

Review



The effects of interprofessional education on teamwork, communication skills and quality of health care in advanced and developing countries: A systematic review and meta-analysis study

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Abstract

Background: Inter-professional education is a new approach in education in which professionals in various fields of health systems learn from each other based on educational events in a real environment, actively and interactively. This systematic review and meta-analysis aims to investigate inter-professional education in advanced and developing countries.

Methods: Persian and English keywords were used to search these databases: ISI Web of Science, Scopus, ProQuest, PubMed/Medline, Embase, Google Scholar, ERIC, Magiran, Irandoc, and Barakat with an English language restriction and for the years 2000 to 2019, using these terms: Embase, Meshand and free. Two evaluators assessed the extracted articles using the Critical Appraisal Skills Program (CASP) checklist. CMA 3.1 software was used for the analysis with a fixed-effects model.

Results: A total of 1425 articles formed the basis of this study. In all, nine articles were extracted that examined the effect of inter-professional education from the viewpoints of professors and students (three for professors and six for students). Heterogeneity among the nine studies was not significant. Teamwork scores, communication skills, and healing of the participants in the study increased by 0.339, 0.283, and 0.275 points after the intervention, respectively.

Conclusion: Inter-professional education is one method of educational integration. Students become aware of how their role overlaps with other medical professions as well as the limitations of their role in treating patients. However, inter-professional education implementation requires infrastructure, such as training professors and preparing them and students to accept inter-professional education.

Background

Due to the increase in complexity of patient care needs and diseases prevention, one profession alone is insufficient to manage patient treatment. Therefore, health care teams pursue different aspects of patient treatment.^{1,2} According to statistics in the US, 9800 avoidable medical mistakes are caused by poor communication among different health professionals annually.³ According to the Association of the Joint Committee on Accreditation (JCAHO), 65% of hospital incidents can be prevented by effective teamwork.⁴ The American Medical Association (AMA) has

emphasized that patients will receive high quality and safe care whenever the health professionals work together with constructive communication and mutual understanding of each member's role, respect, and trust in each other.⁵ In most studies around inter-professional education, the attitudes and readiness of students for receiving inter-professional education have been investigated, including Horsburgh et al, who examined medical, nursing, and pharmacy students' perspectives and found co-learning helped them to be a member of the effective treatment group, increased their teamwork skills and showed them

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the limitations of their field of study.⁶ Aziz et al examined pharmacy and nursing students' viewpoints and found that inter-professional education helped form their professional identity and familiarized them with the tasks of other fields of study.⁷ Maharajan et al examined medical, dentistry, and pharmacy students' viewpoints and found inter-professional education increased the understanding of clinical issues and improved communication with patients and other health care professions.⁸ Wong et al found that students had a positive attitude towards working in the inter-professional health care groups.⁹ Groessl and Vandenhouten examined students' viewpoints and found inter-professional education helped them focus on presenting the best treatment for patients and validate all opinions in inter-professional education.¹⁰ Talwalkar et al found students were more eager to participate in inter-professional education.¹¹ Garoosi found that medical and nursing students were prepared for inter-professional education.¹² However, Yamani found that medical students believed that training alongside other professions was a waste of time.¹³ Medical students were found to have more education and higher self-esteem than nursing students.¹⁴ After measuring student readiness, the effectiveness of this educational method should be measured. In a systematic review study of Zwarenstein et al, in 1999, there was no evidence of incremental cooperation between professions or higher quality of treatment through inter-professional education, and in the replication of their review in 2009, all articles except two reported a lack of effectiveness of this method.¹⁵ In the systematic review of Reeves et al in 2008, inter-professional education was found to increase patient satisfaction and team collaboration, reduce clinical errors in the emergency department, and improve cure management. Moreover, in the replication of their review in 2013, inter-professional education had positive results on providing diabetic care, patient satisfaction of the culture of emergency environment, cooperative group behavior and reduction of emergency unit errors, collaborative behaviors in the operating room, providing care for family violence and improving the capacity of doctors' mental health in providing patient care.¹⁶ Reeves et al also found that pre- and post-educational intervention studies were enrolled, but none of them were eligible to enter the meta-analysis study.¹⁷ In this study, pre- and post-interventional studies were selected to provide a clear view to educational planners and designers who may want to use this approach. To achieve this goal, in this systematic review and meta-analysis, we will investigate the effect of this educational method on teamwork, communication skills, and quality of patient care, which are the most important goals of inter-professional education.

