

# Practice-Based Learning and Improvement (PBLI) from the Perspective of Iranian Medical Education Experts: A Thematic Content Analysis

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## Abstract

**Background:** Among core competencies introduced by the Accreditation council for graduate medical education (ACGME), practice-based learning and improvement (PBLI) monitors the improvement and quality of physicians' performance during their professional practice. Understanding and knowledge of the viewpoints of medical professionals, planners, and graduates about the concept of PBLI and investigating its current status are required for proposing appropriate policies and plans in this area.

**Methods:** This qualitative study was performed through thematic content analysis. In-depth semi-structured interviews were conducted to gather data in Tehran, Iran from June 2016 to January 2017. Purposeful sampling was applied, and the participants included experts, planners, and medical graduates. While considering the trustworthiness criteria during the study, interviews were performed, transcribed, and coded. We used ATLAS.ti version 6 for coding and categorization.

**Results:** The study sample consisted of 11 participants, including 4 executive officials, 4 experts of medical education, and 3 general practitioners (4 females and 7 males). The average age of the participants was  $48 \pm 8.47$  years. The analyses introduced 9 categories, 56 subcategories, and 224 initial codes. The main categories included: PBLI attributes, components of PBLI, shortcomings of the academic educational system, shortcomings of the health system, strategies for academic education reform, strategies for health system reform, activators of PBLI, solutions for gaps in PBLI, and need for PBLI.

**Conclusions:** PBLI is a professional necessity for all physicians. Feasibly, excellence in clinical care can be achieved with this competency. Implementation of PBLI requires a competency-based curriculum, academic education, and a proper infrastructure for its implementation in clinical service delivery environments. Health system stewardship plays a great role in overcoming the challenges and developing coordinated national systems.

**Keywords:** PBLI, Practice-Based Learning and Improvement, Iran, Thematic Content Analysis

## 1. Background

Maintenance and improvement of the quality of health services cannot be achieved in the healthcare system unless proper plans are designed and implemented at individual level to be extended to the entire system (1, 2). To this end, the accreditation council for graduate medical education (ACGME) has introduced 6 core competencies, including patient care, medical knowledge, practice-based learning and improvement (PBLI), communication skills, professionalism, and system-based practice since 1999 with the aim of training competent and efficient physicians.

Among the mentioned competencies, PBLI monitors the improvement and quality of physicians' performance during their professional practice (3, 4). The importance of PBLI is highlighted, as physicians should monitor and improve the quality of their practice and keep themselves updated with medical advances. In a broader rationale, it is believed that physicians should be pioneers in making

changes rather than reacting to changes made by others. Also, positive changes in the behavior and performance of individuals are known to have positive effects on larger systems and lead to the promotion of the health system (2).

One of the main goals of education in training medical students is to teach them how to learn continuously after graduation and to improve the quality of their practice. Therefore, among all main competencies introduced by ACGME, PBLI ensures the quality of physician's practice and health outcomes. Nevertheless, its comprehensive implementation is difficult due to ambiguity in the literature (3, 5).

So far, there has been no similar research in this area in Iran. Therefore, understanding and knowledge of the viewpoints of medical professionals, planners, and graduates about the concept of PBLI and investigating its current status are required for making appropriate policies in this area.

## 2. Methods

This study was performed through thematic content analysis in Tehran, Iran from June 2016 to January 2017.

### 2.1. Participants

The participants included professors, officials of medical education planning, experts in the field, and physicians with real-life experiences of dealing with the research subject. The participants were selected via purposeful sampling. The inclusion criteria for the professors and experts were as follows: 1) being a medical graduate; 2) being an expert and/or having an executive position in the medical education system; 3) being a clinical instructor; and 4) willingness to participate in the study.

General practitioners were also recruited if they had the following qualifications: 1) graduation from national universities of medical sciences; 2) being only involved in clinical practice; 3) graduation within at least the past 3 years; 4) being a reputable physician with up-to-date and effective medical practice; 5) having power of speech and argument; and 6) willingness to participate in the study. On the other hand, giving unrelated answers and unwillingness to participate in the study were the exclusion criteria. Finally, a total of 11 participants were recruited in this study; their demographic characteristics are presented in [Table 1](#).

### 2.2. Data Collection

Data were collected through in-depth semi-structured interviews. The second researcher in this study is a PhD candidate of medical education and a member of the education development center (EDC) with experience in qualitative studies. She could establish sincere and reliable communication with the participants. The interviews were mainly conducted face-to-face at the office of the university, EDCs, or clinics.

The interviews started with open-ended questions and were directed based on the interview guide by probing questions; the order of the questions was changed, based on the discussions. The interview duration ranged from 25 to 100 minutes (average, about 60 minutes). In the present study, we tried to select participants from related groups.

