Original Article

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Quick Response Code:

Website: www.jehp.net

DOI: 10.4103/jehp.jehp_713_20

Evaluation of physical medicine and rehabilitation course for undergraduate medical students: A mixed-methods study

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Abstract:

BACKGROUND: The objective was to evaluate an innovative physical medicine and rehabilitation (PMR) course for undergraduate students of Tehran University of Medical Sciences and their attitude and knowledge change following course participation.

MATERIALS AND METHODS: Ninety-one medical students filled the knowledge, attitude, and satisfaction forms pre- and postintervention. Nineteen medical students, two faculty physiatrists, two residents, two physical therapists, and two occupational therapists participated in the focus groups.

RESULTS: We found significant attitude improvements. They declared the usefulness of PMR course for undergraduate. Moreover, they agreed that physiatrists could be first choice for refer of musculoskeletal patients and they preferred PMR as future career after course experience. Also, they preferred to refer musculoskeletal patients including carpal tunnel syndrome, frozen shoulder, nonspecific low back pain after course participation. We found a good relationship between attitude and practice scores (r = 0.543, P = 0.000); in fact, students' attitude would strongly predict their practice through a model involving age, satisfaction, and exam scores (R^2 = 0.356, B = 0.35 [0.06], and P = 0.000).

CONCLUSION: We found that internship training course might be an effective method of teaching PMR. Improving attitude toward the field of PMR and patient referral practice, career choice and disability perceptions of undergraduates is concluded in this study. Investigation of the advantages of such courses in larger studies with longer follow-up time-points is highly recommend.

Keywords:

Physical medicine, qualitative research, rehabilitation, undergraduate

Introduction

The growing incidence of accidents, cardiovascular events, and cancers, as the most leading causes toward disability, is the strongest rationale to pay attention to rehabilitation programs.[1] Rehabilitation medicine, as an impressive piece of patient management puzzle, emphasizes on continuous care of patients considering their psychological or social burden.[2]

Unfortunately, studies suggested the prominent role of rehabilitation are not only unavailable for public, but also unclear for health-care professions and medical students.[3,4] Medical students during their long educational pathway, encounter various kinds of chronic diseases through internal medicine, surgery, and neurology rotations and learn about diagnosis and treatments. But, what about the management skills of disability? In

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Received: 22-06-2020
Accepted: 07-08-2020
Published: 27-02-2021

How to cite this article: Emami Razavi SZ, Azadvari M, Hosseini M, Dehgolan SR, Maghbouli N. Evaluation of physical medicine and rehabilitation course for undergraduate medical students: A mixed-methods study. J Edu Health Promot 2021;10:48.

2007, the Association of Academic Physiatrists provided some recommendations regarding the education of undergraduates for the management of patients with chronic conditions and disabilities. This is an important opportunity for physiatrists to take part in the education of medical students.[5]

Prior studies showed that the loss of physicians' orientation about rehabilitation principles and delayed transfer of patients to rehabilitation facilities could impose weighty costs.[6] Although rehabilitation has been integrated in usual practice of some fields including pediatric and geriatric settings, its importance in other fields is not well recognized, hence the need for rehabilitation education for undergraduate medical students is advisable.[7]

According to the report of British Society of Rehabilitation Medicine in 2010, rehabilitation education through a well-organized course by physical medicine and rehabilitation (PMR) specialists is recommended.[8] PMR specialty is a new clinical era all over the world, especially in Iran; then an earlier exposure of medical students could associate with informed selection of PMR as their specialty field.[8] Emphasizing interdisciplinary nature of rehabilitation, augmenting teamwork skills, and achieving a comprehensive point of view about patients could be some indirect result of these educational courses.[9] In addition, participation of undergraduate medical students in rehabilitation team will certainly increase knowledge on other team members' role including physical therapists (PTs) and occupational therapists (OTs).[10]

