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Use of ChatGPT as a pedagogical tool in medical education: systematic review of the literature (2020-2025).

Uso de ChatGPT como herramienta pedagógica en la educación médica: revisión sistemática de la literatura (2020-2025).

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Summary.
Medical education is constantly evolving to meet the demands of healthcare in the digital age. In this context, the incorporation of tools based on generative artificial intelligence has sparked interest in their application in higher education, particularly in medical education. ChatGPT emerges as a resource with the potential to transform the teaching and learning process. Based on this, the present research was developed with the objective of identifying the uses and describing the pedagogical strategies associated with the implementation of ChatGPT in medical education. This was achieved through a systematic review of the literature published between 2020 and 2025 in specialized databases: PubMed, Scopus, and Web of Science (WoS), using the PRISMA 2020 methodological approach. A total of 23 scientific articles were selected according to established criteria. The results showed a greater production of exploratory research, conducted in the last three years, by undergraduate students and in countries at the forefront of technology. It was also shown that ChatGPT is used as a complementary tool for learning and developing medical skills. In conclusion, ChatGPT is positioned as a support tool in medical education; however, the available evidence is limited, so studies are needed to evaluate its integration into a structured pedagogical model and its effectiveness in training processes.

Keywords: artificial intelligence, medical education, pedagogical research, educational research

Resumen.
La educación médica se encuentra en constante evolución para responder a las demandas de la salud en una era digital. En este escenario, la incorporación de herramientas basadas en Inteligencia Artificial generativa despierta el interés por conocer su aplicación en la educación superior, particularmente en la educación médica. En este contexto, ChatGPT surge como un recurso con potencial para transformar un proceso de enseñanza aprendizaje. Sobre esta base, se desarrolló la presente investigación con el objetivo de identificar los usos y describir las estrategias pedagógicas asociadas a la implementación de ChatGPT en la educación médica, a través de una revisión sistemática de la literatura publicada entre los años 2020 a 2025 en bases de datos especializadas: PubMed, Scopus y Web of Science (WoS), bajo el enfoque metodológico PRISMA 2020, seleccionando un total de 23 artículos científicos según criterios establecidos. Los resultados evidenciaron que existe una mayor producción científica de tipo exploratoria, realizada en los últimos tres años, en estudiantes de pregrado y países a la vanguardia de la tecnología. Asimismo se evidenció que ChatGPT se emplea como herramienta complementaria para el aprendizaje y desarrollo de habilidades médicas. En conclusión, ChatGPT se posiciona como una herramienta de apoyo en la

educación médica; sin embargo la evidencia disponible es limitada, por lo que se requieren estudios que evalúen su integración en un modelo pedagógico estructurado y su efectividad en los procesos formativos.

Palabras clave: inteligencia artificial, educación médica, investigación pedagógica, investigación educativa

1. Introduction

Currently, the term "Artificial Intelligence" (AI) is commonly heard, but its definition is complex. It can be understood as: the imitation of human intelligence mediated by a technological tool (1), or a system with intelligent behavior (2). This tool contributes to innovation in multiple contexts, including higher education, generating interest in studying its pedagogical implementation in areas of professional training such as medical education (3), whose purpose is to train individuals capable of caring for human health (4). It must be recognized that medical education faces challenges in adapting a training model to its teaching methods (5) and that traditional pedagogy still predominates. Learning "at the patient's bedside" (6, p. 97) is a teaching strategy that has been used since antiquity; however, AI has transformed medical education by improving its pedagogy through dynamic and adaptable scenarios that provide the opportunity to practice clinical reasoning in a safe environment (3). The integration of AI in medical training revolutionizes educational paradigms and contributes to the training of professionals capable of making informed decisions (7) this process must also be accompanied by AI literacy, defined as the set of skills that allows critical evaluation of AI technologies for their effective use (8).

One tool that has gained prominence in recent years is ChatGPT, a language model that extracts and analyzes data patterns using statistical techniques (9); it boasts a vast user base, representing approximately 10% of the world's population and gaining around 800 million users weekly (10). According to OpenAI reports (11), ChatGPT is used for the following purposes: 49% for objective responses, advice, and consultations; 40% for document writing, presentations, project planning, and coding; and 11% for reflection and conversation. In the medical field, ChatGPT's pedagogical uses include: teaching assistance, personalized learning, quick access to information, generation of clinical cases, and the creation of academic papers, among others (6).

The use of technological tools in Higher Education is based on learning theories that emphasize the role of mediation in cognitive development. Among these, Vygotsky's sociocultural theory stands out (12), which states that the formation of higher-order behavior requires a stimulus as an auxiliary device (13). Furthermore, in response to the demands of education, the connectivist theory developed by George Siemens emerged, proposing that in an interconnected world, interaction between areas should be facilitated for continuous learning (14). In response to the training needs of medical students and their connection to innovation, ChatGPT can contribute by serving as a tool for developing clinical, ethical, and human competencies while preserving critical reasoning (3).

