

## COMPREHENSIVE INTEGRATED MODULE ON HYPERTENSION INVOLVING COGNITIVE, PSYCHOMOTOR AND AFFECTIVE DOMAINS OF PHASE 2 MBBS STUDENTS: AN EDUCATIONAL INTERVENTIONAL PROSPECTIVE STUDY

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### Abstract

**Background:** In most of the medical colleges in India, basic science courses have been traditionally & typically taught as standalone independent content domains. This gives no chance for the students to correlate and integrate the knowledge that they have gained which leads to lack of clinical proficiency, breeding low confidence among student's mind. Integrated teaching will make it easier for students to make connections and to engage in relevant activities that will provide a deeper understanding of the course contents. As per national medical commission (NMC), in competency based medical education (CBME), 20% of the teaching must be integrated teaching. **Materials and Methods:** Educational interventional prospective study was conducted in the department of pathology, Veer Chandra Singh Garhwali Government Institute of Medical Sciences & Research. 136 phase II MBBS students and 26 faculty of participating departments (Physiology, Pathology, Pharmacology, Community medicine & Internal medicine) were included in study and hypertension module from cardiovascular system was included. The faculty sensitization and training conducted and students apprised of the study. Pre-test on a pre-validated questionnaire on hypertension was conducted, consisting of Short Answer Questions (SAQs), Multiple Choice Questions (MCQs) and problem-based learning (PBL). Integrated teaching sessions were started (total 5 sessions). Post-test was conducted and evaluation for cognitive, psycho-motor and affective domain was done by pre-post-test questionnaire, OSPE station, rating scale check-list. The faculty and student response to questionnaire about perception and challenges of integration was collected in the form of 5-point Likert scale (Strongly agree to strongly disagree). **Result:** The results which we obtained in the hypertension module revealed that the performance of the students improved after the integrated teaching learning session and integrated teaching was found to be more effective than traditional lecture methods. The highest score obtained by the students in the pre-test was 19(76%). The lowest score obtained in the pre-test was 4 (16%). Highest score in post-test was 22(88%) and the lowest score obtained in post-test was 11(44%). Mean values of the pre-test were (11.13±3.07) and that of post-test were (17.76± 2.38). **Conclusion:** This integrated teaching programme led to improvement in student motivation, satisfaction, performance and engagement. A majority of students and faculty accepted it to be an effective teaching and learning method. Introduction of integrated teaching in medical education is justified despite all the challenges to improve the quality of students learning to provide good health care services.

## INTRODUCTION

In most of the medical colleges in India, basic science courses are typically taught as standalone

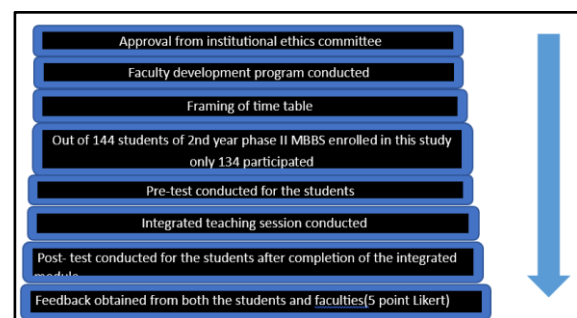
independent content domains which gives students a view of the parts but not the whole of the structure function relationship. Teaching basic sciences in different blocks gives no chance for the students to