### 2.3. Data Analysis

After conducting the interviews, the scripts of the conversations were reviewed several times, and coding was performed in each interview by the same researcher. First, the scripts of the interviews were divided into semantic units. Next, open coding was performed, and the initial codes were sent to the participants to confirm. Different codes were compared and classified with respect to

**Table 1.** The Demographic Information of the Participants

Participant No.	Gender	Age, y	Occupation
EX1 (expert)	Male	51	Specialist, clinical instructor, and medical education expert
EX2	Male	58	Subspecialist, clinical instructor, member of EDCI, and medical education expert
EX3	Female	51	Specialist, clinical instructor, member of EDC, and medical education expert
EX4	Male	65	Subspecialist, clinical instructor, member of medical education board, and medical education expert
M1 (manager)	Female	45	Specialist, clinical instructor, and member of medical education board
M2	Male	51	Specialist, clinical instructor, and member of medical education board
M3	Male	56	Subspecialist, clinical instructor, and manager of EDC
M4	Female	44	Specialist, clinical instructor, and manager of EDC
GP1 (general practitioner)	Male	44	General practitioner in a public clinic
GP2	Female	35	General practitioner in a private office
GP3	Male	40	General practitioner in a private clinic

Abbreviation: EDC, education development center.

their differences and similarities. This iterative process continued for categories and subcategories, according to their characteristics and peculiarities. At this stage, the initial categorization was discussed and revised by the researchers in order to achieve agreement. However, the processes of encoding, formation of categories and subcategories, and extraction of the main themes were carried out, using ATLAS.ti version 6.

### 2.4. Trustworthiness

The 4 criteria of credibility, confirmability, dependability, and transferability were continuously considered by the researchers. The gathered data were confirmed through the following processes: 1) allocating sufficient time to data collection and simultaneous analysis; 2) establishing proper communication with the participants;

3) conducting interviews in locations selected by the participants; 4) confirmation of the scripts and initial codes by the participants; 5) presenting detailed descriptions; 6) reading out the extracted codes by other colleagues and reaching a conclusion with scientific consensus; and 7) confirmation by an outside observer.

#### Ethical considerations

The present study was approved by Shahid Beheshti University of Medical Sciences (IR.SBMU.RAM.REC.1394.377). Interviews were conducted after obtaining informed consents for digital recording, explaining the issues related to the anonymity and confidentiality of the information, and ensuring the subjects about deleting the audio files after transcription. Also, withdrawal from the study was optional at any time.

### 3. Results

The sample in the present study included 11 participants (4 females and 7 males). The average age of the participants was  $49 \pm 8.60$  years. The analyses led to the formation of 9 categories, 56 subcategories, and 224 initial codes. The extracted categories and subcategories are presented in [Table 2](#).

### 4. Discussion

#### 4.1. PBLI Attributes

PBLI is a metacompetency with a wide range of subcompetencies. It does not correspond to a separate competency in the framework of CanMEDS, while it is evident in all parts of CanMEDS framework and includes several subcompetencies (2). A study by Teunissen in professional clinical environments indicated that learning is the undeniable outcome of practice and that maintenance and improvement of quality of practice entail learning. In fact, learning and engaging in professional practice are 2 sides of the same coin (6).

The learner judges the information received from the context, based on personal inclusive attitudes and values; this judgment is based on learning and one's idea of his/her future performance. Therefore, individual attributes affect one's attention to and thoughts about learning. In fact, teachers should consider the impact of internal and personal factors on learning (6, 7).

Promotion of health care is a professional skill-based activity, which involves a combination of theoretical and functional aspects (8). Improvement of the quality of health care is a way to understand control over daily professional affairs in clinical environments. Background knowledge, skills, and tools for improving the quality of health

care have the potential to convert unorganized daily business affairs to defined processes, which can lead to the desired outcomes for professors, learners, and recipients of health care (9).

According to the participants, proactivity denotes control over daily professional affairs. With respect to PBLI features, one of the participants stated:

“Some people have this habit of always appraising themselves both consciously and unconsciously about why they treated a patient in a certain way. If something draws their attention, they pursue it in order to reach a conclusion.”

Moreover, another participant stated:

“We have a metacompetency, named PBLI, which includes subcompetencies, such as search, appraisal, synthesis, application, change, change of management, and quality improvement”.

#### 4.2. Components of PBLI

A review of the literature regarding PBLI suggests that self-directed learning (SDL) is one of the main components of PBLI, which requires a range of skills. Today, the professional world demands documentation of SDL to renew professional licenses (10, 11). To identify the strengths and weaknesses, the self-reflection process should be integrated in daily medical responsibilities. During this process, the physician critically evaluates what has been properly done or what is flawed. He/she searches to see what action is needed to improve the condition; this issue has been also considered in the renewal of professional licenses. However, the nature of the process is not punitive, but rather a physician's responsibility towards the patient and community (12).