Without denying the great opportunities that the use of AI platforms provides for education, it is essential to consider the ChatGPT tool as a complement, which does not alter or compromise the quality of medical training (15) since it may have biases and errors (16) and from a social perspective the training of a health professional impacts the quality of medical care received by a population (3). In the educational field, AI has become a pedagogical tool for teaching and skills acquisition (17), and its incorporation improves educational processes (18). In this context, it is known that medicine requires constant updating and access to accurate information; this can be achieved through the incorporation of tools such as ChatGPT (19) with the aim of creating dynamic learning environments (20).

This study promotes the strengthening of higher education and seeks, through research, to drive innovation in medical training to guarantee safe, ethical, humanized, and well-being-oriented healthcare for the population (21, p. 25). Based on the above and the growing interest in AI in education, one of the knowledge gaps that justifies this study is the lack of consensus on its use as a pedagogical tool in medical training programs. This leads to the following research question: What are the main pedagogical uses of the ChatGPT tool in medical education? Consequently, this systematic review aims to identify the uses and describe the pedagogical strategies of ChatGPT in the teaching and learning process in medical education, in order to guide teachers and students toward its responsible and relevant use in a training process (22).

1.1. Literature review

Education is essential in society, providing students with the tools to develop, define, process, and expand critical thinking and decision-making skills. In the 21st century, most global changes have been technological in nature, so education at all levels must be equipped with technology (18). According to the United Nations Educational, Scientific and Cultural Organization (23), AI has the potential to innovate education; however, it also maintains that rapid changes generate significant ethical problems.

1.2. Artificial Intelligence in Higher Education

Every educational system aims for students to acquire knowledge and develop skills such as creativity, critical thinking, and empathy (24). It must be acknowledged that, to date, education has not achieved the capacity to be personalized. According to Machuca (25), AI can complement traditional pedagogy and guide it toward an adaptive model by recognizing strengths, weaknesses, and learning styles (26), thus promoting student-centered education (27). The implementation of AI in Higher Education Institutions (HEIs) requires changes and adaptations. In the case of HEIs with distance and online modalities, its implementation represents a strength, since their educational model is characterized by the exclusive use of information technologies (28). It is also important to mention that, according to Jardón *et al.* (29), the main opportunities offered by AI in HEIs are: personalized learning, administrative automation, educational data analysis, and research support. Despite this, it also faces ethical and data privacy challenges (30). Therefore, technology does not replace the human capabilities of searching and experimenting that allow for meaningful learning (31).

1.3. Medical Education and Pedagogical Approaches

A professional competence is the ability a person has in their field of study to solve a problem; defining all the aptitudes required for a profession is complex, since performing an activity requires countless skills (32). According to Arbea *et al.* (33, p.13), the competencies that a health professional should develop are: "professional values, attitudes, behavior, ethics, clinical and communication skills, and critical and investigative thinking." Regarding pedagogical models, it is recognized that medical education has long been oriented towards a traditional teaching model; however, technological innovation demands continuous redesign of health education (34). According to Gutiérrez-Cirlos *et al.* (6), medical education requires diverse pedagogical models, including the constructivist model and problem-based learning, which is developed through simulation, discussion, and resolution of clinical cases, as well as the humanistic model with patient-centered medicine and the socio-critical approach that enables decision-making. In agreement, Ordoñez *et al.* (35) include evidence-based medicine, e-learning, and the flipped classroom. Each pedagogical model has its own characteristics, and their combined application promotes comprehensive medical training (36).

1.4 ChatGPT as a pedagogical tool

According to Santos *et al.* (19), medicine is a field that demands constant updating; in response to this need, AI can adapt an educational process through tools such as ChatGPT (20). As a pedagogical resource in medicine, it can be used for: medical assistance, scenario simulation, curriculum development, clinical support, among others (1). This conversational assistant can optimize an academic process through content generation, research, and evaluation. From the students' perspective, it has a positive impact, as it facilitates task completion and strengthens skills. These findings align with the constructivist approach to education, where ChatGPT could act as a means for knowledge construction (37). Implementing ChatGPT in medical education presents both advantages and challenges. While it improves educational methods, the ethical and transparency concerns associated with its use should not be overlooked (38).

2. Methods

This research project is a systematic review of the literature published between 2020 and 2025 on the use of ChatGPT as a pedagogical tool in medical education. It utilizes databases as a source of information for compiling scientific articles, with the aim of contributing to the field of higher medical education (39). The project employs a non-experimental, qualitative methodological approach, based on observation and documentation of information in its natural state (40, pp. 78-79). The population consists of articles selected according to established criteria, following the PRISMA 2020 protocol for systematic reviews, to ensure the study's accuracy, rigor, and transparency (41).