correlate and integrate the knowledge that they had gained.<sup>[1]</sup> Knowledge learnt in isolation is rapidly forgotten. So the concept of integration was introduced which is defined as organization of teaching matter to inter-relate or unify subjects frequently taught in separate academic courses or department.<sup>[2]</sup> An integrated curriculum allows students to pursue learning in a holistic way rather than fragmented learning perspectives.<sup>[3]</sup> As per recent guidelines framed by national medical commission (NMC), incorporation of integrated teaching in the medical curriculum is mandatory to provide students with a holistic rather than fragmented learning perspectives. In competency based medical education (CBME), 20% of the teaching must be integrated teaching. There is a high degree of compartmentalization of subjects of preclinical, para clinical and clinical branches which leads to unnecessary repetition and confusion in a student's mind, leading to improper grasping of subjects and they are not able to apply knowledge gained by them into clinical practice and hence lack of clinical proficiency, which breeds low confidence, anxiety and panic among student's mind.<sup>[4]</sup> Inadequate knowledge application will result in delay in diagnosis and treatment which will create economic burden on the patient, as well as increase in morbidity and mortality. This will also affect the doctor patient relationship eventually leading to loss of faith in the health system. Integrated teaching will encourage meaningful learning in medical education and impart knowledge and skills in an integrated manner to the students in dealing with commonly encountered clinical conditions. This style of curriculum will make it easier for students to make connections and to engage in relevant activities that provide a deeper understanding of the course contents because when multiple subjects are combined, students can see the relationships between them and how they can be applied in real world situations, making the material more interesting and engaging. The Hypertension module is selected as hypertension is the leading preventable risk factor for cardiovascular diseases. It affects an estimated 1.3 billion worldwide, killing approximately 10 million people every year.<sup>[5]</sup> Therefore, imparting knowledge and skills in an integrated manner to the students in dealing with such commonly encountered clinical conditions is of utmost importance. This will help in good patient management to prevent premature deaths due to cardiovascular diseases.

## MATERIALS AND METHODS

This Prospective educational intervention study was conducted in the Department of Pathology, Veer Chandra Singh Garhwali Government Institute of Medical Sciences & Research, Srinagar, Uttarakhand over a period of four months from Sept.2023 to December 2023. Consecutive sampling of all the MBBS students of batch 2021, excluding those

refusing consent was done. Study population included 144 Phase II MBBS Students of 2021 batch and 18 faculty of participating departments. Exclusion criteria included those not giving the consent and those not giving both the pre-test and post-test and not completing the integrated teaching session. A Hypertension module from the cardiovascular system was selected for this study. Heads and academic in-charges of selected pre-clinical, para-clinical and clinical departments were requested for preliminary meetings to chart out the modalities for integrated teaching. The various departments integrated in this study were physiology, pharmacology, pathology, Community medicine and Internal medicine, thus incorporating both the horizontal and vertical integration. After due deliberation and understanding a roster was prepared. The main coordinating department and incharge of the program was the department of pathology. The departments of physiology, pharmacology, community medicine and Internal medicine were informed and a faculty member from each department was nominated by the respective head of the department for implementation of this integrated teaching program. The pre-test was conducted after traditional conventional learning, using a pre-validated questionnaire including multiple choice questions (mcqs), short answer questions and problem-based questions, carrying 25 marks. Time allotted for the pre-test was 25 minutes. Before the start of integrated session students as well as faculty were sensitized about the integrated teaching sessions. Thereafter the integrated module was conducted by the department of pathology in integration with other departments as mentioned, according to the roster prepared. The whole duration of the integrated teaching session was 13 hours spread over a period of 8 days (including practical skill and Role play). This was followed by a post-test having the same type of questions as in pre-test. The session was concluded by a post test (formative assessment) and feedback from students and faculty. [Figure 1] showing sequence of activities.



**Figure 1: Flowchart showing sequence of activities for integrated teaching.**

Hypertension module Out of 144 2nd year MBBS students enrolled in this study, 136 students participated in the hypertension module and completed the study. The pretest was conducted

before the start of an integrated session on hypertension. Pre-test questionnaire on the hypertension module consisted of 5 mcqs (multiple choice questions) (each mcq, carrying one mark), 5 short answer type questions carrying 2 marks each and 2 problem based questions carrying 5 marks each [Table 1]. Total time allotted for this exercise was 25 minutes. Time table was framed for an integrated session for the Hypertension module after a lot of intra- and inter- departmental discussions. The total time devoted for this module was 13 hours. Thereafter an integrated module on hypertension was started. The various teaching learning methodologies used were interactive lectures, problem-based learning, direct, observation assisted performance (DOAP) session & Role play.