One of the main components of PBLI is systematic improvement of the quality of health care (13-16). Indices used in quality improvement measure the level of achievement of objectives. These indices in form of number, proportion, or mean can be used as a basis for the achievement of objectives and can be applied by physicians, organizations, and policymakers in planning programs of quality improvement (17, 18). Evidence-based medicine (EBM) is defined as using correct, appropriate, and clear information in clinical decision-making for each patient. Given the growing volume of medical information and knowledge, it is essential for physicians to deploy a systematic strategy for managing the scientific information available about the patients (19). With regard to the major components of PBLI, one of the participants stated:

“As a clinician, I believe that foreground knowledge is very important, as it is considered a determinative factor in decision-making for patients and their prognosis. How-

ever, the foreground knowledge is not necessarily followed in practice to achieve improvement.”

In this regard, another participant stated:

“One option is to search for individuals whose job is to analyze the root causes. Such people can assist us whether we are qualified enough or we need someone with experience in cause analysis.”

#### 4.3. Shortcomings of the Academic Educational System

The current clinical training system has failed to advance in line with demographic changes, patient needs, and changing expectations of the health system and personnel composition. Moreover, it has failed to take modern knowledge, quality improvement, and new technologies into account. Based on previous studies, the prevailing challenges include academic incompetence in training qualified graduated physicians to treat patients with chronic diseases, lack of regular and effective continuing medical education (CME), and defective medical curricula (20).

The outcome of a clinical education system, which fails to evaluate physicians' clinical qualifications, is the entry of unqualified physicians into the profession, which may lead to a reduction in the quality of services provided by the graduates (21). In a study by Nasri et al. more than 50% of interns were dissatisfied with the assessment methods. They believed that mismatch (93.3%) between the final exam and training during the course is greatly effective in educational problems (22).

In general, most clinical instructors are content experts. However, they have not been trained on how to teach the materials, and many of them are unfamiliar with teaching methods, planning, and educational evaluation (23, 24). In a report, entitled, “Achievements, challenges, and prospects facing the healthcare system of Islamic Republic of Iran”, the most important weaknesses of the current education system were as follows: 1) asymmetric development of medical education; 2) emphasis on specialization in line with the changing patterns of diseases and lifestyle; 3) lack of systemic integrity; 4) lack of horizontal and vertical integration of curricula; 5) deficiencies in intracommunication; 6) lack of proper interactions; 7) absence of educational system's commitment to social responsibility; and 8) inequity in providing healthcare services (25). Some of the challenges mentioned by the participants in this regard are as follows:

“There are discussions among faculty members about the educational programs, motivation development, educational system, overloading of the curriculum and educational space, and various settings which cannot eventually provide the required facilities. I mean we have a ma-

ior problem in the core of medical programs, and we have failed to identify them properly.”

“Evaluations should be stronger so that we can screen medical students who get out of the medical system and avoid admitting incompetent students.”

“Based on evidence and my own understanding, CME lacks efficiency in its existing form; other researchers around the world have also reached the same conclusion.”

#### 4.4. Shortcomings of the Health System

Studies have shown that health system challenges are related to and affected by each other. Failure in educational processes and lack of efficient manpower contribute to the lack of integrity in the process of healthcare provision, and therefore, results in degradation of care quality and safety (25).

In a qualitative study by Biglar, entitled, “Stewardship challenges in the medical education system in the country in the opinion of faculty members”, the following shortcomings were tangible and evident: 1) lack of coordination among educational, research, and service provision policies; 2) poor decision-making and evidence-based policy-making; 3) lack of documentation and information for the development of favorable policies; 4) weakness in monitoring and evaluation policies of approved programs; 5) poor practical application of monitoring results for modification of future programs; and 6) dispersion and extension of decision-making centers (26).

In this regard, some of the participants stated:

“I want to say that sometimes, despite the fact that we are in the heart of the healthcare system, challenges and complexities, such as financial problems, patient overload, patient expectations, community expectations, doctors' mental health status, economic issues, and everyday problems may occur...”

“The existing evidence based on documents is neglected, and its position has not been defined in the healthcare system. So, I believe that implementation and auditing processes are not clear at all.”

#### 4.5. Strategies for Academic Education Reform

Personal qualities, traits, experiences, and adaptive capacities are all effective in medical practice. However, these variables are rarely evaluated or considered in student admission decision-making in medical schools (27, 28). Basic information is sufficiently indicative of the effect of personality and personal characteristics on the progress of medical faculties (29).

One of the challenges in the development of competency and new skills, such as quality improvement and

EBM, is the lack of trained teachers. Therefore, in educational planning and implementation, teacher empowerment should be considered in the first place (19, 30, 31). Moreover, development of a structured curriculum is an opportunity to implement PBLI (32-35). Inadequate quality of service provision results in failure to implement PBLI curricula and system-based practices (36). A competency-based curriculum should be implemented in a spiral model in a way that the depth of knowledge and skill employment gradually increase according to Dreyfus model of skill acquisition (14, 37).