The information search was conducted on March 9, 2026, in three specialized databases: PubMed, Scopus, and Web of Science (WoS). An advanced search strategy was implemented, which involved constructing equations with keywords linked by Boolean operators. A specific equation was designed for each database to improve search sensitivity and accuracy. Additionally, a refinement function was used through filters to perform exclusions based on: publication type (book chapters, proceedings, conferences, commentaries), language (other than English and Spanish), subject areas (other than medical sciences or educational research), and publication years (not within the 2020-2025 time period), as described in table 1. Based on the search strategy described, the inclusion and exclusion criteria described in table 2 were established. To detail the selection process for the articles included in this review, a flowchart based on PRISMA 2020 was created, which is detailed in Figure 1 (42).

Table 1. Search equations for obtaining scientific articles.

Database	Search Equation
Scopus	(("ChatGPT" OR "large language model*" OR LLM* OR "generative AI" OR "GenAI") AND ("medical education" OR "health professions education") AND (pedagog* OR teach* OR learn* OR curriculum OR "faculty development" OR "virtual patient*" OR simulation OR feedback OR "formative assessment" OR "case-based" OR "question generation") AND NOT (exam* OR "licensing" OR "board exam*" OR "USMLE" OR "MIR" OR "in-training" OR "certification"))
Web of Science (WoS)	(("ChatGPT") AND ("medical education" OR "medical students" OR "clinical education") AND (study OR trial OR survey OR evaluation OR experiment OR students OR residents))
PubMed	"ChatGPT"[Title/Abstract] AND ("Education, Medical"[MeSH] OR "medical education"[Title/Abstract] OR "medical students"[Title/Abstract]) AND (teaching [Title/Abstract] OR learning [Title/Abstract] OR pedagog*[Title/Abstract])

Table 2. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
IC1. The publication date of the scientific study is within the period 2020 to 2025.	EC1. The publication date of the scientific study is not within the period 2020 to 2025.
IC2. The article corresponds to a primary research study.	EC2. The article does not correspond to a primary research study.
IC3. The article includes medical students in its sample.	EC3. The article does not include medical students in its sample.
IC4. The scientific study deals with the uses of ChatGPT as a pedagogical tool.	EC4. The scientific study does not deal with the uses of ChatGPT as a pedagogical tool.
IC5. The publication language of the article is English and Spanish.	EC5. The publication language of the article is not English and Spanish.
IC6. The scientific study is Open Access.	EC6. The scientific study is not Open Access.

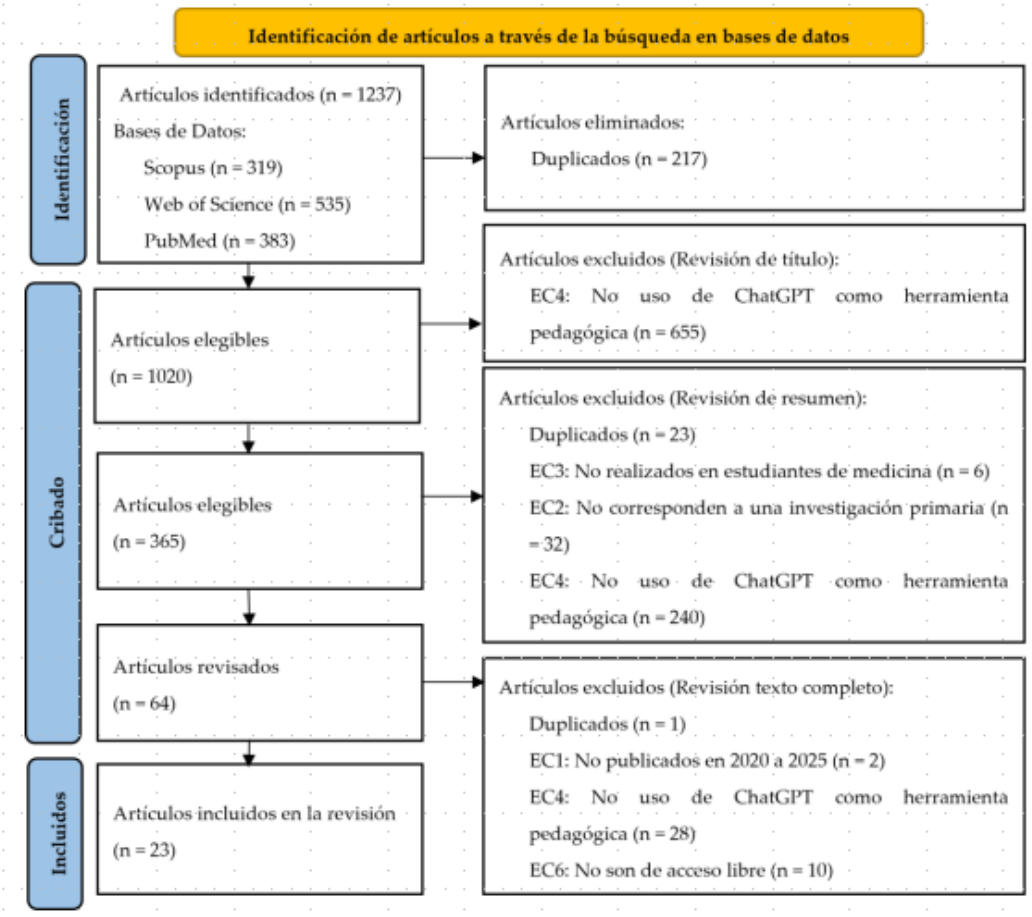

Figure 1. Flow chart of the selection process of articles.