From 1987 in the UK to 2017 in Germany, different PMR programs were designed for undergraduate medical students consisting of lectures; seminars; physical examination classes; multidisciplinary rehabilitation clinics; and some educational courses on orthotics, prosthetics, physical modalities, etc.[11,12] These programs expectedly resulted in higher satisfaction, more accurate rehabilitation knowledge, and improved attitude among students and finally some of them chose PMR as their specialty.[8,13,14] Researchers in Christiana Care Health System suggested that primary care physicians should also be educated about the benefits of referring patients to physiatrists.[15] It seems that education of medical students during clinical rotations could cause proper referral patterns. Considering the need for physician awareness on rehabilitative interventions in decreasing disabilities and early patient refer to rehabilitation specialist, we designed a PMR course for medical students with multidisciplinary therapists' involvement for the first time in Iran. We aimed to evaluate PMR course of Tehran University of Medical Sciences (TUMS) for undergraduates, focusing on benefits and weaknesses, from different professions' point of view, including students themselves, professors, residents, OTs, and PTs. In addition, we intended to know students level of program satisfaction in addition to the attitude change after program participation in patient referral, field selection as a future potential specialty, and the role of physiatrist in rehabilitation and musculoskeletal (MSK) patients' management.

Materials and Methods

Study design

A pre-post interventional study was implemented at the TUMS PMR department from January 2018 to December 2019.

Participants

Ninety-one medical students filled the knowledge, attitude, and satisfaction forms pre- and postintervention. Nineteen medical students, two faculty physiatrists, two residents, two PTs, and two OTs participated in the focus groups. Convenience sampling method was employed for participants' selection.

Course description

The PMR rotation permitted medical students to become exposed to various settings of PMR practice. The program consisted of theoretical classes, practice workshops, bedside education, and physical examination skills evaluation. The courses were scheduled for 4 h in a day for a 2-week period and each course consisted of twenty sessions [Table 1]. The sessions were moderated mostly by volunteering faculty members who were recruited by the head of department. Furthermore, some resident organizers who had previously experienced examination skills moderated some sessions of the course. Our educational tools in this program varied between didactic lectures; round-table discussions; case presentations; and applying PT modalities, OT techniques, and MSK examination classes.

Study setting

The 7-year undergraduate medical curriculum comprises 2.5 preclinical and 3 clinical years, followed by 1.5 year of internship. The latter comprises three 6-month blocks with 3–4 different courses occurring in a 2-week to 3-month duration. The last block for each student includes 2-week elective rotations in which they can choose two out of neurology, anesthesiology, ophthalmology, PMR, forensic medicine, and sports medicine.

Ethics consideration

This study was approved by the Ethical Committee of TUMS (No. IR.TUMS.VCR. REC.1398.1050). Informed consent was taken for recording discussions and using filled forms. The participants were aware of the

Table 1: Sessions of Tehran University of Medical Sciences – physical medicine and rehabilitation course by detail

Day 1	Day 2	Day 3	Day 4	Day 5
Orientation	Physical examination (shoulder)	Evaluation of patients for rehabilitation	Orthotics and prosthesis	Physical examination (knee)
Introduction to PMR	MSK clinics	Rehabilitation clinics	Rehabilitation clinics	Introduction to physical therapy modalities
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Physical examination (spine)	Osteoporosis	Myofascial pain syndrome	Case presentation	Impact of disability
Introduction to OT	Case presentation	MSK Clinics	MSK Clinics	Rehabilitation clinics

PMR=Physical medicine and rehabilitation, MSK=Musculoskeletal, OT=Occupational therapy

objectives of the study and enrollment in the study was on a voluntary basis. The participants were also assured about the confidentiality of the recorded content and filled questionnaires.

Data collection

After receiving approval from the Education Development Center review board and obtaining a written informed consent from each participant, we collected data of two types: quantitative and qualitative methods. First, a quantitative survey was completed by the students using a prerotation and postrotation form: self-reported attitude of PMR and referral pattern of patients. They completed feedback forms at the end of rotation. Attitude questionnaires designed by three experienced PMR assistant professors based on literature review and the face validity of forms were evaluated by seven students. The form included nine items on attitude toward PMR and five items on referral function and satisfaction items scored in a Likert scale (strongly agree: 5 and strongly disagree: 1). The questionnaires were confidential and completed without names and coded with an identification number to match preintervention and postintervention responses. The survey instrument itself was found to have a good test–retest reliability with an alpha coefficient of 0.81.

