

## REVIEW ARTICLE

# ChatGPT Review: A Sophisticated Chatbot Models in Medical & Health-related Teaching and Learning

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## ABSTRACT

Artificial intelligence (AI) has transformed our interactions with the world, spawning complex apps and gadgets known as intelligent agents. ChatGPT, a chatbot hybrid of AI and human-computer interaction, converse with humans and have a wide range of possible uses. Chatbots have showed potential in the field of medical education and health sciences by aiding learning, offering feedback, and increasing metacognitive thinking among undergraduate and postgraduate students. OpenAI's ChatGPT, an advanced language model, has substantially enhanced chatbot capabilities.

Chatbots are being used in the medical related field for teaching & learning, mental state categorisation, medication recommendation, health education and awareness. While chatbots have been well accepted by users, further study is needed to fully grasp their use in medical and healthcare settings.

This study looked at 32 research on ChatGPT and chatbots in medical-related fields and medical education. Medical education, anatomy, vaccines, internal medicine, psychiatry, dentistry, nursing, and psychology were among the topics discussed in the articles. The study designs ranged from pilot studies to controlled experimental trials.

The findings show the exponential growth and potential of ChatGPT and chatbots in healthcare and medical education, as well as the necessity for more research and development in this sector.

Malaysian Journal of Medicine and Health Sciences (2023) 19(SUPP12): 98-108. doi:10.47836/mjmhs.19.s12.12

**Keywords:** Chatbot; ChatGPT; Teaching & learning; Medical education; Health sciences; Student

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## INTRODUCTION

### Previous Studies of Chatbot & ChatGPT

ChatGPT is "an artificial intelligence-powered chatbot created by OpenAI and based on the GPT (Generative Pretrained Transformer) language model [1]. ChatGPT is one of the most sophisticated chatbot models created using cutting-edge language processing techniques. It uses deep learning techniques to generate conversational responses to text inputs that resemble human speech. The advent of Artificial Intelligence (AI) has fundamentally altered the way in which we interact with the world around us. Through the creation and assessment of sophisticated applications and devices, known as intelligent agents, we have been able to

achieve a level of functionality that was once thought impossible [2]. The conception of a chatbot embodies the fusion of AI and the Human-Computer Interaction model, as expounded by the study [3]. Cambridge Dictionary defines chatbot as "a computer program designed to have a conversation with a human being, especially over the internet [4]. A chatbot encompasses a multitude of artificial entity, be it a computer, programme, algorithm, or AI, that engages in communication with a human or other interlocutor. Directed by intricate algorithms, chat bots navigate the realm of human interaction by carefully selecting the most fitting response from a preconceived set of expressions [5]. These bots are designed to respond to users' messages by selecting the most appropriate expression from preprogrammed schemas. Alternatively, emerging bots may utilise adaptive machine learning algorithms to enhance their conversational abilities [6]. The manifold investigations conducted have brought to light the possibilities of chatbot potential in diverse

educational settings, encompassing interventions pertaining to health and well-being [7], medical instruction [8], mathematical pedagogy [9], linguistic acquisition [10], etc. The latest studies have revealed that chatbots possess the potential to serve as proficient facilitators in the realm of students' research knowledge, as concluded by [11]. The implementation of chatbots in education has been found to have the potential to inspire students by facilitating feedback provision and stimulating metacognitive thinking [11].

OpenAI developed ChatGPT, a GPT-3.5-based advanced language model. In 2018, OpenAI's GPT model generated coherent, contextually relevant writing from queries. GPT's first natural language understanding and generation were outstanding. A large online text corpus provided information on numerous subjects. Early GPTs struggled to contextualise.

ChatGPT, developed by OpenAI, has improved greatly since its release. GPT-2, known for its text creation, inspired the model [12]. Due to worries about abuse, OpenAI published restricted versions of GPT-2 but modified the model to build ChatGPT and future versions [13]. OpenAI is addressing restrictions, improving response quality, and promoting responsible model use while biases, user safety, and ethics are prioritised [13]. ChatGPT advances language models, advancing natural language processing and human-machine interactions.

### Chatbots in the Medical Field

The healthcare industry is only one of many that is seeing an uptick in the creation of chatbots and other conversational agents [14]. Chatbots, made possible by recent developments in natural language processing (NLP) and AI, are already being put to use in a variety of healthcare settings, including symptom triage [15], mental state classification [16], medicine recommendation [17], and promotion of health education [18].

