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Active learning in health and real-life settings: review

Metodologias ativas de ensino em saúde e ambientes reais de prática: uma revisão

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ABSTRACT: *Introduction*: Considering the current demand for the development of teaching strategies adapted to current realities, knowledge of active teaching-learning methods is of great value for medical education. There are several types of active methodologies and those based on case problems are being implemented in medical studies at increasingly early stage. Despite being a necessary part of the curriculum of medical education institutions, there is no consensus on its method, applicability and evaluation. This study proposes a review of the literature on teaching-learning methods in real-world contexts, their benefits and applications. *Materials and Methods*: The present study is a narrative review of the literature that included 23 articles and 1 book chapter published between 1992 and 2018, in Portuguese and English, in PubMed, SciELO, Lilacs and CAPES Periodicals. *Discussion*: The methods proposed for guidance, evaluation and feedback are varied, adaptable and in constant change. "One Minute Preceptor", "The 5-minute moment" and the "SNAPPS method" are different ways of discussing in these settings and aim to facilitate the student-patient-preceptor interaction. Learning strategies in real environments present benefits in relation to the learning of theoretical content, as they place the student in an environment of real action and encourage systematic diagnostic reasoning, which requires the retrieval of prior knowledge. It is believed that the professional who is trained with these active methodologies will have a profile of autonomy, self-learning, proactiveness and scientifically based professional practice. *Conclusion*: There is no "practical rule" for the inclusion of these methods in the curriculum of universities; their use must be adapted to the reality and profile of each educational institution. It is noted that the teacher/preceptor must always reflect about their teaching methods, seeking to understand their methodology and resignify their performance, encouraging the search for more active and efficient tasks.

Keywords: Medical, education; Preceptorship; Problem-based learning.

RESUMO: *Introdução*: Diante da demanda para a elaboração de estratégias de ensino adaptadas para realidade atual, o conhecimento sobre metodologias ativas de ensino-aprendizagem tem grande valor, para a educação médica. Há diversos tipos de metodologias ativas e aquelas baseadas em casos-problema tem sido implementadas na graduação médica de forma mais precoce; apesar de ser parte integrante e necessária do currículo das instituições de ensino médico, não há consenso sobre sua forma de orientação, aplicabilidade e avaliação. Propõe-se revisar a literatura sobre as metodologias de ensino-aprendizagem em ambientes reais, conhecendo seus benefícios e a aplicações. *Materiais e Métodos*: O presente estudo trata-se de uma revisão integrativa da literatura na qual foram incluídos 23 artigos e 1 capítulo de livro entre os anos 1992 e 2018, em língua portuguesa e inglesa, sendo exploradas as bases de dados PubMed, SciELO, Lilacs e Periódicos CAPES. *Discussão*: Os métodos propostos para orientação, avaliação e *feedback* são variados, adaptáveis e estão em constante modificação. "Preceptor em um minuto", "O momento em cinco minutos" e "Método SNAPPS" são diferentes maneiras de discussão nesses cenários a fim de facilitar o processo de interação estudante-paciente-preceptor. Estratégias de aprendizagem em ambientes reais apresentam benefícios em relação ao aprendizado de conteúdos teóricos estritos, pois coloca o aluno em ambiente de atuação verídico e estimula a elaboração de raciocínio diagnóstico sistematizado, que exige a recuperação de conhecimentos prévios. Acredita-se que o profissional que seja formado com essas metodologias ativas terá um perfil de autonomia, autodidatismo e atitude profissional proativa e com base científica. *Conclusão*: Não há "regra prática" para inserção das metodologias ativas no currículo das universidades, seu uso deve ser adaptado à realidade e ao perfil de cada instituição. Ressalta-se que o professor/preceptor deve refletir sobre seus métodos de ensino, buscando entender sua metodologia e ressignificar a sua atuação, estimulando a busca de tarefas mais ativas e eficientes.

Palavras-chave: Educação médica; Preceptoria; Aprendizagem baseada em problemas.

