Teaching Corner

How to improve the comprehensive capabilities of radiographers at Mzuzu Central Hospital within the context of modern medical imaging technology?

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Abstract

Objective

This study aimed to investigate strategies for comprehensively enhancing the capabilities of radiographers at Mzuzu Central Hospital (MCH), within the framework of contemporary medical imaging technology advancements.

Methods

The current study comprehensively assessed the technical proficiency of radiographers working at MCH, while concurrently looking at the challenges encountered during routine CT operations. Subsequently, a multifaceted exploration was conducted to identify avenues and devise strategies aimed at augmenting the overall capabilities of the radiographers.

Results:

The primary duty of radiographers at MCH involves operating imaging equipment and performing diagnostic procedures using ultrasound, X-ray, and CT scans on patients. Notably, these radiographers often perceive themselves academically underqualified and only occupying a supportive role in the hospital setting. Specifically, CT scanning, a pivotal diagnostic tool is hindered by suboptimal technician performance, characterized by inadequate operational proficiency, a negligible focus on scan optimization and minimal concern for CT scan quality. These deficiencies compromise the quality of CT scans, thereby negatively affecting diagnostic precision and subsequent treatment outcomes. Consequently, the study recommends a three-pronged approach for improvement: (1) a robust enhancement of radiological professionals' overall competence; (2) support for professional development and self-directed learning; (3) strengthening personnel management and promoting accountability within the Radiology Department.

Conclusion

Radiographers at MCH were imperative to continuously elevate their expertise in order to keep pace with the ever-evolving requirements of their profession and the significant advancements in contemporary medical imaging technology. This ongoing professional development was crucial for ensuring optimal patient care and harnessing the full potential of advanced imaging modalities.

Key words: Radiographer; Capability; Modern medical imaging technology

Introduction

Amidst the rapid advancements in modern medical technology and the subsequent enhancement of healthcare standards, contemporary medical imaging technologies play crucial roles in disease diagnosis, treatment planning, pathological assessment, and post-intervention monitoring[1-3]. Encompassing a broad interdisciplinary knowledge base, modern medical imaging technology presents significant technical challenges to radiographers, necessitating the seamless integration of practical skills with the ever-evolving technological landscape[4-5]. Consequently, the comprehensive upgrading of radiographers' competencies is paramount in ensuring optimal diagnostic outcomes and propelling advancements within the field[6-9].

The Radiology Department of Mzuzu Central Hospital stands as the preeminent medical imaging center in northern Malawi, integrating various modalities such as colour doppler ultrasound, Computed Radiography (CR), Digital Radiography (DR), mammography, and Multi-slice Spiral CT (MSCT). Radiographers, as main users of the equipment, are the backbone of the department's operation. The recent incorporation of high-end imaging equipment underscores the imperative for young radiographers to continually elevate their competencies, promptly enriching their knowledge base and personal attributes. By transforming these challenges into opportunities, radiographers can effectively meet the rigorous demands of modern medical imaging technology[10,11]. Therefore, this study aims to delve into the technical proficiency of radiographers at MCH, while concurrently examining the issues encountered during routine image acquisition. Through this analysis, we aspire to

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uncover avenues and strategies for fostering a comprehensive enhancement of these radiographers' capabilities in medical imaging field.

Methods

Comprehensive Analysis of Contemporary Radiographers' Technical Proficiency

To enhance the comprehensive capabilities of radiographers, it is essential to comprehend the current state of this profession. Many radiographers are engrossed in repetitive tasks, which can lead to a monotonous daily routine that stifles innovation and procedural optimization. This routine often fosters complacency, inhibiting creativity and progress. Additionally, the managerial aspects of Radiology Departments are typically reserved for radiologists, leaving radiographers confined to executing routine examinations as assigned. Furthermore, the academic backgrounds of radiographers tend to be less advanced than those of radiologists, with many radiographers holding associate or bachelor's degrees, often not directly related to the field. This discrepancy, coupled with limited training within Radiology Departments, can result in young radiographers struggling with both practical experience and theoretical knowledge, dampening their enthusiasm and initiative. In challenging situations, some radiographers may even consider resignation or change the profession[12].

Within the Radiology Department of MCH, a similar scenario unfolds. Amidst an acute shortage of radiologists in Malawi, with only three nationwide, the department relies heavily on an expatriate radiologist from China, while the remainder of the staff comprises solely of radiographers. Radiographers sometimes may have a misplaced understanding of their job positioning, lacking sufficient sense of identity and achievement[12]. This mindset not only impedes personal growth but also hinders the development of the radiographer workforce as a whole. It is crucial to address these issues and provide opportunities for growth and recognition within the field to foster a more positive and productive work environment.

