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### Effect of early clinical exposure and near peer assisted learning combination program on attitudes of medical students towards basic sciences courses

**Background:** This study aimed to assess the impact of early clinical exposure and near-peer assisted learning combination on recognition of clinical aspects of basic sciences for preclinical medical students.

**Method:** In this translational (efficiency type) study, 59 Iranian medical students were selected to participate in clinical courses. An intern was in charge of mentoring to elaborate clinical aspects of basic sciences. During the clinical course, students faced several cases related to presented materials in order to perceive the role of previously learned topics in basic sciences courses. Finally, the students filled a validated and reliable questionnaire, which was designed to assess the level of satisfaction and effect of the program on students' attitude toward clinical usage of basic science courses.

**Results:** Participants in their feedback gave an overall rating of the satisfaction of program as high to very high. A majority (89%, n=42) of students stated that participating in this workshop results in increased motivation for studying and 97% (n=46) declared that these types of programs must be considered in the medical education curriculum.

**Conclusion:** This study showed that a near-peer mentor can effectively accomplish the objectives of this project because of precedent dealing with similar issues. Designing a teaching strategy to fill the gap between the parts of the curriculum was the most prominent achievement of this study.

**Keywords:** Medical Education, Basic Sciences, Early Clinical Exposure, Near Peer Assisted Learning

### تأثير التعرض السريري المبكر وبرنامج التعلم بمساعدة الأقران القريبين على اتجاهات طلاب الطب تجاه دورات العلوم الأساسية

**الخلفية:** هدفت هذه الدراسة إلى تقييم تأثير التعرض السريري المبكر ومجموعة التعلم بمساعدة الأقران على التعرف على الجوانب السريرية للعلوم الأساسية لطلاب الطب قبل السريري.

**الطريقة:** في هذه الدراسة الانتقالية (نوع الكفاءة)، تم اختيار 59 طالب طب إيراني للمشاركة في الدورات السريرية. كان المتدرب مسؤولاً عن التوجيه لتطوير الجوانب السريرية للعلوم الأساسية. واجه الطلاب خلال المقرر السريري عدة حالات تتعلق بالمواد المقدمة من أجل إدراك دور الموضوعات التي سبق تعلمها في مقررات العلوم الأساسية. وأخيراً، قام الطلاب بملاء استبيان تم التحقق منه وموثوق به، والذي تم تصميمه لتقييم مستوى الرضا وتأثير البرنامج على موقف الطلاب تجاه الاستخدام السريري لمقررات العلوم الأساسية.

**النتائج:** أعطى المشاركون في تعليقاتهم تقييماً عاماً لرضا البرنامج من مرتفع إلى مرتفع جداً. صرحت غالبية الطلاب (89%، العدد = 42) أن المشاركة في ورشة العمل هذه تؤدي إلى زيادة الدافع للدراسة، وأعلن 97% (العدد = 46) أن هذه الأنواع من البرامج يجب أن تؤخذ بعين الاعتبار في مناهج التعليم الطبي.

**الاستنتاج:** أظهرت هذه الدراسة أن المرشد القريب من الأقران يمكنه تحقيق أهداف هذا المشروع بفعالية بسبب تعامله السابق مع قضايا مماثلة. وكان تصميم استراتيجية التدريس ملء الفجوة بين أجزاء المنهج من أبرز إنجازات هذه الدراسة.

**الكلمات المفتاحية:** التعليم الطبي، العلوم الأساسية، التعرض السريري المبكر، التعلم بمساعدة الأقران

### بررسی تأثیر برنامه ترکیبی مواجهه زودرس بالینی و یادگیری از طریق همتایان نزدیک بر نگرش دانشجویان پزشکی نسبت به دروس علوم پایه