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INTRODUCTION

Considering the current demand for the development of teaching strategies adapted to current realities, knowledge of active teaching-learning methods is of great value, especially for medical education[1]. The curriculum of medical schools is frequently adapted to the needs of the health system and the population, seeking to unite new and old pedagogical concepts to provide a broad medical education[1–3].

There are several types of active methodologies already applied in medical schools, such as Problem-Based Learning, Team-Based Learning – which use case problems –, Case-Based Discussion and Bedside Teaching. Methodologies based on case problems, that is, on real patients, are being implemented in medical studies at increasingly early stages, with the intention of promoting the immersion of the student in their future work environment and stimulating the sedimentation of prior knowledge[4].

Teaching in real-world contexts is highly relevant for medical training. It is the predominant strategy for in-service training during the medical course, and it is also widely used in professional internships at the end of other courses in the health area. In addition, it is used in postgraduate training (medical residency), sometimes even as the exclusive methodology.

Despite being a necessary part of the curriculum of medical education institutions, there is no consensus on its method, applicability and evaluation, which are adapted to the profile of each institution. The literature describes some guideline proposals, many adapted to the demands of each service, but which bring new points of view on how to implement this teaching strategy. Thus, this study proposes a review of the literature on teaching-learning methods in real-world settings, their benefits and applications.

MATERIALS AND METHODS

The research aimed to review real-world teaching methods and their forms of assessment, updates and experience reports. This is an integrative literature review, exploring the databases PubMed and SciELO. The keywords used were: Medical Education; Medical Training; Undergraduate Medical Education; Preceptorship; Active learning. Systematic and narrative review studies, qualitative, quantitative, descriptive and analytical studies carried out between 1992 and 2018 were included. The method is summarized in Figure 1.

The search for the descriptors on the platforms returned 23 articles and a book chapter in the PubMed database, nine articles in SciELO, two articles in LILACS and three in CAPES Periodicals, with a total of 38 publications. After applying the inclusion criteria – period between 1992 and 2018, text in Portuguese and/or English and type of publication – and the exclusion criteria – theses, dissertations, incomplete articles or book chapters, and repeated articles – 21 publications remained (20 articles and a book chapter), on which this literature review is based.

