Current Status of ChatGPT Utilization in Medical Education: Potentials, Challenges and Strategies

Tianhui Xu, Huiting Weng, Fang Liu, Li Yang, Yuanyuan Luo, Ziwei Ding, Qin Wang

Table of Contents

Current Status of ChatGPT Utilization in Medical Education: Potentials, Challenges and Strategies

Tianhui Xu[1] MSN, RN; Huiting Weng[2] MSN, RN; Fang Liu[2] RN, MSN, PhD; Li Yang[2] MSN, RN; Yuanyuan Luo[1] MSN, RN; Ziwei Ding[1] MSN, RN; Qin Wang[3] MSN, RN, Dr

[1]The Second Xiangya Hospital Central South University Xiangya Nursing School of Central South University Changsha CN
[2]The Second Xiangya Hospital Central South University Changsha CN
[3]Clinical Nursing Teaching and Research Section The Second Xiangya Hospital Central South University Changsha CN

Corresponding Author:
Qin Wang MSN, RN, Dr
Clinical Nursing Teaching and Research Section
The Second Xiangya Hospital Central South University
139 Middle Renmin Road Changsha, 410011, China
Changsha
CN

Abstract

ChatGPT, a Generative Pre-trained Transformer, has garnered global attention and sparked discussions since its introduction in early 2023. However, it has stirred controversy within the realms of medical education and scientific research. This paper focuses on exploring the potentials, challenges, and corresponding strategies associated with ChatGPT. ChatGPT offers personalized learning support to medical students through its robust natural language generation capabilities, enabling it to furnish answers. Moreover, it has demonstrated significant utility in simulating clinical scenarios, facilitating teaching and learning processes, and revitalizing medical education. Nevertheless, a myriad of challenges accompany these advancements. In the realm of education, it is imperative to prevent excessive reliance on ChatGPT and combat academic plagiarism. Similarly, in the medical domain, ensuring the timeliness, accuracy, and credibility of ChatGPT-generated content is crucial. Concurrently, ethical challenges and concerns regarding information security arise. In light of these challenges, this paper proposes targeted strategies. Firstly, mitigate the risk of over-reliance on ChatGPT and academic plagiarism through ideological education, fostering comprehensive competencies, and implementing diverse evaluation criteria. Embracing modern educational approaches alongside ChatGPT enhances the overall quality of medical education. Enhance the professionalism and reliability of the generated content by implementing measures such as optimizing ChatGPT's training data professionally and enhancing the transparency of the generation process. This ensures that the generated content aligns with the most recent standards of medical practice. Furthermore, enhancing value alignment and establishing relevant laws or codes of practice address ethical concerns, including algorithmic discrimination, medical responsibility allocation, privacy, and security. In conclusion, while ChatGPT presents significant potential in medical education, it also encounters various challenges. Through comprehensive research and the implementation of suitable strategies, it is anticipated that ChatGPT's positive impact on medical education will be harnessed, laying the groundwork for advancing the discipline and fostering the development of high-caliber medical professionals.

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v

Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Original Manuscript

Current Status of ChatGPT Utilization in Medical Education: Potentials, Challenges and Strategies

Abstract

ChatGPT, a Generative Pre-trained Transformer, has garnered global attention and sparked discussions since its introduction in early 2023. However, it has generated controversy within the realms of medical education and scientific research. This paper examines the potential applications, limitations, and strategies for utilizing ChatGPT. ChatGPT offers personalized learning support to medical students through its robust natural language generation capabilities, enabling it to furnish answers. Moreover, it has demonstrated significant utility in simulating clinical scenarios, facilitating teaching and learning processes, and revitalizing medical education. Nonetheless, numerous challenges accompany these advancements. In the context of education, it is of paramount importance to prevent an excessive reliance on ChatGPT and combat academic plagiarism. Likewise, in the field of medicine, it is vital to guarantee the timeliness, accuracy, and reliability of content generated by ChatGPT. Concurrently, ethical challenges and concerns regarding information security arise. In light of these challenges, this paper proposes targeted strategies for addressing them. Firstly, the risk of over-reliance on ChatGPT and academic plagiarism must be mitigated through ideological education, fostering comprehensive competencies, and implementing diverse evaluation criteria. The integration of contemporary pedagogical methodologies in conjunction with the utilization of ChatGPT serves to enhance the overall quality of medical education. To enhance the professionalism and reliability of the generated content, it is recommended that measures be implemented to optimize ChatGPT's training data professionally and enhance the transparency of the generation process. This ensures that the generated content is aligned with the most recent standards of medical practice. Moreover, the enhancement of value alignment and the establishment of pertinent legislation or codes of practice address ethical concerns, including those pertaining to algorithmic discrimination, the allocation of medical responsibility, privacy, and security. In conclusion, while ChatGPT presents significant potential in medical education, it also encounters various challenges. Through comprehensive research and the implementation of suitable strategies, it is anticipated that ChatGPT's positive impact on medical education will be harnessed, laying the groundwork for advancing the discipline and fostering the development of high-caliber medical professionals.

1 Introduction

Artificial intelligence (AI) is the simulation of human cognitive capacities using computer programming, allowing robots to emulate human thought and behavior[1]. AI generation is the automated creation of various content formats, such as text, photos, video, and audio, using AI technologies. This approach generates content using language, visuals, and multimodal macro models[2]. Among these technologies, ChatGPT stands out as a sophisticated, large-scale language model developed by OpenAI, which has reached stage 4.0, the most recent iteration of the OpenAI system. ChatGPT, which has been trained on large amounts of textual data, is designed to participate in conversational exchanges with users while responding contextually to their prompts[3]. Particularly, ChatGPT has advanced capabilities in natural language processing, logical reasoning, task execution, information retrieval, picture analysis, content development, and other areas[4]. Moreover, ChatGPT provides a vast range of services accessible through global registration, facilitating its integration across various domains.

In the field of education, the introduction of ChatGPT has generated considerable interest and prompted in-depth discussions. Its exceptional generating capabilities offer new avenues for scholarly research, increased learning, classroom improvement, and knowledge sharing[5]. The

incorporation of ChatGPT into medical education has become a major focus, with the goal of combining the advancements of education and medicine. In order to provide a well-informed assessment of the potential and limitations of integrating ChatGPT into medical education, this research aims to examine both the technology's capabilities and the challenges it may present. Furthermore, tactics are put out to support the smooth integration of technology and medicine.

2 Status of ChatGPT in medical education

In this study, we searched the Web of Science (WOS) database using specific terms related to ChatGPT and education or medical science within the timeframe of January 2022 to December 2024. The search formula is ("Chat Generative Pre-trained Transformer" OR "chat GPT" OR ChatGPT OR chat- GPT OR GPT-3.5 OR GPT-4.0") AND (Education OR educate OR educator OR Students, Medical OR medical science OR medicine OR healthcare OR health science). We utilized CiteSpace v6.1R6 (64-bit) Basic to analyze the posted keywords[6]. The basic parameters employed in CiteSpace were configured as follows: the time partition ranged from January 2022 to December 2024, with a one-time slice; the node selection criterion was set to k=25 for the g-index in each time slice, while the remaining parameters were kept at default settings. The top seven keywords, ranked by frequency in the keyword network , are identified as follows: natural language processing, impact, academic integrity, artificial intelligence in medicine, writing, health literacy, and healthcare professionals(Figure 1). And the top ten countries by publication volume are USA, India, China, Australia, England, Germany, Canada, Italy, Spain and United Arab Emirates(Figure 2).

In the following section, we will analysis the impact of ChatGPT and focus on its advantages, disadvantages and coping strategies in the areas of education, academics, clinical decision-making and health education.