**زمینه و هدف:** هدف این مطالعه ارزیابی تأثیر ترکیب مواجهه زود هنگام بالینی و یادگیری از طریق همتایان نزدیک در شناخت جنبه‌های بالینی علوم پایه برای دانشجویان پزشکی است. **روش:** در این مطالعه انتقالی 59 دانشجوی ایرانی رشته پزشکی برای شرکت در دوره های بالینی انتخاب شدند. یک کارورز تحت عنوان منتور مسئول راهنمایی برای تشریح جنبه های بالینی علوم پایه بود. منتورها طی یک جلسه توجیهی، موضوعات، اهداف و الزامات این برنامه را برای دانش آموزان تعریف کردند. در طول دوره بالینی، دانشجویان با مواردی در ارتباط با مطالب ارائه شده برای درک اهمیت موضوعاتی که قبلاً در دروس علوم پایه آموخته‌اند، مواجه شدند. در نهایت دانشجویان پرسشنامه ای با روایی و پایایی معتبر را تکمیل کردند که برای ارزیابی میزان رضایت و تأثیر برنامه بر نگرش دانشجویان نسبت به استفاده بالینی از دروس علوم پایه طراحی شده بود.

**یافته‌ها:** شرکت کنندگان در بازخورد خود، میزان رضایت از برنامه را از بالا تا بسیار بالا دانستند. اکثریت (42٪، n=42) و 97٪ (n=46) اعلام کردند که این نوع برنامه ها باید در برنامه درسی آموزش پزشکی لحاظ شود.

**نتیجه گیری:** این مطالعه نشان می دهد که یک همتای نزدیک می تواند اهداف این پروژه را به دلیل سابقه برخورد با موضوعات مشابه، به طور موثر انجام دهد. طراحی راهبرد آموزشی جدید برای پر کردن شکاف بین بخش های برنامه درسی، برجسته ترین دستاورد این پژوهش بود.

**واژه های کلیدی:** آموزش پزشکی، علوم پایه، مواجهه زودرس بالینی، آموزش از طریق همتایان نزدیک

### ابتدائی طبی نمائش کا اثر اور طبی طلباء کے بنیادی سائنس کورسز کی طرف رویوں پر قریبی ہم مرتبه معاون سیکھنے کے پروگرام کا اثر

**پس منظر:** اس مطالعے کا مقصد طبی طبی طلباء کے لیے بنیادی سائنس کے طبی پہلوؤں کی شناخت پر ابتدائی طبی نمائش اور قریب قریب ہم مرتبه معاون سیکھنے کے امتزاج کے اثرات کا جائزہ لینا تھا۔

**طریقہ:** اس مترجم (کارکردگی کی قسم) کے مطالعے میں، 59 ایرانی میڈیکل طلباء کو کلینیکل کورسز میں حصہ لینے کے لیے منتخب کیا گیا۔ ایک انٹرن بنیادی علوم کے طبی پہلوؤں کی وضاحت کے لیے رہنمائی کا انچارج تھا۔ کلینیکل کورسز کے دوران، طلباء کو پیش کردہ مواد سے متعلق کئی معاملات کا سامنا کرنا پڑا تاکہ بنیادی سائنس کے کورسز میں پہلے سیکھنے گئے موضوعات کے کردار کو سمجھ سکیں۔ آخر میں، طلباء نے ایک توثیق شدہ اور قابل اعتماد سوالنامہ پُر کیا، جسے بنیادی سائنس کورسز کے کلینیکل استعمال کی طرف طلباء کے رویے پر پروگرام کے اطمینان اور اثر کا اندازہ لگانے کے لیے ڈیزائن کیا گیا تھا۔

**نتائج:** شرکاء نے اپنے تاثرات میں پروگرام کے اطمینان کی مجموعی درجہ بندی زیادہ سے زیادہ تک دی۔ طلباء کی اکثریت (89%، n=42) نے بتایا کہ اس ورکشاپ میں حصہ لینے کے نتیجے میں مطالعے کے لیے حوصلہ افزائی میں اضافہ ہوتا ہے اور 97% (n=46) نے اعلان کیا کہ طبی تعلیم کے نصاب میں اس قسم کے پروگراموں پر غور کیا جانا چاہیے۔

**نتیجہ:** اس مطالعے سے پتہ چلتا ہے کہ ایک قریبی ہم مرتبه سرپرست اس منصوبے کے مقاصد کو مؤثر طریقے سے پورا کر سکتا ہے کیونکہ اسی طرح کے مسائل سے نبرد آزما ہونے کی وجہ سے۔ نصاب کے حصوں کے درمیان خلا کو پُر کرنے کے لیے تدریسی حکمت عملی وضع کرنا اس مطالعے کی سب سے نمایاں کامیابی تھی۔