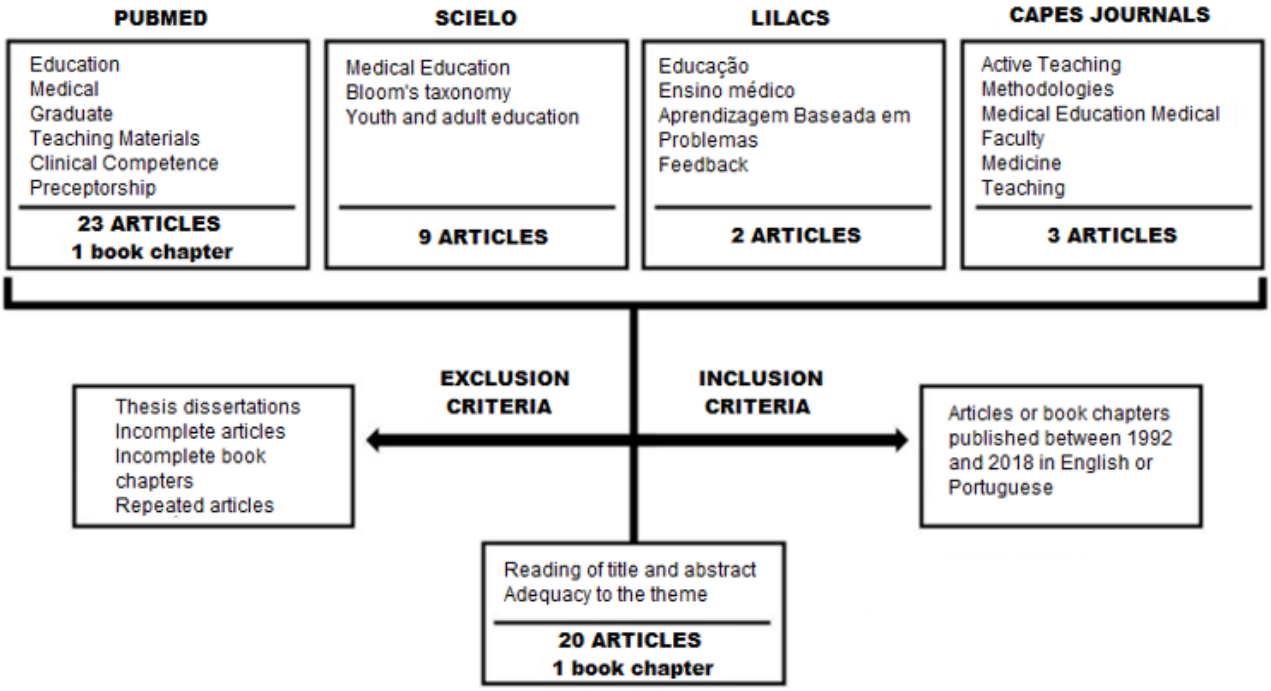

Figure 1. Selection of articles on real-world teaching and learning methods, according to the inclusion and exclusion criteria

RESULTS

Neher et al.[5] presented in an experience report a five-step teaching model called "microskills" – get a commitment, probe for supporting evidence, teach general rules, reinforce what was done right, and correct mistakes –, which aims to encourage the student to reflect on their own doubts about patient data presented, with questions such as "What do you think is going on with this patient", "What laboratory tests do you feel are indicated", "What would you like to accomplish on this visit?" and "Why do you think this patient has been noncompliant?".

The model emphasizes the acquisition of new knowledge through the feedback from teachers to the answers given by the student to each of the questions. Feedbacks can be positive or negative, immediate or not, and specific or not. The model helps the student to recognize useful skills for medical practice and is done in a more timely manner – from 1 to 2 hours[5].

In a randomized clinical trial, Furney et al.[6] evaluated the effect of the "The One-Minute Preceptor" model of faculty development, which also uses the 5 "microskills". It was concluded that the model is a practical intervention that improves residents' teaching skills, as 87% of them rated the method as "useful" or "very useful", and their students reported improvements in 4 microskills. In addition, these students reported greater motivation to do outside reading compared to students whose preceptor did not use the method[6].

In a review article published in 2003, Ramani[7] described 12 teaching strategies that facilitate bedside teaching: preparation, planning, orientation, introduction, interaction, observation, instruction, summarization, debriefing, feedback, reflection and preparation for the next activity. The method is divided into different and well-defined stages, with the objective of helping teachers familiarize themselves with the clinical curriculum, improve their performance and confidence in teaching, perfect the doctor-patient relationship and provide feedback and reflections on the performance of the students, presenting their successes and errors. All these strategies must be carried out so that there is a progressive evolution of the student in relation to anamnesis, physical examination, decision-making and good doctor-patient interaction[7].

Wolpaw et al.[8] reported the experience with a learner-centered model for presenting cases to the preceptor. The model consists of 6 steps: (1) summarize briefly the history and findings; (2) narrow the differential to two or three relevant possibilities; (3) analyze the differential by comparing and contrasting the possibilities; (4) probe the preceptor by asking questions about uncertainties, difficulties, or alternative approaches; (5) plan management for the patient's medical issues; and (6) select a case-related issue for self-directed learning.

This strategy includes the report of the main aspects of the interview and physical examination and definition of the clinical management and most important problem of the patient, with the objective of developing practice-based learning skills and, consequently, contributing to maintain professional competence in the workplace. In this context, this bedside teaching-learning model represents a paradigm shift in outpatient education, as it actively involves the student and creates a collaborative learning conversation in the context of clinical care.

