Can ChatGPT Take Over Humans in Medicinal Exploration?

Rohan Niraula   
Kathmandu  
Nepal  
University of Northampton

University ID: 21422014

rohanniroula456@gmail.com

**ABSTRACT**

ChatGPT is a chatbot from Open AI that enables personalized, knowledgeable, and interactive responses to a text. It can be used to assist researchers in predicting and diagnosing a variety of diseases, diagnoses, and treatments, and to improve patient care. It has been used in various fields, such as medicine, science, and research, and has been utilized for a wide variety of purposes. This article provides an overview of chatbots, chatbot-based technology, focusing on chatbot research, medicinal scientific research, and a discussion of the potential misuse of ChatGPT for producing fraudulent content in medicinal exploration.

**CCS Concepts**

**Natural Language Processing ➝ Language models; Discourse, Dialogue, and Pragmatics ➝ Discourse analysis; Dialogue management; Pragmatics; Language resources➝ Corpora and resources; Language annotation and tagging; Lexicons and ontologies; Speech resources; Machine translation ➝ Rule-based machine translation; Statistical machine translation; Example-based machine translation; Hybrid machine translation.**

**Keywords**

Keywords: ChatGPT, Healthcare, Medicine, Digital Health, Ethics.

# INTRODUCTION

Chatbots are pre-trained with knowledge and highlighted as programs that create human-AI interaction either for the satisfaction of the user or the simulation of offline agents. (Lowry, Romano, Jenkins, & Guthrie, 2009). Alan Turing Can Machine Think, gave rise to ELIZA, First Chatbot in 1966. ELIZA, Psychotherapist’s simulator selected an output template based on a pattern of linguistic rules provided manually. PARRY (1973) also used in the experiment (1979) gave domain for further research on high-speed response and learning. Similar chatbot, but AI was introduced in Jabberwacky using CleverScript. predictable and slow response, conversation loop was still a prior problem in chatbots with no scalability. (Jwala, 2019). ALICE (1995) was working better than ELIZA by using AIML. In 2001, chatbots like SmarterChild started to display movie times and sports scores. (Molnar & Zoltan, 2018) After this, Machine learning and deep learning were well prior (Bhattacharjya et al., 2022) for research which resulted in Siri, Watson, Google Assistance, Cortana, and Alexa. Watson beat the Jeopardy winners. Even EQ and IQ were taken into consideration in terms of Microsoft Xiaolace (Zhou, Gao, Li, & Shum, 2019). Google Assistance started predicting user needs, but data privacy and malware were key cons of these intelligent chatbots. (Cortana Security flaw means your PC may be comprised, 2018) (Adamopoulou & Moussiades, 2020).

Nearly all businesses are in the field of researching chatbots to create a friendly toy tool chatbot for customers. Mainly they are focusing on emotional (Xu, Liu, Guo, Sinha, & Akkiraju) requests and neutral responses. (Costa, 2018) Here, we will be finding the answer to the question: Can ChatGPT Take Over Humans in Medicinal Exploration?

Chatbots are the new way to interact with the world. They can be task-oriented, helping you with specific tasks like booking a flight or making a reservation. Or they can be conversational, chatting with you about anything. Chatbots use machine learning to generate personalized, knowledgeable, and interactive responses. (Bhattacharjya et al., 2022)

Diagram

Description automatically generated

Figure 1. History Open AI Innovations

.

The ChatGPT is a language-based model constructed on GPT-3.5 design, which can produce text that sounds natural. This is made possible because of its widespread teaching in a gigantic collection of internet text data using unsupervised learning methods, and further improvement through supervised learning techniques. (Blanchard et al., 2023) This language model is still under development, but it has the potential to revolutionize the way we create and consume text.

This tool can serve various purposes, including generating responses in dialogues or conversations, explaining intricate concepts, and creating new code or correcting existing ones. Due to its exceptional performance, ChatGPT has been dubbed as "scary good" by its advocates, and it still holds significant potential for further refinement. Its versatility makes it an invaluable asset in various industries and applications. (Eke, 2023)

Diagram

Description automatically generated

Figure 2. Encoder-Decoder Architecture

.

