Editorial

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The Growing Problem of Radiologist Shortage: China's Perspective

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Stress from the Growing Problem of Radiologist Shortages in China

The prevalence rate of chronic diseases among Chinese adults is now over 60%, representing an increase of 15.5% compared to that in 2008. Moreover, > 60% of the patients visit tertiary hospitals, accounting for less than 13% of all hospitals in China. This places a significant burden on the radiologists working in tertiary hospitals. Additionally, the annual growth rate of medical imaging data in China has reached 30%, whereas that of radiologists is only 4%. This discrepancy resulted in an average of only one radiologist per 70000 individuals. On average, one Chinese radiologist is required to interpret or report 300–400 X-rays, 80–100 computed tomography (CT) scans, or 60–80 magnetic resonance imaging (MRI) scans each day. Even if it takes only approximately 10–20 minutes to complete one CT or magnetic resonance report, it still necessitates 10–12 working hours per day to adequately read all medical images [1].

A nationwide survey was conducted in 2023 for emergency radiologists in 180 hospitals, including 53.3% tertiary hospitals and 46.7% secondary hospitals. The volume of emergency imaging examinations and the workload per shift were significantly higher in tertiary hospitals than in secondary hospitals. Radiologists feel stressed because of the risk of misdiagnosis or missed diagnoses, heavy workloads, and time constraints. The top three demands for emergency radiologists include minimizing reporting time as much as possible, providing accurate imaging results for precise diagnosis and treatment, and effectively identifying critical values.

Chinese Radiology Society Promoting Implementation of Artificial Intelligence in Medical Imaging

Realizing the problems caused by the shortage of radiologists and the potential role of artificial intelligence (AI), the AI subgroup of the Chinese Radiology Society (CSR) was established in 2018. They were committed to promoting the implementation of AI in medical imaging applications. The AI subgroup of CSR develops progress reports on AI applications in medical imaging, updating regularly to ensure that CSR stands on the leading edge of AI.

More than 40 members of the editorial board and more than 100 editors, including experts from relevant government regulatory departments, top AI algorithm scientists, renowned medical imaging experts, and research experts from leading AI enterprises, are currently working on a progress report titled "Artificial Intelligence in Medical

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Imaging in China." They aimed to compare progress and development trends domestically and internationally and explore the fundamental driving forces and potential breakthrough paths for industrial advancement. The ultimate goal is to promote the healthy growth of AI in the medical imaging industry.

Data, as a core element of AI research, play a critical role throughout the lifecycle of AI in medical imaging. First, data are valuable for productivity, as they intersect with national security and standards establishment, ultimately determining the developmental trajectory of AI. Second, a standardized database containing comprehensive patient information can be used to train junior radiologists in examinations, diagnoses, and differential diagnoses. Additionally, medical precision and intelligence can be enhanced by mining and analyzing clinical databases, leading to advances in scientific research and improvements in management. High-standard data are essential for model building, iteration, training, and testing. With support from the National Health Commission and CSR, 14 national medical imaging database projects were launched in 2022, covering various diseases, such as osteoporosis, lung nodules, hepatocellular carcinoma, coronary arteries, and emergency diseases.

Medical Education Combined with AI

China's higher medical education is actively exploring "AI + Medical Education" to cultivate medical professionals. By 2021, AI-related majors had been registered at 435 universities with the approval of the Ministry of Education. According to the survey, 7% of the respondents reported that their colleges offered 1–2 AI-related theoretical courses, such as "AI Python Language Programming," "AI and Life Sciences," "AI Elementary Seminar," "Neural Networks and Deep Learning," and "Application of AI in Medicine." Additionally, approximately 84.8% of postgraduate students expressed aspirations for more AI courses in colleges and universities, surpassing undergraduate students (65.8%), vocational students (65.1%), and trainees (63.4%) [2].

Policies Supporting and Facilitating the Application of Medical Imaging AI

In accordance with the relevant policies on medical imaging issued by various government departments in 2022–2023, there has been a strong push to enhance the development of domestic medical imaging equipment and explore multiple application scenarios for AI in medical imaging. These policies have provided explicit regulatory guidance for the advancement of AI technology in China. Since 2023, several provinces have initiated pilot programs to incorporate AI medical imaging products into the scope of medical insurance coverage. As a result of supportive policies, the exponential growth of AI medical imaging software has occurred since its initial approval in early 2020. To date, 70 AI medical imaging products, including AI-assisted diagnosis and therapy products, have been approved by the National Medical Products Administration (NMPA), including AI-assisted diagnosis and AI-assisted therapy products [3].

In China, significant progress has been made in the application of AI in medical imaging in China. Based on a nationwide survey conducted in 2022, a total of 6347 questionnaires were collected. The application of AI varies across regions, with the concentration of AI products occurring mainly in tertiary hospitals followed by secondary hospitals. The penetration rate of AI in medical imaging is predicted to reach 30%–40% by 2024. The top three applications of AI in radiology are pulmonary nodule screening, coronary post-processing and structured reports, and automatic rib screening [2].

The Medical Image Cloud Service Platform (MICSP) also relieves the shortage of radiologists and enhances teleradiology efficiency. First, the MICSP is expected to break down information silos and achieve data sharing within and between hospitals. Second, the MICSP can provide services for more efficient access to medical imaging data and an understanding of imaging reports. Additionally, through remote consultation assistance, the MICSP can improve diagnostic efficiency and accuracy in primary hospitals. Finally, MICSP can standardize scanning protocols and simplify operations. It is worth mentioning that several provinces in China have already implemented AI medical imaging cloud platforms.

CONCLUSION

AI is developing rapidly and has become one of the most popular methods in medical imaging. AI has exerted a far-reaching influence in many fields, including "AI + Education," "image enhancement," "workflow triage," "quantification," and "customized interactive reports" [4]. With more effective clinician and AI collaboration and the evolution of large language models, the future of AI

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in medical imaging demonstrates promising results in the shortage of radiologists in China.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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