**مطلوبہ الفاظ:** طبی تعلیم، بنیادی سائنسز، ابتدائی طبی نمائش، قریبی ہم مرتبه کی مدد سے سیکھنے

## INTRODUCTION

Medical education curriculum in Iran consists of two parts: basic science and clinical courses (1, 2). The curriculum of basic medical sciences is a prerequisite for the success in higher-level medical sciences and plays an essential role in understanding the content of the subsequent sections. According to clinical professors, basic science courses have great importance in shaping the competency of medical students, but it is believed that the relationship between these courses and clinical issues has not been emphasized. Due to the absence of clinical perception in basic science courses, a concept is growing among students that they consider these courses as an unnecessary part of MD program (3, 4).

Recently, medical education systems are willing to fill the gap between the basic sciences, and the clinical courses, and Different attempts such as early clinical exposure (ECE) have been made in order to integrate the basic science courses with clinical courses. ECE is a type of vertical integration in which preclinical students are involved in clinical programs. ECE can increase students' motivation and enhance the connection between basic science courses and clinical concepts (5, 6).

Near peer-assisted learning (NPAL) is a method for medical education in which students are mentored by a student who is one or more years senior. In this method, education is provided in a friendlier environment (7). NPAL can improve the performance of trainees in exams as well as increasing confidence and motivation (8). Data from several studies suggest that NPAL can help students in managing the stressful situation of transitioning from preclinical to clinical period. Previous research has established that NPAL has an immediate impact on personal and professional development in both trainees and trainees (9). It is now well established that ECE and NPAL can improve outcomes in medical education. However, few studies have investigated the effect of using these methods adjunct to each other. The purpose of this study was to evaluate whether an early clinical exposure program, with the help of a near-peer mentor would influence on attitudes of medical students regarding the clinical application of basic sciences. Additionally, this study aimed to determine students' satisfaction with the program.

## METHODS

### 1. Selection of participants:

Fifty-nine medical students of the Mashhad University of Medical Sciences were recruited by poster, E-mail, and E-poster to register for this translational (efficiency type) study. All participants were studying basic sciences or physiopathology (the first two grades of medicine in Iran). They filled a prepared google form to be selected. The google form was designed by the executive committee and was published on social media. It contained two sections; the first was about personal information and the second section asked about their motivation. The motivation section was the main criterion for selection (an open answer question about their motivation to clinical exposure), which was assessed by

two persons of the executive committee on the basis of blind selection method. The exclusion criteria were firstly, students who attended the course for the second time; and secondly, those who did not fill the final questionnaire. 12 persons were excluded, because they did not fill the final questionnaire. Finally, 47 participants were included in the study; they were divided into 7 groups; each group included 5 to 8 participants.

### 2. Selection of mentors:

Mentors were selected among volunteered internship level students. Mentors taught the participants by the near-peer-assisted learning (NPAL) method (7). Selected mentors were introduced by the clinical experts among active and top students according to their grades and clinical skills, who are highly motivated in teaching and concerned about improving medical education. The coordinators explained the program goals in an in-person session to the mentors and trained them how to be a skilled mentor.

### 3. Process:

Nine clinical courses were conducted from May 2018 until June 2020, with the duration of 1-2 days for each course. This study was approved by of Mashhad University of medical sciences ethics committee. The clinical courses were held in the internal medicine department of Ghaem and Imam Reza hospitals. All seven subspecialties of internal medicine (Hematology, Rheumatology, Nephrology, Endocrinology, Pulmonology and Gastroenterology, and cardiology) were involved. An orientation session for the students was conducted by the program coordinator prior to introducing the mentor to the student. In the whole process of the program, the objective of the program and medical ethics were highlighted. Mentors gave the participants some information 3-5 days prior to the project date, in the form of educational videos, introducing important chapters of textbooks and taking medical history. On the date of the project, mentors guided participants by showing PowerPoint, taking medical history, and evaluation the imaging and laboratory data of the patients. At the end of each course, the mentor discussed about the disease and its management with the participants. The students were encouraged to ask questions and clear any doubts.

Mentor was responsible for clarifying the importance of clinical aspects of basic sciences and also, the mentor suggested some study skills to the students in basic sciences terms. After finishing the clinical courses, a group in social media was provided for students to ask their unresolved questions.