The ChatGPT model leverages the encoder-decoder architecture, using transformer-based models to process vast amounts of data concurrently. This revolutionary approach to natural language processing has transformed the model's ability to understand and generate text. The encoder component of the architecture maps input text into a multi-dimensional latent space, while the decoder component generates the output text based on the encoded representation. By using this mechanism, ChatGPT can capture complex relationships among different elements of a text, resulting in a more accurate understanding of its semantic meaning. The encoder-decoder architecture allows transformer-based models to process text in a more natural way, by taking into account the context of the surrounding words. (Alberts et al., 2023)

# Literature Review

ChatGPT responded to biomedical queries from HS Kumar within 120 seconds (about 2 minutes) with 300–500-word responses that were innovative and well-structured but lacked academic rigor and precision. (HS Kumar, 2023) ChatGPT was employed to summarize Chinese articles, but its reply was with accuracy and citation issues. They encouraged users not to rely entirely on its feedback. (Chen, 2023) The medical chatbot's efficiency in identifying external writing was commendable, but they proposed concerns regarding unfairness and plagiarism in the responses that need to be addressed.(Kitamura, 2023) The user tested ChatGPT on various medical topics and obtained responses with unrealistic insights and text similarity. Therefore, the user advises against using ChatGPT for research articles and recommends cross-checking for originality and accuracy. (Lubowitz, 2023) A study measured ChatGPT’s ability to provide clinical and mathematical input for cardiovascular nursing. It generated concise explanations and cited evidence-based journals. However, it lacked recent evidence beyond 2021. (Moons & Van Bulck, 2023) The application of ChatGPT in stem cell research revealed that the answers were superficial, lacking depth and complexity. It may function as a timesaving tool but should not be relied upon as a sole source of information. (Cahan & Treutlein, 2023) They conducted nursing discussions with ChatGPT and found it to be a positive experience, however, it was lacking emotional and distinctive touch. (Gunawan, 2023) With 96 objective and 30 subjective queries, the obtained credit line using ChatGPT was 89.5%, and the responses were relevant and knowledgeable.(Fijačko et al., 2023) ChatGPT underwent rigorous training and was able to pass the USMLE exam, however, it cannot replace nurses due to its inability to provide human interaction. (Mbakwe et al., 2023) ChatGPT demonstrated potential in aiding medical papers, histories, and Computer Aided Design systems. However, the flaws of ChatGPT must be put into action due to the risk of providing outdated or hallucinatory information. (Shen et al., 2023) The study yielded insightful results concerning the applicability of ChatGPT in surgical procedures. 15 diverse questions were posed to the model, spanning various periods and categories, resulting in favorable patient outcomes. (Hassan et al., 2023a) It is important to be mindful of cybersecurity when using ChatGPT and avoid sharing confidential information to obtain better results. (Mijwil et al., 2023) The user should be cautious of false experts and aware of issues related to attribution and originality. This was demonstrated through a study that analyzed 20 papers sourced from Google Scholar and PubMed. (Fatani, 2023) A study on ChatGPT reveals inconsistencies, inaccuracies, and disregard for fundamental medical journal writing conventions. While utilizing ChatGPT can improve medical writing efficiency, total reliance on it should be cautioned. (S. Biswas, 2023) A study comparing ChatGPT responses to those of Korean students on parasitology questions revealed a 67.4% acceptability rate for ChatGPT, compared to 87.3% for students. Inaccuracy was identified as the primary reason for the lower acceptability score. (Huh, 2023) Researchers assessed ChatGPT proficiency in producing discharge reports and outcomes. ChatGPT provided results like those of medical experts, albeit with a quicker turnaround time. Nevertheless, it occasionally provided ambiguous information that did not align with medical protocols. (Patel & Lam, 2023) A survey of seafarers showed overall satisfaction with ChatGPT electronic consultation and health condition identification. However, few researchers expressed concern about potential biases towards certain ethnic groups and the risk of generating misleading data with harmful consequences. (Sharma & Sharma, 2023) Research supports the use of ChatGPT in clinical decision-making, but only after ensuring its accuracy. However, some companies have banned its use due to concerns regarding plagiarism and inaccurate information. (Kleesiek et al., 2023) Salvagno believes that ChatGPT can be a valuable tool for research and analysis, but he also believes that it is important to have human oversight to ensure that the tool is used responsibly. While ChatGPT can accelerate operations and generate ideas, it cannot replace human expertise. ChatGPT is a powerful tool, but it is not a replacement for human judgment. It should be used to help humans make better decisions, not to make decisions for them. (Salvagno et al., 2023) Researchers used ChatGPT to survey 100,000 health workers to estimate the impact of vaccination. They found that the hazard ratio was 0.48, which means that vaccinated health workers were 48% less likely to become infected with a disease than unvaccinated health workers. ChatGPT