The utilisation of chatbots in healthcare presents a significant benefit in that they can function as a surrogate for physicians, serving as the initial point of contact to counsel patients on symptoms, offer preliminary diagnoses, and furnish suggestions for subsequent measures [7]. In the realm of healthcare, one may observe a multitude of triumphant chatbot instances, such as Babylon Health, Your.MD, Woebot, and SafedrugB [19]. Despite the positive user reception and early signs of promise, more study is required to assess the full extent of these chatbots' usefulness in healthcare settings [20].

The exploration of chatbots or other conversational agents in the realm of medical education and training is a path that is currently being traversed with great interest and curiosity [21]. The emergence of chatbots

as a viable medium for dispensing medical knowledge is a testament to the remarkable strides made in the domains of AI and natural language processing. As students embark on their journey towards medical expertise, they may find solace in conversing with chatbots to expand their understanding of medical afflictions and remedies. Meanwhile, instructors may harness the power of chatbots to offer individualised assessments and appraisals to their students. Moreover, the perpetual availability of chatbots to disseminate medical information and resources is of utmost significance in areas where medical education is not easily attainable.

### The performance of Chatbot on major examinations

The inquiry pursued by Gilson et al. delves into the performance of ChatGPT in the United States Medical Licensing Examination [22]. It seeks to unravel the essence of this phenomenon and its implications for the field of medicine. The contemplation of the ramifications of expansive linguistic models on medical education and the evaluation of knowledge. The demonstration revealed a noteworthy decline in efficacy as the complexity of the inquiry intensified ( $P=.01$ ) amidst the AMBOSS-Step1 compilation. The study conducted by Li et al. delves into the inquiry of whether the ChatGPT interface possesses the capability to effectively engage with and fulfil a simulated objective structured clinical examination, which emulates the assessment for membership of the esteemed Royal College of Obstetricians and Gynaecologists [23]. The attainment of a high score by ChatGPT on the United States Medical Licensing Examination is undoubtedly commendable. However, it is imperative to acknowledge that the assessment of its performance on medical licensing examinations in other nations, particularly those in non-English-speaking regions, remains inadequately scrutinised. Tanaka et al.'s study delves into the comparison between the exam's passing rate and its true essence [24]. To contemplate the efficacy of ChatGPT in addressing the intricacies of practise queries for the attainment of board certification in ophthalmology. The authors have employed a series of text-based multiple-choice questions, sourced from the OphthoQuestions practise question bank, in order to prepare for the board certification examination [25]. The study conducted by Humar et al., endeavours to delve into the intricacies of ChatGPT's performance on the Plastic Surgery In-Service examination and to draw a comparison with the national performance of residents [26]. This pursuit of study is a testament to the human desire to understand and unravel the capacities of technology and human cognition. The study conducted by Fang et al. endeavours to evaluate the efficacy of ChatGPT's aptitude in the realm of medical education and clinical decision-making, particularly in the context of China [27]. The quest to evaluate ChatGPT's aptitude for tackling radiology board-style examination questions

bereft of images is a philosophical inquiry into its inherent capabilities and constraints. From February 25 to March 3, 2023, a group of individuals engaged in a series of actions in the pursuit of knowledge. They meticulously aligned 150 multiple-choice questions with the format, subject matter, and level of difficulty of the Canadian Royal College and American Board of Radiology examinations. Then, these queries were categorised according to their respective thinking levels, namely lower-order (recall, understanding) and higher-order (apply, analyse, synthesise) thinking, as well as their topics, which were either physics or clinical in nature [28]. Can the essence of human knowledge and expertise be distilled into a machine's algorithmic framework?. This is the fundamental question that the study seeks to answer, as it delves into the possibility of AI surpassing the American Board of Orthopaedic Surgery examination [29]. In the realm of human experience, we are often presented with dichotomies that challenge our understanding of the world. One such dichotomy is the comparison between orthopaedic residents and chatgpt. While on the surface these two entities may seem vastly different, upon closer examination we can see that they are both integral parts of the human experience, representing different facets of our collective consciousness [30]. Through contemplation and introspection, we may come to a deeper understanding of the inter connectedness of all things, and the ways in which seemingly disparate elements of our world are in fact intimately intertwined [31]. The emergence of ChatGPT (OpenAI), a novel AI model that employs large language models (LLM) and non-specific domain areas, has sparked philosophical contemplation. The corpus of knowledge that has left an indelible mark on the intellectual landscape includes the propensity of ChatGPT's knowledge [32] and the ability of ChatGPT to answer eligible questions correctly [33].