Interactive lectures, based on the competencies provided by NMC(National Medical Commission) were conducted by different departments. Then Measurement of blood pressure (Practical skill) was undertaken by Manual measurement of blood pressure (BP) which tested psychomotor skill and this practical teaching for psychomotor domain was undertaken by the department of pathology in collaboration with the department of physiology. Total students who participated in this study were 136, and those were divided into 8 groups of 18 each, who were allotted to 8 different tutors at 8 different stations and the remaining two students were accommodated in the first group. An OSPE (Objective Structured Practical Examination) was conducted. Demonstrate observe assist and perform(DOAP) session was then organised and the students were given a demonstration of blood pressure measurement using mercury sphygmomanometer to develop their performance skill, based on the consecutive steps on competency checklist for blood pressure measurement. The students were given a scenario mentioning the subject's condition and background, and were assessed on the basis of pre validated checklist for history taking, rest before measurement, proper position of the subject, cuff positioning and tying, palpatory method performance and timing, auscultatory method performance and reporting of the result. The students were evaluated based on their performance on OSPE in both pre and post skill development test by an evaluator, and scores were awarded from a maximum total score of 20 marks. Problem based learning was an important aspect of this module where different case scenarios related to hypertension were discussed with active participation from students. The department of pathology and department of internal medicine were mainly responsible for this activity.

Role play was also incorporated in the study and the distribution of students was similar to skill class. In each group one student acted as doctor, and the other student acted as simulated patient and was performed by students, under the observation of the trained tutor. The student's communication skills were analyzed by him using a 7-point Kalamazoo scale

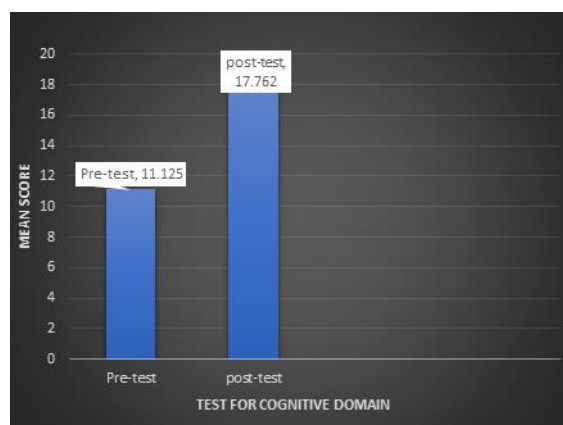
adapted version, which contained 24 items. This clinical communication skills checklist contained an assessment of 7 competencies with a total score of 24 to 120. After giving communication skills training, changes in a student's communication skills were analyzed by the paired t-test using MS EXCEL.

The session was concluded by a post-test and feedback from students and faculty. The student's feedback questionnaire consisted of 11 questions with 5-point Likert Scale (1-Strongly disagree, 2-Disagree, 3- Neutral, 4- Agree, 5- Strongly agree). The faculty feedback questionnaire had 11 questions with the 5- point Likert scale. The feedback questionnaire from both the students and faculty was taken and assessed with the help of Likert Scale and expressed in terms of percentage.

## RESULTS

A total of 144 students of 2nd year MBBS were exposed to new teaching intervention in the form of integrated teaching learning (TL) sessions. Of these 136 students gave pre-and post-test both. Pre and post-test statistics was calculated by paired sample t-test with the help of SPSS version 21 software.

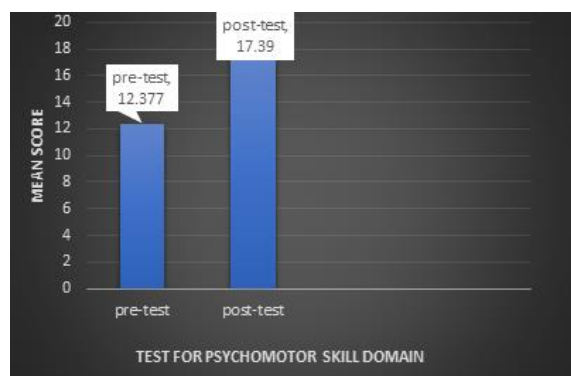
The highest score obtained by the students in the pre-test was 19(76%) out of 25 marks. The lowest score obtained in the pre-test was 4 (16%). Highest score in post- test was 22(88%) out of 25 and the lowest score obtained in post-test was 11(44%). Mean values of the pre-test were (11.13±3.07) and that of post- test were (17.76± 2.38). Comparative analysis of total scores obtained by students in pre and post test showed statistically highly significant results (p value<0.0001) Thus, the results which we obtained in the hypertension module revealed that the performance of the students improved after the integrated teaching learning session and integrated teaching was found to be more effective than traditional lecture method. [Table 2 & Figure 2]



**Figure 2: Mean scores of Pre and post-test of cognitive domain.**

Similarly for psycho-motor skill, An OSPE (Objective Structured Practical Examination) was conducted The students were evaluated based on their performance on OSPE in both pre and post skill

