

Neurology teaching difficulties and the academic consequences of the COVID-19 pandemic

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I recently read the very interesting article titled 'Neurophobia among undergraduate medical students: a European experience beyond the Anglosphere' by Lambea-Gil et al [1], published in the June 2023 issue of the esteemed *Revista de Neurología*. The article provided valuable insights into factors related to difficulties and aversion to neurology during the undergraduate medical course. I commend the authors for their comprehensive research. If possible, I would like to offer some perspectives from my daily practice as a neurology professor concerning a few points raised in the article, which I believe may further enrich the ongoing discourse in the field of neurology education.

Last year, I started academic activities at a high-rated medical school in Brazil (Jundiaí School of Medicine, São Paulo State). During the routine teaching with the undergraduate students (mainly from 4th to 6th grades) I observed that it was necessary to make an additional effort to support them to connect the learnings of neuroanatomy, neurophysiology, neurosemiology, and neuropharmacology to comprehend clinical neurology properly. A frequent complaint among these students was that the neuroscience contents are taught in different years in the undergraduate medical course. These opinions may reinforce one of the main results related to neurophobia shown in the commented study (i.e., 'poor integration of neuroscience subjects in the curriculum').

Interestingly, the authors also showed a high frequency of answers citing 'neuroanatomy' as a reason for difficulties, fear, or aversion to neurology among undergraduate students at their institution. In this setting, I would like to bring an additional problem for discussion: currently, professors are challenged to teach clinical neurology to a generation of students who were recently in quarantine due to the COVID-19 pandemic during the first years of medical school. In my opinion, this period caused a high negative impact mainly on their acquired knowledge of neuroanatomy due to limited contact with anatomical pieces. Furthermore, another observation in my routine when evaluating patients was the student's limitations and fears related to neurosemiology, which could be partly associated with the lack of interaction with patients in a crucial moment of learning and technique training in this recent period. Even with a relatively low frequency compared to other factors in the study results by Lambea-Gil et al, 'neurological examination' was also related to neurophobia.

Recently, while participating in the American Academy of Neurology Annual Meeting 2023 in Boston, I had the opportunity to talk to some undergraduate medical students from different countries who referred to dealing with similar issues when learning neurology, including the limitations caused by the pandemic period. Thus, this negative impact is possibly a global issue in neurology education. Although the term 'neurophobia' was described almost 30 years ago [2], we still urgently need teaching readaptations. Unfortunately, the COVID-19 pandemic may have caused additional limitations to the current generation of undergraduate medical students and professors. I consider that together we have an obligation to replan neurology education and act as soon as possible.

In conclusion, I would like to reiterate my appreciation for the valuable article published in your esteemed journal. My intention is to provide viewpoints from the practice and humbly contribute to the ongoing discourse in the field of neurology and medical education. Neurophobia has been suggested to impact healthcare practices negatively [3], and I am confident that, by gathering data, we can collectively advance our understanding of this complex issue.

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Neurology teaching difficulties and the academic consequences of the COVID-19 pandemic. Reply

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We have read with great interest the letter from R.B. João regarding neurology teaching at the Jundiaí School of Medicine [1] in light of our recent study about neurophobia [2]. This valuable experience serves to underscore the presence of neurophobia within Portuguese-speaking countries [3], while also highlighting its prevalence as a global phenomenon across medical schools worldwide. As the author mentions, scientific forums such as the American Academy of Neurology annual meeting can provide a unique opportunity to share experiences among educators and propose potential solu-



tions to the teaching of our discipline. In the case of the Spanish Society of Neurology, representatives of the national Council of Medical Students (Consejo Estatal de Estudiantes de Medicina), have been invited in recent years to our Annual Meeting to share their perspectives and discuss new projects.

As R.B. João has illustrated, the teaching of neurosciences in the Medical degree is typically divided across various academic years, which poses significant challenges to the effective integration of knowledge. In this regard, implementing target interventions during the teaching of clinical neurology could prove to be a valuable approach, facilitating the connection of previously acquired knowledge in neuroanatomy, neurophysiology, and other preclinical subjects. Additionally, another potential strategy, not necessarily conflicting with the previous one, would involve incorporating seminars or workshops on these subjects led by neurologists or neurosurgeons, providing students with a clinically oriented perspective.

Regarding the impact of the COVID-19 pandemic on neurology teaching, it has undoubtedly affected the younger generations of undergraduates [4]. However, it has also acted as a catalyst for transforming university education by promoting the adoption of new e-learning tools, such as information and communication technologies and healthcare simulations [5]. Nonetheless, our students identified the amount and quality of clinical internships as the primary means of enhancing the teaching of neurology [2]. While e-learning can be crucial for many training experiences, it cannot fully replace the invaluable experience of direct interaction with patients.

To adapt to these advancements, it will be necessary to review the medical curricula. In the case of Spain, many medical curricula have been in place for over a decade, following the implementation of the European Higher Education Area and the Bologna Process. The different experiences gathered in the teaching of neurosciences over the last decades, combined with the

lessons learned during the COVID-19 pandemic, can serve as valuable tools for improving the syllabus. This would not only have a positive impact on addressing neurophobia but also extend to different disciplines within the medical degree.

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