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Letter to the Editor

The shrinking workforce of pathologists: implications for healthcare and possible solutions

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Dear Editor,
I would like to draw your attention to a pressing issue that threatens the sustainability and effectiveness of pathological diagnostics in Italy: the alarming shortage of pathologists and the increasing workload imposed on the remaining specialists, which significantly affects diagnostic turnaround times, a critical aspect of patient care. This situation could compromise service efficiency and raise concerns about diagnostic accuracy and patient safety.
Recent projections indicate a growing deficit of medical specialists across various disciplines, with pathology being one of the most affected. According to workforce planning data, the number of active pathologists in Italy is expected to decline significantly by 2025 due to an aging workforce and an insufficient number of newly trained specialists [1]. Moreover, many residency scholarships remain unfilled each year, as pathology remains an unpopular choice among medical graduates. For example, in 2024 alone, 110 out of 180 (52%) residency positions in pathology were left unassigned [2]. While this high percentage may be partially attributed to a general shortage of new medical graduates, it also suggests a declining interest in pathology as a career choice, with many students preferring other disciplines.
This issue is not unique to Italy. Studies from the United States and Canada have demonstrated a significant decline in the number of practicing pathologists, with individual workload increasing dramatically over the past decade. Research highlights that the number of active pathologists in the United States dropped by 17.5% between 2007 and 2017, while the diagnostic workload rose by 41.7% [3,4]. Similar trends have been observed in Canada, where increasing demand for pathology services has outpaced the supply of trained professionals [4].
The repercussions of the pathologist shortage are already evident. Pathologists face an increasing workload, both in terms of case numbers and the time required per case. Advances in personalized medicine and molecular diagnostics, while promising, also add complexity to daily practice, requiring greater attention and significantly increasing time consumption per case. The combination of an aging workforce, reduced replacements, and heightened demands places an unsustainable burden on the remaining professionals. This increasing complexity is evident in daily practice in many fields of pathology. For instance, the evaluation of specimens of cancer patients undergoing neoadjuvant therapy

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and the immunohistochemical evaluation of PD-L1 expression in several different tumors are just two examples of how pathology is becoming increasingly intricate and time-intensive [5,6]. While the clinical benefits of these techniques are unquestionable, they demand substantial time and concentration. In the context of a pathologist shortage, the increasing demand for such evaluations may lead to delays in diagnosis, delayed initiation of treatment, potential misinterpretations due to overwork, and ultimately, compromised patient outcomes. Delays in starting treatment for many neoplasms can negatively impact patient outcomes, potentially negating the benefits of a more complex and personalized approach. Numerous studies have connected such delays with poorer clinical outcomes, highlighting the criticality of timely intervention [7,8].

Several proposals have been made to address these challenges. Firstly, increasing training positions is imperative. Residency programs should be expanded, particularly in specialties experiencing the most significant shortages[1,4]. In Italy, it has been suggested that the global number of residency scholarships should be raised to at least 9,500-10,000 per tear [1].

Additionally, efforts should be made to enhance the appeal of pathology as a career. Currently, only a few universities offer structured pathology internships during medical education, meaning that most students are exposed only to the theoretical aspects of pathology while preparing for exams, without experiencing its critical clinical impact. Implementing a mandatory, well-structured internship in pathology could help generate interest in the discipline.

Furthermore, improving working conditions for practicing pathologists is crucial. Addressing burnout, which is often linked to excessive workload, lack of work-life balance, and inadequate compensation, should be a priority. Providing psychological and workplace support, fostering a collaborative rather than competitive environment, and ensuring fair compensation are essential steps toward retaining specialists in the field.

Time efficiency in pathology should also be recognized as a critical resource alongside financial investments. As previously exemplified, some highly specialized analyses, while not particularly costly in terms of equipment and reagents, are time-intensive and should be streamlined to fit within hospital workflow constraints. Encouraging use of business process management strategies, such as checklists, automated procedures, and predefined reporting templates, could help minimize inefficiencies and reduce wasted time [9].