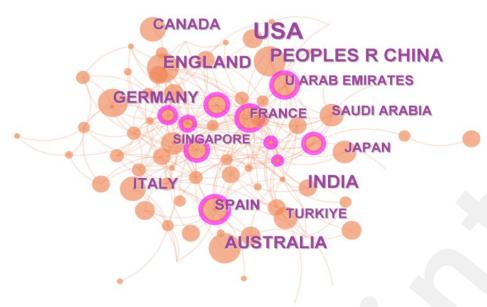Figure 1. Keywords of ChatGPT in the medicine and education.

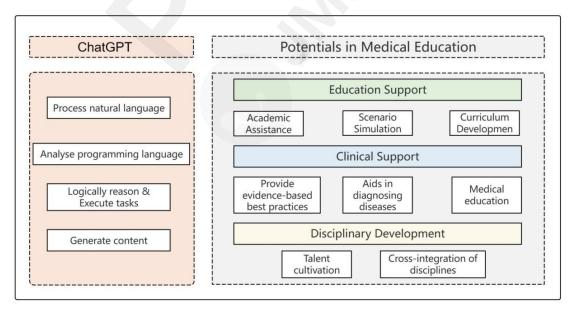Figure 2. National publications of ChatGPT in the medicine and education.

3Potentials

Figure 3. Functions of ChatGPT and the potential of medical education.

3.1 Education Support

3.1.1 Academic Assistance

ChatGPT excels in both language understanding and content generation. It relies on semantic understanding and reasoning to decipher user intent through interactive dialog. In addition, by applying deep learning techniques, ChatGPT efficiently retrieves information from a variety of sources to provide consumers with reliable answers[7]. As a result, ChatGPT emerges as an invaluable resource for medical students, especially in helping them understand complex ideas.ChatGPT improves topic understanding by providing examples and conducting text analyses[8]. Furthermore, ChatGPT serves an important role in alleviating academic difficulty among medical students[9]. With its ability to produce and answer questions as well as assist with revision tasks, ChatGPT can help medical students complete coursework, assess the quality of their coursework, and reinforce previously learned concepts[10]. Serving as a personalized tutor, it develops customized learning programs and time management strategies based on individual interests and learning preferences[11]. Additionally, renowned for its prowess in research and writing, ChatGPT contributes significantly to academic endeavors[12]. On one hand, it assists students in comprehensively exploring research literature, gaining a preliminary understanding of current research trends[13]. On the other hand, ChatGPT aids in structuring thesis frameworks and generating writing prompts, while also offering grammar and spelling checks to enhance writing proficiency and quality[14].

3.1.2 Scenario Simulation

ChatGPT has superior interactive features that allow it to replicate clinical settings for medical students through situational simulation and role-playing[15]. This functionality assists medical students transition from a theoretical to a clinical attitude. Furthermore, ChatGPT provides a potential to faithfully mimic clinical circumstances while dynamically adapting to changes in patients' conditions[16]. This function lets students to gain practical experience managing unexpected medical problems in simulated contexts, thereby improving their preparedness and psychological fortitude.

3.1.3 Curriculum Development

ChatGPT is crucial in educational curriculum development since it helps teachers enhance their logical thinking and task performance skills[17]. It assists teachers create lesson plans, course handouts, and lesson plan content, which accelerates curriculum development[13]. For example, I asked ChatGPT to create a teaching plan on pressure ulcer care, and the resulting content is presented in Figure 2. Upon assessing the information, it is obvious that ChatGPT could generate core teaching plan content. However, teachers must supplement with more precise and detailed knowledge points, as well as validate the created information.

Furthermore, ChatGPT promotes innovation in teaching approaches by enabling scenario-based learning, role-playing, and the integration of diverse educational resources[18]. Recognizing the value of continuous pedagogical innovation, teachers are encouraged to apply the capabilities of artificial intelligence, such as ChatGPT, alongside traditional teaching methods[19]. This integration allows for constant advancement in teaching approaches, which improves the effectiveness of teaching practices and enables educators fulfill their instructional responsibilities more efficiently.

⚙ ChatGPT
Pressure Ulcer Care Teaching Plan

Teaching Objectives:

1. Understand the definition, classification, and pathogenesis of pressure ulcers.
2. Master the prevention measures and assessment methods of pressure ulcers.
3. Understand the principles of treatment and nursing methods for pressure ulcers.
4. Cultivate students' comprehensive abilities in pressure ulcer care, including teamwork and communication skills.

Teaching Challenges:

1. Understanding the pathogenesis and grading system of pressure ulcers.
2. Details and practical operations of pressure ulcer prevention measures.
3. Understanding treatment methods and nursing techniques for pressure ulcers of different grades.

Teaching Focus:

1. Prevention measures and assessment methods of pressure ulcers.
2. Principles of treatment and nursing methods for pressure ulcers.
3. Case analysis and practical exercises.

Teaching Process:

Part One: Theoretical Explanation

1. **Definition and Classification of Pressure Ulcers**:
   * Explain the definition of pressure ulcers, introduce common grading systems (such as Braden or NPUAP classifications), and describe the characteristics and pathophysiological changes of pressure ulcers at different levels.
   * Provide examples to illustrate the clinical manifestations and prognosis of pressure ulcers of different grades.
2. **Pathogenesis of Pressure Ulcers**:
   * Explain the main mechanisms of pressure ulcer formation, including poor blood circulation caused by sustained pressure, tissue hypoxia, and cellular damage.
   * Discuss the occurrence mechanisms of pressure ulcers in different situations through case analysis.
3. **Prevention Measures for Pressure Ulcers**:
   * Provide a detailed introduction to prevention measures for pressure ulcers, including regular repositioning, maintaining skin cleanliness and dryness, adequate nutrition and fluid intake, and the use of appropriate mattresses and supports.
   * Analyze actual cases to discuss how to develop effective prevention measures for different patient situations.

Part Two: Practical Operations

1. **Assessment Methods for Pressure Ulcers**:
   * Demonstrate how to assess pressure ulcers, including observing the location, size, depth, color, and surrounding tissue status.
   * Students work in groups to practice assessment and recording of simulated pressure ulcers.
2. **Principles of Pressure Ulcer Treatment**:
   * Demonstrate the treatment principles for pressure ulcers of different grades, including local cleansing and moist wound healing, pressure ulcer dressing, surgical treatment, etc.
   * Conduct group exercises to simulate the nursing process of pressure ulcers, including wound cleaning, dressing changes, etc.

Part Three: Case Discussion and Summary

1. **Case Analysis**:
   * Provide real cases for students to analyze and discuss prevention, assessment, and treatment strategies for pressure ulcers based on the knowledge learned.
   * Guide students to think and discuss the advantages, disadvantages, and possible implementation difficulties of different strategies.
2. **Conclusion and Reflection**:
   * Summarize the key points of this class, emphasizing the importance and comprehensiveness of pressure ulcer care.
   * Encourage students to reflect on their learning and provide questions and suggestions.

Teaching Evaluation:

1. Classroom Q&A: Assess students' mastery of pressure ulcer care knowledge through questioning.
2. Practical Operation Assessment: Evaluate students' practical operations, including the accuracy and standardization of pressure ulcer assessment and treatment operations.
3. Case Analysis Report: Require students to submit case analysis reports in groups, evaluating their comprehensive analysis and problem-solving abilities.

Figure 4. Lesson plan for pressure ulcer care.

3.2 Clinical Support

ChatGPT plays a pivotal role in clinical support, standardizing procedures, aiding in disease diagnosis, and delivering health education. In terms of literature search and operational procedures, ChatGPT is capable of accessing the most recent literature and clinical guidelines[20]. This capability enables the provision of evidence-based best practices to healthcare professionals, facilitating the identification of current operational procedures and the enhancement of operational protocols[21]. Regarding disease diagnosis, ChatGPT can analyze patient data and test results, assisting doctors in diagnosing conditions and offering treatment recommendations[22]. Additionally,

it supports healthcare professionals in telemedicine by engaging in real-time communication with patients and providing remote diagnosis and treatment suggestions[23]. Moreover, ChatGPT serves as a valuable tool for patient health education. It can translate health education materials into multiple languages and deliver personalized health education using straightforward language, thereby aiding patients in understanding condition guidance and adopting healthier lifestyles[24].