helped to reduce the research time by automating the survey process and making it easier to collect data from many people. However, questions of research ownership arose, raising concerns over whether ChatGPT should be credited for its contributions. (Macdonald et al., 2023) The use of large data sets to improve health policy and decision-making is supported, with credit given to ChatGPT for its valuable input. (Sifat, 2023) Researchers analyzed ChatGPT use in four clinical areas: practice support, scientific production, misuse in medicine, and public health research. They concluded that ChatGPT was proficient in language generation but lacked medical expertise and experience. Additionally, ethical concerns were raised regarding plagiarism and nonsensical output. (Cascella et al., 2023) Researchers suggested using ChatGPT to answer health queries and devise disease prevention tactics while acknowledging its drawbacks, like no direct communication with health experts and plagiarism risk. Nevertheless, he asserted that ChatGPT could expedite research and advance medical innovations. (S. S. Biswas, 2023) The speaker noted ChatGPT’s proficiency in handling big data, streamlining repetitive tasks, and enhancing research precision. Nevertheless, they cautioned that ChatGPT still requires refinement before being applied to challenging subjects and recommended additional investigations. (Doshi et al., 2023) A team of researchers assessed ChatGPT’s performance in generating ideas for plastic surgery. They reviewed 12 topics and obtained 10 specific ideas. ChatGPT was 55% accurate overall, with 35% accuracy for general ideas and 75% accuracy for specific ideas. The team found that ChatGPT was a useful tool for plastic surgeons, especially for consultations, patient support, and marketing. (Gupta et al., 2023) A team of researchers studied the possible health risks of using ChatGPT and found that it could be addictive. However, it could also promote healthy habits, such as exercise, reading, and cooking. Further research is needed to determine whether ChatGPT is a safe personal assistant. (Haman & Školník, 2023) The scholar expressed concern over promoting flawed or fabricated research and suggested that higher education institutions develop curricula to instruct students about the safe and ethical use of AI (Artificial Intelligence). He emphasized the importance of careful management, regulation, and monitoring of LLMs like ChatGPT, particularly in dentistry, where they could be beneficial. (Hill-Yardin et al., 2023) The benefits of ChatGPT were acknowledged, but concerns were raised about its lack of distinct writing style, transparency, and critical thinking skills. The argument was made that innovative technologies should be embraced but with human oversight and input. ChatGPT was integrated into an emergency department triage system and accurately identified the urgency to prioritize patients for treatment. (Eggmann et al., 2023) The study found ChatGPT could aid nurses with repetitive duties, yet it also poses the risk of deskilling and furnishing erroneous or partial data. Researchers concluded that ChatGPT could not substitute human nurses who offer patients a compassionate approach and an ameliorating setting. (Scerri & Morin, 2023) ChatGPT utilized to study the 2022 monkeypox outbreak, identified a range of factors that contributed to the emergence of the disease, including environmental changes, human behavior, pathogen evolution, immunocompromised individuals, and public health response. (Cheng et al., 2023) criticized current medical education after ChatGPT passed USMLE. He emphasized teaching students to identify gaps in knowledge.(Solomon et al., 2023) The speaker criticized medical education after ChatGPT passing of USMLE and emphasized teaching students to recognize knowledge gaps. (Mbakwe et al., 2023b) The author employed ChatGPT to examine patients in reproductive endocrinology and infertility. However, due to limited knowledge of the physical realm, the results were prejudiced. The author proposed that experts in the domain should participate in developing and applying AI technology to enhance processes. (Alvero, 2023) JAMA (Journals of the American Medical Association) will require authors to disclose AI use in manuscripts and take responsibility for the accuracy of content and images to address errors in literature reviews and inaccuracies about patient populations. (Thomas, 2023) ChatGPT is useful, but not a substitute for rheumatologists. Ethical and philosophical issues arise, including authorship, plagiarism, and critical thinking. Its impact on the field will depend on its appropriate use. (Verhoeven et al., 2023) A study demonstrated ChatGPT’s ability to create clinically accurate letters on skin cancer care. The researcher recommended that regulatory bodies closely monitor the integration of ChatGPT and that a "human-in-the-loop" approach be used during the initial phases of integration. (Ali et al., 2023) ChatGPT abstracts mislead reviewers in 32% of cases. Proper citation of sources is recommended, and KSSTA is working on developing detectors to identify AI-generated manuscripts. (Johnson et al., 2023) A study reported that ChatGPT has a 96.1% accuracy rate in responding to cancer-related inquiries, compared to the National Cancer Institute's 100% accuracy. The author urged more research to guarantee that ChatGPT can offer precise and impartial information to patients. (Dahmen et al., 2023) ChatGPT can aid urologists in prioritizing patient care by lessening their physical workload. Nonetheless, its use should be judicious and accompanied by human supervision. (Gabrielson et al., 2023)