### **Faculty of Medicine of UPM & USIM and the Related Curriculum**

The establishment of the Faculty of Medicine at the University of Malaya in 1963 marked the beginning of a distinguished legacy in medical education in Malaysia. Currently, there are 32 institutions dedicated to medical education, comprising 11 publicly funded and 21 privately funded establishments [34]. Throughout history, the medical school curriculum has played a pivotal role in shaping the type of practitioners' doctors become. The majority of schools employ various methods to deliver their curriculum. The Faculty of Medicine and Health Sciences at Universiti Putra Malaysia embraced an innovative approach by adopting problem-based learning as its primary pedagogical framework, regulated by Malaysian Qualifications Agency (MQA) and Malaysian Medical Council (MMC) [35, 36]. Additionally, in 1995, Omar Hassan Kasule proposed the Islamic Input Medical Curriculum (IIMC), which was approved by the International

Islamic University Malaysia (IIUM) Senate [37]. The Faculty of Medicine and Health Sciences at Universiti Sains Islam Malaysia designed a medical curriculum integrated with Islamic sciences [38] guided by the philosophy of "the integration of Naqlī (revealed) and 'Aqlī (rational) knowledge" [39]. In a continuous quest for advancement, medical schools are progressively integrating e-learning into their esteemed curricula. This imperative arises from the directives of accrediting bodies such as the National Accreditation Board and the Malaysia Medical School, which compel medical institutions to embrace contemporary technologies [40]. A medical curriculum that incorporates technology is an effective strategy to meet the educational demands of modern physicians. Computer-assisted learning, mobile devices, digital games, simulations, wearable technologies, and other tools offer opportunities to enhance the educational experience for aspiring medical students and practitioners [41].

### **MATERIALS AND METHODS**

The present discourse delves into an exploration of searches conducted via PubMed, an online repository that houses biomedical literature from the National Library of Medicine at the United States National Institute of Health. The inclusion criteria were; all types of English articles with full text, articles published in PubMed from year since beginning, and related to "ChatGPT/ Chatbot", "education/ teaching/ learning", "medical/ health-related field", "students/ undergraduate students". The exclusion criteria were; articles for which full text was not available, were not in English, and not related to "ChatGPT/ Chatbot", "education/ teaching/ learning", "medical/ health-related field", "students/ undergraduate students".

Throughout the inquiry, the utilisation of eleven unique arrangements of the keywords "ChatGPT", "Chatbot", "Education", "Teaching", "Learning", "Medic\*", "Health", "Clinic\*", "Pre-clinical", "Undergraduate Student\*", "Student\*", were employed. In the quest for records, the authors entered various combinations into the query box on PubMed. The first combination involved the juxtaposition of "ChatGPT" OR "Chatbot". The second combination explored the interplay between "Education" OR "Teaching" OR "Learning". The third combination included "Medic\*" OR "Health" OR "Clinic\*" OR "Pre-clinical". The fourth combination involved the collocation of "Undergraduate Student\*" OR "Student\*". The fifth combination delved into the relationship between "ChatGPT" OR "Chatbot" and "Education" OR "Teaching" OR "Learning" and "Medic\*" OR "Health" OR "Clinic\*" OR "Pre-clinical" and "Undergraduate Student\*" OR "Student\*". The five distinct amalgamations we have devised are intended to account for the diverse levels of precision in the lexicon employed, while simultaneously ensuring that our quest is all-encompassing enough to uncover any

pertinent scholarship. The researchers embarked on their literary analysis in 30 Mei 2023. The process of article identification and screening is described in Figure 1.