Materials and Methods

Information references and inclusion and exclusion criteria

A systematic search of sources was performed to

evaluate the effectiveness of inter-professional education in increasing communication skills, teamwork, and improvement of disease treatment. ISI Web of Science, Scopus, ProQuest, PubMed/Medline, Embase, Google Scholar Eric databases were used to find articles from January 2000 to July 2019. Iran's databases, including SID (Scientific Information Database), IranDoc (Iranian Research Institute for Information Science and Technology), Magiran, Irandoc, and Barkat Danesh Gostar system (Barakat Knowledge Network system) were also searched. To search for articles, these keywords were used under the medical subject headings (MeSH): Education, student, inter-professional, multi-professional communication, team working, patient care. Related resources in selected studies were searched manually. To investigate unpublished studies and documentation (grey literature), ProQuest website and websites related to theses, conferences, and abstracts were used. In addition, inter-professional education journals, including the *Journal of Inter-care* and the *Journal of Research in Inter-professional Practice and Education* as well as *Medical Teacher* and *Medical Education*, reputable journals in the field of medicine, were also searched. The websites of some organizations in inter-professional education (WHO, CAIPE-UK, CIHC, and AIPPEN), which publish the latest reports and achievements of inter-professional education and hold annual conferences at the international level, were also searched. We communicated with active experts in this subject to learn about published and unpublished studies. The search strategy for the databases is shown in Table 1. In order to search, PICO was used (P = Medical Science Student, I = Inter-Professional, O = team working, C = patient care-communication).

Search Strategy

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(((((Inter-professional [Title/Abstract])) OR
(interdisciplinary [Title/Abstract])) OR (multi-
professional [Title/Abstract]))) AND (Education
[Title/Abstract])) AND (Communication [Title/
Abstract])) AND ("Patient Care"[Title/Abstract]) AND
(English[lang])
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Detailed descriptions of the search strategies for some electronic databases such as PubMed are given in Table 1.

The criteria for considering articles for the study were articles published between January 2000 and July 2018, articles published in English and Farsi, and pre-post test articles.

Exclusion criteria were articles with not fully reported results, review papers, or letters to the editor or suggestions.

Extracting data

After extracting articles from the databases using the mentioned keywords, a thematic specialist assessed articles in three stages. First, the titles of all articles were reviewed, and articles that were not consistent with the objectives of the study were excluded. Abstracts and full texts of articles

Table 1. Search strategies detail in the PubMed database

Search	Add to builder	Query	Items found	Time
#13	Add	Search (#12) AND #5	156	00:16:41
#12	Add	Search (#11) AND #4	1 118	00:16:13
#11	Add	Search (#10) AND #9	6 602	00:15:46
#10	Add	Search ((#1) OR #2) OR #3	46 193	00:15:06
#9	Add	Search Education[Title/Abstract]	542 012	00:14:31
#8	Add	Search student[Title/Abstract]	125 329	00:14:03
#7	Add	Search Academic[Title/Abstract]	153 443	00:13:38
#6	Add	Search "team working"[Title/Abstract]	1 032	00:12:50
#5	Add	Search "Patient Care"[Title/Abstract]	72 810	00:12:17
#4	Add	Search Communication[Title/Abstract]	273 766	00:11:39
#3	Add	Search multi-professional[Title/Abstract]	1 400	00:11:10
#2	Add	Search interdisciplinary[Title/Abstract]	43 297	00:10:32
#1	Add	Search Inter-professional[Title/Abstract]	1 729	00:09:46

were reviewed, and studies that met exclusion criteria and had a poor relationship with the objectives of the study were identified and excluded. Two evaluators assessed the remaining studies for bias, and the conflicted cases were referred to a third evaluator. Required data extracted from the articles were summarized in an extraction form. The extracted data included the first author, year of publication, country of study, sample size, and mean and standard deviation of scores before and after the intervention for team working, communication, and patient care. Endnote X8 resources management software was used to organize articles, study titles, and abstracts, and determine duplicate cases.

Selection and evaluation of studies

The Critical Appraisal Skills Program (CASP) checklist was used to assess the quality of the articles. This tool has 12 items. A score of less than 50% indicates low quality, 50-70% average, and a score of 70% or higher indicates high quality.¹⁷

Statistical analysis

The number of sample volumes in each study and mean scores were extracted. Meta-analysis was used to combine the difference between scores' mean of study outcomes. Non-heterogeneity was assessed between Cochran's statistics (Q) and I² Index, which expresses the percentage of changes among studies. To calculate the overall effect size, if the statistic values of I² were less than 50%, the Mantel-Haenszel fixed-effect model was used, and if the statistic values of I² were more than 50% or P value < 0.05, the random effect model was used. Statistical analyses were performed using CMA 3.2 software. A P value of less than 0.05 was considered significant.