# Critical Analysis

## Ethical issues

One study said ChatGPT cannot diagnose complex medical conditions. Therefore, it should focus on administrative tasks and improving patient care.(DiGiorgio & Ehrenfeld, 2023) Artificial intelligence (AI) can be used to assist in disease prediction, diagnosis, and treatment. For example, AI can be used to develop cancer treatment guidelines from MRI radionics. (Xue et al., 2023) ChatGPT is efficient in decreasing anxiety, but it is not a substitute for medical care. Regulators and healthcare professionals must establish standards and raise awareness. (Hopkins et al., 2023) ChatGPT has been evaluated for medical education and clinical decision-making, with encouraging outcomes. It can be utilized to assist students compose and auditing material, yet it ought not be utilized to create unique substance. An observation framework ought to be presented to forestall understudies from utilizing ChatGPT for scholastic bad behavior, and approaches ought to be set up to direct the utilization of AI in human services. (Arif et al., 2023) ChatGPT is a promising instrument, yet it very well may be utilized for scholastic bad behavior. Educators ought to extend their measures to forestall understudies from utilizing ChatGPT on various decision tests. (Morreel et al., 2023) The authors believe that an open science research foundation is needed to standardize experimental techniques, readouts, and benchmarks, in order to better measure and understand the impact of human-AI collaborations. (Kung et al., 2023) ChatGPT poses ethical concerns in the medical field. It must be appropriately trained and validated before being used. There is a risk that students and medical professionals may misinterpret medical knowledge. (Baumgartner, 2023) To safely integrate ChatGPT into otolaryngology, safeguards must be implemented. These include reviewing the literature, understanding capabilities, pilot testing, and protecting patient privacy. (Park et al., 2023) ChatGPT is a powerful tool that could revolutionize surgery and robotics. However, it is important to use it responsibly and ethically. AI has the potential to improve patient care, but it is important to remember that it is a tool, not a replacement for human judgment. (Hassan et al., 2023b) AI-generated written content is virtually identical to text authored by human beings, thereby presenting a risk to the credibility of scientific literature and the safeguarding of intellectual property in the field of sports and exercise medicine. (Cox et al., n.d.) ChatGPT is a powerful tool, but it can be dangerous if used irresponsibly. In the context of academic inquiry, using ChatGPT as a research tool can lead to inaccurate or biased results. It is important to use ChatGPT with caution and to be aware of its limitations. (Marchandot et al., 2023) The prospective capacity of AI-generated recommendations to enhance clinical decision-support alert reasoning is considerable. Notwithstanding, there are certain obstacles to surmount, such as the susceptibility of the ChatGPT framework and the requisite for supplementary informatics endeavors. (Liu et al., 2023) It is incumbent upon researchers to meticulously fact-check and authenticate their work, and for scientific journals to establish robust verification mechanisms to identify any potential interference by language models, to safeguard the credibility and validity of the research findings. (Dergaa et al., 2023)

## Trust issues

ChatGPT enables algorithmic medicine, but concerns have been raised that it may supplant clinical judgment with procedural metrics. (DiGiorgio & Ehrenfeld, 2023) Real-time updating of training data is not feasible with ChatGPT, and the responses generated by the model may tend to generality and vagueness, necessitating careful consideration of any possible adverse effects. (Xue et al., 2023) An article underscores the primacy of research quality vis-a-vis quantity, as demonstrated by a comparative study of abstracts generated by ChatGPT against the originals, which were evaluated via a plagiarism detection system and impartial human reviewers, in a double-blind fashion. (Moons & Van Bulck, 2023b) A study observed a commensurate level of response quality from ChatGPT and Google's feature snippets, concerning queries related to healthcare. (Hopkins et al., 2023) There is a pressing need to regulate LLMs and AI, while simultaneously embracing their potential to expedite research endeavors and mitigate inequitable outcomes. (Graf & Bernardi, 2023) Experts have raised concerns over the potential for ChatGPT to supplant critical thinking, generate superfluous and illogical information, and engender ethical, medicolegal, copyright, and methodological challenges. (Arif et al., 2023) A Dutch family medicine examination comprising 47 questions was utilized to evaluate ChatGPT's performance, yielding scores of 8/20 and 10/20 when prompted to provide singular responses and rank possible responses, respectively. (Morreel et al., 2023) ChatGPT was evaluated using the United States Medical Licensing Examination (USMLE), and it performed at or near the passing threshold. The explanations that ChatGPT provided were highly concordant with the correct answers, and they demonstrated a high degree of insight. This suggests that ChatGPT has the potential to be a valuable tool for medical education and research.(Kung et al., 2023) Ensuring the reliability and validity of information necessitates cross-checking with reputable and peer-reviewed sources. (Park et al., 2023) In an evaluation comprising 15 questions concerning AI in surgery encompassing aspects such as history, potential, limitations, and ethical concerns, ChatGPT demonstrated a nuanced and comprehensive understanding of the subject matter through its responses. (Hassan et al., 2023b) A study revealed that AI can expeditiously generate research papers, albeit with the potential for inaccuracies and ethical implications. (Anderson et al., 2023) To preempt AI scraping articles, the authors advocate for ongoing human inspection by topic experts and publication of papers within "free paywalls." (Anderson et al., 2023) While ChatGPT-4 can offer prompt and secure medical recommendations for blepharoplasty, its training data may be obsolete, and it cannot deliver tailored advice. (Cox et al., n.d.) A recent study found that both AI-generated and human-generated suggestions can be beneficial for enhancing clinical decision support (CDS) alerts. AI-generated suggestions were found to be highly relevant and comprehensible, with nine of the top 20 recommendations originating from the AI system. This suggests that AI has the potential to be a valuable tool for improving CDS alerts. (Liu et al., 2023) ChatGPT's ability to incorporate false or partial information in academic papers can result in inadvertent plagiarism and incorrect attribution of ideas. (Dergaa et al., 2023)