### 4. Designation and validation of the questionnaire and statistical analysis:

At the end of each clinical course, a questionnaire was given to students. The questionnaire was meant to assess the impact of the program on the students. Paper and online questionnaires were provided.

Validated and reliable questionnaire was designed by the executive committee to evaluate the results of this study (10). Validation of the questionnaire was done by 5 faculty members of the Mashhad University of Medical Sciences; two faculty members of medical education department, one of epidemiology department and two of physiology

department. Cronbach's alpha test was used for evaluating the reliability of the questionnaire and verifying the internal consistency calculated 0.88 (11). The test-retest method was used and the correlation coefficient = 0.65 and p value=0.04 were obtained. It was found that the questionnaire has very good reliability.

This questionnaire contained 2 parts;

1. Information about gender, semester, and accommodation
2. Fifteen questions by rating from minimum (0) to maximum (4)

To further analyze the data, SPSS version 22 was used. Also, descriptive statistics were utilized evaluating the data, which consisted of the frequency of responses for every question.

## RESULTS

This project was held in 9 courses and 59 Students participated. A survey of the participants was conducted and feedback was recorded. Changing attitudes toward basic science courses, a positive influence of near-peer mentoring in increasing motivation for studying, and simultaneously explaining the clinical cases based on basic sciences courses were the most significant issues that students mentioned during the initial courses.

Student satisfaction and project quality were measured using a questionnaire for other courses. Forty seven students completed the questionnaire. (Table 1)

<b>Gender</b>	
Men	15
Women	32
<b>Semester</b>	
1st	0
2nd	20
3rd	18
4th	8
5th	1
<b>Accommodation</b>	
Dormitory	19
Personal House (With Family )	25
Personal House (Without Family)	3

The results showed that 55.3% (n=26) of the participants mentioned the high degree of satisfaction with the program's quality and 44.7% (n=21) very high. Most of them (97.8%, n=46) expressed the existence of this course was necessary during the basic science courses. Approximately 93% (n=44) of the respondents said that this project conformed to their expectations. The majority of those who completed the survey (89.3%, n=42) of students indicated that attending this course increased their motivation to study. About 83% (n=39) of the students expressed, the presence of near-peer mentors is effective in guidance and familiarity with clinical

environment and 91.5% (n=43) of the students stated that near-peer mentors are impressive in recognition of how to communicate with patients as a doctor. More than 91% (n=43) of students estimated scientific knowledge level of near-peer mentor high and very high that can deepen student's previous learning. About 80% (n=38) of the students believed that after this course their knowledge has been exceeded. Approximately 74% (n=35) of them agreed that basic sciences are important in clinical case solving. More than 95% (n=45) of the students mentioned that this course is effective in student's future performance as a medical student (Table 2)

## DISCUSSION

NPAL method is a known extra-curriculum pathway for medical students for improving their skills in taking medical history and physical examination due to early clinical exposure (7). This study set out to investigate the usefulness of early clinical exposure and assess its effect on students studying preclinical semesters (basic science courses and pre-clinical physiopathology courses which is including the first to seventh semesters) of medical education curriculum who were participated in a clinical course of internal medicine.

In the current study, several factors were evaluated such as, motivation to study, communication skills with patients and hospital staff, and future performance of the students in clinical environment.

NPAL method affected 83% (n=39) of the students' attitude towards familiarity with clinical environment. The satisfaction of all participants about this course was remarkably high (44.7% (n=21) very high and 55.3% (n=26) high). Since, 89.3% (n=42) of the preclinical students were motivated to study medical references much better than before to solve the clinical cases by referring to basic sciences. The most noticed basic sciences that matched with the internal medicine course by the students were physiology and anatomy (these sciences were selected among 5 subjects; including, physiology, anatomy, bacteriology, parasitology and pathology). Although, the participated students stated that the instructed subjects in the curriculum of medical faculties are not sufficient for clinical case-based medicine learning; however, 80.8% (n=38) of the participants mentioned that the instructed skills in this course were overrun the instructed lessons in the curriculum. Therefore, it is implied that preclinical exposure of medical students to hospital environment can be helpful for the clinical case solving in the future years of medical doctoral education.

