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LETTER TO THE EDITOR - EDITORIAL

"Neurosurgical procedures performed during residency in Europe - preliminary numbers and time trends"

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Dear Editor,

We read with great interest the article by Stienen and colleagues entitled "Neurosurgical procedures performed during residency in Europe - preliminary numbers and time trends" [4]. The authors performed a survey to evaluate the number of procedures which were performed independently, supervised, or assisted during neurosurgical residency in Europe. A total of 80 responses were used for analysis, about 60% of responders completed residence between 2011 and 2018, and over 90% of them were employed at a university hospital. The mean number of procedures performed independently, supervised, or assisted was 511, 514, and 752, respectively.

We appreciate Stienen and colleagues' efforts to shed light on neurosurgical residency education. We were surprised by the presented preliminary results and wonder if these results genuinely reflect neurosurgical resident training in Europe. Their previous reports allowed us to deduce case-load and availability of surgical cases for residents both in Europe and Germany. More than 20 years ago, Reulen and März already delineated that a volume of 2100 operations per year is required to appropriately train 7–8 residents [1]. However, administrative work and patient care outside the operating room consume a considerable amount of residents' time [2, 3].

An excellent training in residency is the foundation to become a great neurosurgeon. Theoretical and practical training might vary between neurosurgical departments. The individual promotion of each resident might vary as well depending on theoretical expertise, technical skills, and motivation of the resident. We believe that not merely performing a surgical procedure but also conceptual comprehension is required to develop surgical expertise. This cannot be determined by pure case-load but would also involve to inquire whether neurosurgeons feel apt to perform a specific procedure at the time of board certification.

The following aspects attracted our attention: First, according to table 2, each resident averagely was involved in 1263 procedures during residency (i.e., 511 independently and 752 assisted procedures, excluding not further specified supervised 514 procedures). Therefore, each resident was involved in at least 210 procedures per year. It is highly unusual that more than one resident acts as an assistant, specifically in cranial procedures.

Internet presences of participating neurosurgical centers provide the amount of annual procedures and number of residents. Naturally, there is a high variability which is also depending on hospital location and specialties. However, calculating with 14 residents and a number of 210 procedures per year results in a total of 2940 annual procedures (this still excludes unspecified supervised procedures and procedures without residents). This number markedly exceeds the number of cases disclosed by various participating centers. We suggest the authors customize the survey and additionally report the amount of annual surgical procedures, surgical procedures performed by residents, and the number of residents in training.

Second, over 15% of the responders finished residency about 20 years ago. Unless documented well, there must be a considerably recall bias, especially for the section "procedures performed completely or partly, under supervision (includes performing the approach for senior surgeons)."

Third, residents were involved in spinal procedures in less than one-third among all procedures. Based on personal communication and experience, this does not reflect current practice within neurosurgical departments over the last decade, where up to two-thirds of the cases are spinal procedures.

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Finally, we believe that "independently, supervised and assisted procedures" require further clarification. In neurosurgical training, supervision to a certain degree is mandatory due to medico-legal reasons. Additionally, would be of interest how many responses (absolute numbers) were actual records or best estimates.

We would like to encourage Stienen and colleagues to continue their work since the data is mandatory to enhance neurosurgical training. Expectantly, we are looking forward to the final analysis of the data.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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