



Loading and Coverage Hours of Radiologists in Taiwan: Findings of a Small Survey in 2024

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The total population of Taiwan is about 23.42 million, and there are 1277 board-certified radiologists. The population-adjusted workforce of radiologists of Taiwan is 2.4 to 2.9 times smaller than that of the United States, and the average annual workload per radiologist is 2.0 to 3.4 times higher than that in the US [1]. As of early 2024, there were approximately 5.5 radiologists per 100000 people in Taiwan. With the advancements in radiologic technology and the development of interventional radiology, various clinical specialties increasingly rely on radiological examinations. Some hospitals even provide radiological services 24 hours a day. Due to the heavy workload, radiologists often need to work overtime to complete their tasks. However, the number of radiologists has not increased proportionally to the rising demand. The heavy workload may result in overwork and fatigue among radiologists, affecting practice quality, and patient safety.

For an objective understanding of the current specific work duties, tasks and coverage hours of Taiwan radiologists and a subjective assessment of their workload and

manpower needs, we designed a self-reported questionnaire targeting radiologists in Taiwan. The study was approved by our Institutional Review Board, and the requirement of informed consent from the respondents was waived. The survey was conducted between March 14 and 21, 2024. The questionnaire mainly investigated the working hours and duty status of board-certified radiologists in Taiwan. The questions comprised basic information, objective working hours and duty status, subjective workload assessment, and an open-ended question. The subjective workload assessment uses a modified Likert 5-point scale. The questionnaire consisted of a total of 58 questions and was conducted using Google Forms, ensuring anonymity. The survey link was emailed to supervisors and attending staff of various hospitals across the Taiwan Radiological Society, and responses were voluntary. The link was sent to 67 individuals, and 33 responses were ultimately received from 19 different medical institutions.

Our study shows that working overtime to complete tasks is common, and most respondents had to work on weekends. During weekday shifts, actual working hours exceeded the standard hours, with the most common being 10 hours (12/33, 36%). All respondents worked more than 40 hours per week, with seven (7/33, 21%) having worked over 60 hours per week (Supplementary Table 1). On weekdays, 26 out of 33 (79%) respondents were required to work night shifts. On weekends, it was common to work on Saturdays (22/33, 67%) and on Sundays or national holidays (21/33, 64%) (Table 1). Besides medical duties, the work load also included teaching, research, and administrative tasks and at times continued even on weekends (Fig. 1). The complexity of these duties added burden to their clinical workload. The

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Table 1. Types and frequency of work in night shifts on weekdays and during weekends (Saturdays and Sundays) and national holidays

Categories	Night shift on weekday	Saturday	Sunday and national holiday
Type of work			
On-duty*	2 (6)	12 (36)	5 (15)
On-call†	11 (33)	1 (3)	7 (21)
Mixed On-duty and on-call	8 (24)	8 (24)	8 (24)
Remote report interpretation	4 (12)	1 (3)	1 (3)
None	7 (21)	11 (33)	12 (36)
Frequency of work			
Once per quarter (3 months) or less	1 (3)	0 (0)	1 (3)
Once per 2 months	0 (0)	2 (6)	6 (18)
Once a month	2 (6)	12 (36)	9 (27)
Once every 2 weeks	3 (9)	4 (12)	12 (36)
Once a week	16 (48)	3 (9)	0 (0)
One week per month	1 (3)	0 (0)	0 (0)
On call one week biweekly (15 days per month)	1 (3)	0 (0)	0 (0)
None	5 (15)	12 (36)	15 (45)

Data are number of respondents with the percentage in parentheses.

*Requires radiologists staying at the hospital for consultations and radiology examinations, †Radiologists can leave the hospital and return if needed, providing oral consultations via phone, or visiting the hospital as needed