Once the duplicated were eliminated, a total of 32 articles remained after an extensive search through the database. This review encompasses all studies pertaining to the Chatbot, including those that employ medical students to ascertain the intended usage of the chatbot in the medical field. The selection process involved the exclusion of articles that did not pertain to the subject of medical/ health related field or medical education, or those that utilised Chatbot for purposes other than medical or health-related field. Additionally, studies that involved other AI, or did not take students into account were also excluded. This rigorous process ensured that only the most relevant and appropriate articles were included in the analysis. The research team engaged in a process of eligibility assessment and discussion regarding full text articles.

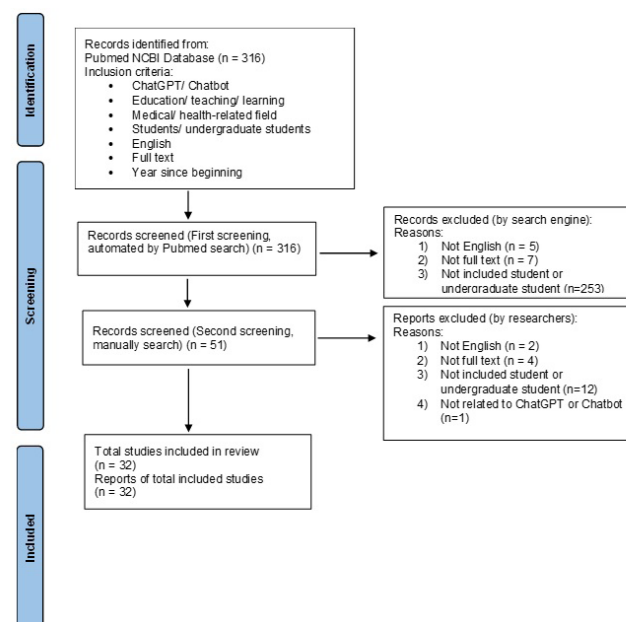
**RESULTS**

The final papers included in this review are 32 studies (Figure 1). All these published works showed strong exponential growth in the usage of ChatGPT or Chatbot related to health topics for the last 5 years (2019-2023). The studies can be categorised into medical disciplines (both pre-clinical and clinical fields) such as medical education, anatomy, parasitology, vaccination, internal medicine (cardiovascular), clinical (bedside teaching), and psychiatry (Table I & II). Furthermore, other studies include the dentistry discipline and health sciences fields such as nursing and psychology. The research papers include all types of articles, including commentary, narrative reviews, mini reviews, and full experimental papers. The study design for all full experimental papers ranged from pilot studies or proof of concept studies to mix-method studies (qualitative and quantitative studies), case control studies, randomised controlled trials, controlled

experimental studies, quasi-experimental studies, qualitative case studies, cross-sectional studies, design and development research, and design science research.

**Chatbots in Teaching and Learning**

The chatbot increased interest in education and self-directed learning among students. This statement is supported by one finding that suggests a chatbot may improve students’ self-directed learning abilities, interest, and engagement [21]. Another experiment involved the AISS chatbots, which supply anatomical questions and provide quick responses. In a preliminary study among medical students, the session boosted self-reported anatomy knowledge confidence, they felt more comfortable making errors with the AI than with teachers, and they increased their engagement [42]. Furthermore, a group of researchers developed a voice chatbot learning system powered by AI to train nursing undergraduates’ perceived self-efficacy and confidence



**Figure 1** : The process of article identification and screening.

**Table I : Summary Table of Included Studies (Original Article)**

PMID	Discipline	Type of article/ Study Design	Country	Samples	First Author	DOI	Study finding regarding Chatbot/ ChatGPT
30990463	Medical related (Psychiatry/ Psychology)	Qualitative case study	South Korea	Full-time graduate students	Park S	10.2196/12231	Chatbot promoted self-reflection in stress management conversations
31334236	Medical-related (Learning method)	Cross-sectional survey design	Singapore & Netherland	Researcher/scientists, medical/bio-medical students	Sandalova E	10.3389/fmed.2019.00152	A majority of 98% of respondents never use Chatbot for their work
31663857	Health sciences (Nursing)	Design and development research	Singapore	Nursing undergraduates	Shorey S	10.2196/14658	A voice chatbot was developed for learning system powered by an artificial intelligence (AI) to train the nursing communication skills.

