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Research Burden in the Portuguese Residency Program: Cardiology's Unique Challenge

Exigência Científica no Internato Português: O Desafio Único da Cardiologia

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ABSTRACT

This study analyses the research output expected for the final curricular evaluation of Portuguese medical residency programs, with particular focus on cardiology. All publicly available specialty-specific evaluation grids were reviewed in December 2024. Cardiology required 46 research items to attain maximum scoring, including research papers and congress abstracts stratified by journal quartile. This was the highest requirement among all specialties, compared to a median of 11 across all specialties. Uniquely, cardiology was the only specialty to quantitatively specify participation in research projects, clinical trials, and registries. In contrast, it scored below average in the most recent national residency satisfaction survey. However, no significant correlation was observed between the number of required research items and overall satisfaction. These findings suggest a potential misalignment between curricular evaluation criteria and the actual conditions of residency training. Reviewing these requirements may help create a more balanced and sustainable training environment.

Keywords: Biomedical Research; Cardiology/education; Curriculum; Internship and Residency; Portugal

RESUMO

Este estudo analisa os requisitos de produção científica definidos para a avaliação curricular final dos programas de internato médico em Portugal, com especial foco na Cardiologia. Todas as grelhas de avaliação específicas por especialidade, disponíveis publicamente, foram revistas em dezembro de 2024. A Cardiologia revelou a exigência mais elevada, requerendo um total de 46 itens de investigação para atingir a pontuação máxima — incluindo artigos científicos e resumos apresentados em congressos, estratificados de acordo com o quartil da revista. Em comparação, a mediana entre todas as especialidades foi de 11 itens. De forma singular, a Cardiologia foi a única especialidade a quantificar explicitamente a participação em projetos de investigação, ensaios clínicos e registos. Em contraste, apresentou uma classificação inferior à média no inquérito nacional mais recente de satisfação dos internos. Contudo, não se observou uma correlação significativa entre o número de itens de investigação exigidos e o nível global de satisfação. Estes resultados sugerem um possível desalinhamento entre os critérios de avaliação curricular e as condições reais de formação. A revisão destes requisitos poderá contribuir para um ambiente formativo mais equilibrado e sustentável.

Palavras-chave: Cardiologia/educação; Currículo; Internato e Residência; Investigação Biomédica; Portugal

Residency satisfaction and career decision-making

Specialist training is the cornerstone of postgraduate medical training in Portugal. For newly graduated doctors, selecting a residency program is a complex and multifactorial decision that significantly impacts their careers and personal lives.[1] Residency is also a period where doctors are particularly vulnerable to burnout due to factors such as young age, high workload, inadequate supervision, lack of autonomy, and the need for continued study outside of working hours.[2] In a 2016 national survey, cardiology was ranked second in overall satisfaction; however, in the most recent update, it experienced a significant decline and ranked second to last.[3] Although not mandatory for completing the cardiology residency, the requirements for scientific production have become a *de facto* target, as they are perceived as necessary to improve career prospects and professional stability.

Therefore, our study aimed to compare the research work demands of the cardiology residency program with those of other specialties and to examine their relationship with overall residency satisfaction.

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Curricular evaluation and research requirements

The final examination of the Portuguese residency program consists of three parts: theoretical, practical, and curricular assessments. The curricular evaluation varies between specialties, with scoring criteria set by each specialty's college under the Portuguese physician regulatory body, the Portuguese Medical Association. Research performance, which includes research papers, abstract presentations, and involvement in scientific projects/clinical trials, is part of the curricular assessment. Although the curriculum grid does not specify a minimum number of research items, it does set a maximum score for each category.

We systematically reviewed every publicly available Portuguese-certified medical specialty curriculum grid in December 2024, extracting the minimum number of research items required for maximum score in research performance. Subgroup analyses were performed based on research type, quality requirements, and miscellaneous categories.

In addition, we analyzed the association between the number of research outputs required for maximum scoring and each specialty's overall satisfaction score, as reported in the most recent national residency satisfaction survey.