Prior studies have noted the importance of preclinical exposure as an essential program. For instance, a study that was conducted in Thailand evaluated the outcomes of hospital wards exposure by the medical students (12). They exposed preclinical students to 6 wards of hospital by mentors, who were at internship level. The included wards were Internal Medicine, Pediatrics, Surgery, Emergency Medicine, Obstetrics and Gynecology and Anesthesiology (12). They compared the participated students in the course to not-participated students; it is interesting to note that a

**Table 2. Frequency distribution of responses to the questionnaire**

variable	Never		Very little		Little		High		Very high	
	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
Program Satisfaction	-	-	-	-	-	-	55.3	26	44.7	21
The necessity of holding clinical courses in basic science semesters	-	-	-	-	2.1	1	25.5	12	72.3	34
The conformity rate of this project with participants expectations (for students who chose the high or very high choices in the first question)	-	-	-	-	6.4	3	63.8	30	29.8	14
The conformity rate of medical education with student expectations before entering the university	-	-	12.8	6	44.7	21	29.8	14	12.8	6
Impact of clinical course on student motivation to study	-	-	-	-	10.6	5	55.3	26	34	16
The conformity rate of medical education provided during basic sciences courses with the clinical environment	4.3	2	25.5	12	42.6	20	17	8	10.6	5
Effectiveness of near peer mentor in guidance and familiarity with clinical environment	-	-	6.4	3	10.6	5	51.1	24	31.9	15
Impact of near peer mentor on how to communicate with patients	-	-	6.4	3	2.1	1	36.2	17	55.3	26
The scientific knowledge level of near peer mentor to deepen student's previous learning	-	-	2.1	1	6.4	3	42.6	20	48.9	23
The impact of this course on how to interact with the clinical experts and physicians	2.1	1	2.1	1	8.5	4	40.4	19	46.8	22
Student's opinion about improvement of his/her knowledge after this course	-	-	2.1	1	17	8	55.3	26	25.5	12
Impact of this course on student's attitude toward the professional future	-	-	-	-	-	-	44.7	21	55.3	26
Opinion about the effectiveness of this course in student's future performance as a medical student	-	-	-	-	4.3	2	36.2	17	59.6	28
Student's attitude toward the importance level of the basic sciences in clinical case solving	-	-	4.3	2	21.3	10	46.8	22	27.7	13
The effectiveness of clinical environments in developing patients' health	-	-	10.6	5	12.8	6	53.2	25	23.4	11

significant increase was detected in students' motivation to study, use of basic sciences in clinical studies, attention during class, and trend to be a qualified medical doctor (12). Govindarajan et al. reported markable elevation of the post-test questionnaire scores compared to pre-test in 144 Indian preclinical medical students after a clinical exposure course in several internal medicine wards (including Nephrology, Pulmonology and Cardiology) ( $p < 0.001$ ) (5). In addition, Mafinejad et al. performed a course of clinical exposure for medical students of the first four semesters ( $n = 216$ ) in Tehran (the capital city of Iran); in which 80.1% of students were in agreement with the important role of basic sciences in the future clinical settings (13). Beside the outcomes of NPAL method on the preclinical students who were instructed during the course, Friel et al. reviewed the outcomes of this method on the mentors or tutors (14). Although tutors of NPAL method are medical

students, who are studying in higher levels of medical education, but are not professional teachers who educated the preclinical students by their knowledge. Friel et al. reported notable improvement in knowledge and self-confidence of tutors during the NPAL courses (14). Unfortunately, we did not evaluate the outcomes of internal medicine course on the mentors in the current study, as a limitation. The importance and originality of this study is having senior medical students as mentors; due to the psychological support as a result of sincerely relationship between senior and junior undergraduate medical students, and also, deliverance from the stressful situation which is experienced during the faculty professors teaching courses (7). Selection of top-rated interns was an important item for mentoring; because high knowledge about medicine could motivate the participants to study better than before. The other strength

of this study was the pre-exposure information, which was introduced to the participants by the mentor; due to the quantity of students' knowledge for solving clinical cases. According to a comment of a participant who wrote that "If the clinical courses were concordant with the passed courses in the curriculum, the success rate of instruction would be higher"

As a result of this course, the students showed improvement in motivation to study and greater satisfaction and upgraded attitudes towards clinical aspects of basic sciences.

#### Ethical Considerations:

Ethical issues including plagiarism, informed consent,

misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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