Professional communities comprise of groups of people with a shared concern, motivation, or enthusiasm to do or learn something better; this is why the members regularly interact with each other. Professional communities interact through activities, such as problem-solving, information request, search for other people's experiences, reuse of resources, coordination and cooperation, discussion on development, project documentation, visits, and depiction of knowledge maps and identifying the gaps (38, 39).

Commitment to continuous learning and performance improvement is necessary for any practitioner. The available evidence about CME and changes in the performance of participants is complex and diverse. An effective CME should be based on need assessment. However, physicians have limited success in self-assessment. Therefore, among processes, which are currently applied for professional development, competency assessment should be based on external assessments (10).

Another effective change is the replacement of the credit hour system for evaluating students' activities, learning abilities, and performance. Continuing professional development (CPD) is maintaining, promoting, and systematically expanding the students' knowledge and skills; it is developing the physicians' capabilities to perform professional and technical tasks (40). The focus of CPD is learning clinical issues through colleagues and instructors (41).

Organizations such as the American academy of family physicians (AAFP), American medical association (AMA), and association of American medical colleges (AAMC) are setting national standards for professional development through auditing patient care, feedback based on performance measurement, follow-ups before and after interventions, and benchmarking the same functions or similar patients (42).

#### 4.6. Strategies for Health System Reform

Information technology (IT) plays an important role in personal health management and provision of health care and public health. In such contexts, extensive use

of IT can improve healthcare quality, prevent medical errors, improve management of healthcare costs, increase management efficiency, and reduce the paperwork. Moreover, it can increase the efficiency of healthcare services (through rapid identification of infectious outbreaks across the country), improve disease tracking and treatment of chronic diseases, and provide comparable data on costs and quality of care (39, 43-46).

Optimal medical practice is guaranteed by application of strong national evidence in various fields of health care. Therefore, a national evidence-based health system guarantees the production, storage, dissemination, implementation, and sharing of strong evidence and ultimately facilitates monitoring and evaluation of processes, which lead to the systematic provision of effective and safe clinical care (tailored to the needs of various stakeholders). Finally, besides facilitating evidence-based care provision, through clinical effectiveness, we can evaluate the performance of providers, departments, and evidence-based health centers and use data from the health system to develop evidence-based practice (47, 48).

In this context, one of the participants stated:

"We do not need a person who is in clinical practice. We need, for instance, an academician who reviews and appraises the information that a group of experts has developed while considering the special circumstances of our country; this gap currently exists in our country."

"Synthesis and localization of knowledge represent clinical guidelines and standards."

#### 4.7. Triggers of PBLI

Awareness of the gap in knowledge, skills, and attitudes of medical practitioners can be identified through internal or external sources. External factors mainly include institutions and organizations, which play a regulatory role. Based on functional data, they analyze the individual's situation with respect to the standards. Moreover, external feedback consists of the results of license renewal tests for monitoring, unions, and performance measures, which can be applied through regulatory bodies, quality improvement processes, or patient and peer feedback (2, 8, 12, 13, 33).

Under different circumstances, the strengths, shortcomings, and limitations can be identified through incentives. People, who seek to address the gap in knowledge, skills, or attitudes, are motivated by internal resources. Complexity or difficulty of a clinical problem, emergence of a new clinical situation, uncertainty in decision-making, noncompliance of the results with expectations, and peer benchmarking can help identify the gaps in knowledge, skills, and performance (12, 49-51). In this regard, one of the participants expressed:

“Sometimes, they get feedback from their patients. For example, the patient might say that the prescribed drug is unsuitable! Once I went to a doctor who gave me different orders; well, he thought about his own practice and reputation.”

“A doctor, for various reasons, might have the idea that he lacks sufficient knowledge; in fact, we should consider a kind of self-perception in such cases.”

#### 4.8. Solutions for Gaps in PBLI

As previously discussed, the identified knowledge gaps can be resolved with SDL, CME, or learning communities. The identified gaps in skills and performance can be resolved through participation in communities of practice, involvement in CPD courses, or implementation of quality improvement techniques. The critical components of PBLI actualization include monitoring, identifying, and removing gaps, which require intersectoral coordination and comprehensive administration of the entire process (12, 49, 52, 53). In this regard, the participants stated:

“A proactive approach towards knowledge requires us to have a plan to progress and update our background knowledge; this plan is in fact a kind of self-study program.”

“Regarding competence development, when I realize I have a problem in a certain area, the common thing for me to do is to go to a practice community; this way I can gain competence.”

#### 4.9. Need for PBLI

The world of medicine has undergone some changes during the past 5 decades. The organizations are seeking to reduce the costs, patients seek greater control over their treatment, and both patients and organizations are seeking high-quality medical services; therefore, physicians and other service providers should focus on these objectives (54). However, we must recognize that physicians are responsible for their own errors and that they should compensate for them if causing damage to patients.