Overall, ChatGPT enhances medical education by integrating essential functionalities into clinical support through standardized processes, aiding in disease diagnosis, and delivering health education[25]. This not only empowers healthcare professionals to provide medical services more efficiently but also provides students with a comprehensive and enriching learning experience, fostering the growth of medical professionals with practical skills and professional competence.

3.3 Disciplinary Development

The integration of artificial intelligence (AI) and medicine represents a future frontier, characterized by the convergence of technological innovation and advancements in medical care[26]. This cross-disciplinary collaboration not only promotes technical advancement, but also drives medical treatment to better intelligence and efficiency. Furthermore, it promotes the development of comprehensive capabilities in academic institutions who can navigate the junction of medicine and technology. In the future, coordinated activities in medical and technical domains have the potential to expedite technological innovation and move the field of medicine forward. This collaboration promises to usher in a new era of healthcare marked by innovation and efficiency, efficiently meeting society's changing health needs[27]. ChatGPT advances medical education by enabling interdisciplinary collaboration and encouraging innovation at the confluence of medicine and technology.

4 Challenges

4.1 Learning Dependency and Uneven Education

While ChatGPT can serve as a valuable learning aid by providing answers, assisting in understanding complex concepts, and offering personalized tutoring, excessive reliance on it can yield detrimental consequences in the long term[10]. Overdependence on ChatGPT may result in the erosion of critical thinking skills, creativity, and self-directed learning capabilities. The ease of obtaining answers quickly through ChatGPT may foster complacency among students, discouraging them from engaging in reflective problem-solving[28]. To mitigate this issue, students should proactively disclose which parts of their work were aided by ChatGPT, allowing teachers to assess the overall quality of assignments more accurately[10]. Failure to do so may lead to the perpetuation of an "information cocoon," wherein students are only exposed to solutions that align with their existing preferences, hindering the exploration of diverse perspectives. Furthermore, the widespread adoption of ChatGPT may exacerbate educational inequalities. Developing and underdeveloped countries may lack the necessary technological infrastructure and resources to fully leverage ChatGPT, widening the educational gap between these regions and more developed countries[29]. Hence, it is crucial to address these challenges to ensure equitable access to educational resources and opportunities worldwide.

4.2 Copying and Plagiarism

When tackling assignments or final papers, students often seek to leverage technology to address challenges, enhance content, and elevate the overall quality of their work. ChatGPT, with its exceptional interactive capabilities and vast knowledge base, offers students the opportunity to obtain

answers, prepare for exams, outline papers, and even complete them through interactive dialogue[29]. However, such practices are commonly perceived as copying answers and plagiarism, thereby contravening the fundamental principles of scientific research and academic integrity [30]. Moreover, ChatGPT encounters issues related to the fabrication of reference citations, as it may generate citations without verifiable sources, making it difficult for users to locate the original literature on academic platforms[31]. This inability to access and verify the sources provided by ChatGPT poses significant obstacles to maintaining academic integrity and conducting rigorous scholarly research[32].

It is noteworthy that Som Biswas, a radiologist in the United States, has authored 16 papers with ChatGPT, resulting in the publication of six articles across four journals[33-38]. Nevertheless, a thorough examination of the content by experts in the field has revealed significant inaccuracies, with all references found to be fictitious[39]. Nature editors stated that, while ChatGPT cannot be held accountable for the content and integrity of scientific studies, its contributions can be recognized[40]. Similarly, scientific journal editors claimed that utilizing ChatGPT-generated content without adequate citations may be considered plagiarism, while contributions to ChatGPT might be acknowledged in the acknowledgments section[40]. Therefore, there is an urgent need to develop clearer criteria for distinguishing between authorized use and plagiarism when using ChatGPT assistance in academic research.

4.3 Insufficient Factualness, Timeliness, and Interpretability

ChatGPT's credibility is not absolute, as it grapples with issues such as illusion, poor timeliness, and interpretability, akin to other large language models[41]. Despite its impressive performance, ChatGPT has been known to generate convincing yet erroneous information, undermining its reliability, particularly in the healthcare domain. Furthermore, because its training data is only up to January 2022, its conclusions may not always be up to date[12]. Furthermore, ChatGPT lacks specialist medical knowledge and may struggle to understand complicated illness relationships [42]. Its algorithms function as a black box, providing findings without divulging the underlying mechanism, creating ambiguity about their applicability for healthcare applications[43]. While doctors may leverage ChatGPT for disease diagnosis to enhance clinical accuracy, the absence of evidence supporting diagnosis and treatment may leave patients questioning the reliability of the results.

4.4 Ethical Issues

While ChatGPT has the potential to revolutionize medical education, it also raises a number of ethical concerns. It is of the utmost importance to address issues such as algorithmic discrimination, the allocation of responsibility for medical malpractice involving ChatGPT, and the safeguarding of data privacy and security[44, 45].

ChatGPT displays algorithmic biases, including gender stereotypes, racial discrimination, and cultural insensitivity[46]. These biases not only undermine the model's accuracy, fairness, and reliability, but they also perpetuate disparities in clinical healthcare[29]. Furthermore, ChatGPT's inadequacies, such as inadequate timeliness, interpretability, and accuracy, increase the risk of incorrect clinical diagnoses, treatment protocols, and the transmission of incorrect information, risking patient care[47]. Furthermore, safeguarding patient privacy is critical in the therapeutic arena,

mandating strict safeguards for sensitive patient data. Given that ChatGPT may share information, there may be a possibility of privacy breaches, as patient data is temporarily stored on OpenAI's servers[48]. This raises concerns regarding the potential leaking of patients' private information, such as personal details, medical conditions, and examination results, while using ChatGPT for assisted diagnosis, treatment, and health education[49]. Hence, there is an urgent need to establish practical ethical norms to harness the value of ChatGPT while ensuring alignment with scientific and technological advancements and societal development goals. These norms should address concerns related to algorithmic biases, data privacy, accuracy, and accountability to foster responsible and ethical utilization of ChatGPT in healthcare and other domains[50].

4.5 Undermining Communication and Trust

Currently, research on the applications of ChatGPT for clinical communication and health education is limited, and the outcomes are not substantial[51]. Healthcare professionals humanistic care qualities, as well as the emotional rapport they build with patients, are critical components of disease treatment[49]. While ChatGPT can aid in accomplishing clinical tasks, it lacks emotion, empathy, and the capacity to perceive patient emotions. Therefore, healthcare professionals cannot depend on ChatGPT for communication and health education with patients[52]. This necessitates healthcare professionals integrating emotional value into patient interactions, fostering a more holistic approach to care, and combining the rationality of artificial intelligence with the empathetic senses of healthcare providers. By striking a balance between technological assistance and human compassion, healthcare professionals can cultivate a patient-centric environment that addresses both medical needs and emotional well-being.

5 Strategies

Table 1 summarizes the challenges and strategies of ChatGPT.

Table 1 The challenges and strategies of ChatGPT.

