Postprint: Reflections on Clinical Pathways in Radiological Imaging in the New Era

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Abstract

As radiographic imaging technology continues to advance, the clinical diagnostic and therapeutic pathway for radiographic imaging in the new era primarily comprises three essential components: the multidisciplinary treatment model, the establishment and adherence to clinical guidelines, and the clinical application of emerging technologies such as artificial intelligence. Radiologists should leverage this pathway to assume a greater role in patient care, and to demonstrate greater medical value to physicians in other clinical departments, healthcare management departments, and the general public.

Full Text

Contemplation on Clinical Diagnostic Pathways of Radiological Imaging in the New Era

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Abstract

Along with the continuous development of radiological imaging techniques, the clinical diagnostic pathway of radiological imaging in the new era comprises three important aspects: the multidisciplinary team (MDT) model, establishing and following clinical guidelines, and the clinical application of new technologies such as artificial intelligence. Radiologists can play a more important role in patient diagnosis and treatment and demonstrate their value to colleagues, healthcare systems, and society through this clinical pathway.

Keywords: multidisciplinary team; clinical guideline; artificial intelligence; radiologist; value

1. Multidisciplinary Team Model

With rapid advances in radiological imaging technology, the development of the discipline must align with the direction of China' s healthcare development in the new era. To demonstrate value and meet clinical needs, radiologists should actively engage in three critical components of modern radiological imaging clinical pathways: the multidisciplinary team (MDT) model, evidence-based clinical guidelines, and the clinical application of artificial intelligence.

MDT represents the most important and core component of radiological imaging clinical pathways in the new era. Established on the foundation of evidence-based medicine, this patient-centered model brings together experts and healthcare professionals from multiple related disciplines to form a relatively fixed comprehensive treatment team that conducts clinical discussions on specific diseases or organs. The UK National Health Service has incorporated the colorectal cancer MDT model into its planning. In 1948, the United States first proposed the concept of tumor boards. In 1981, MD Anderson Cancer Center pioneered the comprehensive implementation of subspecialty oncology clinical pathways in the United States. In 1997, West China Hospital became the first institution in China to establish a colorectal tumor MDT, forming a leading model for multidisciplinary collaboration.

Radiologists play several positive roles in the MDT process. First, they clarify lesion localization and interpret imaging signs, providing qualitative diagnosis and thus ensuring medical safety and improving quality. Second, they integrate clinical symptoms, laboratory findings, and radiological examination results to provide clinically optimized imaging protocols. Third, they combine the latest developments from various departments with patients' disease conditions, financial status, and physical and psychological capacity to formulate scientific, standardized optimal treatment plans after weighing advantages and disadvantages. This involvement not only wins the trust of clinicians from other departments and gains recognition from hospital management but also enhances radiologists' professional identity and sense of achievement. Furthermore, MDT facilitates the summary of difficult cases and enables radiologists to educate patients, healthcare administrators, and the public about radiological imaging.

The Royal College of Radiologists has proposed requirements and standards for clinical radiologists in tumor MDTs across three dimensions: time, quality control, and teaching. Time requirements stipulate that radiologists must review all images in advance. Quality control requires that auxiliary imaging reports should be provided, containing more professional information not covered in original reports, including tumor TNM staging and prognosis. When patients' treatment plans may be affected, any discrepancies from original diagnostic opin-

ions and differing views from surgeons or pathologists should be documented. Teaching requirements state that besides fixed MDT members, other radiologists should participate periodically to deepen their understanding of the MDT process.

In China, the lack of standardized MDT protocols means their potential benefits have not been fully realized, with only a minority of patients currently benefiting. The proliferation of MDTs has increased workload for radiology departments, posing challenges to work scheduling. Solutions include demonstrating the value of MDT to hospital administrators to secure greater administrative support, incorporating MDT participation into routine clinical work arrangements, and implementing more precise scheduling.

2. Integration of Laboratory and Radiological Examinations

Within the MDT framework, radiologists can integrate clinical symptoms, laboratory test results, and radiological imaging findings to provide optimal imaging protocols. All participating departments must thoroughly understand patient information and propose treatment plans. This process represents continuing education for radiologists and other clinicians while also providing opportunities to educate patients, healthcare managers, and the public about radiological imaging. MDT offers more personalized and precise treatment compared to conventional consultations, particularly benefiting patients with oncological and complex conditions. For patients, MDT can effectively reduce treatment costs, avoid unnecessary referrals, and maximize quality of life. For physicians, it reduces clinical risks and decreases unnecessary imaging examinations, thereby conserving medical resources. For hospitals, it improves treatment service levels, saves costs, and facilitates multidisciplinary academic exchange and interactive learning of cutting-edge technologies.

3. Clinical Application of New Technologies such as Artificial Intelligence

With the rapid development of artificial intelligence technology, its application in medical imaging is advancing daily, with numerous clinical studies and implementations in tumor detection and radiotherapy target organ delineation. Integrating AI into daily radiological practice can reduce repetitive simple tasks for radiologists, decrease human error, improve work efficiency and diagnostic accuracy, and promote precision medicine in imaging. However, AI cannot completely replace radiologists' clinical work. In the new era of radiological imaging clinical pathways, AI functions such as machine reading and simple treatment recommendations will gradually become part of daily practice. The combination of AI technology with big data mining enables the transformation of vast medical imaging data into effective clinical decisions through AI-driven screening, organization, and extraction. The advancement of medical imaging technology,

progress in AI, and continuous accumulation of healthcare big data will propel the development of intelligent medicine into a new era.

4. Summary

The third important component of radiological imaging clinical pathways in the new era is establishing and adhering to clinical guidelines. Guideline consensus articles refer to authoritative instructional documents, and their development and promotion represent crucial measures for standardizing healthcare services. To ensure scientific, fair, and authoritative guideline development and adaptation to China' s national conditions, guideline consensus articles must meet specific criteria: (1) clear scope and purpose of application; (2) representation by authoritative academic groups with reasonable participation from all stakeholders; (3) rigorous and standardized development process supported by evidence-based medicine; (4) clear textual expression with content undergoing thorough expert validation and clinical testing.

The most important principle of radiological imaging clinical pathways in the new era is enabling radiologists to participate more actively in clinical diagnosis and treatment, consistently adopting patient-centered approaches, establishing and following clinical guidelines, and continuously applying new diagnostic and treatment concepts and methods such as MDT and AI. Through this pathway, radiologists will undoubtedly play greater roles in patient care and demonstrate greater value.

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Note: Figure translations are in progress. See original paper for figures.