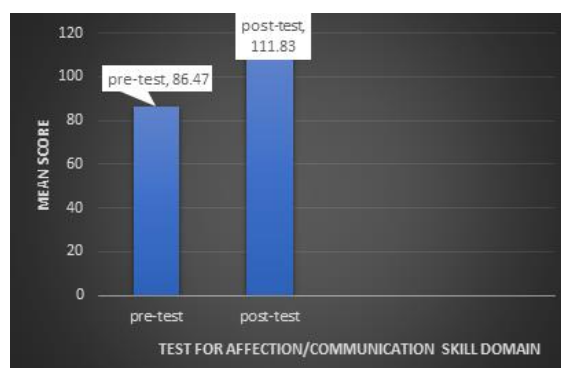
development test by an evaluator, and scores were awarded from a maximum total score of 20 marks. The highest score obtained by the students in the pre-test was 17(85%) out of 20 marks. The lowest score obtained in the pre-test was 6 (30%). Highest score in post- test was 20(100%) out of 20 and the lowest score obtained in post- test was 14(70%). Mean values of the pre-test were  $(12.37 \pm 2.35)$  and that of the post-test were  $(17.39 \pm 1.54)$ . Comparative analysis of total scores obtained by students in pre and post tests showed statistically highly significant results ( $p$  value  $< 0.0001$ ) Thus, the results revealed that the performance of the students improved after DOAP session. [Table 3 and Figure 3]



**Figure 3: Mean scores of pre and post-test of psychomotor domain.**

For affective domain assessment, the role-play was performed by students, under the observation of the trained tutor. The student's communication skills were analyzed by him using a 7-point Kalamazoo scale adapted version, which contained 24 items. Thus, a total of 24 competencies (each competency scored 1 to 5; a total score of 24 to 120). In this study,

students improved significantly in most of the competencies after communication skills training. After giving communication skills training, changes in student's communication skills ,were analyzed by the paired t-test using MS excel. The highest score obtained by the students in the pre-test was 102(85%) out of 120 marks. The lowest score obtained in the pre-test was 48(40%). Highest score in post- test was 120(100%) out of 120 and the lowest score obtained in post- test was 102(85%). Mean values of the pre-test were  $(86.47 \pm 14.89)$  and that of post- test were  $(111.85 \pm 4.83)$ . Comparative analysis of total scores obtained by students in pre and post test showed statistically highly significant results ( $p$  value  $< 0.0001$ ). Thus, the results revealed that the communication skills of the students. [Table 4 and Figure 4].



**Figure 4: Mean scores of pre and post-test of affection domain (communication skill)**

Feedback from students & faculty who participated in this integrated teaching programme, was taken and has been represented in the tabulated forms [Table 5 & 6].

**Table 1: Pattern of pre-test questionnaire is shown below**

Pattern of pre-test questionnaire	No.	Total no. of marks
Multiple choice questions (MCQs)	05(1×5)	05
Short Answer Questions(SAQs)	05(2×5)	10
Problem based questions (PBQs)	02(2×5)	10
Total		25

**Table 2: Comparison of total scores obtained by students in pre and post-cognitive tests (maximum marks =25)**

Test type	N	Mean± SD	Paired difference		Significance	
			Mean	SD	T value	P value
Pre test	136	11.125±3.072	-6.63	3.25	-19.91	<0.0001
Post test	136	17.762±2.382				

$P < 0.0001$  Statistically significant

**Table 3: Comparison of total scores obtained by students in pre and post-psychomotor (skill ) tests (maximum marks =20)**

Test type	N	Mean± SD	Paired difference		Significance	
			Mean	SD	T value	P value
Pre test	136	12.377±2.35	-5.01	2.04	-20.80	<0.0001
Post test	136	17.39±1.54				

$P < 0.0001$  Statistically significant

**Table 4: Comparison of total scores obtained by students in pre and post-test check for communication skill (maximum marks =120)**

Test type	N	Mean± SD	Paired difference		Significance	
			Mean	SD	T value	P value
Pre test	136	(86.47±14.89)	-25.42	14.32	-18.90	<0.0001

Post test	136	(111.85± 4.83)			
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P<0.0001 Statistically significant