Challenges	Strategies	Feasible plans
	Delineate the relationship between individuals and ChatGPT	ChatGPT serves as a useful tool to aid us
Learning Dependency and Uneven Education	Apprise the limitations of ChatGPT	Adopt an objective and cautious stance
	Optimize curriculum design	Integrate ChatGPT into medicalcurriculum；Optimize methods for assessing assignments and grades
	Guide proper utilization	Address the basic principles and ethical boundaries, enhance awareness of academic ethics and integrity
Copying and Plagiarism	Evaluate and review the content	Develop specialized software or employ fake text detection technology
	Develop guidelines and regulatory mechanisms	Formulate guidelines and management mechanism
Insufficient Factualness, Timeliness, and Interpretability	Enhance and tailor training methodologies	Large-scale training and employ transfer learning
	Improve accuracy	Fine-tuning and reinforcement learning
	Improve transparency and interpretability	Establish visual interfaces, output human-machine interaction code, and employing XAI techniques
Ethical Issues Algorithmic discrimination	Address algorithmic discrimination	Large-scale training, XAI and quality improvement

Responsibility allocation	Assign responsibility	Review content , involve healthcare professionals in decision-making, and ensure patients' right
Safeguarding data privacy and security	Protecting personal privacy and information data	Conceal original motives, implement manual review mechanisms, data encryption 、anonymization and establish guidelines, ethical frameworks, and institutional norms
Undermine communication and trust	Humanistic care and emotional Support from healthcare professionals	Provide emotional support and humanistic care
	Teacher's quality education	Implement student-centered education and cultivate excellent qualities

5.1 Prevention of Over-dependence

·Delineate the relationship between individuals and ChatGPT

Humans remain the primary agents in social activities, with ChatGPT serving as a useful tool to aid them[53]. While students may utilize the answers and suggestions provided by ChatGPT, it is crucial that they engage in critical thinking and judgment to arrive at their conclusions[54].

·Apprise the limitations of ChatGPT[30]

Despite students' optimism towards ChatGPT[55], educators must underscore that it is not a panacea and guide students to adopt an objective and cautious stance. Educators can focus on nurturing students' independent thinking, creative problem-solving abilities, and information literacy skills. This includes cultivating habits of reading and lifelong learning, fostering critical thinking and effective communication, and enhancing independent problem-solving skills[21]. The ultimate goal is to empower students to transition from mere questioners to creators and decision-makers[56].

·Optimize curriculum design

This can include introducing a teacher-student-machine interaction paradigm for instruction, giving courses on artificial intelligence, and experimenting with new assignment forms and evaluation methodologies[57].

1. Integrating ChatGPT into the Medical Curriculum. Problem-Based Learning (PBL) allows students to analyze clinical problems, encouraging proactive thinking and comparing their own ideas to those generated by ChatGPT[58]. This comparison encourages students to reflect on the strengths and limitations of both human-generated and AI-generated solutions, fostering a deeper understanding of clinical reasoning and decision-making processes. In addition to integrating ChatGPT with PBL, it can also be combined with other instructional methods such as CBL, TBL, group meetings, etc[59]. By employing diverse teaching modalities, critical thinking and innovative thinking among students can be nurtured.

2. Update the methods for assessing assignments and grades. Educators might replace typical writing tasks with presentation reports, oral debates, group discussions, and peer reviews[17]. Encouraging students to preserve transcripts of their interactions using ChatGPT can also help[31]. Rather than relying on ChatGPT for direct responses, emphasizing knowledge and competency allows students to interact more deeply and think critically.

5.2 Academic Integrity

·Guide Proper Utilization

ChatGPT has distinct advantages, and it is critical not to restrict students from utilizing it totally, but rather to guide them to use rightly[60]. Thus, improving the quality of student learning is critical. In terms of educational orientation, teachers ought to lead students toward developing appropriate

values about science and technology. Prioritizing education on academic integrity is crucial, with a focus on reiterating the basic principles and ethical boundaries of scientific research, enhancing awareness of academic ethics and integrity, and deepening reverence for science. In addition, organizations and institutions can conduct academic integrity seminars to educate individuals about the ethical use of ChatGPT[57]. Educators should also educate students about the consequences and repercussions of violating research integrity.

·Evaluate and review the content

The text produced by ChatGPT should be evaluated and reviewed to ensure academic accuracy and integrity[61]. Developing specialized software or using fake text detection technologies created particularly to recognize text generated by ChatGPT can help detect whether communication contains faked or nonsensical text[62]. To ensure that the answers are correct, they must be approached with reasonable skepticism and verified for accuracy. It is also vital to clearly identify which pieces came from ChatGPT. For example, using plagiarism detection software allows students to ensure that the information generated by ChatGPT does not infringe on other people's academic work, lowering the danger of plagiarism and ensuring the accuracy and authenticity of referenced references[63].

· Develop guidelines and regulatory mechanisms

Stakeholders can collaborate to create relevant recommendations for the standardized use of ChatGPT[64]. Simultaneously, implementing a corresponding management system can enhance the management approach by providing training, education, assessment, review, feedback, and improvement activities to ensure the ethical use of ChatGPT[65].

5.3 Model Enhancement

·Enhance and tailor training methodologies

While ChatGPT boasts significant power, its susceptibility to hallucination poses a challenge to its credibility. However, effective mitigation of this issue and refinement of its specialization could unlock limitless potential in the medical domain[66]. Using regular input of data into the model or employing transfer learning can effectively augment a vast, diverse, accurate, and high-quality training dataset, thereby enhancing the performance of ChatGPT[67].

·Improve accuracy

Through fine-tuning or reinforcement learning, the process of continuously incorporating user feedback, collecting and analyzing suggestions, and re-integrating ChatGPT resources is achieved to sustainably improve ChatGPT performance[62]. Collecting feedback on ChatGPT responses allows for iterative adjustments and enhancements to the model's accuracy[68]. Timely updates of data, especially for time-sensitive matters, facilitate a more accurate understanding of queries and the generation of relevant answers. For instance, regular updates on clinical data, research findings, expert consensus, and medical guidelines can effectively inform clinical practice.

·Improve transparency and interpretability

ChatGPT's transparency can be improved by creating visual interfaces, generating human-machine interaction code, and using Explainable Artificial Intelligence (XAI) techniques[8]. Increased openness builds confidence between humans and robots. Not only does it help medical workers understand the model's decision-making process, but it also allows for improved evaluation

and interpretation of generated outcomes, lowering the risk of medical errors[69]. Incorporating transparency measures is thus critical for increasing ChatGPT's utility in medical settings.

5.4 Emphasizing Ethical Issues

Value alignment is a contentious subject in ChatGPT, with the goal of aligning its capabilities and actions with human objectives, ethical standards, and values in order to promote safety and confidence in human-ChatGPT cooperation. The top three ethical concerns related to ChatGPT include algorithmic discrimination, medical liability allocation, and privacy and security difficulties[49].

·Address algorithmic discrimination

To address algorithmic bias, on one hand, incorporating diverse and balanced samples for large-scale training can enhance ChatGPT's fairness awareness[70]. On the other hand, utilizing XAI can help identify biased patterns in ChatGPT while implementing fair models[8]. Furthermore, continuous review and quality improvement can minimize gender and racial discrimination in the healthcare sector to the greatest extent possible[44].

·Assign responsibility

Clear responsibility allocation is paramount when collaborating with ChatGPT for clinical disease diagnosis and health education. In other words, ensuring the maximum safety in the clinical use of ChatGPT requires explicit delineation of responsibilities. Healthcare professionals utilizing ChatGPT for decision support should actively engage in its decision-making process and critically assess its recommendations. Collaboration between healthcare professionals and ChatGPT can enhance decision-making accuracy[71]. Patients' right to information should be upheld. Organizations and institutions must ensure ChatGPT's responsible participation in treatment and adherence to ethical standards[72].

·Protecting personal privacy and information data

Measures such as analogously asking ChatGPT questions to conceal original motives, implementing manual review mechanisms for uploaded information, data encryption and anonymization can mitigate privacy risks[73]. Compliance with privacy laws and regulations is essential to secure patient privacy and medical information, ensuring data handling and storage integrity[43]. Establishing clear guidelines, ethical frameworks, and institutional norms for data collection, storage, and use is crucial[66].