An analytical, cross-sectional and descriptive study found that medical schools are moving towards a more student-centered curriculum, guided by the development of professional practice. However, despite the creation of groups for the construction/review of curricula, adaptation of the physical structure and increase in student participation, the historical and cultural influence of the Flexner's model, which has always been used, is still perceived in the training of medical professionals. This means that it is difficult to untie medical learning from old theories, such as: focusing on the individual, denying their social groups and communities; emphasizing technological procedures and equipment; highlighting the cure of diseases at the expense of health promotion and prevention of comorbidities; and considering that all illnesses have a causal agent and, therefore, the hospital is the best place to treat the patient[3].

Another method, called the "The 5-minute moment", was introduced by preceptor physicians participating in a study group with the same name in Stanford, with the objective of developing a technique to optimize bedside teaching. In this method, the preceptor uses brief stories or anecdotes to facilitate the memorization of the maneuver or clinical sign to be explored in the physical examination, which are followed by the practical demonstration, repetition by the student, and possible corrections, all within 5 minutes[9,10].

The articles used for this review are summarized in Table 1.

Table 1: Articles on active real-world teaching and learning methodologies

Title	Year	Methodology	Conclusions
A five-step "microskills" model of clinical teaching[5]	1992	Experience report	Presents a five-step teaching model called "microskills" to guide teaching in practical environments. The skills are (1) get a commitment, (2) probe for supporting evidence, (3) teach general rules, (4) reinforce what was done correctly, and (5) correct mistakes
Teaching the one-minute preceptor[6]	2001	Randomized controlled trial	Describes the model called "One minute preceptor", which includes the 5 "microskills" implemented in the American medical school. It concludes that it is a good method to guide preceptors and residents and is accepted in academia
ABC of learning and teaching in medicine: Learning and teaching in the clinical environment[4]	2003	Book chapter	Discusses real-world teaching method and their advantages and disadvantages, with an emphasis on teaching methods for adults. Values the patient as a learning tool
Teaching at the bedside: a new model[11]	2003	Experience report	Describes a workshop and the development of a model for "bedside" teaching. The model includes suggested skills for effective bedside teaching that are arranged into three domains: patient comfort, focused teaching, and group dynamics
Twelve tips to improve bedside teaching[7]	2003	Review article	Describes 12 key strategies for "bedside" teaching: preparation, planning, orientation, introduction, interaction, observation, instruction, summarization, debriefing, feedback, reflection, preparation
SNAPPS: a learner-centered model for outpatient education[8]	2003	Experience report	Reports experiences with a model for medical education that puts student in a central role. The SNAPPS mnemonic means: (1) Summarize: Summarize the clinical history and physical examination findings; (2)Narrow: suggest two or three differential diagnoses; (3) Analyze: analyze the differential diagnoses and possibilities; (4) Probe: deepen the discussion, asking the preceptor questions about doubts or alternative behaviors; (5)Plan: plan patient management; (6) Select: select texts that can help understanding the clinical case
Pedagogical approach and change trends in medical schools[3]	2009	Cross-sectional, analytical and descriptive study	This study addresses a qualitative assessment of pedagogical approaches carried out with 28 medical schools and demonstrates a strong inclination towards a more student-centered curriculum, guided by the development of professional practice
Identifying and training effective clinical teachers: New directions in clinical teacher training[12]	2006	Review article	Reflects on the core skills of teachers who work in practical clinical teaching. Discusses the need for specialized knowledge in preceptor training. And proposes a structured and effective clinical teaching mode
Students learning from patients: let's get real in medical education[13]	2008	Review article	Discusses strategies that put the patient at the center of medical learning
"Then you get a teacher"—guidelines for excellence in teaching[14]	2009	Review article	Conducts a qualitative cohort analysis and literatur**Table 1:** Articles on active real-world teaching and learning methodologies e review to address points to be developed in the training of a preceptor
Prática, desafios e expectativas da supervisão de estágio em medicina[15]	2013	Descriptive cross-sectional	Addresses the practice of the supervisor and preceptor during the monitoring of interns in the medical hospital internship of a Public University of Alagoas. Highlights the need for continuing education for the student body and encourages interdisciplinarity
Undergraduate training on emergencies with active student participation[16]	2014	Descriptive	Describes the process of planning, structuring and implementing the teaching of medical emergencies in the State of Ceará, in the view of teachers and students. Highlights the satisfactory assessment in relation to active teaching-learning methods
Problem-based learning[17]	2014	Review Article	Reviews the history of the Problem-Based Learning modality, describing its steps, objectives, advantages and disadvantages
Maximizing teaching on the wards: review and application of the one-minute preceptor and snapps models[18]	2014	Narrative review article	Reviews the "One Minute Preceptor" and "SNAPS" teaching models
Active teaching-learning methodologies: integrative review[1]	2016	Integrative review	Discusses active teaching-learning methodologies as alternatives for the teaching-learning process, with several benefits and challenges