32604638	Medical-related (Learning method/ pharmacology)	Qualitative study design using thematic content analysis	Sweden	Msc student	Stathakarou N	10.3233/SHTI200531	The chatbots has the potential to facilitate memorization of concepts for pharmacological formulations and medical laws
33950849	Medical-related (Psychiatry/ Psychology)	Mixed methods proof-of-concept study/ pilot study	Italy	University students	Gabrielli S	10.2196/27965	Chatbot could help university students cope with stress
34054328	Medical-related (Health awareness)	Mixed-method study (qualitative and quantitative methods)	Malaysia	Undergraduate student	Mokmin NAM	10.1007/s10639-021-10542-y	Chatbot has potential to increase health literacy among young generation
34513002	Medical-related (Learning method/ medical education)	Pilot study	UK	Medical students across all year groups and academic staff.	Kaur A	10.1177/20552076211038151	Chatbot has possible potential and limitation in Medical Education
34956693	Medical-related (Learning method/ anatomy)	Pilot study	Hong Kong	Medical students	Li YS	10.1007/s40670-021-01405-9	Chatbot reported to increase students' confidence, more comfortable making mistake and increase level of engagement
35059305	Medical related (Psychiatry/ Psychology)	Randomised controlled trial	China	Undergraduate student & graduate student	Liu H	10.1016/j.invent.2022.100495	Chatbot reduced depression and anxiety
35411629	Health sciences (Nursing)	Qualitative descriptive study	Spain	Final-year nursing students	Rodriguez-Arastia M	10.1111/jonm.13630	Chatbot help clinical decision making and ensure quality and patient safety
35770149	Medical-related (Clinical learning)	Case control study	Hong Kong	Medical students	Co M	10.1016/j.heliyon.2022.e09751	Chatbot as alternative to bedside teaching for clinical history taking
35793132	Medical-related (Health awareness)	Cross-sectional study with questionnaire validation	China & Australia	College students of the School of Foreign Studies, Nantong University, China	Shan Y	10.2196/37933	Chatbot increased acceptance and engagement among Chinese female college students with regards of health-care issues.
35886584	Dentistry	Descriptive cross-sectional study	Spain	Fourth- and fifth-year dental students	Su6rez A	10.3390/ijerph19148735	Chatbot as virtual patient increases interaction and satisfaction among dentistry students
36301616	Medical-related (Vaccine)	Design science research	South Africa	University students	Okonkwo CW	10.2196/39157	Chatbot as tool to manage COVID-19 transmission control
36457086	Health sciences (Nursing)	Quasi-experimental study	South Korea	Junior students from a nursing college	Han JW	10.1186/s12909-022-03898-3	Chatbot increased interest in education and self-directed learning among nursing students
36457813	Medical-related (Psychiatry/ Psychology)	Mixed-method study (qualitative and quantitative methods)	Germany	Medical students	Moldt JA	10.1177/20552076221139092	Chatbot could assess the stress levels of medical students
36627845	Medical-related (Parasitology)	Descriptive study	South Korea	Medical students	Huh S	10.3352/jeehp.2023.20.1	Chatbot (ChatGPT) not yet comparable to medical student knowledge and interpretation
36704275	Medical-related (Learning method)	Mixed-method study (qualitative and quantitative methods)	Spain	Undergraduate and master's degree students in Health Sciences	S6iz-Manzanares MC	10.1016/j.heliyon.2023.e12843	Chatbot usage as self-regulated learning increased student's perceived satisfaction especially among post-graduate

36724004	Medical-related (Health awareness)	Mixed-method study (qualitative and quantitative methods)	US	Undergraduate student & graduate student	Biro J	10.2196/41017	Chatbot design have an impact on its effectiveness in providing health care information
36826206	Medical-related (Psychiatry/ Psychology)	Mixed-method study (qualitative and quantitative methods)	Czech Republic	Third semester of bachelor's degree, students in the field of information studies and Librarianship	Černá M	10.3390/ejihpe13020022	Chatbot without AI must follow specific guidelines to maintain student satisfaction
36855245	Medical-related (Learning method)	Mixed-method study (qualitative and quantitative methods)	Germany	Medical students	Moldt JA	10.1080/10872981.2023.2182659	Chatbot usage gains positive response among future physician but need to have structured approach on AI and data competencies in future
36901193	Medical-related (Learning method)	Controlled experimental design	Taiwan	Nursing students	Hsu MH	10.3390/ijerph20054185	Chatbot increased the effectiveness for medical terminology learning