5.5 Irreplaceability of Medical Personnel and Educators

· Humanistic Care and Emotional Support from Healthcare Professionals

While ChatGPT has the potential to enhance access to primary healthcare in underdeveloped regions and streamline repetitive tasks for medical staff, it cannot be considered a substitute for healthcare professionals in any capacity[13]. ChatGPT is devoid of the attributes that are typically associated with independent consciousness, ethical standards, emotional empathy, and the capacity to anticipate unforeseen circumstances. The interpersonal communication between healthcare professionals and patients, as well as the emotional support and humanistic care that are provided in person, cannot be replicated by ChatGPT[74]. Furthermore, medical professionals provide invaluable empirical assistance and support to patients based on their clinical experience, which enhances the quality of clinical services. This is a capability that ChatGPT does not possess[74]. Consequently,

ChatGPT should be regarded as a valuable adjunct to the work of medical personnel in clinical settings, rather than as a replacement for human healthcare providers.

·Teacher's Quality Education

Education fosters individual growth, community advancement, and the continuation of human civilization. While ChatGPT has effectively helped to progress education by equalizing and enriching instructional resources, it is still only a tool for teachers, not a replacement[75]. Teachers have distinct powers that ChatGPT lacks. They practice student-centered teaching and help kids develop moral qualities and abilities like ideals, beliefs, values, critical thinking, emotional intelligence, and creativity. Furthermore, people are naturally social animals that require interpersonal interactions to thrive and find spiritual fulfillment.

In conclusion, despite the benefits of ChatGPT, technology cannot replace humans in healthcare and education. Our individual features and capacities allow us to maintain social value in an era of rapid developments in artificial intelligence.

6 Conclusion

ChatGPT has demonstrated considerable potential in medical education, but it has also introduced a number of thought-provoking difficulties. As ChatGPT advances, it may present new obstacles and opportunities. On a worldwide basis, cultural diversity is under peril. ChatGPT disseminates information based on the training data it gets, making well-known and popular information more easily shared and transferred. However, this has the tendency to marginalize niche or local cultures and languages, hence reducing cultural variety.Roles in the healthcare sector may change. The increased implementation of automation and intelligent technologies may result in the displacement of positions such as primary diagnostic personnel and imaging diagnostics. But this might also open up new career paths for professionals with expertise in medical AI and information management. Promoting AI technology development in developing nations can help advance fields like the creation of diagnostic software.

It is imperative that we approach ChatGPT with caution and subject it to critical evaluation, weighing its benefits against its drawbacks. This paper presents a dialectical examination of the current state of ChatGPT application in medical education, conducting an in-depth analysis of its advantages and the dilemmas it presents. Additionally, targeted strategies are proposed to address these challenges effectively. The ultimate aim is to standardize and rationalize ChatGPT's maximum potential in the future, paving the way for innovative approaches in medical education and contributing to the advancement of medicine.

Reference
1. Holmes JH, Sacchi L, Bellazzi R, Peek N. Artificial Intelligence in Medicine AIME 2015. Artif Intell Med. 2017 Sep;81:1-2 [FREE Full text] [doi:10.1016/j.artmed.2017.06.011] [Medline:28733119]
2. Wiggins WF, Tejani AS. On the opportunities and risks of foundation models for natural language processing in radiology. Radiol Artif Intell. 2022 Jul;4(4):e220119 [doi:10.1148/ryai.220119] [Medline:35923379]
3. Kurian N, Cherian JM, Sudharson NA, Varghese KG, Wadhwa S. AI is now everywhere. Br Dent J. 2023 Jan;234(2):72 [doi:10.1038/s41415-023-5461-1] [Medline:36707552]
4. Ruiz-Rojas LI, Acosta-Vargas P, De-Moreta-Llovet J, Gonzalez-Rodriguez M. Empowering education with Generative Artificial Intelligence tools: Approach with an instructional design matrix. Sustainability. 2023 July;15(15):11524 [FREE Full text] [doi:10.3390/su151511524]

5.   Lin X. Exploring the role of ChatGPT as a facilitator for motivating self-directed learning among adult learners. Adult Learning. 2023 [doi:10.1177/10451595231184928]

6.   Chen C. (2006). CiteSpace II: Detecting and Visualizing Emerging Trends and Transient Patterns in Scientific Literature. J. Am. Soc. Inf. Sci. 57 (3), 359–377. 10.1002/asi.20317 [FREE Full text] [doi:10.1002/asi.20317]

7.   Vitorino LM, Júnior GHY. ChatGPT and the teaching of contemporary nursing: And now professor? Journal of Clinical Nursing. 2023 Nov;32(21-22):7921-7922 [FREE Full text] [doi:10.1111/jocn.16706] [Medline:37004198]

8.   Khennouche F, Elmir Y, Himeur Y, Djebari N, Amira A. Revolutionizing generative pre-traineds: Insights and challenges in deploying ChatGPT and generative chatbots for FAQs. Expert Systems with Applications. 2024;246 [FREE Full text] [doi:10.1016/j.eswa.2024.123224]

9.   Chan MMK, Wong ISF, Yau SY, Lam VSF. Critical reflection on using ChatGPT in student learning. Nurse Educator. 2023 Nov-Dec;48(6):E200-E201 [doi:10.1097/nne.0000000000001476] [Medline:37348135]

10. Labadze L, Grigolia M, Machaidze L. Role of AI chatbots in education: systematic literature review. International Journal of Educational Technology in Higher Education. 2023 Oct;20(1):56 [FREE Full text] [doi:10.1186/s41239-023-00426-1]

11. Thakur A, Parikh D, Thakur A. ChatGPT in nursing education: Is there a role for curriculum development? Teaching and Learning in Nursing. 2023 Apr;18(3):450-451 [FREE Full text] [doi:10.1016/j.teln.2023.03.011]

12. Gandhi Periaysamy A, Satapathy P, Neyazi A, Padhi BK. ChatGPT: roles and boundaries of the new artificial intelligence tool in medical education and health research – correspondence. Annals of Medicine & Surgery. 2023 Mar;85(4):1317-1318 [doi:10.1097/ms9.0000000000000371] [Medline:37113819]

13. Lee H. The rise of ChatGPT: Exploring its potential in medical education. Anatomical Sciences Education. 2023 [FREE Full text] [doi:10.1002/ase.2270] [Medline:36916887]

14. Seetharaman R. Revolutionizing Medical Education: Can ChatGPT Boost Subjective Learning and Expression? Journal of Medical Systems. 2023;47(1) [FREE Full text] [doi:10.1007/s10916-023-01957-w]

15. Mohammad B, Supti T, Alzubaidi M, Shah H, Alam T, Shah Z, Househ M. The pros and cons of using ChatGPT in medical education: A scoping review. Healthcare Transformation with Informatics and Artificial Intelligence. Studies in Health Technology and Informatics. 3052023. p. 644-647 [doi:10.3233/SHTI230580][Medline:37387114]

16. Hobert S. Say Hello to Coding Tutor Design and Evaluation of a Chatbot-based Learning System Supporting Students to Learn to Program. Fortieth International Conference on Information Systems. 2019:1-17

17. Sun GH, Hoelscher SH. The ChatGPT storm and what faculty can do. Nurse Educator. 2023 May-Jun;48(3):119-124 [doi:10.1097/nne.0000000000001390] [Medline:37043716]

18. Memarian B, Doleck T. ChatGPT in education: Methods, potentials, and limitations. Computers in Human Behavior: Artificial Humans. 2023;1(2) [FREE Full text] [doi:10.1016/j.chbah.2023.100022]