Results

Search results and study features

In a systematic search of the sources, 1425 articles were

identified. After removing the overlap of articles in different databases using Endnote software, the titles and abstracts of 386 articles were assessed. A total of 312 articles were excluded after reviewing titles and abstracts. After reviewing the full text of articles, 65 articles were excluded. In all, 9 articles examined the effect of inter-professional education from professors' and students' viewpoints, in which 6 articles were from students' viewpoints and 4 articles from professors' viewpoints. Finally, 3 articles from students' viewpoints met the conditions for entering the meta-analysis. The flowchart of the study process is shown in Figure 1.

Table 2 shows the specification of imported articles into the meta-analysis.

Meta-analysis Results

Table 3 shows the meta-analysis results for the groups studied.

Team working group

The heterogeneity between the studies was not significant (Q=2.42, df=2, P value=0.297, I²=17.57). A fixed-effects model was used to combine the results. The meta-analysis showed that the score of a working group of participants in the study after the intervention was increased by 0.339 points. In Figure 2, the forest plot of the studies' combination

The communication group

The heterogeneity among the studies was not significant (Q=0.286, df=2, P value=0.86, I²=0.000). A fixed-effects model was used to combine the results. The meta-analysis results showed that the participants' communication score in the study increased by 0.283 points after the intervention. In Figure 3, the forest plot of the studies' combination is shown.

Patient care group

The heterogeneity among the studies was not significant

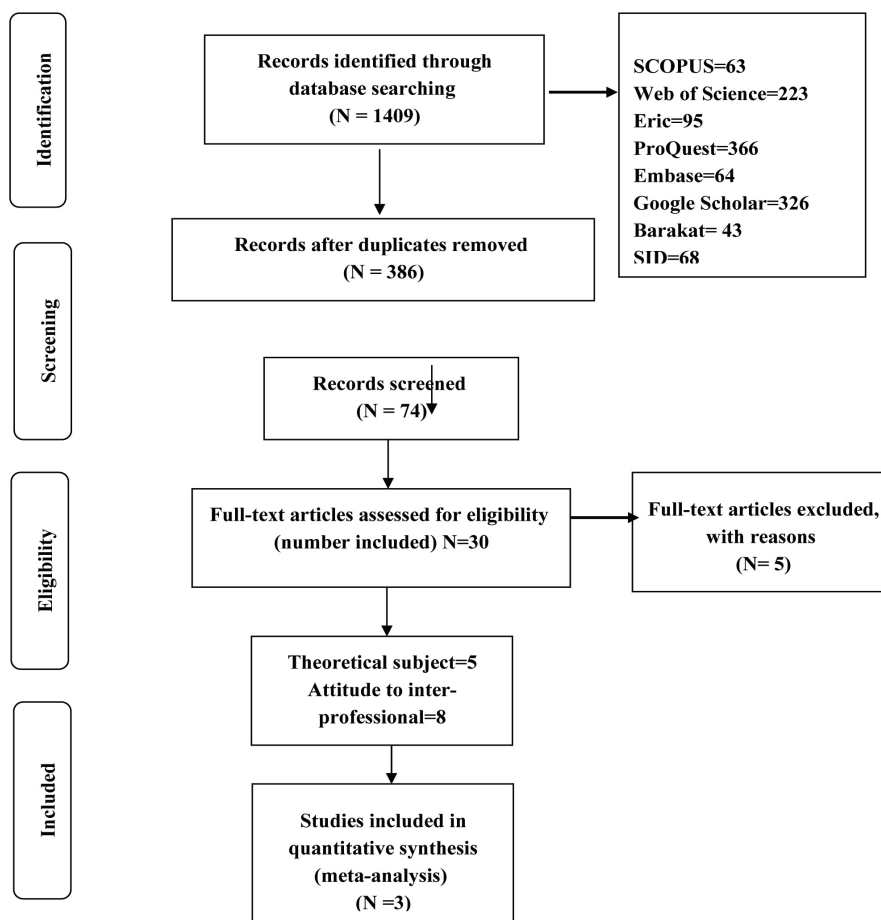


Figure 1. Flowchart of reference extraction based on the PISMI checklist .