A total of 1,237 articles were identified (PubMed: n = 383; Scopus: n = 319; WoS: n = 535). From this initial search, a database was created in Microsoft Excel to extract variables (year of publication, first author, article title, and indexing source). Subsequently, the screening process was carried out: duplicate articles were eliminated (n = 217), and the articles were reviewed by title. Studies focused on ChatGPT and medical education were selected, yielding a total of n = 365 articles. In the next phase,

abstracts were read, delimiting the articles that included the use of ChatGPT as a pedagogical tool in medical education, resulting in a total of n = 64. Finally, the full text was read, taking into account the previously established inclusion and exclusion criteria.

The synthesis of results included the characterization of the articles considering variables such as: year of publication, type of study, sample size, and participating population. The descriptive analysis was based on the grouping of conceptual categories, identifying common patterns and trends. Methodological heterogeneity was evident among the studies; therefore, a strictly narrative synthesis was chosen. It should also be mentioned that the article selection process was carried out by the authors of this study; consequently, the risk of bias in the study selection process could be increased (42).

3. Results

3.1. Characterization of the studies

Regarding the type of journals in which the articles were published, the 23 studies were distributed across 14 scientific journals. 35.71% were published in interdisciplinary journals, 28.57% in medical education journals, and 14.29% in health technology and education journals. As for the distribution by year of publication, an increasing trend in scientific output was observed over the last three years (Figure 2). The graph shows low article production in 2023, possibly due to the global dissemination of ChatGPT at the end of 2022, which may have initially limited scientific output.

The geographical distribution of the articles was determined based on the country of affiliation reported by each publication. Research was conducted in 13 countries, with China (13.04%), the United States (13.04%), and Germany (13.04%) having the highest representation, followed by Italy (8.7%). It should be noted that a multicenter study conducted in 21 countries was also included. Regarding the methodological approach, the 23 articles (n = 23) were empirical. Of these, 73.91% employed quantitative methods, 13.04% used qualitative methods, and 13.04% adopted a combination of qualitative and quantitative methodologies (Figure 3). As for the analysis of data collection methods and sample characterization, 10 instruments were identified (Figure 4), with questionnaires (37.50%) and surveys (25.00%) being the most frequent. Regarding sample size, 65.13% of the studies included fewer than 200 participants and 34.78% exceeded 201 participants.

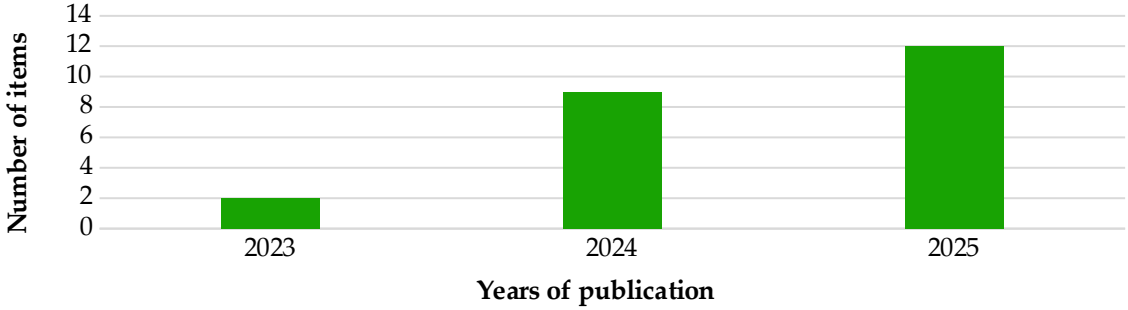

Figure 2. Distribution of articles by year of publication.

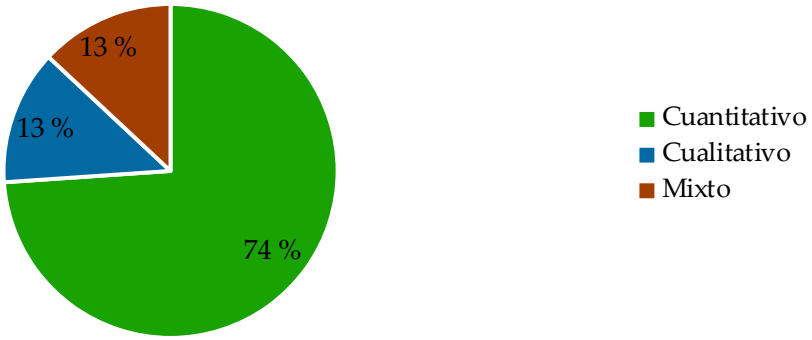

Figure 3. Types of methodologies.