The other way of data gathering was qualitative method applying focus groups. All the 19 medical students (9 females and 10 males), participants of the research course (15% of the entire medical students experienced the course), received an invitation E-mail 1 week after the end of the program to participate in one of the three focus group discussions, each consisting of 6–8 students. There was one focus group for other faculty members. As is known, focus group discussion is an effective data collection tool widely used in qualitative research; it could reflect participants' feelings, perceptions, or experiences.[16] We used an interview-guide consisting of four open-ended questions about the main reasons of course selection, goals of program, advantages and disadvantages, and improvement suggestions. The guide was developed based on previous students' comments and feedbacks. The focus group questions were piloted with a group of three students from nonparticipating ones for clarifying. The focus group discussions were moderated in Persian by a female facilitator who was experienced in qualitative research (NM). Each focus group took place in a conference room around a round table and lasted for 1 h in which only the facilitator and the participants were present. The facilitator took field notes during the focus groups.

Data analysis

All discussions were audio-recorded, transcribed, coded, and analyzed by the facilitator using inductive thematic analysis after each session. Recurrent themes were identified and coded, and themes with similar codes were summarized. The transcripts and generated themes were shared with all of the authors who reviewed all transcripts to reduce any bias. Because participants were de-identified in the transcripts, they were not asked to review the findings of the qualitative analysis. IBM SPSS Statistics 20.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. $P < 0.05$ was considered statistically significant.

Results

Ninety-one seventh-year medical students participated in this study, with a mean age of 25.4 ± 1.4 years, which included 53 females (56%), and 14 were married (14.7%). The response rate was 63% for attitude survey and 68% for feedback on the rotation. About 92.9% of the participants declared that they are satisfied about the program and they will recommend it to other students.

Figure 1 shows the themes and subthemes of focus groups results regarding the benefits of PMR course.

One of the students about the reason for choosing PMR course selection said: "When I selected PMR, I didn't know anything about this specialty and I selected it by chance. But now, after identifying application of physical medicine methods and their effectiveness, I think about PMR as potential choice for my future education." Other said: "one of my friends who is physiotherapist had told

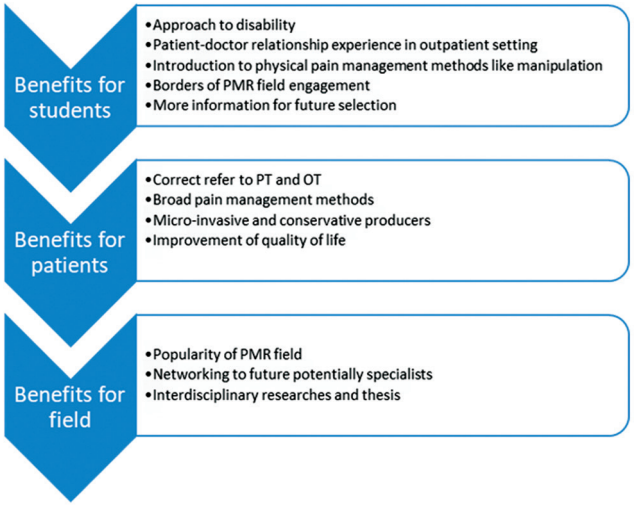

Figure 1: Themes and subthemes about PMR course benefits extracted from the focus groups. PMR = Physical medicine and rehabilitation, PR = Physical therapist, OT = Occupational therapist

me about PMR and physiotherapy overlaps and my sister who is neurologist had said to me electro-diagnostic studies are processing in common in neurology and PMR. I understood this field is wide and I was curious to know about borders of PMR effectiveness."

One of the interns said about useful things that she learned in PMR course as: "I was doubtful about effectiveness of physical modalities and techniques, but now I am sure they are effective. Physiatrists care about patients from different aspects." Other said: "I didn't face disable patient in such setting and I was not able to help disable patients unless being sad for them! But in this course, I learned useful findings in history taking and physical examination of disabled patients to help them in rehabilitation." Another student expressed: "I learned there are so many noninvasive choices for pain management and I think PMR appropriately, filled gap of noninvasive procedures for pain management." He added: "Although PMR patients are mostly the same as orthopedics and rheumatology patients, physiatrists' physical examination and diagnosis are more concise and treatment options are much more widely." One of the interns thinking deeply said: "I learned not to refer all cervical pain and low back pain patients to surgeons when just 10% of them are in need for surgery!"

