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An Exploration of Artificial Intelligence in Enhancing Doctor-Patient Communication Training for Clinical Interns

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Abstract: Doctor-patient communication is an essential core professional competency for physicians and a key training component for medical students during clinical internships. Currently, the teaching of doctor-patient communication in clinical internships across China is generally plagued by rigid teaching models, insufficient teaching resources, a lack of practical training scenarios and delayed evaluation and feedback. Leveraging technologies such as virtual digital humans, voice and facial expression recognition, natural language processing and virtual reality, artificial intelligence can create a highly simulated immersive training environment, deliver real-time intelligent guidance, and establish a full-process quantitative evaluation system. It also helps reduce teaching costs and promote the balanced sharing of high-quality teaching resources, effectively addressing the shortcomings of traditional teaching. Based on the current status of clinical teaching, this paper analyzes the existing difficulties in doctor-patient communication teaching and comprehensively discusses the application scenarios and practical challenges of artificial intelligence, aiming to provide ideas and references for the reform of clinical doctor-patient communication teaching.

Keywords: Artificial intelligence; Clinical internship; Doctor-patient communication; Medical teaching

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1. Introduction

Doctor-patient communication is central to medical practice, as its effectiveness directly influences patient satisfaction, treatment adherence, patient safety, and clinical outcomes [1]. The accreditation standards for clinical medicine programs in China have incorporated doctor-patient communication into the core competency framework for physicians, requiring medical students to develop comprehensive practical skills, including delivering medical information, mediating disputes, and managing long-term communication in chronic disease care [2]. Clinical internships serve as a critical transitional period for medical students to bridge theoretical knowledge and clinical practice, and represent a key stage for cultivating communication competencies. Currently, traditional models of doctor-patient communication education predominantly rely

on instructor-led demonstrations and role-playing, which present notable limitations, including difficulties in large-scale implementation, insufficient personalized guidance, and challenges in simulating high-risk clinical scenarios.

Driven by the technological revolution and the digital transformation of medical education, artificial intelligence (AI) has been deeply integrated into various aspects of medical education [3,4], providing technical support for innovation in doctor-patient communication teaching. Promoting the deep integration of modern information technology with medical humanities education and innovating the teaching model of doctor-patient communication have become important directions in medical education reform. Against this backdrop, this paper analyzes the existing difficulties in doctor-patient communication teaching and comprehensively discusses the application scenarios and practical challenges of artificial intelligence, aiming to provide ideas and references for the reform of clinical doctor-patient communication teaching.

2. Dilemmas of doctor-patient communication teaching in clinical clerkships

2.1. Rigid teaching model

Medical education generally tends to prioritize professional skills over humanistic qualities. During the clinical internship phase, preceptors primarily focus on disease diagnosis and treatment as well as the imparting of operational skills, while neglecting training in doctor-patient communication. Meanwhile, most doctor-patient communication teaching relies on traditional methods such as classroom lectures, case-based teaching, and workshops. As a result, medical interns lack training in real scenarios, exhibit low confidence and stiff expression when communicating with patients, and struggle to establish trusting relationships.

2.2. Limited teaching resources

First, clinical instructors are burdened by heavy daily patient care responsibilities, making it difficult to ensure systematic faculty development and structured training programs. Second, standardized patient resources are scarce [5], and their development and use involve high costs, limiting the ability to support large-scale repetitive communication training and accurately replicate complex emotional states—such as anxiety, skepticism, or anger—that patients may exhibit in real clinical settings. Third, interns have limited opportunities for hands-on clinical communication due to tense doctor-patient relationships and concerns about medical risk management. Supervisors often restrict interns from independently conducting patient consultations, resulting in mostly passive observational learning and insufficient practical experience. Fourth, current teaching is largely confined to routine history-taking scenarios, while high-risk, high-complexity communication situations—such as delivering bad news, mediating disputes, or providing end-of-life care—are rarely incorporated into practical training.

2.3. Delayed feedback and evaluation

The development of physician–patient communication competence relies on timely and precise feedback and guidance; however, conventional feedback in clinical teaching presents notable shortcomings. On the one hand, clinical preceptors, burdened by heavy clinical workloads, tend to provide predominantly post-hoc commentary, which lacks real-time guidance. Moreover, evaluations often depend on subjective experience without quantitative criteria, making it difficult to pinpoint specific deficiencies in aspects such as verbal expression, empathic responses, and nonverbal behavior. On the other hand, the evaluation framework

remains unidimensional, emphasizing the procedural completeness of communication while overlooking the assessment of core competencies such as empathy, emotional regulation, and humanistic care. As a result, interns struggle to make targeted improvements and become trapped in persistent communication difficulties.

3. Application scenarios of artificial intelligence in physician–patient communication education

3.1. Constructing immersive communication training scenarios

Multimodal virtual standardized patients built upon large language models and digital human technology can transcend the scenario and cost limitations of conventional standardized patients, enabling full-scenario, high-fidelity communication training. These virtual standardized patients can simulate individuals of varying ages, genders, cultural backgrounds, and emotional states, covering a wide range of clinical communication contexts such as routine consultations, breaking bad news, family communication, and dispute mediation. They also allow unlimited repeated practice without temporal or spatial constraints [6]. Research has demonstrated that virtual patient dialogues generated by ChatGPT can realistically reproduce complex emotions such as anxiety and skepticism in prenatal counseling scenarios, effectively compensating for the insufficient emotional expressiveness of traditional standardized patients [7,8]. Another study has developed an AI-based physician–patient empathic language teaching and evaluation system on a WeChat mini-program, which helps medical students enhance their empathy in doctor–patient communication and stimulates their learning interest [9]. Interns who received AI training also exhibited better communication self-confidence and higher patient satisfaction scores in real clinical settings [10].