**Table 5: Response of students on the various aspects of integrated teaching sessions on a 5 point Likert scale**

S.no	Question	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	Integrated teaching helped me to get a better understanding of the topic.	95(69.85%)	38(27.94)	1(0.73%)	1(0.73%)	1(0.73%)
2.	Understanding of the topic is better with this method when compared to lectures	86(63.23%)	42(30.88%)	6(4.41%)	1(0.73%)	1(0.73%)
3.	This exercise can be regularly incorporated into the curriculum	69(50.73%)	51(37.52%)	13(9.55%)	2(1.47%)	1(0.73%)
4.	Reduces the amount of time needed for self-study as compared to lectures.	49(36.02%)	50(36.76%)	33(24.26%)	3(2.20%)	1(0.73%)
5.	I would like to recommend integrated teaching to other departments.	69(50.73%)	53(38.97%)	11(8.08%)	2(1.47%)	1(0.73%)
6.	The integrated teaching sessions help me learn course material more than if I studied alone	64(47.05%)	63(46.32%)	6(4.41%)	2(1.47%)	1(0.73%)
7.	Integrated teaching has increased by self-confidence and attitude towards learning	54(39.70%)	60(44.11%)	20(14.70%)	2(1.47%)	-
8.	This teaching technique encouraged my intellectual curiosity	60(44.11%)	60(44.11%)	14(10.29%)	2(1.47%)	-
9.	The knowledge and skills acquired about this topic via this teaching technique will help in clinical practice.	78(57.35%)	51(37.5%)	6(4.41%)	1(0.73%)	-
10.	All topics must be taught collaboratively by multiple teachers of different departments.	75(55.14%)	50(36.76%)	10(7.35%)	1(0.73%)	
11.	My overall feelings were positive regarding the learning activities and experience during the session.	73(53.67%)	56(41.17%)	6(4.41%)	1(0.73%)	

**Table 6: Response of faculty on the various aspects of integrated teaching sessions on a 5 point Likert scale**

S.no	Question	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	Current curriculum of education occurs in blocks of different subjects	5(19.23%)	21(80.76%)	-	-	-
2.	Integrated teaching learning program is useful method of TL	7(26.9%)	18(69.23%)	1(3.84%)	-	-
3.	With an integrated teaching learning program, students would be able to understand the concept more easily.	10(38.46%)	15(57.69%)	1(3.84%)	-	-
4.	Concept of integrated teaching is much time consuming for us	2(7.69%)	11(42.3%)	10(38.46%)	3(11.5%)	-
5.	This will need a lot of trainings and refresher training at the faculty level	5(23.07%)	13(50%)	3(11.5%)	4(15.38%)	-
6.	Interdepartmental coordination is a very difficult task	-	16(61.53%)	5(19.2%)	4(15.38%)	1(3.84%)
7.	Integrated teaching learning program will help the students to perform better in clinical practice	13(50%)	12(46.15%)	1(3.84%)	-	-
8.	Understanding the topic is better with this method.	9(34.61%)	10(38.4%)	7(26.9%)	-	-
9.	This exercise can be regularly incorporated into the curriculum	7(26.9%)	17(65.3%)	2(7.69%)	-	-
10.	It reduces amount of time needed for self study	2(7.69%)	4(15.38%)	1(3.84%)	15(57.69%)	
11.	Integrated learning will result in more relevant , meaningful and student centered curriculum	5(19.2%)	20(76.9%)	-	1(3.84%)	

## DISCUSSION

As per the recent guidelines framed by National Medical Commission (NMC), incorporation of integrated teaching in the medical curriculum is mandatory to provide students with a holistic rather than fragmented learning perspective. In the currently adopted competency based medical education, 20%

of the teaching must be integrated teaching.<sup>[1]</sup> Since integrated learning is the need of the hour, we thought it worthwhile to formulate, implement, evaluate and analyze the perception of an integrated teaching module of hypertension for phase II MBBS students. Our study was an attempt to improve the quality of medical education with this innovative curricular strategy. For an efficient integrated teaching