Table 2. Specification of articles imported into the meta-analysis

Author	Country	University	Study design	Type of questionnaire	Total participants
Brock et al (2013) ¹⁸	Washington, USA	Unit of Family Medicine and MEDEX Northwest, The University of Washington, Seattle, Washington, USA	Intervention	Teamwork Attitudes Questionnaire (TAQ) team STEPPS communication behaviors and assessment instruments	149
Mcnair et al (2005) ¹⁹	Australia	The University of Melbourne, Carlton, Victoria, Australia	Before-after quasi-experimental design	Questionnaire items were developed from The IPE literature, which describes competencies that have been shown to be useful for teamwork and collaboration in other studies. There were 31 items common to pre- and post-questionnaires. An additional 21 statements appeared only on the post-placement questionnaire. Respondents rated the statements according to an agreement on a 5-point Likert scale from strongly agree (1) to strongly disagree (5).	85
Wong et al (2016) ²⁰	Canada	British Columbia Women's Hospital and Health Centre	Mixed methods-self-assessment -pre- and post-project surveys	Inter-professional Attitudes questionnaire	26

Table 3. Meta-analysis results for studies outcomes

Model	Effect size and 95% confidence interval					Test of null (2-Tail)			Heterogeneity		
	Number of Studies	Point estimate	Standard error	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared
Team working	3	0.339	0.064	0.214	0.465	5.308	<0.001	2.426	2	0.297	17.576
Communication	3	0.286	0.063	0.159	0.407	4.471	<0.001	0.286	2	0.867	0.000
Patient care	3	0.275	0.063	0.151	0.399	4.348	<0.001	1.340	2	0.512	0.000

Team Working

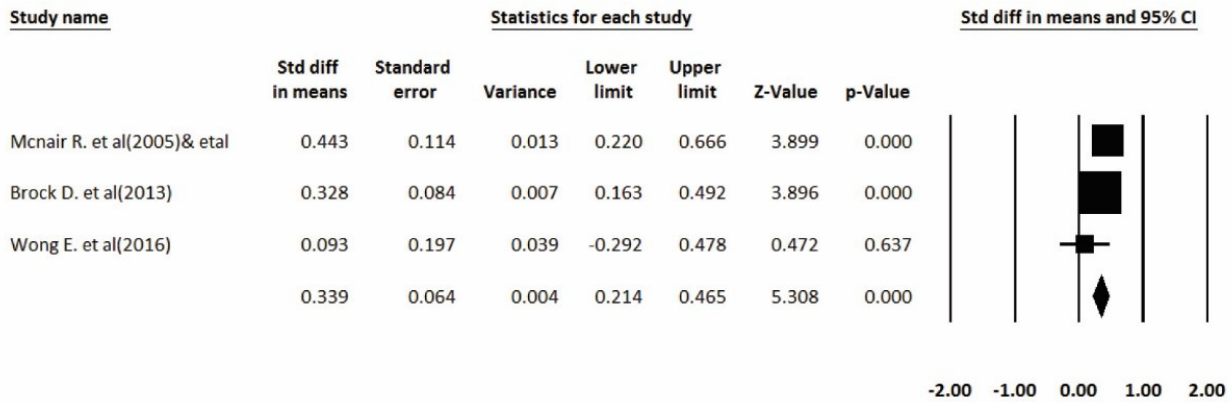


Figure 2. Forest plot of the effect of interprofessional education on teamwork among medical students.