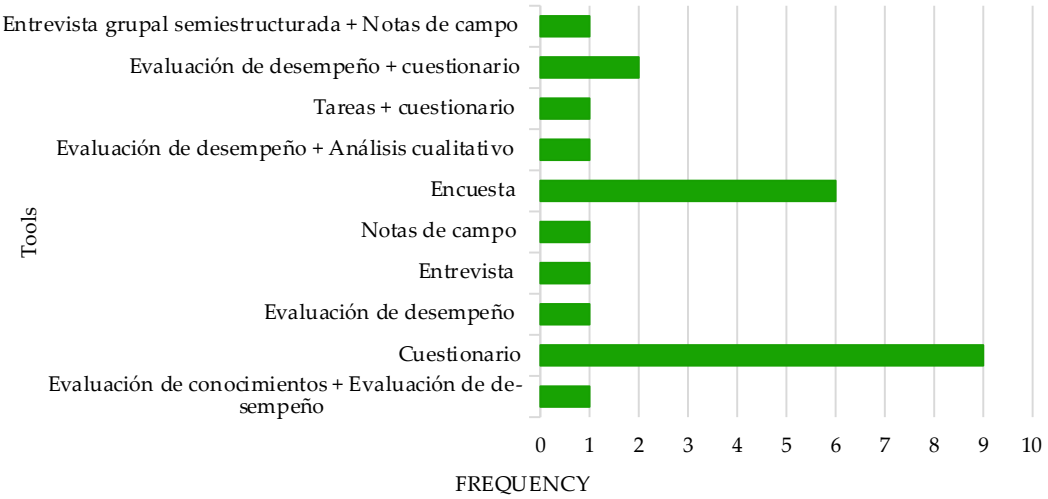

Figure 4. Tools for data collection.

Figure 5 presents the hierarchical distribution of participants according to type and educational level. A predominance of studies conducted with undergraduate students was evident (69.57%), followed by graduate students (17.39%). A smaller proportion included two studies focused on teachers (8.70%) and one study (4.37%) that considered both students and teachers without specifying the educational level.

3.2 Pedagogical strategies based on the use of ChatGPT in medical education

The pedagogical strategies identified in the 23 scientific articles are oriented towards: autonomous learning activities, medical simulation, strengthening of clinical and communication skills, problem-based learning and development of educational materials, which demonstrates that there are various ways to integrate this tool (ChatGPT) into a medical training process (table 3).

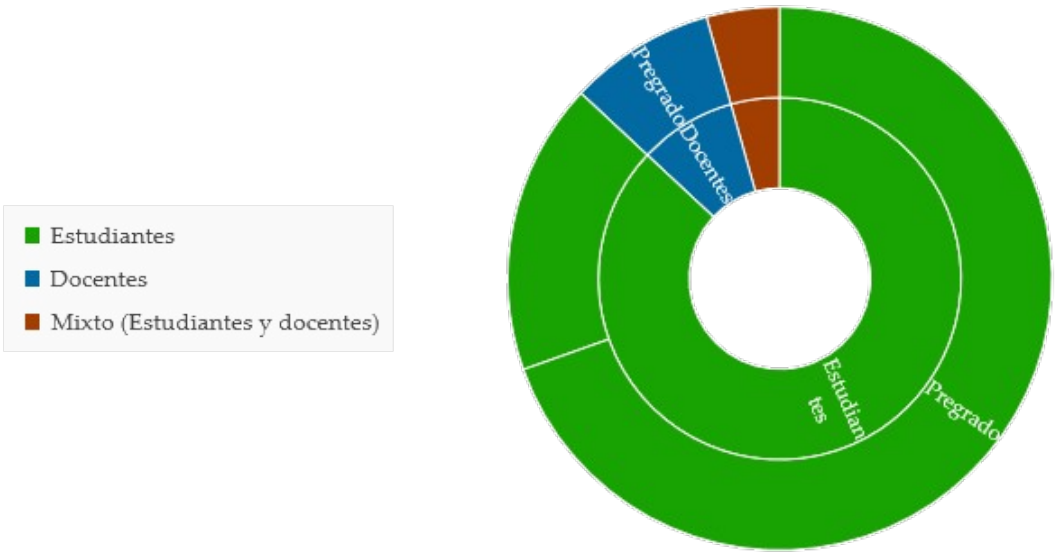

Figure 5. Distibution of participants.