Table 1: Articles on active real-world teaching and learning methodologies *continuation*

Title	Year	Methodology	Conclusions
The five-minute moment[9]	2016	Review article	Presents the "Five-minute moment" method for bedside teaching, which stipulates that physical examination skills can be demonstrated in 5 minutes or less and be enhanced by narrative, stories, literary allusions, anecdotes, and even humor to provide clinical meaning
The principles of active teaching methodologies: a theoretical approach[19]	2017	Review article	Reviews active teaching-learning methods and their principles
Perception about the medical internship at Federal University of Rio de Janeiro by the service's preceptors in primary health care: a case study[20]	2017	Case study	Evaluates the perceptions of preceptor physicians in the Family Health Strategy regarding their performance with medical interns at the Federal University of Rio de Janeiro. Emphasis on the need for periodic training and formation of a professional relationship for these preceptors
Qualifications for medical preceptors and user satisfaction regarding care received in their Basic Health Unit (BHU) of origin[21]	2017	Descriptive cross-sectional	Evaluates user satisfaction of patients seen by a preceptor physician at a BHU in Campinas and seeks to know if these professionals associate preceptorship with their qualification
Reflections and meaning of the teachers skills in medical education[22]	2017	Descriptive cross-sectional	Evaluates the meaning of competence in the perception of teachers in the Skills and Attitudes disciplines of a public college. Emphasis on stimulating leadership and developing longitudinal training programs for teachers
Patient-centered bedside rounds and the clinical examination[10]	2018	Narrative review	Reviews and describes the steps for teaching at bedside rounds.

DISCUSSION

Active teaching-learning methods promote the improvement of prior knowledge, with the student in the central role in the construction of knowledge. These methods encourage students to take an active part in their education and promote the autonomy of preceptors, aiming to increase the effectiveness of learning and consolidate theoretical studies. It is a methodology that can be adapted to the learning preferences of adult students, with retrieval of prior knowledge, insertion in real problem situations and reproducible application[1–3].

It is important to consider the trajectory of the students, so that they can transform their learning process in a critical and active way. This differs from old methods that were centered on the teacher as the main, if not the only, information provider. Problem-based education, for example, occurs with the inclusion of case problems to stimulate the construction of knowledge with the active participation of teachers and students, attaching more meaning to learning[1–3].

The concept of active learning is based on the student's autonomy in the search for knowledge. The student becomes the center of the learning process and not only a listener, but an active critic of the information they receive, evaluating its significance and applicability, whether in a case-problem or through discussion with peers. The students exert control over their own learning, while the teacher becomes a learning facilitator.

In this context, the preceptor-student relationship is much more subjective, with an exchange of experiences, knowledge and difficulties. This method has been successfully implemented in high school, undergraduate and graduate courses, creating new perspectives in teaching and learning[1,23,24].

Problem-Based Learning (PBL), such as tutorial groups and Team-Based Learning (TBL), are strategies for applying active teaching methodologies. They are carried out in controlled environments, such as classrooms or auditoriums, and use case problems to promote diagnostic reasoning.