19. Irwin P, Jones D, Fealy S. What is ChatGPT and what do we do with it? Implications of the age of AI for nursing and midwifery practice and education: An editorial. Nurse Education Today. 2023 Aug;127:105835 [FREE Full text] [doi:10.1016/j.nedt.2023.105835] [Medline:37267643]

20. Odom-Forren J. The role of ChatGPT in perianesthesia nursing. Journal of PeriAnesthesia Nursing. 2023 Apr;38(2):176-177 [FREE Full text] [doi:10.1016/j.jopan.2023.02.006] [Medline:36965923]

21. Baumgartner C. The potential impact of ChatGPT in clinical and translational medicine. Clinical and Translational Medicine. 2023 Mar;13(3) [FREE Full text] [doi:10.1002/ctm2.1206]

22. Ferdush J, Begum M, Hossain ST. ChatGPT and Clinical Decision Support: Scope, Application, and Limitations. Ann Biomed Eng. 2023 Jul 29 [doi:10.1007/s10439-023-03329-4] [Medline:37516680]

23. Sharma M, Sharma S. A holistic approach to remote patient monitoring, fueled by ChatGPT and Metaverse technology: The future of nursing education. Nurse Education Today. 2023 Dec;131:105972 [FREE Full text] [doi:10.1016/j.nedt.2023.105972] [Medline:37757713]

24. Moons P, Van Bulck L. ChatGPT: can artificial intelligence language models be of value for cardiovascular nurses and allied health professionals. European Journal of Cardiovascular Nursing. 2023 Oct;22(7):e55-e59 [FREE Full text] [doi:10.1093/eurjcn/zvad022] [Medline:36752788]

25. Khan RA, Jawaid M, Khan AR, Sajjad M. ChatGPT - Reshaping medical education and clinical management. Pakistan Journal of Medical Sciences. 2023 Mar-Apr;39(2)
[FREE Full text] [doi:10.12669/pjms.39.2.7653] [Medline:36950398]

26. Wang Y, Li N, Chen L, Wu M, Meng S, Dai Z, et al. Guidelines, Consensus Statements, and Standards for the Use of Artificial Intelligence in Medicine: Systematic Review. Journal of Medical Internet Research. 2023 Nov 22;25:e46089 [FREE Full text] [doi:10.2196/46089] [Medline:37991819]

27. Department M, Ireland S. Utilization of ChatGPT in Medical Education: Applications and Implications for Curriculum Enhancement. Acta Informatica Medica. 2023;31(4)
[FREE Full text] [doi:10.5455/aim.2023.31.300-305] [Medline:38379690]

28. Abdulai AF, Hung L. Will ChatGPT undermine ethical values in nursing education, research, and practice? Nursing Inquiry. 2023 Jul;30(3):e12556 [FREE Full text] [doi:10.1111/nin.12556] [Medline:37101311]

29. Liu J, Liu F, Fang J, Liu S. The application of Chat Generative Pre-trained Transformer in nursing education. Nursing Outlook. 2023 Nov-Dec;71(6):102064 [doi:10.1016/j.outlook.2023.102064] [Medline:37879261]

30. Choi EPH, Lee JJ, Ho M-H, Kwok JYY, Lok KYW. Chatting or cheating? The impacts of ChatGPT and other artificial intelligence language models on nurse education. Nurse Education Today. 2023 Jun;125:105796 [FREE Full text] [doi:10.1016/j.nedt.2023.105796] [Medline:36934624]

31. Meyer JG, Urbanowicz RJ, Martin PCN, O'Connor K, Li R, Peng PC, et al. ChatGPT and large language models in academia: opportunities and challenges. BioData Min. 2023 Jul 13;16(1):20 [FREE Full text] [doi:10.1186/s13040-023-00339-9] [Medline:37443040]

32. Dashti M, Londono J, Ghasemi S, Moghaddasi N. How much can we rely on artificial intelligence chatbots such as the ChatGPT software program to assist with scientific writing? J Prosthet Dent. 2023 Jul 10 S0022-3913(23):00371-00372 [doi:10.1016/j.prosdent.2023.05.023] [Medline:37438164]

33. Biswas S, Dobaria D, Cohen HL. ChatGPT and the Future of Journal Reviews: A Feasibility Study. Yale J Biol Med. 2023 Sep;96(3):415-420 [FREE Full text] [doi:10.59249/skdh9286] [Medline:37780993]

34. Biswas S. ChatGPT and the Future of Medical Writing. Radiology. 2023 Apr;307(2):e223312 [FREE Full text] [doi:10.1148/radiol.223312] [Medline:36728748]

35. Biswas S. Passing is Great: Can ChatGPT Conduct USMLE Exams? Ann Biomed Eng. 2023 Sep;51(9):1885-1886 [doi:10.1007/s10439-023-03224-y] [Medline:37154989]

36. Biswas SS. Potential Use of Chat GPT in Global Warming. Ann Biomed Eng. 2023 Jun;51(6):1126-1127 [doi:10.1007/s10439-023-03171-8] [Medline:36856927]

37. Perera Molligoda Arachchige AS, Biswas S. Re: Potential Applications and Impact of ChatGPT in Radiology. Acad Radiol. 2023 Nov 14 [doi:10.1016/j.acra.2023.10.048] [Medline:37973516]

38. Biswas SS. Role of Chat GPT in Public Health. Ann Biomed Eng. 2023 May;51(5):868-869 [doi:10.1007/s10439-023-03172-7] [Medline:36920578]

39. Ariyaratne S, Iyengar KP, Nischal N, Chitti Babu N, Botchu R. A comparison of ChatGPT-generated articles with human-written articles. Skeletal Radiol. 2023 Sep;52(9):1755-1758 [doi:10.1007/s00256-023-04340-5] [Medline:37059827]

40. Stokel-Walker C. ChatGPT listed as author on research papers: many scientists disapprove. Nature. 2023 Jan;613(7945):620-621 [FREE Full text] [doi:10.1038/d41586-023-00107-z] [Medline:36653617]

41. Wu T, He S, Liu J, Sun S, Liu K, Han Q-L, Tang Y. A brief overview of ChatGPT: The history, status quo and potential future development. Ieee-Caa Journal of Automatica Sinica. 2023 May;10(5):1122-1136 [doi:10.1109/jas.2023.123618]

42. Cascella M, Montomoli J, Bellini V, Bignami E. Evaluating the feasibility of ChatGPT in healthcare: An analysis of multiple clinical and research scenarios. Journal of Medical Systems. 2023 Mar 4;47(1):33 [FREE Full text] [doi:10.1007/s10916-023-01925-4] [Medline:36869927]

43. Li J. Security Implications of AI Chatbots in Health Care. Journal of Medical Internet Research. 2023;25 [FREE Full text] [doi:10.2196/47551] [Medline:38015597]

44. Ray PP, Majumder P. The potential of ChatGPT to transform healthcare and address ethical challenges in artificial intelligence-driven medicine. J Clin Neurol. 2023 Sep;19(5):509-511 [FREE Full text] [doi:10.3988/jcn.2023.0158] [Medline:37635433]

45. Ali MJ, Djalilian A. Readership awareness series - Paper 4: Chatbots and ChatGPT - Ethical considerations in scientific publications. Ocul Surf. 2023 Apr 6;28:153-154 [doi:10.1016/j.jtos.2023.04.001] [Medline:37028488]

46. Arshad HB, Butt SA, Khan SU, Javed Z, Nasir K. ChatGPT and Artificial Intelligence in Hospital Level Research: Potential, Precautions, and Prospects. Methodist Debakey Cardiovasc J. 2023 Nov 16;19(5):77-84 [FREE Full text] [doi:10.14797/mdcvj.1290] [Medline:38028967]