3.3. Pedagogical uses of ChatGPT in medical education

Various pedagogical uses of ChatGPT were identified, which were grouped into eight main categories: clinical simulation, where ChatGPT facilitated the creation of clinical scenarios with diagnostic interaction (n = 3); problem-based learning as a support tool in the discussion of clinical cases (n = 2); development of clinical and communication skills, aimed at strengthening clinical judgment and diagnostic decision-making (n = 5); feedback and formative assessment, characterized by the provision of immediate feedback (n = 4).

As a self-directed learning tool, ChatGPT served as a support for text comprehension, answering questions, and providing information (n = 8). Furthermore, instructors reported using it to optimize teaching activities related to the creation of materials and academic content (n = 2). Similarly, a significant proportion of articles focused on analyzing perceptions and attitudes toward the ChatGPT tool (n = 10). Regarding educational level, most studies focused on undergraduate medical students for self-directed learning (n = 5) and feedback (n = 4). In contrast, few postgraduate studies focused on the development of clinical skills (n = 5) and problem-based learning (n = 2). Studies involving medical faculty are limited, and their primary use is for producing educational materials for teaching (n = 2). These results are detailed in table 4.

4. Discussion

This research examined the pedagogical uses of ChatGPT in medical education through a systematic review of the published literature (2020-2025), in a context marked by technological expansion and the incorporation of AI-based tools such as ChatGPT into medical education. The results of this study suggest that ChatGPT is used as a support tool in health education, its use being geared more towards accompanying learning processes, planning, and academic organization than directly replacing learning (78). This could be explained by the limited integration of advanced technologies into medical curricula (66), although there is interest from students and faculty in incorporating these emerging technologies (67-68). However, limitations such as a lack of AI literacy for their effective implementation persist (8). In this sense, the use of technologies like ChatGPT is driven more by individual initiatives than by structured pedagogical models. This demonstrates a shift from institutional approaches to action-oriented logics (69), which could be due to a lack of institutional policies and procedures that would allow for the establishment of standards guaranteeing educational transparency (70). From this arises the need for a regulated, formative, and complementary AI aimed at supporting understanding without replacing knowledge construction (78).

It is found that current scientific literature has a predominantly exploratory character, focused on perceptions and attitudes towards the use of ChatGPT due to its recent incorporation in education (71), in the same way a bibliometric analysis carried out by Zhang *et al.* (72) reported that research currently focuses on the performance and ethical questions of ChatGPT, hence a critical gap arises regarding the scarcity of studies that measure the real impact of this tool on learning outcomes (73).

From a pedagogical perspective, the relevant findings indicate that AI can contribute to the transformation of medical education through dynamic and adaptable learning environments for practicing clinical reasoning in safe spaces (3). In this sense, AI could be the means to optimize learning and facilitate its adaptation to the individual needs of students (79), particularly ChatGPT, which is projected as a tool with the potential to support autonomous learning and the development of clinical and communication skills. Similarly, its responsible use could contribute to the development of ethical and human competencies (74-75). However, these findings should be interpreted with caution because ChatGPT lacks attributes such as independent consciousness, ethical standards, emotional empathy, and the ability to anticipate unforeseen circumstances (1). Consequently, a tool of this type cannot comprehensively manage medical care and diagnostic decisions (66). It is also necessary to mention the term "Scientific Hallucination" (76), a known phenomenon of ChatGPT, in which false data is issued that seems scientifically reasonable and accurate, its eradication is still a challenge (77).

Regarding the research question, the results of this study identify several strategies associated with the use of ChatGPT; however, its effectiveness as a pedagogical tool is inconclusive. This could be explained by the methodological heterogeneity evident in the size and characteristics of the samples, the data collection instruments, and the populations studied. These conditions, along with the fact that articles were selected by a single reviewer, constitute some of the study's limitations. This could introduce a risk of bias in the selection and screening process, and these aspects should be considered when analyzing the results and replicating the study. Furthermore, there is a lack of research on graduate students and faculty, highlighting a research gap focused on these populations and suggesting unequal adoption of the technology.

Table 3. Results of scientific articles included in the systematic review.