Other strategies, such as OSCE and Miniciex - evaluations of certain practices with simulated and real patients, respectively -, case studies, critical experience reports, round-table discussions, plenaries, workshops, among others, are also examples of active methodologies used in academic studies. These methods have been implemented in Brazilian schools in recent years as preparation, in a controlled environment, for the challenges that will be experienced in real-world contexts and in professional practice[1,16.]

Practical skills can be taught throughout medical education or at the end of the course, during internship. In both configurations, the moment of insertion in the real environment is irreplaceable in the training of young medical students, as they must put their theoretical knowledge into practice and learn and consolidate new skills in communication, physical examination and diagnostic reasoning. Along with problem-based education, this method is well accepted by adult students,

as it comprises the development of critical reasoning in significant situations, which will facilitate the retrieval of skills when required in real life[15,16].

The learning process is different for adults then it is for children and adolescents. In this age group, the student has previous knowledge that must be systematically retrieved by the educator. The possibility of experiencing real-world contexts with the supervision of a professional that guides the diagnostic reasoning, action plan and therapeutic course allows the sedimentation of old and new knowledge. The more elaborate the setting in which this knowledge is constructed, such as in the places where it will be needed, the easier it will be remembered[4].

The experience of real environments in the education of a health professional, especially the medical student, often "shapes" their skills based on the figure of the preceptor. Behavior during the clinical interview and physical examination, empathy, clinical reasoning, diagnostic hypotheses, therapeutic plan and professionalism are items that can be learned and reproduced[4,11].

This teaching method still suffers from the lack of systematization of the stages of teaching, evaluation and feedback, with several different descriptions of teaching approaches. Difficulties such as the unpredictability of the number of patients and supplies, the existence of life-threatening situations in some settings (infirmaries, emergency rooms), the demands of the service that can hinder discussion time, the large number of students per room and the low recognition by educational institutions are challenges faced by preceptors, both at undergraduate and graduate levels[4,21,22,25].

The perception that professionals with many years of training and practice are good teachers is bygone, but it is often supported by educational institutions during the selection of preceptors and tutors. The professional's expertise is important, but not sufficient for training students. Investment in education and continuous training of these professionals as facilitators of knowledge for young undergraduate students are also important factors[4,20,22].

Methods to facilitate the teaching of students in real-world settings have been proposed, but in a heterogeneous manner, depending on the preferences of health services and educational institutions and on the educator's own experience.

Dialogue between student and teacher should be valued and enough time should be reserved for discussion after the first stage of collection of medical history and physical examination. At this point, planning, expertise in the area, and previous experiences in education can help preceptors to optimize the time and form of discussion. At the "bedside", some strategies can optimize the time of the visit, such as scheduling patients to be evaluated in advance, forming pairs between students, monitoring student performance during the interview and physical examination, and holding discussions in appropriate spaces, such as support rooms[4,10,14].

In outpatient settings, the teaching-learning process is easier compared to wards and emergency care, as patients are of lower complexity and are more available for dialogue and physical examination, the environment is more controlled in relation to the number of patients and the records for retrieving information, and consultation and discussion time are less undermined. However, disadvantages such as limited diversity of cases and unpredictability of the number of patients are frequent. Strategies that encourage students to be active participants in the consultation and not merely observers are important in this teaching modality. These strategies include allowing the student to lead the consultation and then give subsequent feedback or letting them observe the consultation and physical examination and discussing it during or after [4,7].

The discussion between preceptors and students usually occurs with the proposition of questions followed by brief explanations. Observing the examination and the interview and proposing brief and open questions, based on the students' prior knowledge, with adequate time for answers, are ways to obtain a good case discussion. It may be necessary to increase the level of difficulty of the questions[4,7].