program, it is important to plan for the theme of the topic, sequencing of topics and contents of each topic. Hypertension from the cardiovascular system was the topic selected for integrated teaching. As this is the most prevalent cardiovascular disease entity encountered among the Indian population and taught by different departments throughout medical courses, the students should be trained well to treat such patients and provide good healthcare services for community needs. Similarly, the topics chosen in various other studies conducted on integrated teaching are also based on their prevalence and clinical relevance e.g, Tuberculosis, Diabetes mellitus, Hypertension, etc.<sup>[7,8]</sup> Teachers participating in integrated teaching program have to organize, plan and discuss with interdepartmental members and do a pre-assembly workup. These pre-assembly activities require time and dedication on part of teachers and subject experts to achieve good results. Teaching different aspects of a topic by faculty members of relevant departments instead of one department will help the students to assimilate the knowledge in a better way.<sup>[8]</sup> Keeping these facts in mind, faculty members from departments of physiology, pathology, internal medicine, community medicine and pharmacology were engaged to conduct the integrated module in an effective manner. Framing of the time table was done after many intra and inter departmental discussions on content of integrated sessions and various teaching learning methodologies to be adopted like interactive lectures, small group teachings, case based learning, role play and the practical skills. The entire plan was finalized by collaborating with all the designated departments with an aim to make learning more relevant, beneficial and meaningful. The present study collected both qualitative and quantitative data to assess the effectiveness of integrated hypertension module. The pre-test was conducted after traditional didactic learning, using a pre-validated questionnaire. After completion of the integrated session, a post test was conducted having similar types of questions as in pre-test. Effectiveness of the integrated module of the present study was assessed by doing comparative analysis of pre-test and post test scores. The highest score obtained in pre-test was 76% while the highest score obtained in post-test after integrated teaching was 88%. The post-test scores improved after integrated teaching. We found statistically extremely significant results on comparing the mean scores of the pre-test and post-tests. The mean values of pre-test conducted after traditional teaching were (11.13±3.07) and that of post-test were (17.76± 2.38). We found statistically extremely significant results on comparing the mean scores of both pre and post-test the module, with greater improvement in the post -test scores. The results of the present study support the view of various other studies. Study done by,<sup>[9]</sup> showed that the mean scores of the pre and post test were 6.2 and 9.6 respectively which was statistically significant. Another study done by Tripathi R,<sup>[10]</sup> revealed a

statistically significant difference ( $p<0.001$ ) in the mean score before and after the integrated session (6.17±1.54 and 17.6±2.68 respectively). Similar observations were made by,<sup>[11]</sup> where the mean scores of the conventional teaching method were 15.4±4.62 and after the integrated method were 21.8± 4.48. So the marks obtained by students after the integrated method were found to be higher than the marks obtained by conventional methods and were statistically significant. The results of the present study and most of the comparative studies conducted on conventional teaching methods versus integrated teaching methods in different medical institutions are in favour of implementing integrated teaching in the curriculum of medical education as it enhances performance and skill development. This learning methodology which is student centered, is expected to make learning a pleasure and use knowledge base as an effective manner in clinical practice. Our faculty admitted that the whole experience was very motivating and it has improved their knowledge about newer teaching -learning methods. The faculty feedback was positive and wanted to incorporate integrated teaching for other important topics and combine it with traditional methods. Active participation of the students was the most important factor for the successful implementation of this integrated teaching module. We also felt that the enthusiasm, hard work and integrated effort by the faculty members who participated in the program were extremely important for the success of this intervention. Similar observation was made by,<sup>[12]</sup> and he found that the students as well as the faculty were excited to implement this tool of education and accordingly participated enthusiastically. They concluded that the newer methods of education will help to enhance teacher- student and teacher – teacher interactions. The findings of this study support the view of our study. The present study will serve as a useful example for other departments and institutes to incorporate or formulate integrated teaching in their curriculum.

## CONCLUSION

The integrated teaching methodology is a holistic, methodical and planned approach which is beneficial to provide more benefits to students, teachers and institution as a whole. Integrated modular sessions were found to be more helpful in applying knowledge and learning in actual clinical settings. The present study on integrated Cardiovascular system module (CVS) has yielded encouraging results in terms of improved scores of the students and positive perception both by students and faculty. This integrated teaching programme led to improvement in student motivation, satisfaction, performance and engagement. A majority of students and faculty accepted it to be an effective teaching and learning method. Introduction of integrated teaching in medical education is justified despite all the

challenges to improve the quality of students learning to provide good health care services. The present study can be expanded to evaluate long term impact of integrated teaching in terms of retention of knowledge, conceptual learning and skill development.

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