Analysis of Issues in Daily CT Operation Practices Among Radiographers

The 16-slice spiral CT scanner from Neusoft, installed in 2021 in the Radiology Department of MCH stands as the most advanced imaging modality in northern Malawi catering for over two million people requiring CT imaging services. CT scanning holds a pivotal role in clinical settings and the importance in ensuring the quality operation of this imaging equipment is out of question. However, several challenges persist in the CT operation practices among radiographers, as outlined below: firstly, proficiency levels in CT operations are suboptimal. Given the intricate instrumentation and demanding skill set required for CT scanning, the competency of operators is crucial to guarantee optimal scan quality. Unfortunately, many hospitals face a shortage of proficient CT radiographers, resulting into low-quality scans that compromise diagnostic accuracy. Secondly, there is a lack of emphasis on scan optimization. High-quality CT scans are essential for precise diagnoses and treatment planning in various medical conditions. However, many CT radiographers overlook the importance of optimizing scan parameters, leading to suboptimal scan quality that fails to meet diagnostic requirements. Thirdly, insufficient attention is given to the significance of CT scan quality. As MCH serves as the largest referral center in northern Malawi, it faces significant pressure to deliver high-quality medical imaging services, CT radiographers are often under considerable work stress. This frequently results in a disregard for CT quality control. Consequently, technical issues arise during operations, adversely affecting the quality of CT scans. To address these challenges, it is imperative to invest in training and education programs for radiographers, focusing on the importance of proficiency, scan optimization, and quality assurance in CT operations. Additionally, implementing quality control measures and fostering a culture of continuous improvement within the Radiology Department can help ensure that CT scans meet the highest standards of quality and diagnostic accuracy.

Characterization of Contemporary Medical Imaging Technologies: The Digital Evolution and Technical Distinctiveness

The digital evolution revolutionized the field of medical imaging with the widespread adoption of innovative modalities like CT, CR, DR and magnetic resonance imaging (MRI). These advancements have marked a significant shift from analog to digital image processing, leading to substantial improvements in image quality and clarity through advanced post-processing techniques[13]. Furthermore, digitalization has opened new avenues for image storage and transmission. However, the dissemination of modern medical imaging technologies remains uneven, with bigger hospitals and tertiary health care facilities typically embracing digitization while smaller ones often lag behind, relying on traditional imaging modalities. That being said, it is predictable that digitalized imaging will eventually become widely accepted and popular.

A distinct feature of radiological diagnosis lies in its inherent subjectivity; thus, it requires rigorous efforts in the acquisition to mitigate the influence of subjective factors. This necessitates adherence to strict standards for technical protocols and image quality during examination procedures. In addition to that, the practical implementation of radiological imaging involves the integration of diverse media requiring effective coordination across device selection, image processing, as well as manual and automatic operations. Computer technology advancements have made it possible to overcome incompatibilities between different data sources, promoting the collaborative use of data from several sources. This, in turn, underscores the fundamental enhancement of diagnostic efficiency and accuracy.

Results

Through a meticulous examination of the technical proficiency exhibited by radiographers at MCH, coupled with an identification of the challenges confronted during routine CT operations, this study presents three strategic pathways (Enhancing the Professional Capabilities of Radiographers; Promoting Self-Education and Professional Growth; Strengthening Personnel Management and Accountability) aimed at augmenting the comprehensive capabilities of radiographers within the modern imaging technology landscape.

Discussion

Enhancing the Professional Capabilities of Radiographers

Firstly, the Radiology Department at MCH should prioritize

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the recruitment of highly skilled professionals, with a keen focus on technical expertise, thereby reinforcing the collective competence of its technical workforce. Secondly, it is imperative to continuously rejuvenate and enrich the skill set by fostering collaborations and exchanges with top local and international hospitals. Thirdly, the intensification of comprehensive training programs tailored specifically for radiographers, complemented by scientifically designed curricula, is vital. As modern imaging technologies impose increasingly stringent standards, both theoretical knowledge and practical proficiency must be vigorously cultivated through regular training sessions and assessments.

Promoting Self-Education and Professional Growth

Given the multifaceted nature of modern medical imaging encompassing disciplines like physics, biology, informatics, and computer technology; radiographers must embark on a continuous journey of self-improvement. This involves actively engaging in continuing professional education programs (CPDs), attending academic lectures and online learning platforms, as well as acquiring practical experience. By continually replenishing their knowledge through diverse learning avenues, one may stay abreast of technological advancements and meet the evolving demands of modern imaging technologies. Furthermore, modern imaging necessitates that radiographers proactively identify issues, seek solutions, and assume a proactive stance throughout the imaging process thereby contributing to the comprehensive application and innovative development of modern imaging techniques.

Strengthening Personnel Management and Accountability

The quality of management at the supervisory level is paramount in elevating clinical diagnosis and imaging examination standards. A scientific management system coupled with a rational reward-and-punishment mechanism can effectively motivate radiographers. Additionally, implementing a cohesive and consistent departmental management model clarifies job responsibilities across various positions, fostering rational staffing, equitable collaboration, and fair arrangements. Over time, such a rational personnel management approach lays the groundwork for nurturing a positive work environment, reinforcing team cohesion, and ultimately enhancing the overall performance and accountability of radiographers.

Conclusion

Imaging is a crucial technological requirement for radiology departments, requiring the effective use of imaging technologies to deliver high-quality imaging services to patients. To attain this objective, radiographers are obligated to relentlessly pursue personal growth and skill enhancement, thereby aligning their competencies with the ever-evolving requirements of their profession and embracing the technological advancements that define contemporary imaging science. This unwavering dedication to excellence is paramount in navigating the challenges posed by the dynamic and ever-changing landscape of modern imaging technologies.

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