Research demands across Portuguese specialties

Portugal has 48 certified medical specialties. Of these, 8 (16%) lacked formal curricular grids. Of the remaining specialties, 13 (31%) had no cap on the maximum score for publications or poster/oral presentations. Cardiology required a minimum of 46 scientific production items, including six research papers as first author in 1st or 2nd quartile journals, 20 abstracts as first author published in 1st or 2nd quartile journals' supplements, and 20 abstracts published as first author in 3rd or 4th quartile journals' supplements. Across all specialties, the median number of required research items was 11 [8, 19.5], with cardiology being an outlier along with allergy and immunology (36) (Fig. 1).

Regarding quality, ten specialties (23.8%) had no specific journal requirements, 29 (69%) distinguished between indexed and non-indexed journals, and only two (4.8%) differentiated between journal quartiles (cardiology and plastic surgery).

Furthermore, cardiology required participation in two scientific projects, two clinical trials, and two national/international registries. While 26 specialties (61.9%) valued participation in scientific projects, the majority of these (78.5%) did not specify a minimum number required for full scoring. Only five specialties explicitly mentioned involvement in clinical trials in their grids, and only cardiology specifically required contributions to registries. Additionally, the cardiology grid was unique in requiring invited lectures at scientific meetings, teaching activities, and completion of a doctoral degree to achieve maximum scoring.

In the national residency satisfaction survey, cardiology scored lower than the average (3.69/5 *vs* 4.12/5), despite the lower response rate (16% *vs* 19%). Pearson's correlation analysis revealed no significant relationship between the number of scientific production items and overall satisfaction (r = 0.043, P = 0.823).

Implications for cardiology training and resident well-being

Our study highlights the high research expectations placed on Portuguese cardiology residents compared to other specialties. Cardiology requires 46 high-quality research items for maximum score on curricular evaluation, far exceeding the median of 11 items across specialties, many of which do not impose quality restrictions.

The high research work demands during the cardiology residency can be compared to the concept of 'hard training' from the perceptual learning study of Garcia *et al*.[4] In this study, harder tasks led to quicker, more intense improvements, while easier tasks resulted in slower, more gradual progress. Similarly, cardiology's stringent research work expectations push residents to rapidly develop advanced research skills. However, just as arduous training requires continuous effort, the high expectations in cardiology could challenge residents' ability to balance clinical and research responsibilities. Notably, the cardiology residency includes no dedicated research rotations, and most hospitals do not allow protected time for research.

Despite the heavy research burden, no significant correlation was found between the number of required research items and overall residency satisfaction. This suggests that factors such as clinical workload, mentorship, or work-life balance may also contribute to dissatisfaction among cardiology residents.[2] These elements, when combined with high research expectations, could amplify the risk of burnout. However, a limitation of our study is the lower response rate among cardiology residents (16% *vs* 19% for the general survey population). This reduced participation may have influenced the satisfaction scores, as the smaller sample size could underrepresent the broader experiences of cardiology residents. As a result, the data may not fully capture the diversity of opinions or the true extent of dissatisfaction within the specialty. Nevertheless, the decline in cardiology satisfaction coincided with the implementation of the new evaluation grid, and this

is unlikely to be explained solely by participation bias. Thus, the findings should be interpreted with caution, particularly regarding the levels of dissatisfaction in cardiology compared to other specialties, while also highlighting the importance of encouraging broader participation in residency satisfaction surveys through stronger institutional endorsement, integration into training evaluation, or digital reminders.

Another relevant implication is the potential impact on specialty attractiveness. The significant emphasis on research work may discourage top-ranked medical applicants from choosing cardiology, redirecting them towards specialties that place greater value on clinical practice. Furthermore, we can speculate that the diversion of time and energy from clinical training to research activities risks undermining the acquisition of essential technical skills, thus potentially compromising the future of cardiologists as healthcare providers.

Our analysis suggests that the cardiology residency in Portugal is an outlier among all specialties due to its uniquely high scientific requirements. Resident satisfaction has also declined in recent years, coinciding with the implementation of these demands, which raises concerns about the sustainability and long-term attractiveness of the specialty.