According to the statistics reported in America, prevalence of medical complaints has soared from 8% in 1986 to 27% in 1990. Similar studies in Iran have indicated increasing growth in medical complaints. On the other hand, in recent years, the viewpoint of the community has significantly changed about physicians (55). Some of these ideas were discussed by the participants:

“Students should know more about legal issues, and the curriculum should be revised. A series of issues should be added to the medical curriculum. Gradually, some lawyers are entering the medical field. This, along with people’s familiarity with legal issues, leads to a series of complex complaints in the medical system. “

“In brief, I should say that the service quality is not good; I’m not very satisfied”.

#### 4.10. Conclusions

The results of this study showed that today, PBLI is a professional necessity for all physicians. Feasibly, excellence in clinical care can be achieved with PBLI. Implementation of PBLI requires a competency-based curriculum, academic education, and a proper infrastructure for implementation in clinical environments. The ministry of health, treatment, and medical education plays a great role in overcoming the challenges and developing coordinated national systems.

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#### References

- Carey WA, Colby CE. Educating fellows in practice-based learning and improvement and systems-based practice: The value of quality improvement in clinical practice. *J Crit Care*. 2013;28(1):112 e1-5. doi: [10.1016/j.jcrc.2012.07.003](https://doi.org/10.1016/j.jcrc.2012.07.003). [PubMed: 22884535].
- Salzman DH, Franzen DS, Leone KA, Kessler CS. Assessing practice-based learning and improvement. *Acad Emerg Med*. 2012;19(12):1403-10. doi: [10.1111/acem.12026](https://doi.org/10.1111/acem.12026). [PubMed: 23279247].
- ACGME. ACGME Common Program Requirements 2013.
- Ziegelstein RC, Fiebach NH. "The mirror" and "the village": a new method for teaching practice-based learning and improvement and systems-based practice. *Acad Med*. 2004;79(1):83-8. [PubMed: 14691003].
- Lynch DC, Swing SR, Horowitz SD, Holt K, Messer JV. Assessing practice-based learning and improvement. *Teach Learn Med*. 2004;16(1):85-92. doi: [10.1207/s15328015tlm1601\\_17](https://doi.org/10.1207/s15328015tlm1601_17). [PubMed: 14987181].
- Teunissen PW, Wilkinson TJ. Learning and teaching in workplaces. Medical education. Theory and practice. Edinburgh: Churchill Livingstone; 2011.
- Watling C, Driessen E, van der Vleuten CP, Lingard L. Learning from clinical work: the roles of learning cues and credibility judgements. *Med Educ*. 2012;46(2):192-200. doi: [10.1111/j.1365-2923.2011.04126.x](https://doi.org/10.1111/j.1365-2923.2011.04126.x). [PubMed: 22239333].
- Ogrinc G, Headrick LA, Morrison LJ, Foster T. Teaching and assessing resident competence in Practice-based Learning and Improvement. *J General Intern Med*. 2004;19(5p2):496-500.
- Dean Cleghorn G, Baker R. What faculty need to learn about improvement and how to teach it to others. *J Interprofession Care*. 2009;14(2):147-59. doi: [10.1080/jic.14.2.147.159](https://doi.org/10.1080/jic.14.2.147.159).
- Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA*. 2006;296(9):1094-102. doi: [10.1001/jama.296.9.1094](https://doi.org/10.1001/jama.296.9.1094). [PubMed: 16954489].

**Table 2.** The Categories and Subcategories

PBLI Attributes	Frequency
<b>1</b>	
- Personal attributes	5
- Vocational notion	6
- Context-based	2
- Metacompetency	2
- Skill-based	2
- Theoretical and functional PBLI	1
- Reactive and proactive approaches in PBLI	1
<b>2</b>	Components of PBLI
- SDL2	15
- Evidence-based medicine	3
- CQI3	6
- Self-monitoring and self-assessment	4
<b>3</b>	Shortcomings of the academic educational system
- Lack of academic education of PBLI and its subcompetencies	9
- Unsuitable learning environments	4
- Insufficient academic student assessments	4
- Unqualified teachers	3
- Ineffective CME4	4
<b>4</b>	Shortcomings of the health system
- Economic problems and unsuitable practice environments for PBLI implementation	4
- Lack of a culture of improvement and absence of practice settings as inhibitors of PBLI	5
- Absence of proactive practice monitoring	7
- Insufficiency of national guideline programs	5
<b>5</b>	Strategies for academic education reform
- Consideration of admission criteria	4
- Faculty empowerment	5
- PBLI-based curriculum	9
- Social learning and community of practice	9
- Well-organized CME	9
- Well-organized CPD	3
- Periodic evaluation of practice	20
<b>6</b>	Strategies for health system reform
- National evidence-based practice systems	7
- National knowledge management systems	8
- CME bodies	8
- IT infrastructure development	7
<b>7</b>	Activators of PBLI
- Personal interest to know more	1
- Professional obligation	2
- Perceived knowledge, skill, and performance gap from external sources	9
<b>8</b>	Solutions for gaps in PBLI
- Solutions for the knowledge gap (SDI, CME, and	5