Finally, artificial intelligence (AI) is increasingly entering the healthcare sector, including pathology laboratories [10]. AI-based image analysis could help automate repetitive and time-consuming tasks, allowing pathologists to focus on more complex and cognitively demanding activities. For example, automated evaluation of immunohistochemical markers such as hormone receptors, Ki-67 proliferation index, HER2, and PD-L1 could streamline routine tasks. Beyond image analysis, AI has the potential to achieve even greater advancements. Recently introduced AI models could serve as an effective assistant for pathologists, engaging with them through natural language and human interactions while demonstrating impressive accuracy [10]. AI could also facilitate text generation, summarizing patient medical records, radiology reports, and laboratory data in seconds. By integrating clinical, radiological, and laboratory information, AI could even generate preliminary pathology reports, which pathologists could review and finalize, significantly reducing the time required for manual report writing. Of course, strict regulations must be enforced to prevent misuse or breaches of sensitive health data but, despite these challenges, AI holds immense potential to alleviate the growing workload burden in pathology.

In conclusion, the shortage of pathologists poses a serious threat to the quality of healthcare and requires urgent attention. Tackling this problem is essential for ensuring high-quality patient care and sustainable pathology services worldwide, including in Italy. Policymakers, medical institutions, and professional organizations must collaborate to implement effective solutions. Increasing the number of trained pathologists, optimizing laboratory efficiency, promoting pathology among medical students, and integrating AI into diagnostic workflows represent essential steps toward mitigating this crisis. Otherwise, failure to act could continue to result in delayed diagnoses and reduced access to critical medical services, ultimately compromising patient outcomes.

Conflicts of interest statement

The Author declares no conflicts of interest.

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References

1 https://www.anaao.it/public/aaa_8949220_fabbisogni_2018-2025_versione_05_01_2019.pdf

2 https://www.anaao.it/content.php?cont = 41225

3 Ramos J, Aung PP. International Medical Graduates and the Shortage of US Pathologists: Challenges and Opportunities. Arch Pathol Lab Med. 2024;148(6):735-738. https://doi.org/10.5858/arpa.2023-0290-EP

4 Metter DM, Colgan TJ, Leung ST, Timmons CF, Park JY. Trends in the US and Canadian Pathologist Workforces From 2007 to 2017.

JAMA Netw Open. 2019;2(5):e194337. Published 2019 May 3. https://doi.org/10.1001/jamanetworkopen.2019.4337

5 Provenzano E, Bossuyt V, Viale G, et al. Standardization of pathologic evaluation and reporting of postneoadjuvant specimens in clinical trials of breast cancer: recommendations from an international working group. Mod Pathol. 2015;28(9):1185-1201. https://doi.org/10.1038/modpathol.2015.74

6 Mastracci L, Grillo F, Parente P, et al. PD-L1 evaluation in the gastrointestinal tract: from biological rationale to its clinical application. Pathologica. 2022;114(5):352-364. https://doi.org/10.32074/1591-951X-803

7 de Melo Gagliato D, Lei X, Giordano SH, et al. Impact of Delayed Neoadjuvant Systemic Chemotherapy on Overall Survival Among Patients with Breast Cancer. Oncologist. 2020;25(9):749-757. https://doi.org/10.1634/theoncologist.2019-0744

8 Lu H, Zhao B, Zhang J, et al. Does delayed initiation of adjuvant chemotherapy following the curative resection affect the survival outcome of gastric cancer patients: A systematic review and meta-analysis. Eur J Surg Oncol. 2020;46(6):1103-1110. https://doi.org/10.1016/j.ejso.2020.01.013

9 Sharma A, Nishadham V, Gupta P, et al. Evaluation of Turnaround Times of Diagnostic Biopsies: A Metric of Quality in Surgical Pathology. Int J Surg Pathol. Published online July 21, 2024. https://doi.org/10.1177/10668969241261561

10 Lu MY, Chen B, Williamson DFK, et al. A multimodal generative AI copilot for human pathology. Nature 2024;634:466-473. https://doi.org/10.1038/s41586-024-07618-3