Communication

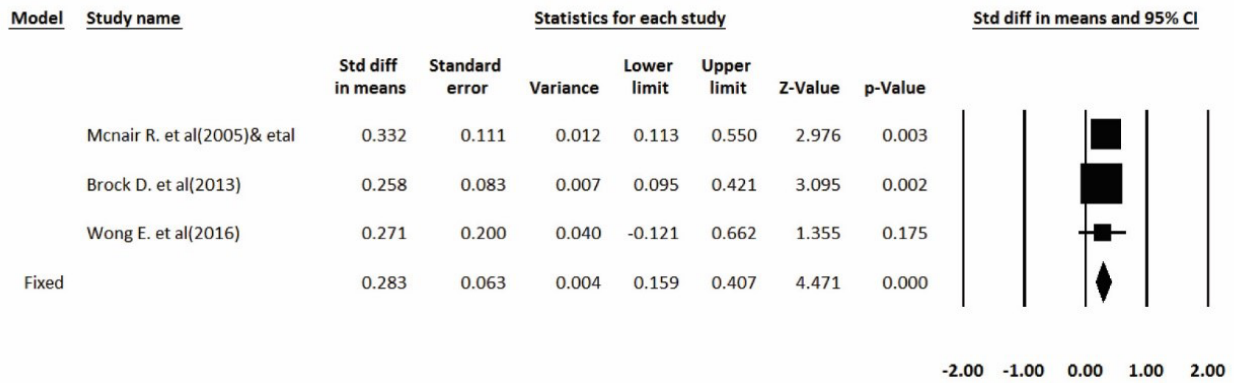


Figure 3. Forest plot of the effect of inter-professional education on communication skills of medical students.

($Q = 1.34$, $df = 2$, P value = 0.51, $I^2 = 0.000$). A fixed-effects model was used to combine the results. The meta-analysis results showed that the participants' communication score in the study increased by 0.275 points after the intervention. In Figure 4, the forest plot of the studies' combination is shown.

Publication bias review

In order to investigate the publication bias, Egger's regression test was used. According to the Egger's regression test, there was no evidence of publication bias (P value = 0.46)(Figure 4).

Discussion

The meta-analysis results found that inter-professional education improves teamwork, communication skills, and quality of treatment in all three areas. The results of this study showed that the most crucial objective of inter-professional education was to increase teamwork, strengthen communication skills, and ultimately improve

the quality of treatment achievable through this training method. The first purpose of this study was to investigate the effect of inter-professional education; the results showed that inter-professional education increases teamwork. In his study, Reeves et al mentioned that students in this way of training had a positive attitude to work in the group since they spent more time in teamwork, and it provided the opportunity for students to talk and exchange ideas on issues that they faced, and as a result, it strengthened their teamwork.²¹ In the semi-experimental study of Momeni et al²², inter-professional education improved teamwork skills of a cardiopulmonary group. Kenaszchuk et al also expressed that the students had maximum opportunities for inter-professional interactions through positive feedback they received from each other to increase their motivation to cooperate, change their attitudes to teamwork, and become interested in learning clinical issues together; thus, they received a unit overview of the treatment process and understood the role of other professions in the treatment process.²³ Zabar has also expressed that students understood that

Patient Care

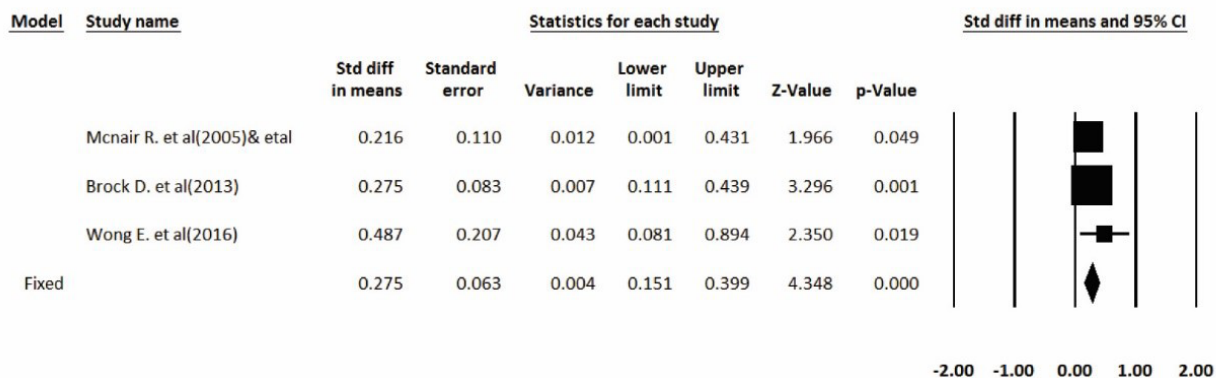


Figure 4. Forest plot of the effect of inter-professional education on patient care rate among medical students.