47. Sridi C, Brigui S. The use of ChatGPT in occupational medicine: opportunities and threats. Annals of Occupational and Environmental Medicine. 2023 Oct 23;35:e42 [FREE Full text] [doi:10.35371/aoem.2023.35.e42] [Medline:38029273]

48. Berşe S, Akça K, Dirgar E, Kaplan Serin E. The role and potential contributions of the artificial intelligence language model ChatGPT. Annals of Biomedical Engineering. 2024 Feb 52(2):130-133 [doi:10.1007/s10439-023-03296-w] [Medline:37378876]

49. Wang C, Liu S, Yang H, Guo J, Wu Y, Liu J. Ethical considerations of using ChatGPT in health care. J Med Internet Res. 2023 Aug 11;25:e48009 [FREE Full text] [doi:10.2196/48009] [Medline:37566454]

50. Liu J, Chen C, Qu Y, Yang S, Xu L. RASS: Enabling privacy-preserving and authentication in online AI-driven healthcare applications. ISA Transactions. 2023;141:20-29 [FREE Full text] [doi:10.1016/j.isatra.2023.03.049] [Medline:37059673]

51. Abd-Alrazaq AA, Rababeh A, Alajlani M, Bewick BM, Househ M. Effectiveness and Safety of Using Chatbots to Improve Mental Health: Systematic Review and Meta-Analysis. Journal of Medical Internet Research. 2020 Jul 13;22(7):e16021 [FREE Full text] [doi:10.2196/16021] [Medline:32673216]

52. Scerri A, Morin KH. Using chatbots like ChatGPT to support nursing practice. Journal of Clinical Nursing. 2023 Aug;32(15-16):4211-4213 [FREE Full text] [doi:10.1111/jocn.16677] [Medline:36880216]

53. Busch F, Adams LC, Bressem KK. Biomedical ethical aspects towards the implementation of artificial intelligence in medical education. Medical Science Educator. 2023 Jun 7;33(4):1007-1012 [FREE Full text] [doi:10.1007/s40670-023-01815-x] [Medline:37546190]

54. Shoufan A. Exploring Students' Perceptions of ChatGPT: Thematic Analysis and Follow-Up Survey. IEEE Access. 2023;11:38805-38818[FREE Full text] [doi:10.1109/access.2023.3268224]

55. Moldt J-A, Festl-Wietek T, Madany Mamlouk A, Nieselt K, Fuhl W, Herrmann-Werner A. Chatbots for future docs: exploring medical students' attitudes and knowledge towards artificial intelligence and medical chatbots. Medical Education Online. 2023 Dec;28(1):2182659 [FREE Full text] [doi:10.1080/10872981.2023.2182659] [Medline:36855245]

56. Farrokhnia M, Banihashem SK, Noroozi O, Wals A. A SWOT analysis of ChatGPT: Implications for educational practice and research. Innovations in Education and Teaching International. 2023:1-15 [FREE Full text] [doi:10.1080/14703297.2023.2195846]

57. Abd-alrazaq A, AlSaad R, Alhuwail D, Ahmed A, Healy PM, Latifi S, et al. Large language models in medical education: Opportunities, challenges, and future directions. JMIR Medical Education. 2023 Jun 1;9:e48291 [FREE Full text] [doi:10.2196/48291] [Medline:37261894]

58. Divito CB, Katchikian BM, Gruenwald JE, Burgoon JM. The tools of the future are the challenges of today: The use of ChatGPT in problem-based learning medical education. Medical Teacher. 2023;46(3):320-322[doi:10.1080/0142159x.2023.2290997] [Medline:38149617]

59. Wu Y, Zheng Y, Feng B, Yang Y, Kang K, Zhao A. Embracing ChatGPT for Medical Education: Exploring Its Impact on Doctors and Medical Students. JMIR Medical Education. 2024;10 [FREE Full text] [doi:10.2196/52483] [Medline:38598263]

60. Harrison LM, Hurd E, Brinegar KM. Critical race theory, books, and ChatGPT: Moving from a ban culture in education to a culture of restoration. Middle School Journal. 2023;54(3):2-4 [doi:10.1080/00940771.2023.2189862]

61. Jeyaraman M, Ramasubramanian S, Balaji S, Jeyaraman N, Nallakumarasamy A, Sharma S. ChatGPT in action: Harnessing artificial intelligence potential and addressing ethical challenges in medicine, education, and scientific research. World Journal of Methodology. 2023 Sep 20;13(4):170-178 [FREE Full text] [doi:10.5662/wjm.v13.i4.170] [Medline:37771867]

62. Sohail SS, Farhat F, Himeur Y, Nadeem M, Madsen DØ, Singh Y, et al. Decoding ChatGPT: A taxonomy of existing research, current challenges, and possible future directions. Journal of King Saud University - Computer and Information Sciences. 2023;35(8) [FREE Full text] [doi:10.1016/j.jksuci.2023.101675]

63. Vignesh Ramachandran PP, Balakrishnan Pachamuthu. A Tête-à-tête with ChatGPT on the impact of artificial intelligence in medical education. Med J Malaysia. 2023 Jul 4;78(4):547-549 [FREE Full text] [Medline:37518931]

64. Shoja MM, Van de Ridder JMM, Rajput V. The emerging role of generative artificial intelligence in medical education, research, and practice. Cureus. 2023 Jun 24;15(6):e40883 [FREE Full text] [doi:10.7759/cureus.40883] [Medline:37492829]

65. Kleebayoon A, Wiwanitkit V. ChatGPT and the teaching of contemporary nursing: Comment. Journal of Clinical Nursing. 2023 Oct;32(19-20):7642-7642 [FREE Full text] [doi:10.1111/jocn.16762] [Medline:37194403] [doi:http://dx.doi.org/10.1111/jocn.16762]

66. Thapa S, Adhikari S. ChatGPT, Bard, and large language models for biomedical research: Opportunities and pitfalls. Ann Biomed Eng. 2023 Dec;51(12):2647-2651 [doi:10.1007/s10439-023-03284-0] [Medline:37328703]

67. Al-Hasan TM, Sayed AN, Bensaali F, Himeur Y, Varlamis I, Dimitrakopoulos G. From Traditional Recommender Systems to GPT-Based Chatbots: A Survey of Recent Developments and Future Directions. Big Data and Cognitive Computing. 2024 Mar;8(4) [FREE Full text] [doi:10.3390/bdcc8040036]

68. Lo CK. What Is the Impact of ChatGPT on Education? A Rapid Review of the Literature. Education Sciences. 2023;13(4) [FREE Full text] [doi:10.3390/educsci13040410]

69. Liu J, Wang C, Liu S. Utility of ChatGPT in clinical practice. Journal of Medical Internet Research. 2023 Jun 28;25:e48568 [FREE Full text] [doi:10.2196/48568] [Medline:37379067]

70. Stahl BC, Eke D. The ethics of ChatGPT – Exploring the ethical issues of an emerging technology. International Journal of Information Management. 2024;74 [FREE Full text] [doi:10.1016/j.ijinfomgt.2023.102700]

71. Woodnutt S, Allen C, Snowden J, Flynn M, Hall S, Libberton P, Purvis F. Could artificial intelligence write mental health nursing care plans? Journal of Psychiatric and Mental Health Nursing. 2024 Feb;31(1):79-86 [FREE Full text] [doi:10.1111/jpm.12965] [Medline:37538021]

72. Paranjape K, Schinkel M, Nannan Panday R, Car J, Nanayakkara P. Introducing Artificial Intelligence Training in Medical Education. JMIR Medical Education. 2019;5(2) [FREE Full text] [doi:10.2196/16048] [Medline:31793895]