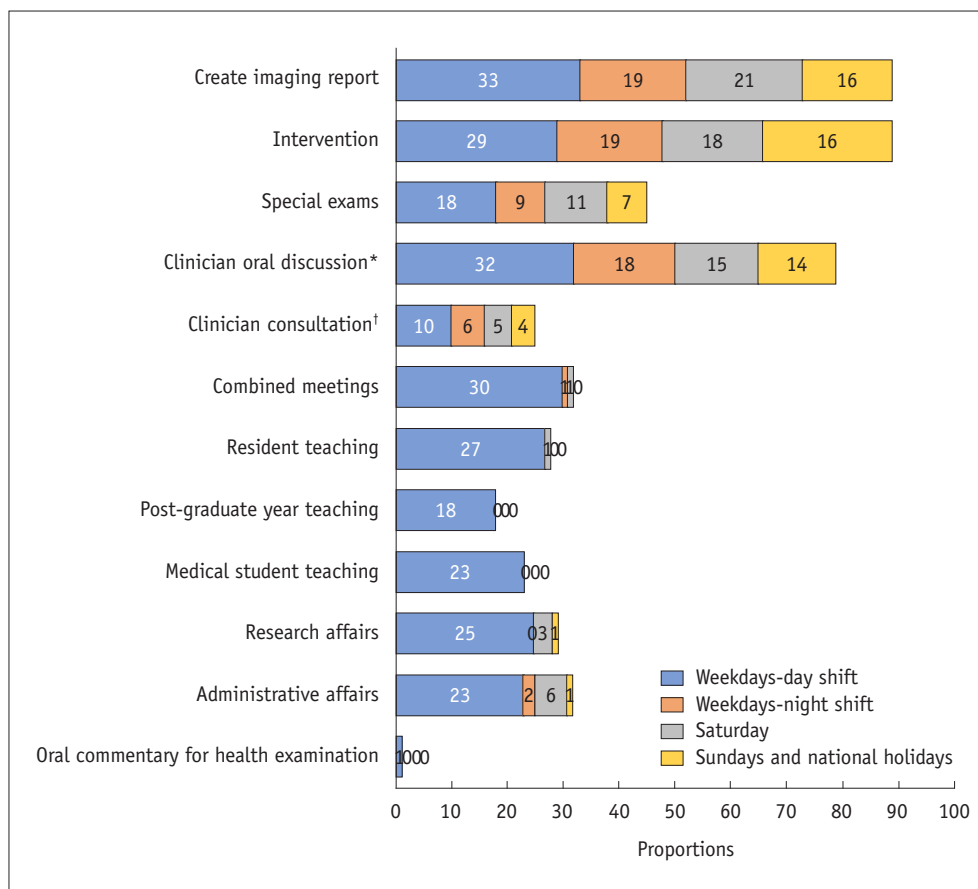


Fig. 1. Radiologist's duties and tasks distribution by shift and day type. Data represent the number of respondents. *Radiologists only received consultation over the phone, †Required formal written responses.

increased workload can increase the likelihood of errors in image interpretation and affect patient safety [2].

Regarding the appropriate examination volume to interpret and report within an 8-hour period, most respondents considered this to be an appropriate workload to provide reports of 100–199 plain films ($n = 15$), 20–30 CT scans ($n = 14$), or 20–30 MRIs ($n = 17$). However, most respondents also stated that their workload from plain film and CT exceeded the ideal numbers they provided in their responses. The number of reports for respondents in Taiwan is higher than that in some other countries [3]. This indicates that Taiwanese radiologists have been handling a high volume of reports for a long time, which is related to a shortage of radiologists relative to the country's population.

None of the respondents perceived his or her workload as light. Twenty respondents (20/33, 61%) described their workload as heavy, four (4/33, 12%) as extremely heavy, and only nine (9/33, 27%) viewed it as moderate. Most respondents (31/33, 94%) worked overtime to manage their duties. Burdensome daily work load leading to heavy workloads was expressed by most respondents (23/33, 70%). Additional factors exacerbating the workload included high work volume (22/33, 67%), intense stress (12/33, 36%), prolonged working hours (15/33, 45%), inadequate rest time (9/33, 27%), affected normal sleep time (7/33, 21%), and reimbursement below expectations (7/33, 21%). A temporary decrease in the number of reports during the COVID-19 pandemic in Taiwan and other countries was a common observation [4], and the workload resurged in Taiwan as the pandemic ended. Regarding the manpower need of their working hospitals, based on personal opinion, many respondents (17/33, 51.5%) stated there was a need for additional 3–5 radiologists, corresponding to a 5%–50% increase, and some (4/33, 12.1%) suggested 6–10 radiologists additionally required, corresponding to a 15%–50% increase. Despite inadequate manpower being a common experience among Taiwan radiologists, there is a consistently annual increase of 50–55 certified radiologists in Taiwan [1].

Other workload-related issues stated in the open question included extensive administrative tasks, too many multidisciplinary meetings, imbalanced shift distributions, insufficient annual leave, manpower shortages, suboptimal shift schedules, excessive on-call/on-duty frequency, increased administrative work, interruptions during report writing due to administrative tasks, imaging diagnostics, or interventions. The heavy workload even caused delays in

reporting or scheduling interventional work. Respondents hoped for increased reimbursement and better distribution of tasks according to specific specialties.

The limitations of this survey include the low number of questionnaire responses, which could be insufficient to represent all radiologists across Taiwan. We speculate that the low response rate to the questionnaire also reflects excessive workloads. The variation in work distribution across different hospitals, respondent differences in stress resilience, and the specific subspecialties covered may lead to biased workload results. Additionally, the use of artificial intelligence (AI) to assist radiologists has been increasing in recent years, but we did not collect data on AI usage. Nevertheless, our survey indicates that the workload in Taiwan's radiology departments is relatively high for radiologists. Recruiting more radiologists to reduce the workload would improve the accuracy of image interpretation and enhance the quality of medical care.

Supplement

The Supplement is available with this article at <https://doi.org/10.3348/kjr.2024.0487>.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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