## Accountability issues

Concerns arise regarding the potential misuse of ChatGPT for producing fraudulent content in academic settings. Thus, guidelines must be implemented for proper usage. ChatGPT has shown comparable performance to Google Feature Response, yet there are reservations regarding inadequate citations and inaccurate responses. (Moons & Van Bulck, 2023b) ChatGPT and Google Feature Response gave similar results, but there are concerns about the lack of references and the possibility of incorrect responses. (Hopkins et al., 2023) The article explores methods to detect fraudulent manuscripts, such as data sharing, training, education, new technology, and blockchain. Blockchain can boost security and originality by creating an unalterable record, monitoring progress, handling intellectual property, storing data, and identifying plagiarism. (Ollivier et al., 2023)Researchers propose including ChatGPT as an author, but editors-in-chief reject this idea due to the lack of accountability and consent from the AI. (Graf & Bernardi, 2023) ChatGPT is a powerful writing assistant that can help you write paper content using online search engines. It can help you find relevant information, generate ideas, and write clear and concise text. ChatGPT is a valuable tool for students, researchers, and anyone who needs to write high-quality content. However, its ability to perform a comprehensive literature search and critical analysis is limited, due to the constraints of its training data. As a result, its use is primarily limited to abstract writing. (Arif et al., 2023)Thorough evaluation, monitoring, and adherence to ethical guidelines are necessary to prevent harm to patients and protect intellectual property rights. (Park et al., 2023) AI-generated research papers raised plagiarism and ethical concerns due to potential inaccuracies and unreliability, as revealed by an experiment to generate papers instantly. (Anderson et al., 2023) LLMs may misattribute information, necessitating researchers to verify their work, establish fact-checking procedures, and design an NLP plagiarism checker to support editors and publishers in detecting problems. (Dergaa et al., 2023)

# Conclusion

ChatGPT is still in its maturity phase, though it gained 100 million users in just 2 months. This doesn’t assure its response to be true and useful findings, so still, vast research on its output should be continued such that we could use it as a perfect assistant for expertise but not as a substitute for human interaction.

# REFERENCES

Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, *2*, 100006. https://doi.org/10.1016/J.MLWA.2020.100006

Alberts, I. L., Mercolli, L., Pyka, T., Prenosil, G., Shi, K., Rominger, A., & Afshar-Oromieh, A. (2023). Large language models (LLM) and ChatGPT: what will the impact on nuclear medicine be? *European Journal of Nuclear Medicine and Molecular Imaging*, *50*(6), 1549–1552. https://doi.org/10.1007/s00259-023-06172-w

Ali, S. R., Dobbs, T. D., Hutchings, H. A., & Whitaker, I. S. (2023). Using ChatGPT to write patient clinic letters. *The Lancet Digital Health*, *5*(4), e179–e181. https://doi.org/10.1016/S2589-7500(23)00048-1

Alvero, R. (2023). ChatGPT: Rumors of Human Providers’ Demise Have Been Greatly Exaggerated. *Fertility and Sterility*. https://doi.org/10.1016/j.fertnstert.2023.03.010

Anderson, N., Belavy, D. L., Perle, S. M., Hendricks, S., Hespanhol, L., Verhagen, E., & Memon, A. R. (2023). AI did not write this manuscript, or did it? Can we trick the AI text detector into generating texts? The potential future of ChatGPT and AI in Sports &amp; Exercise Medicine manuscript generation. *BMJ Open Sport & Exercise Medicine*, *9*(1), e001568. https://doi.org/10.1136/bmjsem-2023-001568

Arif, T. Bin, Munaf, U., & Ul-Haque, I. (2023). The future of medical education and research: Is ChatGPT a blessing or blight in disguise? *Medical Education Online*, *28*(1). https://doi.org/10.1080/10872981.2023.2181052

Baumgartner, C. (2023). The opportunities and pitfalls of ChatGPT in clinical and translational medicine. *Clinical and Translational Medicine*, *13*(3). https://doi.org/10.1002/ctm2.1206