**Table II : Summary Table of Included Studies (Review/ Commentary)**

PMID	Discipline	Type of article/ Study Design	Country	First Author	DOI	Study finding regarding Chatbot/ ChatGPT
32581935	Medical-related (Psychiatry/ Psychology)	Review	Netherlands	Dekker I	10.3389/psy.2020.01063	Chatbot is a digital form of therapy to address scalable solution of student mental health issue
36857593	Health sciences (Nursing)	Commentary	US	Seney V	10.1097/NNE.0000000000001383	ChatGPT is utilised to enhance clinical judgement in nursing education
36863937	Medical-related (Learning method/ medical education)	Commentary	Canada	Eysenbach G	10.2196/46885	ChatGPT has enormous potential for medical education, research, and practise
36916887	Medical-related (Learning method/ medical education)	Commentary	South Korea	Lee H	10.1002/ase.2270	ChatGPT has the potential to revolutionise medical education by changing the way students learn about biological sciences
36950398	Medical-related (Learning method/ medical education)	Commentary	Pakistan	Khan RA	10.12669/pjms.39.2.7653	ChatGPT can help with medical education, research, and clinical management, but it cannot fully replace human
37043716	Health sciences (Nursing)	Review	US	Sun GH	10.1097/NNE.0000000000001390	ChatGPT may change nursing education, but to ensure ethical and responsible use
37085182	Medical-related (Learning method/ medical education)	Commentary	Germany	Sedaghat S	10.7861/clinmed.2023-0078	ChatGPT performance equal to third-year medical students but may contain misinformation especially regarding anatomy and radiology content
37162219	Medical-related (Learning method/ medical education)	Commentary	China	Feng S	10.1097/ACM.0000000000005242	ChatGPT might transform medical education but cannot replace human competency
37215063	Medical-related (Health-care)	Mini Review	India	Dave T	10.3389/frai.2023.1169595	ChatGPT has a variety of prospective healthcare and medical applications

in effective communication skills, however, the paper reported the early phase of development, pending a significant outcome [43].

Chatbots as virtual dental patients increased interaction and satisfaction among dentistry students when interacting with an AI chatbot designed as a virtual patient, that could improve their diagnostic skills [44]. Another study demonstrated the effect of educational level and prior knowledge on the frequency of chatbot use, the learning results, and students' perceived satisfaction with self-regulated learning. The postgraduate students showed significant results as compared to undergraduate students [45]. However, chatbots without AI must follow specific guidelines to maintain student satisfaction. This is shown by a study to uncover design concepts for chatbots without AI that make educational interactions comfortable and rewarding for students. Students utilised chatbots to retrieve information and expected the chatbot to respond psychologically and communicatively like a person, that could understand and assist them for educational purposes [46]. Nevertheless, in some countries, chatbots are not yet popular. A majority of 98% of respondents never use chatbots for their work, despite their belief that social media may help bridge the gap between scientific advancement and its use in medicine [47].

### **Chatbots and Cognitive Ability**

Chatbots have the potential to facilitate memorisation concept in pharmacology and medical law. The study found that these two subjects could benefit from chatbots from the students' perspective by facilitating the memorisation of concepts for pharmacological formulations and medical laws [48]. Interestingly, chatbots (ChatGPT) are not yet comparable to medical student knowledge and interpretation. This is demonstrated by a study where medical students outperformed ChatGPT in parasitology examination. ChatGPT's accuracy in answering the exam question was unrelated to the items' knowledge level [32]. Chatbots were shown to improve exam performance for pulmonology, cardiology, and critical care medicine tests among medical students. Chatprogress, a chatbot-based game, increased medical students' test performance in the tests. On top of that, students expressed satisfaction with the chatbot-based game and requested more pedagogical feedback, even when they correctly answered the queries [49]. Another experiment demonstrated that chatbots increased the effectiveness of learning medical terminology. A controlled experiment was conducted to assess the effectiveness of Termbot, a chatbot designed for acquiring medical terminology. It enhanced the learning outcomes for students to learn medical terminology through an easy and fun approach to learning [50].