One of the methods developed for practical settings is known as "One minute preceptor" or "OMP". This method is widely used, as it facilitates clinical teaching using five steps[5,6]. This model was considered practical and easy to use and was highly accepted by professionals, as the preceptors who analyzed cases using the OMP focused on teaching and learning differential diagnoses, diagnostic methods and natural presentation of the disease, which contributed to a more effective teaching process[26] and increased the ability of students to reach their own conclusions and set goals for the next tutorials[27].

Furthermore, according to Neher et al.[5], residents trained by this methodology tend to continue using 90% of its precepts in future teaching with students, for an average of four years. In addition, 40% to 60% of residents who did not have any training by the "One minute preceptor" still experienced the first three items of the method[28]. However, professionals report that the time allocated to teaching with the OMP model seems to affect the speed of care, which worries preceptors, as they need to meet the demands of the service while still offering quality educational support to students[29].

In addition to this model that seeks to optimize both the content and the time of the discussion between preceptor and student, another method, known as "SNAPPS", addresses how the case will be presented to the teacher[9,18]. This method is very intuitive and easy to learn, as it is an adaptation of clinical history, physical diagnosis, differential, evaluation and therapeutic plan. It also emphasizes the active role and the identification of

useful lessons for future professional experience[9].

Furthermore, this method was effective to preceptors, as the focus is on students' doubts, which decreases the time allocated to the development of learning objectives. However, this methodology requires more preparation time from both preceptors and students, as it is necessary to have a deep understanding of its execution and a more individualized teaching-learning process. In addition, it may be difficult to adapt the method for some students, as it requires autonomous learning[30].

The 12 strategies described by Ramani[7] are efficient in teaching, as they specify each step, which helps the training of the model, and are comprehensive in relation to the steps to be followed. However, they demand more time for a rigorous training of preceptors, resulting in higher costs and efforts to universities. In addition, a longer discussion time is necessary for the correct performance of the method, making the consultation longer and potentially harming the doctor-patient relationship.

Another methodology – "The 5-minute moment" – seeks to enhance the physical examination, create memory save points for the easy retrieval of skills, optimize the discussion time during the practical activity and consequently improve the acquisition of physical examination skills by the students[10,23].

It is important to remember that the patient is the primary focus of medicine and other areas of health, so learning and teaching to listen to and individualize the patient during consultations contributes to a humane training of undergraduate students, regardless of the type of assessment used[8,11]. Patients are also important feedback tools for the preceptor and the student, as their degree of satisfaction is associated with the development of abilities and skills by the students, which, in turn, mirrors the practices of their preceptors[20].

Learning strategies in real environments present benefits in relation to the learning of theoretical content, as they place the student in an environment of real action and encourage systematic diagnostic reasoning, which requires the retrieval of prior knowledge. The necessity to develop diagnostic reasoning in an environment of "stress" helps the retrieval of previous information, the sedimentation of knowledge and the behavior memory (sedimentation of what was experienced to be used in a similar future situation)[1,4].

Therefore, training in this type of environment can consolidate the content taught in the classroom and simulated environments and is a preview of the student's behavior after finishing training and entering the labor market. It is believed that the professional who is trained with these active methodologies will have a profile of autonomy, self-learning, proactiveness and scientifically based professional practice[17].

CONCLUSION

The real-world teaching and learning methods are focused on the interactions between doctor, student and patient and help consolidate new and old knowledge. There is no "practical rule" for the inclusion of these methods in the curriculum of universities/university centers; their use must be adapted to the reality and profile of each educational institution. To improve the effectiveness of the methods, it is necessary to train professors and preceptors on the model that will be adopted, so that they are familiarized with the method and can question it, discuss it and, finally, adapt it to the reality of the university.

It is also worth noting that the teacher/preceptor must always reflect about their teaching methods, seeking to fully understand their methodology and resignify their performance, avoiding passive behavior of students and encouraging the search for more active and efficient tasks.

Improvements in teaching and learning skills should focus not only on the practical skills of the undergraduate student, but also on improving the doctor-patient relationship and creating a more humane professional profile.

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