73. Li J. A Privacy Preservation Model for Health-Related Social Networking Sites. Journal of Medical Internet Research. 2015;17(7)[FREE Full text] [doi:10.2196/jmir.3973] [Medline:26155953]
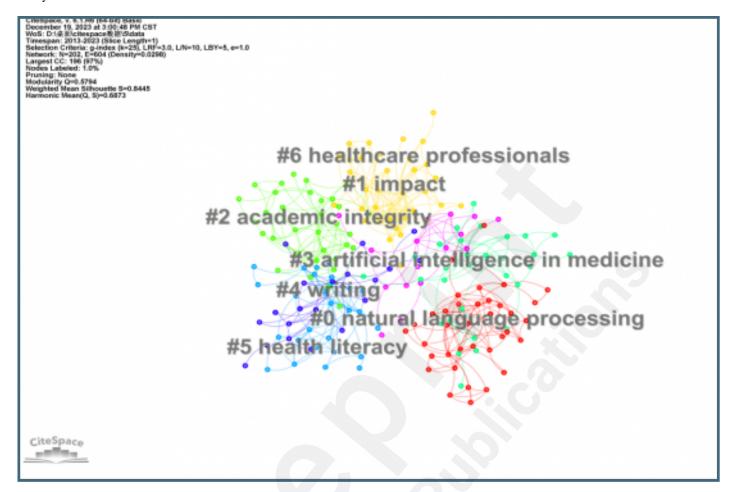
74.   Wójcik S, Rulkiewicz A, Pruszczyk P, Lisik W, Poboży M, Domienik-Karłowicz J. Beyond ChatGPT: What does GPT-4 add to healthcare? The dawn of a new era. Cardiology Journal. 2023 Oct;30(6):1018-1025 [FREE Full text] [doi:10.5603/cj.97515] [Medline:10713213]

75.   Reiss MJ. The use of AI in education: Practicalities and ethical considerations. London Review of Education. 2021 Feb;19(1)[FREE Full text] [doi:10.14324/lre.19.1.05]
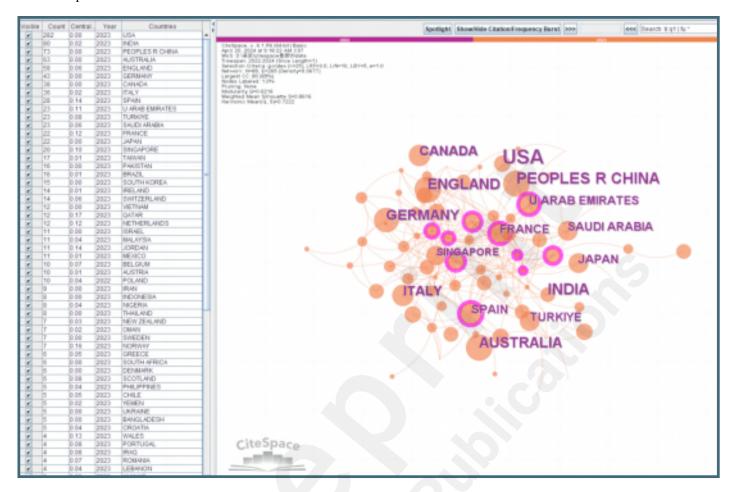
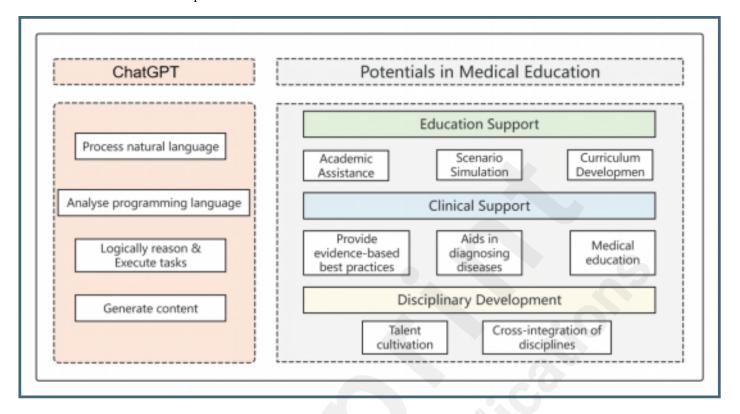**Supplementary Files**

Figures

Keywords of ChatGPT in the medicine and education.

National publications of ChatGPT in the medicine and education.

Functions of ChatGPT and the potential of medical education.

Lesson plan for pressure ulcer care.

⬤ ChatGPT

Pressure Ulcer Care Teaching Plan

Teaching Objectives:

1. Understand the definition, classification, and pathogenesis of pressure ulcers.
2. Master the prevention measures and assessment methods of pressure ulcers.
3. Understand the principles of treatment and nursing methods for pressure ulcers.
4. Cultivate students' comprehensive abilities in pressure ulcer care, including teamwork and communication skills.

Teaching Challenges:

1. Understanding the pathogenesis and grading system of pressure ulcers.
2. Details and practical operations of pressure ulcer prevention measures.
3. Understanding treatment methods and nursing techniques for pressure ulcers of different grades.

Teaching Focus:

1. Prevention measures and assessment methods of pressure ulcers.
2. Principles of treatment and nursing methods for pressure ulcers.
3. Case analysis and practical exercises.

Teaching Process:

Part One: Theoretical Explanation

1. **Definition and Classification of Pressure Ulcers:**
   * Explain the definition of pressure ulcers, introduce common grading systems (such as Braden or NPUAP classifications), and describe the characteristics and pathophysiological changes of pressure ulcers at different levels.
   * Provide examples to illustrate the clinical manifestations and prognosis of pressure ulcers of different grades.
2. **Pathogenesis of Pressure Ulcers:**
   * Explain the main mechanisms of pressure ulcer formation, including poor blood circulation caused by sustained pressure, tissue hypoxia, and cellular damage.
   * Discuss the occurrence mechanisms of pressure ulcers in different situations through case analysis.
3. **Prevention Measures for Pressure Ulcers:**
   * Provide a detailed introduction to prevention measures for pressure ulcers, including regular repositioning, maintaining skin cleanliness and dryness, adequate nutrition and fluid intake, and the use of appropriate mattresses and supports.
   * Analyze actual cases to discuss how to develop effective prevention measures for different patient situations.

Part Two: Practical Operations

1. **Assessment Methods for Pressure Ulcers:**
   * Demonstrate how to assess pressure ulcers, including observing the location, size, depth, color, and surrounding tissue status.
   * Students work in groups to practice assessment and recording of simulated pressure ulcers.
2. **Principles of Pressure Ulcer Treatment:**
   * Demonstrate the treatment principles for pressure ulcers of different grades, including local cleansing and moist wound healing, pressure ulcer dressing, surgical treatment, etc.
   * Conduct group exercises to simulate the nursing process of pressure ulcers, including wound cleaning, dressing changes, etc.

Part Three: Case Discussion and Summary

1. **Case Analysis:**
   * Provide real cases for students to analyze and discuss prevention, assessment, and treatment strategies for pressure ulcers based on the knowledge learned.
   * Guide students to think and discuss the advantages, disadvantages, and possible implementation difficulties of different strategies.
2. **Conclusion and Reflection:**
   * Summarize the key points of this class, emphasizing the importance and comprehensiveness of pressure ulcer care.
   * Encourage students to reflect on their learning and provide questions and suggestions.

Teaching Evaluation:

1. Classroom Q&A: Assess students' mastery of pressure ulcer care knowledge through questioning.
2. Practical Operation Assessment: Evaluate students' practical operations, including the accuracy and standardization of pressure ulcer assessment and treatment operations.
3. Case Analysis Report: Require students to submit case analysis reports in groups, evaluating their comprehensive analysis and problem-solving abilities.

Multimedia Appendixes

Table 1 The challenges and strategies of ChatGPT.
URL: http://asset.jmir.pub/assets/26519a9962a2999c6e2b98382c4662e3.docx