- Smith SJ, Kakarala RR, Talluri SK, Sud P, Parboosingh J. Internal medicine residents' acceptance of self-directed learning plans at the point of care. *J Grad Med Educ.* 2011;3(3):425-8. doi: [10.4300/JGME-03-03-30](https://doi.org/10.4300/JGME-03-03-30). [PubMed: [22942979](https://pubmed.ncbi.nlm.nih.gov/22942979/)].
- Beliveau ME, Nishimura RA, O'Gara P. Physician competence: a perspective from the practicing cardiologist. *Methodist Debaque Cardiovasc J.* 2014;10(1):50-2. [PubMed: [24932364](https://pubmed.ncbi.nlm.nih.gov/24932364/)].
- Cole JG. Practice-based, Guided Self-assessment for Improved Patient Care: Performance Improvement CME Jefferson Medical College 2016. Available from: <http://jdc.jefferson.edu/cgi/viewcontent.cgi?article=1523&context=hpn>.
- Tomolo AM, Lawrence RH, Watts B, Augustine S, Aron DC, Singh MK. Pilot study evaluating a practice-based learning and improvement curriculum focusing on the development of system-level quality improvement skills. *J Grad Med Educ.* 2011;3(1):49-58. doi: [10.4300/JGME-D-10-00104.1](https://doi.org/10.4300/JGME-D-10-00104.1). [PubMed: [22379523](https://pubmed.ncbi.nlm.nih.gov/22379523/)].
- Lipstein EA, Kronman MP, Richmond C, White KN, Shugerman RP, McPhillips HA. Addressing core competencies through hospital quality improvement activities: attitudes and engagement. *J Grad Med Educ.* 2011;3(3):315-9. doi: [10.4300/JGME-D-10-00179.1](https://doi.org/10.4300/JGME-D-10-00179.1). [PubMed: [22942955](https://pubmed.ncbi.nlm.nih.gov/22942955/)].
- Cynthia Cartwright SE. American College of Osteopathic Surgeons General Surgery: The Practice, The System, The Profession. ACOS; 2015.
- Eugene C, Nelson PBB, Joel SL. Practice-Based Learning and Improvement: A Clinical Improvement Action Guide. USA: Joint Commission on Accreditation of Healthcare Organizations; 2007.
- Mainz J. Defining and classifying clinical indicators for quality improvement. *Int J Qual Health Care.* 2003;15(6):523-30. [PubMed: [14660535](https://pubmed.ncbi.nlm.nih.gov/14660535/)].
- Whelan CT, Podrazik PM, Johnson JK. Acase-based approach to teaching practice-based learning and improvement. *Hospital Phys.* 2005;41(12):34.
- Abazari P, Vanaki Z, Mohammade I, Amini M. Challenges of physicians' training program on diabetes prevention and control. *Iran J Med Educ.* 2012;12(1):19-32.
- Jokar F, Haghani F. Nursing clinical education, the challenges facing: A Review Article. *Iran J Med Educ.* 2011;10(5):1153-60.
- Nasri K, Kahbazi M, Nasri S. Medical students' viewpoints toward basic sciences and preinternship comprehensive exams in Arak University of Medical Sciences. *Iran J Med Educ.* 2010;10(1):82-91.
- Houston TK, Clark JM, Levine RB, Ferenchick GS, Bowen JL, Branch WT, et al. Outcomes of a national faculty development program in teaching skills: prospective follow-up of 110 medicine faculty development teams. *J Gen Intern Med.* 2004;19(12):1220-7. doi: [10.1111/j.1525-1497.2004.40130.x](https://doi.org/10.1111/j.1525-1497.2004.40130.x). [PubMed: [15610333](https://pubmed.ncbi.nlm.nih.gov/15610333/)].
- MacDougall J, Drummond MJ. The development of medical teachers: an enquiry into the learning histories of 10 experienced medical teachers. *Med Educ.* 2005;39(12):1213-20. doi: [10.1111/j.1365-2929.2005.02335.x](https://doi.org/10.1111/j.1365-2929.2005.02335.x). [PubMed: [16313580](https://pubmed.ncbi.nlm.nih.gov/16313580/)].
- Vafadar Z, Vanaki Z, Ebadi A. Interprofessional Education a Response to Health System Challenges. *Iran J Med Educ.* 2014;14(2):148-64.
- Amiresmaili M, Nekoei Moghadam M, Moosazadeh M, Pahlavan E. Challenges of general practice education in Iran: A qualitative study. *Strides Dev Med Educ.* 2013;9(2):118-31.
- Albanese MA, Snow MH, Skochelak SE, Huggett KN, Farrell PM. Assessing personal qualities in medical school admissions. *Acad Med.* 2003;78(3):313-21. [PubMed: [12634215](https://pubmed.ncbi.nlm.nih.gov/12634215/)].
- McGaghie WC. Qualitative variables in medical school admission. *Acad Med.* 1990;65(3):145-9. [PubMed: [2407255](https://pubmed.ncbi.nlm.nih.gov/2407255/)].
- Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. *BMJ.* 2002;324(7343):952-7. [PubMed: [11964342](https://pubmed.ncbi.nlm.nih.gov/11964342/)].
- Kataoka SH, Podell JL, Zima BT, Best K, Sidhu S, Jura MB. MAP as a