### **Chatbot in Medical and Health Sciences Education**

OpenAI's ChatGPT, a generative language model tool, has demonstrated enormous potential for medical education, research, and practise [51]. Medical students and academic personnel have seen the clear benefits of a customised chatbot tool for medical teaching during the COVID-19 pandemic. This pilot study explored the potential of chatbots in medical education but emphasised the limitations to ensure the effectiveness and suitability in medical student training [52].

Furthermore, ChatGPT has the potential to revolutionise medical education by changing the way students learn about biological sciences [53]. However, due to the present limitations of AI, ChatGPT can help with medical education, research, and clinical management, but it cannot fully replace human skill and expertise [54]. This is supported by another study, ChatGPT might transform medical education but cannot replace human competency. Personalised learning, information availability, and real-time clinical decision-making feedback might transform medical education. It helps students grasp complicated topics, increase critical thinking, and make educated clinical judgements. However, AI cannot replace human competence and hands-on training. AI biases must be addressed to prevent healthcare inequities. ChatGPT can help medical instructors create new and successful learning experiences for students [55].

ChatGPT might revolutionise education, but the users need to know the capabilities and limits to guarantee ethical and responsible use and prepare students for the changing technology landscape in nursing and healthcare [56]. In one study, medical students demonstrated a positive attitude towards the use of AI and chatbots in the medical field. However, they express concerns about data protection that may be deprived [57]. Academically, ChatGPT may convey harmful content, disinformation, and plagiarism. On the other hand, ChatGPT improves healthcare provider-patient interactions but struggles with complex topics like anatomy. It streamlines radiological reporting but may miss critical medical information or contain inaccuracies [58].

### **Chatbots in Clinical & Healthcare Settings**

Chatbots could be utilised as an alternative to bedside teaching for clinical history taking. This study demonstrated that the chatbot mobile application for teaching undergraduate medical students clinical history taking was equally successful as bedside teaching with real patients [59]. Chatbots also increased the acceptance and engagement of healthcare topics among Chinese female college students with regards to healthcare issues [60]. Another study suggested that COVID-19 transmission among university students can be managed by integrating chatbot technology

like COVID-Bot into the educational system. The chatbots deployment is utilised to check and verify their vaccination status, thus helping viral transmission control [61].

In nursing education, ChatGPT has been shown to improve clinical judgement. ChatGPT can clarify difficult topics, organise student time and assignments, develop patient situations, and practise NCLEX-style questions (National Council Licensure Examination). NCLEX is a standardised examination in the United States for nursing licences. Students are allowed to create more complicated situations that better reflect nursing care and clinical judgement [62].

The Intelligent Health Advice Bot (IHAB), a chatbot application, was developed to provide objective health and exercise advice. The findings suggest that this chatbot could improve health literacy, especially among students and young adults, through platform discussion [63]. Another piece of research implied that AI-based conversational agents like SafeBot could help nurses solve problems, manage staff and care delivery models, and ensure quality and patient safety [64].

Another study found that a chatbot's complexity of replies and persona credentials affect its health care information delivery. Technical language responses from chatbot replies were found to be effective and boost test results, while high health literacy groups are more likely to trust chatbots [65]. ChatGPT has several healthcare and medical applications. It can help with clinical diagnostics, medical updates, patient management, and contextually relevant replies. However, ChatGPT and other AI tools in medical writing create ethical and legal issues such as copyright infringement and transparency in AI-generated work [66].

#### **Chatbot in the Psychiatry or Psychology Field**

The study by Park et al., designed a chatbot-based motivational interview to help graduate students manage stress. Participants reported considerable perceived tension. Evocative queries and agent-generated affirmations were part of the conversational sequence. The study found that chatbots promote self-reflection in stress management conversations [67]. This is supported by another report that suggests integrated psychological AI chatbots can be a scalable solution to student mental health difficulties [68]. Another study augmented this finding through Atena, a psychoeducational chatbot. Students were exposed to Atena, which provides cognitive behavioural therapy, positive psychology, and mindfulness-based healthy coping skills twice a month. The study showed that the Atena chatbot could help university students cope with stress [69].