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The authors have declared that ChatGPT Open AI was used for the purpose of copyediting the manuscript. After using this tool, the content was reviewed and edited by the authors, who assume full responsibility for the content.

AUTHOR CONTRIBUTIONS

GFC, VDN: Conceptualization, data curation, original draft.

JP, DSF, PA, JD, FMS: Critical review of the manuscript.

All authors approved the final version to be published.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in October 2024.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

JD is the president of the Portuguese Council of Medical Residents of the Portuguese Medical Association.

FM received consulting fees from Medtronic, Abbott and Microport; received payment or honoraria for lectures, presentations, speakers' bureaus, manuscript writing or educational events from Medinfar and Azevedos; received payment for expert testimony from Novartis; received support for attending meetings or travel from Pfizer; has a leadership or fiduciary role in Sociedade Portuguesa de Cardiologia.

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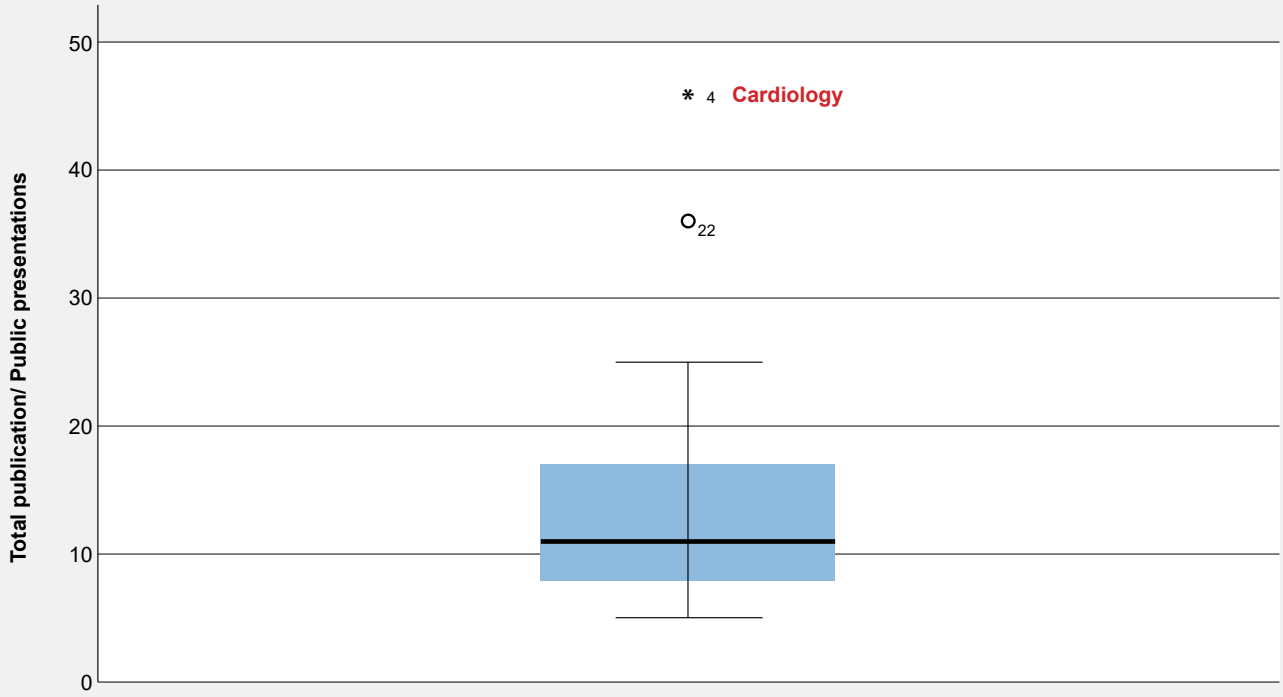

Figure 1 – Box plot showing the distribution of total publications/public presentations across all Portuguese certified specialties. The central line represents the median, with the box spanning the interquartile range (IQR). Whiskers extend to 1.5 times the IQR. Cardiology is an extreme outlier and Allergy and Immunology is an outlier.