- model for practice-based learning and improvement in child psychiatry training. *J Clin Child Adolesc Psychol*. 2014;**43**(2):312-22. doi: [10.1080/15374416.2013.848773](https://doi.org/10.1080/15374416.2013.848773). [PubMed: [24245855](https://pubmed.ncbi.nlm.nih.gov/24245855/)].
31. Wilper AP, Smith CS, Weppner W. Instituting systems-based practice and practice-based learning and improvement: a curriculum of inquiry. *Med Educ Online*. 2013;**18**(1):21612. doi: [10.3402/meo.v18i0.21612](https://doi.org/10.3402/meo.v18i0.21612). [PubMed: [28166020](https://pubmed.ncbi.nlm.nih.gov/28166020/)].
  32. McClain EK, Babbott SF, Tsue TT, Girod DA, Clements D, Gilmer L, et al. Use of a structured template to facilitate practice-based learning and improvement projects. *J Grad Med Educ*. 2012;**4**(2):215-9. doi: [10.4300/JGME-D-11-00195.1](https://doi.org/10.4300/JGME-D-11-00195.1). [PubMed: [23730444](https://pubmed.ncbi.nlm.nih.gov/23730444/)].
  33. Varkey P, Karlapudi S, Rose S, Nelson R, Warner M. A systems approach for implementing practice-based learning and improvement and systems-based practice in graduate medical education. *Acad Med*. 2009;**84**(3):335-9. doi: [10.1097/ACM.0b013e31819731fb](https://doi.org/10.1097/ACM.0b013e31819731fb). [PubMed: [19240440](https://pubmed.ncbi.nlm.nih.gov/19240440/)].
  34. Willis DR, Bennett I, Jones BG, Renshaw SE, Holley M, Dankoski ME. Practice-based learning and improvement in family medicine student clerkships: a CERA study. *Fam Med*. 2014;**46**(6):423-8. [PubMed: [24911296](https://pubmed.ncbi.nlm.nih.gov/24911296/)].
  35. Wong BM, Etschells EE, Kuper A, Levinson W, Shojania KG. Teaching quality improvement and patient safety to trainees: a systematic review. *Acad Med*. 2010;**85**(9):1425-39. doi: [10.1097/ACM.0b013e3181e2d0c6](https://doi.org/10.1097/ACM.0b013e3181e2d0c6). [PubMed: [20543652](https://pubmed.ncbi.nlm.nih.gov/20543652/)].
  36. Varkey P. Practice-based learning and improvement curricula: a critical opportunity to educate future physicians and leaders. *J Grad Med Educ*. 2011;**3**(1):12-3. doi: [10.4300/JGME-D-11-00007.1](https://doi.org/10.4300/JGME-D-11-00007.1). [PubMed: [22379515](https://pubmed.ncbi.nlm.nih.gov/22379515/)].
  37. Ogrinc G, Headrick LA, Mutha S, Coleman MT, O'Donnell J, Miles PV. A framework for teaching medical students and residents about practice-based learning and improvement, synthesized from a literature review. *Acad Med*. 2003;**78**(7):748-56. [PubMed: [12857698](https://pubmed.ncbi.nlm.nih.gov/12857698/)].
  38. Wenger E. Communities of practice: A brief introduction. ; 2011.
  39. Dunnebeil S, Sunyaev A, Blohm I, Leimeister JM, Krcmar H. Determinants of physicians' technology acceptance for e-health in ambulatory care. *Int J Med Inform*. 2012;**81**(11):746-60. doi: [10.1016/j.ijmedinf.2012.02.002](https://doi.org/10.1016/j.ijmedinf.2012.02.002). [PubMed: [22397989](https://pubmed.ncbi.nlm.nih.gov/22397989/)].
  40. Friedman A, Phillips M. Continuing professional development: Developing a vision. *J Educ Work*. 2004;**17**(3):361-76. doi: [10.1080/1363908042000267432](https://doi.org/10.1080/1363908042000267432).
  41. Brigley S, Johnson C, Bird J, Young H. Hospital doctors' views of their CPD and its relationship to learning in the organization. *Med Teach*. 2006;**28**(4):379-81. doi: [10.1080/01421590600603335](https://doi.org/10.1080/01421590600603335). [PubMed: [16807182](https://pubmed.ncbi.nlm.nih.gov/16807182/)].