One of the students opined about the reason of PMR implementation for undergraduate as: "It is investment for future. We are potentially future specialists in different fields and we are now, after experiencing this course, familiar with PMR. It is much more valuable in setting of youngness of PMR field like in my country."

Another student added about limitation of this program as, "We didn't know at the beginning of program about what we have to learn in this course to follow them. I sometimes got anxious during some classes for residents and patient visits especially when I was not able to learn every points."

However, another student said immediately after the previous one as, "Overall, we are happy that we are not work force here and we are educated as student in this course!"

At the personnel focus group, an OT said: "One of the most impressive concern regards our field is physicians knowledge about the boundaries of field and proper patient refer. I was satisfied educating medical students about OT field due to mentioned effect."

The physiotherapist trainer added: "I tried to show different modalities and explain about their indications of effectiveness to cause conscious PT prescriptions."

One of the PMR residents said, "rehabilitation as a multidisciplinary field needs more connections with other fields including neurology and orthopedics. Presence of undergraduate medical students at PMR ward and their involvement in research programs (or their thesis) could be effective in more academic links with other specialties."

One of the OTs said, "If you want to extend the boundaries of professional communications with physicians, you should interfere the physicians in training curriculum which impress most their future decisions." Immediately one of the PTs nodded her head to confirm her and added: "If their practical style shape, it is much more difficult to change it!"

Table 2 summarizes the strengths and weaknesses of the program from the view of students.

We compared attitude statements and practice of appropriate referral, pre- and postrotation [Tables 3 and 4]. We did not find any attitude difference according to gender, marital status, and exam scores. Interestingly, we found a good relationship between attitude and practice score (r = 0.543, P = 0.000); in fact, students' attitude would strongly predict their practice through a model involving age, satisfaction, and exam scores (R^2 = 0.356, B = 0.35 [0.06], and P = 0.000).

Discussion

The aim of this study was to evaluate the impact of a 2-week program of PMR on 7th-year medical students' attitude toward the field and their performance on the pattern of patient reference to different subspecialties. "One of my friends who is physiotherapist had told me about PMR and physiotherapy overlaps and my sister

Table 2: Strengths and weaknesses of the course

Strengths of program	Weaknesses of program
Trust between coordinators and students	Short time for OT observation
Not crowded programing of course	Loss of patient follow-up opportunity
By detailed MSK physical examination education	Overlap of MSK examination classes contents with other rotations such as rheumatology and orthopedics
No abuse of students	Detailed explanation of modalities not about application of modalities
Balanced workload	
Direct communication with professors	

MSK=Musculoskeletal, OT=Occupational therapy

Table 3: Comparison of attitude to patient referral function pre- and post-rotation

Function in referral	Mean±SD		Significance
	Preintervention	Postintervention	
Carpal tunnel syndrome diagnosis and management	3.2±1.0	3.9±0.8	<0.001
Frozen shoulder management	3.6±0.9	3.8±0.9	0.019
Nonspecific low back pain management	3.5±1.1	4.2±0.7	0.047
Foot drop rehabilitation	2.8±0.9	3.3±1.1	0.635
Flat foot management	3.1±1.1	4.2±0.6	0.864

SD=Standard deviation

Table 4: Comparison of attitude toward physical medicine and rehabilitation pre- and post-rotation

Attitude statement	Mean±SD		Significance
	Preintervention	Postintervention	
Physiatrists' important role in MSK diseases management	3.6±0.7	4.2±0.6	0.298
Physiatrist as first line of referral in most MSK problems	2.8±0.9	3.8±0.9	0.008
Physiatrists' role in neuro-rehabilitation	4.0±0.8	4.4±0.6	0.101
Physiatrists' role in bowel bladder management	3.3±0.8	4.0±0.7	0.109
Physiatrists' role in electrodiagnosis	3.9±0.9	4.2±0.7	0.718
Effectiveness of procedures such as injections and nerve blocks	2.1±0.8	2.2± 0.7	0.102
Enough awareness about PMR field of practice	2.1±1.1	3.7±0.9	0.578
Preference for PMR selection for residency	2.2±1.0	2.8±1.2	<0.001
Importance of PMR course for undergraduate	3.3±0.9	3.5±1.0	0.004

