Dutch nuclear medicine and radiology residency

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The rapid advancements in medical imaging over the past few decades hold great promise for future diagnostic and treatment options, with hybrid imaging techniques such as PET/CT, PET/MRI, and theranostics among the most recent developments. However, challenges have also emerged, including the high costs associated with medical imaging and the increased workload for imaging specialists, which is not matched by a proportional increase in the workforce. To maintain healthcare costs at a manageable level and prevent burnout, attrition, and a decline in image interpretation quality, various strategies have been implemented to address the growing workload. While artificial intelligence shows promise for assisting with imaging interpretation tasks (IITs) and non-interpretative tasks (NITs), some of the latter primarily consist of labour-intensive manual activities, such as answering telephone calls, administrative duties, and logistics. In this regard, reading room assistants have been deployed to varying extents to support staff and residents.

Although the integration of imaging specialties in clinical practice continues to enhance efficiency, the training programs and workforces of nuclear medicine and radiology remain largely separate in most countries. A key distinction in the Netherlands is the integration of nuclear medicine and radiology residency programs introduced in 2015, aimed at enhancing expertise in hybrid imaging and improving efficiency in both diagnostic and therapeutic applications.

To evaluate this integrated training program, a survey was conducted among 139 nuclear medicine physicians and radiologists across eight training regions in the Netherlands. Participating staff members gave the program an average score of 5.7 on a 10-point scale. Reported strengths included increased expertise in hybrid imaging, better preparation for future imaging needs, and improved efficiency in resident training and multidisciplinary collaboration. However, concerns were raised about reduced exposure to nuclear medicine, limited time for research and innovation, and potential challenges with international recognition. These concerns are partly related to the restructuring of two previously separate five-year programs into a single five-year curriculum, in which the first half is dedicated to general radiology and the second half includes seven subspecialisation options in radiology and one for nuclear medicine. Suggested improvements included increasing exposure to nuclear medicine, enhancing research opportunities, and better integrating workflows between the two specialties. Overall, the integration shows promise in terms of efficiency, but particular attention should be paid to finding a balance between the exposure to nuclear medicine and radiology, as well as addressing the international recognition of the program.

During the evaluation of the integrated program, a decline was observed in the number of residents choosing the nuclear medicine pathway. A survey among 114 residents explored factors influencing their decisions to pursue or refrain from the nuclear medicine pathway. Favourable factors included expert supervision, opportunities for scientific research, diversity in procedures, and the expanding role of hybrid imaging. Unfavourable factors included insufficient integration between nuclear medicine and radiology in some hospitals, imbalances in training that favour radiology, uncertainty regarding international recognition, and concerns about future job opportunities. Residents interested in nuclear medicine also demonstrated a stronger inclination toward research and innovation. These findings highlight the importance of improving collaboration between nuclear medicine and radiology departments and addressing uncertainties related to career prospects and international recognition.

Despite residents expressing uncertainty about employment opportunities, earlier findings among nuclear medicine physicians and radiologists suggested a more positive outlook. An analysis of the Dutch job market in 2021, examining 157 vacancies, showed the highest demand for all-round, abdominal, and interventional radiologists. Although nuclear medicine positions were fewer, most specifically requested professionals trained in both nuclear medicine and radiology, reflecting rapid adaptation to the integrated training model. These dual-trained specialists are also eligible for a broader range of radiology positions, particularly in non-academic hospitals. Additionally, approximately 30% of vacancies required non-clinical competencies such as research, teaching, management, and ICT or AI skills. This aligns well with the interests of nuclear medicine–oriented residents, who tend to have a stronger focus on research and innovation. Overall, the findings demonstrate a growing demand for broadly trained imaging specialists and highlight the added value of non-clinical skills.

While many strategies to manage workload have focused on improving efficiency on the supply side, the primary driver of increased workload remains a rising demand. Imaging requests are largely based on clinical judgment, but given limited financial resources, both referring clinicians and imaging specialists share responsibility for the efficient allocation of these resources. An assessment of residents from internal medicine, radiology, and surgery examined the impact of financial knowledge on imaging requests. The results showed that most residents lack accurate knowledge of imaging costs, with none correctly estimating all costs and a small proportion misestimating all of them. This lack of financial literacy was not associated with specialty or level of training. Nevertheless, residents expressed concern about rising healthcare costs and a strong interest in improving their knowledge. A large majority supported the inclusion of financial education in medical training curricula, suggesting that improved cost awareness could help reduce unnecessary imaging and associated expenses.

Although this assessment focused only on direct imaging costs and did not consider long-term benefits, the findings indicate that increasing cost awareness among residents could contribute to more efficient use of healthcare resources.

Finally, the implementation of reading room assistants during radiology on-call hours was evaluated. These assistants, who receive brief training, take over non-interpretative tasks such as answering calls, managing administrative duties, and assisting with logistics. Their presence resulted in a net time saving of 24% and a substantial reduction in interruptions during shifts. This decrease in workload and reduction in interruptions allows residents to focus more on interpretative tasks with higher educational value, while also potentially reducing stress, medical errors, burnout, and attrition.

In summary, the integration of nuclear medicine and radiology training in the Netherlands shows promise in enhancing efficiency and expertise in hybrid imaging. However, challenges remain in balancing training exposure, fostering research opportunities, and addressing issues of international recognition and job prospects. This thesis also highlights the importance of improving financial literacy, collaboration between specialties, and addressing workload-related stressors to ensure the long-term success and sustainability of this integrated model. Ultimately, the findings suggest that addressing these factors will be crucial in attracting and retaining skilled professionals in the evolving field of medical imaging. ♦