Bhattacharjya, A., Punyamurthi, A., Atota Lakshmi, S., Iragala, A., Thallapureddy, M. C., & Kannaiah, S. K. (2022). An Exploratory Study on Chatbots. *Proceedings - 2022 2nd International Conference on Electronic and Electrical Engineering and Intelligent System, ICE3IS 2022*, 340–344. https://doi.org/10.1109/ICE3IS56585.2022.10010154

Biswas, S. (2023). ChatGPT and the Future of Medical Writing. *Radiology*, *307*(2). https://doi.org/10.1148/radiol.223312

Biswas, S. S. (2023). Role of Chat GPT in Public Health. *Annals of Biomedical Engineering*. https://doi.org/10.1007/s10439-023-03172-7

Blanchard, F., Assefi, M., Gatulle, N., & Constantin, J.-M. (2023). ChatGPT in the world of medical research: From how it works to how to use it. *Anaesthesia Critical Care & Pain Medicine*, *42*(3), 101231. https://doi.org/10.1016/j.accpm.2023.101231

Cahan, P., & Treutlein, B. (2023). A conversation with ChatGPT on the role of computational systems biology in stem cell research. *Stem Cell Reports*, *18*(1), 1–2. https://doi.org/10.1016/j.stemcr.2022.12.009

Cascella, M., Montomoli, J., Bellini, V., & Bignami, E. (2023). Evaluating the Feasibility of ChatGPT in Healthcare: An Analysis of Multiple Clinical and Research Scenarios. *Journal of Medical Systems*, *47*(1), 33. https://doi.org/10.1007/s10916-023-01925-4

Chen, T.-J. (2023). *ChatGPT and other artificial intelligence applications speed up scientific writing*. https://doi.org/10.1097/JCMA.0000000000000900

Cheng, K., He, Y., Li, C., Xie, R., Lu, Y., Gu, S., & Wu, H. (2023). Talk with ChatGPT About the Outbreak of Mpox in 2022: Reflections and Suggestions from AI Dimensions. *Annals of Biomedical Engineering*, *51*(5), 870–874. https://doi.org/10.1007/s10439-023-03196-z

Cox, A., Seth, I., Xie, Y., Lang, D., Hunter-Smith, D. J., & Rozen, W. M. (n.d.). *Utilizing ChatGPT-4 for Providing Medical Information on Blepharoplasties to Patients 3 4*. https://doi.org/10.1093/asj/sjad096/7111402

Dahmen, J., Kayaalp, M. E., Ollivier, M., Pareek, A., Hirschmann, M. T., Karlsson, J., & Winkler, P. W. (2023). Artificial intelligence bot ChatGPT in medical research: the potential game changer as a double-edged sword. *Knee Surgery, Sports Traumatology, Arthroscopy*, *31*(4), 1187–1189. https://doi.org/10.1007/s00167-023-07355-6

Dergaa, I., Chamari, K., Zmijewski, P., & Ben Saad, H. (2023). From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing. *Biology of Sport*, *40*(2), 615–622. https://doi.org/10.5114/biolsport.2023.125623

DiGiorgio, A. M., & Ehrenfeld, J. M. (2023). Artificial Intelligence in Medicine &amp; ChatGPT: De-Tether the Physician. *Journal of Medical Systems*, *47*(1), 32. https://doi.org/10.1007/s10916-023-01926-3

Doshi, R. H., Bajaj, S. S., & Krumholz, H. M. (2023). ChatGPT: Temptations of Progress. *The American Journal of Bioethics*, *23*(4), 6–8. https://doi.org/10.1080/15265161.2023.2180110

Eggmann, F., Weiger, R., Zitzmann, N. U., & Blatz, M. B. (2023). Implications of large language models such as <scp>ChatGPT</scp> for dental medicine. *Journal of Esthetic and Restorative Dentistry*. https://doi.org/10.1111/jerd.13046

Eke, D. O. (2023). ChatGPT and the rise of generative AI: Threat to academic integrity? *Journal of Responsible Technology*, *13*, 100060. https://doi.org/10.1016/j.jrt.2023.100060

Fatani, B. (2023). ChatGPT for Future Medical and Dental Research. *Cureus*. https://doi.org/10.7759/cureus.37285

Fijačko, N., Gosak, L., Štiglic, G., Picard, C. T., & John Douma, M. (2023). Can ChatGPT pass the life support exams without entering the American heart association course? *Resuscitation*, *185*, 109732. https://doi.org/10.1016/j.resuscitation.2023.109732

Gabrielson, A. T., Odisho, A. Y., & Canes, D. (2023). Harnessing Generative Artificial Intelligence to Improve Efficiency Among Urologists: Welcome ChatGPT. *Journal of Urology*, *209*(5), 827–829. https://doi.org/10.1097/JU.0000000000003383