PMR=Physical medicine and rehabilitation, MSK=Musculoskeletal, SD=Standard deviation

who is neurologist had said to me electro-diagnostic studies are processing in common in neurology and PMR. I understood this field is wide and I was curious to know about borders of PMR effectiveness." This sentence from one of the students shows the limited knowledge of medical students about field boundaries not only for patient referral but also for field selection as a future career.

A secondary aim was to describe the rotation, helping for establishment of other useful PMR courses. We introduced a new model through making students encounter physical agent modalities and OT field; as it had been proved in earlier studies that undergraduate medical students did not have enough knowledge about the role of OTs and PTs.[17,18] Fortunately, our qualitative findings suggested reasons for program benefit from the perspectives of OTs and PTs. These findings included the education of medical students on physical agents' application, OT field boundaries, and activities. We undertook this rotation because of lack of focused teaching in neuromuscular rehabilitation and MSK conditions in our outpatient settings and because of a crucial need to increase the awareness of graduating medical students about PMR specialty. Through focus groups, students declared getting comprehensive view on patients with need for rehabilitation and specified model in history taking and physical examination of such patients.

The third aim was evaluation of PMR course benefits from the view of different faculty personnel and students. Furthermore, another purpose was evaluation of strengths and limitations of the program. Our results showed that students reported a significant gain in their knowledge on PMR course and they declared that they would recommend this course to other students.

The mean difference of the probability of PMR selection for residency in comparison of pre- and postprogram showed a significant change after the PMR course. In a study by Cromes, students ranked PMR ninth out of ten specialties for consideration of their future choice. After experiencing 6-h clinical teaching and discussion sessions with a physiatrist, the PMR was ranked fifth of ten.[19]

Evaluating the effect of PMR course at Emory University School of Medicine for 2nd-year medical students, through a 9-week period, the authors found that no student entered PMR residency, but they stated that "those who were more favorable toward physical medicine at the completion of the course reported making more referrals to physical medicine, and more use of all services offered by physical medicine."[20] These findings suggest that implementation of such courses during the last years of internship could induce a dramatic impact on decision-making about specialty selection rather than that in the first years of medical school.

Besides that, Lehmann suggested that without education, undergraduate students would not be able to recognize rehabilitation problems, thus reducing referrals to the physiatrist.[21] In the vein of this study, we found a significant score change about patient referrals to physiatrist at the end of course. Furthermore, a good relationship detected between attitude and students' practice score, suggests direction of attentions to attitude of undergraduate medical students, as an effective drive, for achieving an appropriate patient referral to physiatrists. Our result is in line with Abramson's study at Harvard medicine school, suggesting that senior medical students' referral patterns strongly correlated with the knowledge of PMR.[22]

Although ancient studies showed very poor perception of medical students and physicians toward PT and OT,[23-25] recent studies endorsed this finding again. They found future colleagues' base knowledge and favorable attitude as key components for more interdisciplinary co-operations.[26-28] Our qualitative result, "If you want to extend the boundaries of professional communications with physicians, you should interfere the physicians in training curriculum which impress most their future decisions," is in line with the existed studies.

We faced some limitations including the possibility of participation of only optimistic students with a positive point of view about PMR course and missing unsatisfied ones. Furthermore, we did not follow-up students. In fact, we are not sure about their behavioral change and our results are limited to their attitudes. Although gender influences career choice, we did not specifically analyze the focus group discussions based on gender due to the de-identification. The main strength of this study was applying mixed qualitative and quantitative methods for not only students but also faculty members.

Conclusion

We found that internship training course might be an effective method of teaching PMR. Improving attitude toward the field of PMR and patient referral practice, career choice and disability perceptions of undergraduates is concluded in this study. Investigation of the advantages of such courses in larger studies with longer follow-up time-points is highly recommend.

Acknowledgment

We thank all medical students, PTs, and OTs, who devoted their time and valuable opinions for this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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