



The Growing Problem of Radiologist Shortages: Korean Perspective

Kyung-Hyun Do¹, Kyongmin Sarah Beck², Jeong Min Lee^{3,4}

¹Department of Radiology and Research Institute of Radiology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea

²Department of Radiology, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Republic of Korea

³Department of Radiology, Seoul National University College of Medicine, Seoul, Republic of Korea

⁴Department of Radiology, Seoul National University Hospital, Seoul, Republic of Korea

Keywords: Radiologists shortage; Burn-out

Radiology departments in Korea are currently facing a severe shortage of radiologists, and the increase in radiological examinations is contributing to increased workload. The development of cutting-edge medical technologies and advancements in medicine have significantly enhanced the role of diagnostic imaging in healthcare. Factors such as an aging population and the evolution of health insurance systems have contributed to a substantial increase in the demand for medical imaging.

In Korea, the number of computed tomography (CT) and magnetic resonance imaging (MRI) examinations has surged owing to the implementation of health insurance coverage policies. As of 2019, Korea's use of CT scans was 1.5 times higher, and MRI scans was twice as frequent compared to the Organization for Economic Cooperation and Development (OECD) countries' average. From 2016 to 2020, the total number of CT and MRI scans has increased by 40.9%. Additionally, ultrasound examinations have seen substantial growth, especially abdominal scans, which rose from 160,000 cases in 2013 to 3.22 million cases in 2021, primarily

Received: October 15, 2023 **Accepted:** October 16, 2023

Corresponding author: Kyung-Hyun Do, MD, PhD, Department of Radiology and Research Institute of Radiology, Asan Medical Center, University of Ulsan College of Medicine, 88 Olympic-ro 43-gil, Songpa-gu, Seoul 05505, Republic of Korea

• E-mail: dokh@amc.seoul.kr

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

because of government policies expanding coverage [1].

However, the extent to which radiologists can cope with this surge in examinations is a critical issue. To maintain the quality and efficiency of patient care, it is crucial to ensure that the number of radiologists aligns with the increasing volume of diagnostic imaging procedures.

In 2013, there were 3065 radiologists in South Korea. Fast forward to 2023, a decade later, the number of radiologists has increased to 4206, representing a 1.3-fold increase. In contrast, the number of radiological examinations has increased tenfold during this period, significantly outpacing the growth of the radiologist workforce.

To gauge the workload of Korean radiologists, we divided the total number of diagnostic procedures by the number of radiologists. We calculated the number of radiologists by considering those under the age of 65 years (comprising approximately 85% of the total radiologists in Korea), excluding interventional radiologists (approximately 340 individuals) and accounting for a 10% reduction due to various factors. Based on this calculation, it is evident that radiologists in Korea have a substantial workload; they are required to perform an average of 17 CT scans, 9 MRI scans, and 21 ultrasound scans, totaling 47 examinations, daily. In 1 month, this workload translates to approximately 334 CT scans, 176 MRI scans, and 426 ultrasound scans, amounting to 936 procedures per month.

In short, the burden of workload in radiology departments in Korea has increased, resulting in a shortage of radiologists. This scarcity has a direct impact on the accuracy and efficiency of diagnostic processes. Moreover, it has given rise to burnout and increased stress among Korean radiologists, ultimately compromising their job satisfaction

and, in severe cases, resulting in errors and reduced overall quality of care.

A survey of the members of the Korean Society of Radiology conducted between August 19, 2022 and August 31, 2022 attracted responses from 642 radiologists, including 511 board-certified radiologists and 131 radiologist trainees. Workload varied significantly depending on the practice setting. Among radiologists in private clinics, 30.6% reported performing 300–500 examinations per month, whereas 35.5% reported conducting 500–800 examinations per month. This indicates that more than half of radiologists in private clinics manage a substantial workload. In contrast, radiologists in university hospitals face even higher workloads, with 28.7% performing between 800–1000 examinations per month and 23.2% conducting more than 1000 examinations per month [2].

Moreover, radiologists in training hospitals bear the responsibility of not only patient care, but also education, research, and active involvement in professional societies. However, the insufficient allocation of time and resources has placed an excessive workload on academic radiologists. This shortage of time and resources has led to a lack of focus on education and research, adversely affecting academic achievements and work quality. Data on burnout among radiologists at university hospitals paint a worrying picture; a staggering 71.6% reported feelings of burnout. Furthermore, 45.7% of the academic radiologists reported being 'neither satisfied' nor 'dissatisfied' with their job. Lower scores for career satisfaction and higher scores for burnout were reported by academic radiologists, compared with private practice radiologists. The primary cause of burnout among radiologists was excessive workload, with 62% citing it as the leading factor. Stress is closely related to interpersonal relationships, accounting for 24% of the reported factors that contribute to burnout [2].

Radiology departments in training hospitals play crucial roles as hubs of learning by integrating education, research, and clinical practice to advance medical knowledge and enhance patient care. They are at the forefront of improving patient outcomes, promoting public health, advancing radiological technologies, and developing guidelines and policies. However, the current shortfall in faculty poses significant challenges, potentially hindering these departments from realizing their full potential and mission.

Radiologists have expressed their desire for reduced working hours as their top priority for overcoming burnout. Additionally, restoring work-life balance and addressing

staffing shortages and salary increases were also identified as important measures to combat burnout. These findings underscore the urgent need for strategies to alleviate the burden on radiologists, improve their work-life balance, and enhance job satisfaction to ensure the sustainability of the radiology workforce in South Korea.

To address these challenges, interventions should focus on reassessing workload, overcoming pay disparities, and efforts to recruit more academic faculty, while exploring ways to alleviate the workload in healthcare institutions. Additionally, collaborative efforts and support are required to enhance the job satisfaction of healthcare professionals, ensure their well-being, and sustain the growth and development of radiology. Another aspect to consider is curtailing unnecessary medical examinations. Unnecessary tests not only burden radiologists, but also contribute to rising healthcare costs. Launching awareness campaigns to educate the community about the appropriate use of radiological examinations will help reduce unwarranted tests. Implementing evidence-based guidelines for imaging studies can help optimize resource utilization. By adopting these strategies, patients will be able to receive improved medical services and radiologists will be able to provide their best work in a healthier and more sustainable work environment.

Conflicts of Interest

Jeong Min Lee, the editor board member of the *Korean Journal of Radiology*, was not involved in the editorial evaluation or decision to publish this article. All authors have declared no conflicts of interest.

Author Contributions

Conceptualization: Kyung-Hyun Do, Jeong Min Lee. Data curation: Kyung-Hyun Do, Kyongmin Sarah Beck. Formal analysis: Kyung-Hyun Do, Kyongmin Sarah Beck. Project administration: Kyung-Hyun Do, Jeong Min Lee. Writing—original draft: Kyung-Hyun Do. Writing—review & editing: all authors.

ORCID IDs

Kyung-Hyun Do

<https://orcid.org/0000-0003-1922-4680>

Kyongmin Sarah Beck

<https://orcid.org/0000-0002-9262-1001>

Jeong Min Lee

<https://orcid.org/0000-0003-0561-8777>

Funding Statement

None

REFERENCES

1. Ministry of Health and Welfare. The fifth fact-finding surveys

on health and medical services [accessed on September 1, 2023]. Available at: <https://www.mohw.go.kr/board.es?mid=a10411010100&bid=0019>

2. Koo HJ, Do KH. The manpower crisis and burnout in academic radiology: insights from a survey study in Korea. *J Am Coll Radiol* 2023 Sep 29;S1546-1440(23)00731-7