Graf, A., & Bernardi, R. E. (2023). ChatGPT in Research: Balancing Ethics, Transparency, and Advancement. *Neuroscience*, *515*, 71–73. https://doi.org/10.1016/j.neuroscience.2023.02.008

Gunawan, J. (2023). Exploring the future of nursing: Insights from the ChatGPT model. *Belitung Nursing Journal*, *9*(1), 1–5. https://doi.org/10.33546/bnj.2551

Gupta, R., Park, J. B., Bisht, C., Herzog, I., Weisberger, J., Chao, J., Chaiyasate, K., & Lee, E. S. (2023). Expanding Cosmetic Plastic Surgery Research Using ChatGPT. *Aesthetic Surgery Journal*. https://doi.org/10.1093/asj/sjad069

Haman, M., & Školník, M. (2023). Behind the ChatGPT Hype: Are Its Suggestions Contributing to Addiction? *Annals of Biomedical Engineering*. https://doi.org/10.1007/s10439-023-03201-5

Hassan, A. M., Nelson, J. A., Coert, J. H., Mehrara, B. J., & Selber, J. C. (2023a). Exploring the Potential of Artificial Intelligence in Surgery: Insights from a Conversation with ChatGPT. *Annals of Surgical Oncology*. https://doi.org/10.1245/s10434-023-13347-0

Hassan, A. M., Nelson, J. A., Coert, J. H., Mehrara, B. J., & Selber, J. C. (2023b). Exploring the Potential of Artificial Intelligence in Surgery: Insights from a Conversation with ChatGPT. *Annals of Surgical Oncology*. https://doi.org/10.1245/s10434-023-13347-0

Hill-Yardin, E. L., Hutchinson, M. R., Laycock, R., & Spencer, S. J. (2023). A Chat(GPT) about the future of scientific publishing. *Brain, Behavior, and Immunity*, *110*, 152–154. https://doi.org/10.1016/j.bbi.2023.02.022

Hopkins, A. M., Logan, J. M., Kichenadasse, G., & Sorich, M. J. (2023). Artificial intelligence chatbots will revolutionize how cancer patients access information: ChatGPT represents a paradigm shift. *JNCI Cancer Spectrum*, *7*(2). https://doi.org/10.1093/jncics/pkad010

HS Kumar, A. (2023). Analysis of ChatGPT Tool to Assess the Potential of its Utility for Academic Writing in the Biomedical Domain. *Biology, Engineering, Medicine and Science Reports*, *9*(1), 24–30. https://doi.org/10.5530/bems.9.1.5

Huh, S. (2023). Are ChatGPT’s knowledge and interpretation ability comparable to those of medical students in Korea for taking a parasitology examination?: a descriptive study. *Journal of Educational Evaluation for Health Professions*, *20*, 1. https://doi.org/10.3352/jeehp.2023.20.1

Johnson, S. B., King, A. J., Warner, E. L., Aneja, S., Kann, B. H., & Bylund, C. L. (2023). Using ChatGPT to evaluate cancer myths and misconceptions: artificial intelligence and cancer information. *JNCI Cancer Spectrum*, *7*(2). https://doi.org/10.1093/jncics/pkad015

Kleesiek, J., Wu, Y., Stiglic, G., Egger, J., & Bian, J. (2023). An Opinion on ChatGPT in Health Care—Written by Humans Only. *Journal of Nuclear Medicine*, 265687. https://doi.org/10.2967/jnumed.123.265687

Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., Madriaga, M., Aggabao, R., Diaz-Candido, G., Maningo, J., & Tseng, V. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLOS Digital Health*, *2*(2), e0000198. https://doi.org/10.1371/journal.pdig.0000198

Liu, S., Wright, A. P., Patterson, B. L., Wanderer, J. P., Turer, R. W., Nelson, S. D., McCoy, A. B., Sittig, D. F., & Wright, A. (2023). Using AI-generated suggestions from ChatGPT to optimize clinical decision support. *Journal of the American Medical Informatics Association*. https://doi.org/10.1093/jamia/ocad072

Lubowitz, J. H. (2023). ChatGPT, An Artificial Intelligence Chatbot, Is Impacting Medical Literature. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, *39*(5), 1121–1122. https://doi.org/10.1016/j.arthro.2023.01.015

Macdonald, C., Adeloye, D., Sheikh, A., & Rudan, I. (2023). Can ChatGPT draft a research article? An example of population-level vaccine effectiveness analysis. *Journal of Global Health*, *13*, 01003. https://doi.org/10.7189/jogh.13.01003

Marchandot, B., Matsushita, K., Carmona, A., Trimaille, A., & Morel, O. (2023). ChatGPT: the next frontier in academic writing for cardiologists or a pandora’s box of ethical dilemmas. *European Heart Journal Open*, *3*(2). https://doi.org/10.1093/ehjopen/oead007