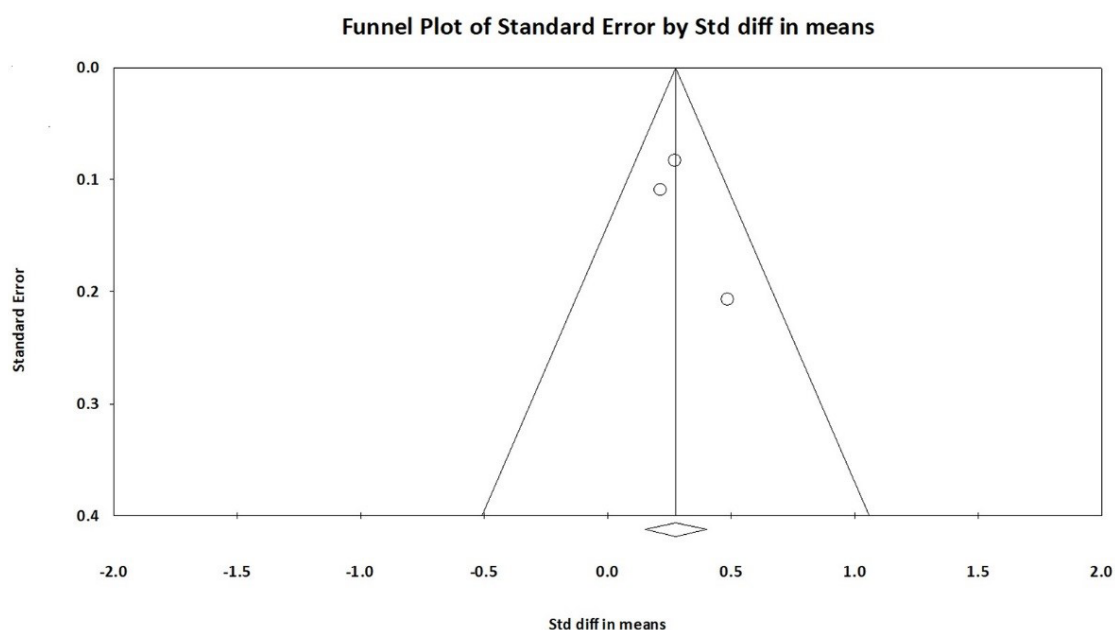


Figure 5. Standard error in the selected studies by log odds ratio

dealing with patients and their treatment requires a range of health care professions through inter-professional education.²⁴ In some studies, the viewpoint of medical students, who think their profession is superior to other professions, is a factor of reluctance to work in teams; they believe that it is a waste of time and express that they do not need to cooperate with other professions in clinical issues.²⁵

The second purpose of this study was to investigate the effect of inter-professional education on communication skills. The meta-analysis showed that inter-professional training improved student communication skills, considering that communication skills overlap with teamwork. As Lapkin et al have expressed, inter-professional education is a way to improve communication skills and inter-professional collaboration that help make clinical decisions. Through this method of educating students to have positive attitudes towards other

professions, they came to understand the role of other professions in treating patients and respecting other professions as necessary for effective communication.²¹

The third goal of the study was to investigate the effect of professional education on the quality of therapeutic care provided to patients. According to the meta-analysis, this educational method will improve the quality of treatment. As Lapkin et al²⁶ concluded, inter-professional education is a way to improve communication skills with other professions that ultimately improved patient treatment. Smith et al also expressed that inter-professional education improved students' clinical decision-making ability,²⁷ and Nørgaard and colleagues' semi-experimental study concluded that this method reduced the tension among the different health group professions, which ultimately increased patient safety and satisfaction.²⁸ In their attitudinal study, Groessel and Vandenhouten argued that inter-professional education is a patient-centered

approach that increases students' focus on the best treatment method¹⁰.

Conclusion

Inter-professional education, as a new educational approach, induces a patient-centered perspective rather than a disease-centered perspective to both students and professors of medical sciences, and students understand the importance of the treatment group in their clinical issues. However, there are several challenges, including workload, lack of time, and lack of balance between the level of information and knowledge of different professions, which are the essential limitations of inter-professional education; these challenges require curriculum development with a holistic view and integration of medical majors. On the other hand, they must educate professors with a multi-professional approach, and the culture of the superiority of some professions towards others must be abolished, which requires strategic planning and policy-making. Especially in our country, where this attitude of superiority has been ingrained in professors' and students' culture, and cultural infrastructure should also be provided for implementing this educational method.

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Authors' contribution

MA, HH, and AA were involved in this study to design and draft the research and the manuscript. HH and MB provided the qualitative design. MGH and HH provided the systematic review and meta-analysis design and analyzed the data. HH and AA wrote the first and second drafts of the paper. MA, HH, AA and MGH reviewed the first and second drafts of the paper and improved them.

Competing interests

There are no competing interests.

Ethical approval

The Research Ethics Committee of the Tabriz University of Medical Sciences approved this study (IR. TBZMED. REC.1398.1201).

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