Moreover, a recent advancement in interprofessional training employs VR to connect students from different healthcare disciplines in a shared virtual environment for real-time collaborative simulation. This approach enables nursing, medical, and allied health students to practice teamwork and communication skills as if they were collaborating on patient cases in person. Leveraging AI, these VR platforms facilitate realistic interactions, allowing students to complete tasks simultaneously and learn from one another. Such interdisciplinary, real-time VR collaboration can improve communication competence and situational awareness, both of which are critical to patient outcomes [11].

3.2. Real-time intelligent feedback

Through natural language processing, speech recognition, and facial expression recognition technologies, AI systems can capture in real time the verbal content, vocal tone, and emotional expression in interns' communication, and generate multidimensional real-time feedback by referencing standardized communication frameworks such as SEGUE and SPIKES[8]. Compared with the post-hoc commentary provided by traditional clinical preceptors, intelligent feedback can precisely identify specific issues such as insufficient use of open-ended questions, lack of empathic expression, and inadequate information delivery, and offer optimization suggestions, thereby achieving a closed-loop learning cycle of "training–feedback–improvement." AI feedback systems have been shown to be significantly more effective than expert instruction in improving medical students' clinical skills, without increasing learners' cognitive load or negative emotions [12]. The medical interview chatbot system developed by Co et al. (2022) can conduct real-time assessment of medical students' history-taking process, effectively improving the standardization of interns' clinical interviewing [13].

3.3. Constructing a standardized evaluation system

AI technology enables the construction of a quantitative evaluation system that covers the entire communication process, providing objective scoring of interns' communication competence from multiple dimensions such as information gathering, rapport building, empathic expression, emotional management, and shared decision-making, thereby avoiding the biases of subjective assessment. Furthermore, the system can record the complete process of each training session and generate individual competence growth curves, helping interns clearly identify their weaknesses and directions for improvement, while also providing teaching administrators with a standardized basis for evaluating teaching quality [10]. A review by Chance indicates that AI evaluation systems can achieve quantitative tracking of communication skills, with the reliability of the assessment results significantly superior to that of traditional subjective evaluations. Moreover, through big data analysis, these systems can predict and assess potential risks among intern cohorts, helping students reduce active errors and ensuring patient safety [10].

3.4. Enhancing the utilization of teaching resources

AI-based teaching systems enable continuous training, markedly enhancing the utilization of teaching resources and reducing training costs [10]. Simultaneously, AI systems can automatically complete training documentation and assessment, substantially alleviating the workload of clinical preceptors, allowing them to devote more attention to guiding complex scenarios and cultivating humanistic literacy.

AI-driven communication teaching systems can enable cross-regional sharing of high-quality educational resources, providing interns in primary-level hospitals and resource-limited areas with standardized training scenarios and evaluation criteria equivalent to those of top-tier medical schools, thereby narrowing the disparities in teaching quality across different regions and internship sites [10]. Scherr et al. noted that large language models can generate an unlimited number of free clinical communication simulation scenarios, offering equal learning opportunities for medical students in economically underdeveloped regions and effectively lowering the resource barriers to medical education [14].

3.5. Challenges in the application of AI technology

Currently, large language models may generate medical content that does not conform to clinical norms, and gaps remain between virtual patients and real patients in terms of dialogue logic and emotional expression, with insufficient fidelity in reproducing certain complex clinical scenarios. Most existing AI-based communication teaching models have been developed on the basis of Western medical education frameworks, without fully accounting for the cultural characteristics of medical practice and physician–patient communication in China—such as family-based decision-making models, medical dispute management, and localized expressions of humanistic care—resulting in a disconnect between some training scenarios and domestic clinical realities. AI communication training involves large volumes of patient privacy data and clinical scenario information, posing risks of privacy breaches during data collection and use. Moreover, over-reliance on AI training may cause interns to neglect the humanistic warmth essential in real clinical settings, thereby weakening their emotional perception skills in face-to-face communication. Chance notes that the ethical norms and data security mechanisms for AI-based teaching remain underdeveloped, representing a core barrier to the wider adoption of the technology [10].

4. Conclusion

Artificial intelligence technology offers a revolutionary solution to the longstanding challenges of physician–patient communication teaching in clinical internships. Application scenarios such as virtual standardized patients, real-time intelligent feedback, and comprehensive multidimensional assessment can effectively enhance the accessibility, precision, and standardization of communication training, as preliminarily validated by evidence-based research both in China and internationally. Although current technological applications still face challenges in terms of medical accuracy, cultural adaptability, and ethical safety, deep integration of AI technology with physician–patient communication education can be realized through pathways such as building medicine-specific large language models, advancing the development of localized scenarios, establishing blended teaching models, and refining ethical norms.

In the future, it is essential to strengthen further theoretical research and practical exploration of AI in medical education, and to construct an AI-empowered physician–patient communication education system that aligns with China's clinical realities. By deeply integrating technological strengths with humanistic medical education, we can cultivate clinicians who possess both professional communication skills and a profound spirit of humanistic care, thereby providing talent support for improving physician–patient relationships and enhancing healthcare quality.

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Reference

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