Mbakwe, A. B., Lourentzou, I., Celi, L. A., Mechanic, O. J., & Dagan, A. (2023a). ChatGPT passing USMLE shines a spotlight on the flaws of medical education. *PLOS Digital Health*, *2*(2), e0000205. https://doi.org/10.1371/journal.pdig.0000205

Mbakwe, A. B., Lourentzou, I., Celi, L. A., Mechanic, O. J., & Dagan, A. (2023b). ChatGPT passing USMLE shines a spotlight on the flaws of medical education. *PLOS Digital Health*, *2*(2), e0000205. https://doi.org/10.1371/journal.pdig.0000205

Mijwil, M., Aljanabi, M., & Ali, A. H. (2023). ChatGPT: Exploring the Role of Cybersecurity in the Protection of Medical Information. *Mesopotamian Journal of Cyber Security*, 18–21. https://doi.org/10.58496/MJCS/2023/004

Moons, P., & Van Bulck, L. (2023a). ChatGPT: can artificial intelligence language models be of value to cardiovascular nurses and allied health professionals. *European Journal of Cardiovascular Nursing*. https://doi.org/10.1093/eurjcn/zvad022

Moons, P., & Van Bulck, L. (2023b). ChatGPT: can artificial intelligence language models be of value for cardiovascular nurses and allied health professionals. *European Journal of Cardiovascular Nursing*. https://doi.org/10.1093/eurjcn/zvad022

Morreel, S., Mathysen, D., & Verhoeven, V. (2023). Aye, AI! ChatGPT passes multiple-choice family medicine exam. *Medical Teacher*, 1–1. https://doi.org/10.1080/0142159X.2023.2187684

Ollivier, M., Pareek, A., Dahmen, J., Kayaalp, M. E., Winkler, P. W., Hirschmann, M. T., & Karlsson, J. (2023). A deeper dive into ChatGPT: history, use and future perspectives for orthopaedic research. *Knee Surgery, Sports Traumatology, Arthroscopy*, *31*(4), 1190–1192. https://doi.org/10.1007/s00167-023-07372-5

Park, I., Joshi, A. S., & Javan, R. (2023). Potential role of ChatGPT in clinical otolaryngology explained by ChatGPT. *American Journal of Otolaryngology*, *44*(4), 103873. https://doi.org/10.1016/j.amjoto.2023.103873

Patel, S. B., & Lam, K. (2023). ChatGPT: the future of discharge summaries? *The Lancet Digital Health*, *5*(3), e107–e108. https://doi.org/10.1016/S2589-7500(23)00021-3

Salvagno, M., Taccone, F. S., & Gerli, A. G. (2023). Can artificial intelligence help for scientific writing? *Critical Care*, *27*(1), 75. https://doi.org/10.1186/s13054-023-04380-2

Scerri, A., & Morin, K. H. (2023). Using chatbots like <scp>ChatGPT</scp> to support nursing practice. *Journal of Clinical Nursing*. https://doi.org/10.1111/jocn.16677

Sharma, M., & Sharma, S. (2023). Transforming Maritime Health with ChatGPT-Powered Healthcare Services for Mariners. *Annals of Biomedical Engineering*. https://doi.org/10.1007/s10439-023-03195-0

Shen, Y., Heacock, L., Elias, J., Hentel, K. D., Reig, B., Shih, G., & Moy, L. (2023). ChatGPT and Other Large Language Models Are Double-edged Swords. *Radiology*, *307*(2). https://doi.org/10.1148/radiol.230163

Sifat, R. I. (2023). ChatGPT and the Future of Health Policy Analysis: Potential and Pitfalls of Using ChatGPT in Policymaking. *Annals of Biomedical Engineering*. https://doi.org/10.1007/s10439-023-03204-2

Solomon, D. H., Allen, K. D., Katz, P., Sawalha, A. H., & Yelin, E. (2023). <scp>ChatGPT</scp> , et al … Artificial Intelligence, Authorship, and Medical Publishing. *ACR Open Rheumatology*. https://doi.org/10.1002/acr2.11538

Thomas, S. P. (2023). Grappling with the Implications of ChatGPT for Researchers, Clinicians, and Educators. *Issues in Mental Health Nursing*, *44*(3), 141–142. https://doi.org/10.1080/01612840.2023.2180982

Verhoeven, F., Wendling, D., & Prati, C. (2023). ChatGPT: when artificial intelligence replaces the rheumatologist in medical writing. *Annals of the Rheumatic Diseases*, ard-2023-223936. https://doi.org/10.1136/ard-2023-223936

Xue, V. W., Lei, P., & Cho, W. C. (2023). The potential impact of ChatGPT in clinical and translational medicine. *Clinical and Translational Medicine*, *13*(3). https://doi.org/10.1002/ctm2.1216