  42. Aparicio A, Willis CE. The continued evolution of the credit system. *J Contin Educ Health Prof*. 2005;**25**(3):190-6. doi: [10.1002/chp.28](https://doi.org/10.1002/chp.28). [PubMed: [16173053](https://pubmed.ncbi.nlm.nih.gov/16173053/)].
  43. ACGME. Advancing Education in Practice-based Learning & Improvement: An educational resource from the ACGME Outcome Project. ; 2005.
  44. Hesselbrock R, Heaton J. Neurology cases evaluated by the U.S. Air Force School of Aerospace Medicine 2000-2012. *Aviat Space Environ Med*. 2014;**85**(5):573-5. [PubMed: [24834573](https://pubmed.ncbi.nlm.nih.gov/24834573/)].
  45. Reardon CL, Ogrinc G, Walaszek A. A didactic and experiential quality improvement curriculum for psychiatry residents. *J Grad Med Educ*. 2011;**3**(4):562-5. doi: [10.4300/JGME-D-11-0008.1](https://doi.org/10.4300/JGME-D-11-0008.1). [PubMed: [23205210](https://pubmed.ncbi.nlm.nih.gov/23205210/)].
  46. Asadi F, Mastaneh Z. Challenges of using information technology in hospitals affiliated to Shaheed Beheshti university of medical sciences, 2009. *Q Iran J Surg*. 2012;**20**(1):18-26.
  47. Green LW. Public health asks of systems science: to advance our evidence-based practice, can you help us get more practice-based evidence? *Am J Public Health*. 2006;**96**(3):406-9. doi: [10.2105/AJPH.2005.066035](https://doi.org/10.2105/AJPH.2005.066035). [PubMed: [16449580](https://pubmed.ncbi.nlm.nih.gov/16449580/)].
  48. Horn SD, Gassaway J. Practice-based evidence study design for comparative effectiveness research. *Med Care*. 2007;**45**(10 Suppl 2):S50-7. doi: [10.1097/MLR.0b013e318070c07b](https://doi.org/10.1097/MLR.0b013e318070c07b). [PubMed: [17909384](https://pubmed.ncbi.nlm.nih.gov/17909384/)].
  49. Burke AE, Benson B, Englander R, Carraccio C, Hicks PJ. Domain of competence: Practice-based learning and improvement. *Acad Pediatr*. 2014;**14**(2 Suppl):S38-54. doi: [10.1016/j.acap.2013.11.018](https://doi.org/10.1016/j.acap.2013.11.018). [PubMed: [24602636](https://pubmed.ncbi.nlm.nih.gov/24602636/)].
  50. Templeman D. How to get the most out of your orthopaedic fellowship: thinking about practice-based learning. *J Orthop Trauma*. 2012;**26** Suppl 1:S3-5. doi: [10.1097/BOT.0b013e31826450da](https://doi.org/10.1097/BOT.0b013e31826450da). [PubMed: [22732864](https://pubmed.ncbi.nlm.nih.gov/22732864/)].
  51. Nabilou B, Feizi A, Seyedin H. Patient Safety in Medical Education: Students' Perceptions, Knowledge and Attitudes. *PLoS One*. 2015;**10**(8):e0135610. doi: [10.1371/journal.pone.0135610](https://doi.org/10.1371/journal.pone.0135610). [PubMed: [26322897](https://pubmed.ncbi.nlm.nih.gov/26322897/)].
  52. Hess BJ, Johnston MM, Iobst WF, Lipner RS. Practice-based learning can improve osteoporosis care. *J Am Geriatr Soc*. 2013;**61**(10):1651-60. doi: [10.1111/jgs.12451](https://doi.org/10.1111/jgs.12451). [PubMed: [24117284](https://pubmed.ncbi.nlm.nih.gov/24117284/)].
  53. Holmboe ES, Arnold GK, Weng W, Lipner R. Current yardsticks may be inadequate for measuring quality improvements from the medical home. *Health Aff (Millwood)*. 2010;**29**(5):859-66. doi: [10.1377/hlthaff.2009.0919](https://doi.org/10.1377/hlthaff.2009.0919). [PubMed: [20439872](https://pubmed.ncbi.nlm.nih.gov/20439872/)].
  54. Rodwin MA. The Politics of Evidence-Based Medicine. *J Health Politics Policy Law*. 2001;**26**(2):439-46. doi: [10.1215/03616878-26-2-439](https://doi.org/10.1215/03616878-26-2-439).
  55. Rafizadeh Tabai Zavareh SM, Haj Manoochehri R, Nasaji Zavareh M. The frequency of complaints referred to the Commission's failure to general practitioners in the forensic center of Tehran from 2004 to 2006. *IJFM*. 2007;**13**(3):152-7.