015;37(4):312-22. Doi: 10.3109/0142159X.2014.970998.
[7] Cox E. Coaching and adult learning: theory and practice. New Dir Adult Cont Educ. 2015;148(3):27-38. Doi: 10.1002/ace.20149.
[8] Hassan S. How to develop a core curriculum in clinical skills for undergraduate medical teaching in the school of medical sciences at University Sains Malaysia? Malaysian Journal of Medical Sciences. 2007;14(2):4-10.
[9] Dornan T, Bundy C. What can experience add to early medical education? Consensus survey. BMJ. 2004;329(7470):834. Doi: 10.1136/bmj.329.7470.834.
[10] Rajan SJ, Jacob TM, Sathyendra S. Vertical integration of basic science in final year of medical education. Int J Appl Basic Med Res. 2016;6(3):182-85. Doi: 10.4103/2229-516X.186958.
[11] Mishra AK, Mohandas R, Mani M. Integration of different disciplines in medicine: a vertical integrated teaching session for undergraduate medical students. J Adv Med Educ Prof. 2020;8(4):172-77. Doi: 10.30476/jamp.2020.87082.1289.
[12] Singh A, Katyal R, Chandra S, Joshi HS, Singh K. Study of impact of vertical integration in medical education in a medical college of India. International Journal Of Community Medicine And Public Health. 2017;4(9):3328-31. https://doi.org/10.18203/2394-6040.ijcmph20173839.

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[Annexure-1]

1. The 'cervix uteri' constitutes-

a. Lower 1/3rd of uterus c. Middle 1/3rd of uterus
b. Upper 1/3rd of uterus d. Middle 1/4th of the uterus

2. Embryologically the cervix is derived from-

a. Paramesonephric duct (Mullerian) c. Mesonephric duct (Wolfian duct)
b. Both a and c d. Thoracic duct

3. The cervical canal communicates with the body of the uterus through-

a. External os c. Internal os
b. Both a and c d. Vagina

4. The cervical canal is lined by-

a. Simple columnar mucus secreting epithelium b. Simple cuboidal epithelium c. Simple squamous epithelium
d. Stratified squamous epithelium

5. Cervical intraepithelial neoplasia (CIN) occurs mostly commonly in which site

a. In vulva b. At the squamocolumnar junction of the cervix c. In uterus d. In vagina

6. Which of the Human Papillomavirus (HPV) is a high risk for cervical cancer?

a. HPV 16 c. HPV 34
b. HPV 78 d. HPV 6

7. Human Papillomavirus (HPV) induced cervical carcinoma is dependent on which of the following oncoproteins ?

a. E5E7 c. E11 E12
b. E6 E 7 d. E 12E1

8. Most common cause of death in cancer cervix

a. Constipation c. Bleeding
b. Uremia d. Vomiting.

9. What are at risk of cervical cancer

a. Multiple sexual partners c. Early age of menarche
b. Early menopause d. Both a and c

10. How do we treat cancer cervix of stage 2

a. Cone biopsy c. cryotherapy
b. Hysterectomy d. Both a and c

11. How do we screen cancer cervix.

a. Pap smear c. VIA
b. X-ray d. Both a and c

12. The blood supply of the cervix is ----------
13. Viruses causing Cancer cervix are ----------
14. Cervical intraepithelial neoplasia -1(CIN-1) is ----------
15. Most common symptoms of cancer cervix is ----------
16. Only Gynecologist can do pap smear - - yes or No
17. Pathologically 3 types of cervical cancer are there - yes or No
18. Human Papillomavirus (HPV) is a DNA Virus- yes or No
19. Does radiotherapy have a role in cervical cancer treatment - yes or No
20. Does Chemotherapy have role in treatment of cancer cervix- yes or No