Author	Year	Database	Country	Qualification	Results	Pedagogical strategy
Hui *et al.* (43)	2025	PUBMED	China	Application of ChatGPT-assisted problem-based learning teaching method in clinical medical education	The use of ChatGPT in Problem-Based Learning improved theoretical performance, clinical skills, and enhanced student perception.	Problem-based learning. Development of clinical skills and communication.
Holderried *et al.* (44)	2024	PUBMED	Germany	A Language Model–Powered Simulated Patient with Automated Feedback for History Taking: Prospective Study	ChatGPT enabled patient simulation and structured feedback.	Clinical simulation. Feedback and formative assessment. Perceptions, attitudes, and usage patterns in education.
Ba *et al.* (45)	2024	PUBMED	China	Enhancing clinical skills in pediatric trainees: a comparative study of ChatGPT-assisted and traditional teaching methods.	ChatGPT improved clinical judgment and communication skills. Highly rated by medical students.	Development of clinical skills and communication. Problem-based learning. Feedback and formative assessment.
Hu *et al.* (46)	2025	PUBMED	China	Status and perceptions of ChatGPT utilization among medical students: a survey-based study.	ChatGPT was used for information searches and assignments, and students had positive attitudes towards the tool considering ethical concerns.	Perceptions, attitudes, and usage patterns in education. Perceptions, attitudes, and usage patterns in education.
Skryd *et al.* (47)	2024	PUBMED	USA	ChatGPT as a Tool for Medical Education and Clinical Decision-Making on the Wards: Case Study.	ChatGPT facilitated clinical diagnostic reasoning and discussion. It provided a quick source of information.	Clinical reasoning. Perceptions, attitudes, and usage patterns in education.
MaaB *et al.* (48)	2025	PUBMED	Germany	Artificial Intelligence and ChatGPT in Medical Education: A Cross-Sectional Questionnaire on students' Competence.	ChatGPT was used for self-directed learning, showed positive attitudes but low preparedness for its use in the academic field.	Self-directed learning. Perceptions, attitudes, and usage patterns in education.

Digiacomo *et al.* (49)	2025	PUBMED	Italy	ChatGPT vs traditional pedagogy: a comparative study in urological learning	Using ChatGPT in conjunction with traditional teaching methods improved learning. ChatGPT without teacher guidance was less effective.	Self-directed learning. Development of clinical skills and communication
McCarrick *et al.* (50)	2025	PUBMED	Ireland	A Randomized Controlled Trial of a Deep Language Learning Model-Based Simulation Tool for Undergraduate Medical Students in Surgery.	ChatGPT as a simulated patient improved communication skills and confidence in taking a medical history.	Clinical simulation. Development of clinical skills and communication. Feedback and formative assessment.
Biri *et al.* (51)	2023	PUBMED	India	Assessing the Utilization of Large Language Models in Medical Education: Insights from Undergraduate Medical Students.	Students showed a positive attitude towards ChatGPT as a support tool, but limited use.	Perceptions, attitudes, and usage patterns in education.
FuBhöller *et al.* (52)	2025	PUBMED	Germany	Perceptions, Usage, and Educational Impact of ChatGPT Among Medical Students in Germany	ChatGPT was used to summarize, research, and clarify concepts, improving understanding and efficiency.	Self-directed learning.
Ajalo *et al.* (53)	2025	PUBMED	Uganda	Widespread use of ChatGPT and other Artificial Intelligence tools among medical students in Uganda: A cross-sectional study	ChatGPT was used for academic tasks.	Production of materials and teaching support
Deb *et al.* (54)	2024	PUBMED	USA	Assessing the Utilization of Large Language Model Chatbots for Educational Purposes by Medical Teachers: A Nationwide Survey from India	ChatGPT was used to simplify content, generate materials, and answer questions in teaching.	Production of materials and teaching support
Dallari *et al.*	2024	PUBMED	Italy	The role of artificial	ChatGPT was used for information	Self-directed learning.

(55)				intelligence in training ENT residents: a survey on ChatGPT, a new method of investigation	retrieval, writing, and as a study tool.	Perceptions, attitudes, and usage patterns in education.
Suárez-García *et al.* (56)	2025	PUBMED	Mexico	DIALOGUE: A Generative AI-Based Pre-Post Simulation Study to Enhance Diagnostic Communication in Medical Students Through Virtual Type 2 Diabetes Scenarios	ChatGPT was used as a virtual patient, providing immediate feedback.	Clinical reasoning Clinical simulation. Development of clinical skills and communication. Feedback and formative assessment.
Ghanem *et al.* (57)	2025	SCOPUS	Egypt	Medical students' knowledge, attitudes, and practices toward generative artificial intelligence in Egypt 2024: a Cross-Sectional study.	ChatGPT was used for task support, positive attitudes, and moderate use.	Perceptions, attitudes, and usage patterns in education.
Gasparini *et al.* (58)	2025	SCOPUS	Australia	A survey of large language model use in a hospital, research, and teaching campus	ChatGPT was used for text generation and support for idea exploration, with a high perception of efficiency.	Production of materials and teaching support. Perceptions, attitudes, and usage patterns in education.
Abouammoh *et al.* (59)	2025	SCOPUS	United Kingdom	Perceptions and Earliest Experiences of Medical Students and Faculty with ChatGPT in Medical Education: Qualitative Study	ChatGPT was used to summarize documents, generate ideas, and support learning.	Self-directed learning. Perceptions, attitudes, and usage patterns in education.
Roy *et al.* (60	2024	SCOPUS	India	Knowledge, Attitudes, and Practices Regarding Chatbots Among Healthcare Professionals in a Tertiary Care Hospital	Moderate awareness, limited use, and barriers to the integration of ChatGPT into medical education were reported.	Perceptions, attitudes, and usage patterns in education.
Elhassan *et al.*	2025	WEB OF	Saudi	Assessing Familiarity, Usage	ChatGPT was used to explain	Self-directed learning.