Bibliotherapy is a form of therapy in which books and

reading materials are used as a therapeutic intervention for psychological or emotional issues. In this study, one group of patients received psychological treatment by reading literature as a prescription (bibliotherapy), while another group was exposed to chatbot therapy. The study found that the chatbot test group had significantly lower depression (PHQ-9) and anxiety (GAD-7) levels than the bibliotherapy group [70]. On top of this, another experiment employed the Perceived Stress Questionnaire (PSQ20) and qualitative chatbot analysis and found that chatbots (Melinda) can accurately detect medical students' stress levels in daily conversations [71].

#### **DISCUSSION**

This study conducted a comprehensive analysis of the utilisation of chatbots, namely ChatGPT, in the context of medical and health sciences education. The primary objective was to get a deeper understanding of the current and potential future uses of chatbots in order to enhance the field of medical education. Several chatbot systems are now being examined in limited, localised investigations, many of which are either pilot studies or involve individuals who are in good health. These findings suggest that the technology is still in its first phases of advancement and deployment [43, 69]. The aforementioned research suggest that the utilisation of chatbot technology in the medical domain, particularly for pre-clinical individuals, is now in its nascent stages of advancement. The utilisation of chatbots for the purpose of augmenting learning outcomes across many contexts has demonstrated that chatbots represent an innovative technology in the early stages of development. There is a scarcity of published research pertaining to pre-clinical subjects, particularly in the fields of physiology, anatomy, and pharmacology. Numerous studies have demonstrated the use of chatbots in enhancing cognitive performance, fostering engagement, promoting self-assurance, and mitigating stress. Nevertheless, the methodologies employed in this study and the relatively small sample size restrict its generalizability.

The proclamation places significant focus on the integration of chatbots within the realm of education. According to a study conducted by researchers, it has been suggested that the use of chatbots has the potential to enhance students' self-directed learning [42], as well as foster increased interest [72] and engagement [69] among them. In a separate experiment, chatbots utilising artificial intelligence were employed to enhance the self-assurance of medical students in relation to their understanding of anatomy. The usefulness of a voice chatbot learning system in enhancing nursing undergraduates' self-efficacy and confidence in efficient communication has shown promise; however, conclusive findings are still pending.

A virtual patient AI chatbots boosted dental students'



diagnostic abilities and happiness. Postgraduate students had better chatbot use, learning results, and satisfaction than undergraduates. To ensure student pleasure and comfort during educational exchanges, chatbots without AI should follow specified rules.

Chatbots affect cognition. It may aid in pharmacology and medical law memory. Medical students outscored ChatGPT in parasitology exams, suggesting that the AI system is still inferior to human knowledge and interpretation. However, chatbots increase medical student test performance in pulmonology, cardiology, and critical care medicine. In a controlled trial, they improved medical terminology learning and acquisition. OpenAI's ChatGPT shows promise for medical education, research, and practise. During the COVID-19 pandemic, it can customise medical teaching tools. ChatGPT improves personalised learning, information availability, and clinical decision-making in medical education, but technology cannot replace human competence and hands-on training. Addressing AI biases, protecting data, and avoiding damaging material and plagiarism are ethical issues.

Chatbots have been tested as alternatives to bedside instruction for clinical history collection. Acceptance, involvement, and healthcare management have improved. Nursing students and young people have utilised chatbots to improve clinical judgement and health advice. They can also help nurses with problem-solving, staff and care delivery models, and patient safety.

Chatbots help graduate students handle stress in psychiatry and psychology. They aid self-reflection and psychoeducation. Unlike bibliotherapy, chatbot therapy reduces sadness and anxiety. Chatbots have also helped medical students manage stress.

The statement summarises chatbot technology's rapid expansion and varied medicinal uses. While highlighting chatbot benefits, limits and ethical concerns are also noted, emphasising the need for more study and responsible application.

## CONCLUSION

While the research analysed shows that chatbot technology has the potential to improve medical and health sciences education, it is crucial to note that the technology is still in its early phases of development and deployment. Many of the studies examined were pilot studies with small sample sizes, limiting the generalizability of the findings. More study is needed to fully understand the possibilities and limits of chatbot technology in various educational environments.

In conclusion, chatbot technology or ChatGPT, has the potential to improve medical education, teaching,

and learning outcomes. It has the potential to engage students, improve clinical decision-making, and boost mental wellness. To fully realise the benefits of chatbot technology in medical and health sciences education, appropriate deployment, resolving ethical problems, and more research are required.

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