(61)		SCIENCE	Arabia	Patterns, and Attitudes of Medical Students Toward ChatGPT and Other Chat-Based AI Apps in Medical Education: Cross-Sectional Questionnaire Study	concepts, answer questions, and provide support for self-directed learning.	
Zhang *et al.* (62)	2024	WEB OF SCIENCE	USA	Exploring the Usage of ChatGPT Among Medical Students in the United States	ChatGPT was used to summarize information, learn new content, and write texts.	Self-directed learning.
Cross *et al.* (63)	2023	WEB OF SCIENCE	Caribbean	Transforming Medical Education: Assessing the Integration of ChatGPT into Faculty Workflows at a Caribbean Medical School	ChatGPT was used to generate multiple-choice questions, support in understanding topics and clinical cases.	Problem-based learning.
Amano *et al.* (64)	2025	WEB OF SCIENCE	Japan	Use and Evaluation of Generative Artificial Intelligence by Medical Students in Japan	ChatGPT was used for tasks, answering questions, and supporting report preparation.	Self-directed learning.
Ozkan *et al.* (65)	2025	WEB OF SCIENCE	(21 countries)	Global Health care Professionals' Perceptions of Large Language Model Use in Practice: Cross-Sectional Survey Study	ChatGPT was used to generate and summarize information. Positive perception of its use.	Production of materials and teaching support.

Table 4. Pedagogical uses of ChatGPT in Medical Education.

Pedagogical use (Category)	Pedagogical strategy (Description)	Authors	Educational level
Simulation clinic	Using ChatGPT to recreate clinical scenarios, simulated patient, interaction for diagnosis	Holderried *et al.* (44) McCarrick *et al.* (50) Suárez-García *et al.* (56)	Predominantly undergraduate
Problem-based learning	Use of ChatGPT for discussion of clinical cases and as a support tool for active learning	Hui *et al.* (43) Ba *et al.* (45)	Undergraduate and postgraduate
Development of clinical skills and communication	Using ChatGPT to strengthen clinical skills, communication skills, and diagnostic judgment	Hui *et al.* (43) Ba *et al.* (45) Digiacomo *et al.* (49) McCarrick *et al.* (50) Suárez-García *et al.* (56)	Undergraduate and postgraduate
Feedback and formative assessment	Using ChatGPT for structured assessment and immediate feedback	Holderried *et al.* (44) Ba *et al.* (45) McCarrick *et al.* (50) Suárez-García *et al.* (56)	Predominantly undergraduate
Self-directed learning	Using ChatGPT as a source of information, to explain concepts, summarize texts, and support self-directed learning	MaaB *et al.* (48) Digiacomo *et al.* (49) FuBhöller *et al.* (52) Dallari *et al.* (55) Abouammoh *et al.* (59) Elhassan *et al.* (61) Zhang *et al.* (62) Amano *et al.* (64)	Predominantly undergraduate
Clinical reasoning	Use of ChatGPT for support in clinical analysis and diagnostic resolutions	Skryd *et al.* (47) Suárez-García *et al.* (56)	Undergraduate and postgraduate
Production of materials and teaching support	Using ChatGPT for generating educational content and as a teaching support tool	Deb *et al.* (54) Ozkan *et al.* (65)	Teachers
Perceptions, attitudes, and usage patterns in education	Use and perception of the use of ChatGPT in medical education	Holderried *et al.* (44) Hu *et al.* (46) Skryd *et al.* (47) MaaB *et al.* (48) Biri *et al.* (51) Dallari *et al.* (55) Ghanem *et al.* (57) Gasparini *et al.* (58) Abouammoh *et al.* (59) Roy *et al.* (60)	Predominantly undergraduate

5. Conclusions

- ChatGPT is being incorporated into medical education through various pedagogical strategies grouped into eight main categories: autonomous learning, development of clinical and communication skills, formative feedback, clinical simulation, and production of educational materials. However, the articles included in this study show that the available evidence is heterogeneous and predominantly exploratory; therefore, its pedagogical effectiveness cannot be established.
- ChatGPT is primarily used as a support tool with pedagogical potential, the implementation of which requires critical, guided, and contextualized management, accompanied by ongoing digital literacy training to ensure educational transparency. Furthermore, studies are needed to evaluate its pedagogical effectiveness with undergraduate and graduate students and faculty, with the aim of integrating it at all educational levels within the health sciences.
- The findings of this study suggest that the incorporation of ChatGPT in medical education should be geared towards a critical, guided and contextualized use based on current training and digital literacy needs, considering the different educational levels in the health field.

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