Neurochirurgie 65 (2019) 4–6

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Professional life

Demography of neurosurgery in France in 2018. Current state and a call to educate more young neurosurgeons

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ARTICLE INFO

Article history:
Received 27 September 2018
Accepted 16 October 2018
Available online 13 November 2018

In order to describe the current neurosurgical demography for France, we retrieved information from the database [1] displayed yearly by our national order of medical doctors (CNOM). The important numbers are presented and commented in order to shed light on the challenges that we are now facing and will be confronted with in the future and provide arguments to promote the education of more young neurosurgeons.

A total of 544 board certified neurosurgeons (BCN) are practicing today all over France.

This is a moderate number of doctors in a country that has a population of 68 million people with a steadily growing population. Looking backward, it has been the worst in the past 40 years, but still, this low density is significantly lower than what has been reported in most countries in Western Europe apart from UK and Netherlands that are facing the same situation [2]. Estimates from UEMS (The European Union of Specialist Physicians) and US (United States) government suggest that the healthcare demand should offer 1 BCN to cover the neurosurgical needs of 100,000 habitants. These figures are based on pure cranial and spinal cord procedures, but they do not take into account the neurosurgical care of patients who will not undergo surgery but still require care management in our departments. Moreover, they do not include the spinal procedures; in fact more than half of our current daily practice is focused on spinal procedures and even though part of these diseases are also treated by orthopaedic surgeons, there is an absolute need to keep a neurosurgical expertise for their management. There is a huge territorial heterogeneity of the distribution of our BCNs with hot spots alongside medical deserts, which follows the medical landscape of medicine in France. This situation has been exacerbated by the fact that for 10 years, the conditions of our practice has been regulated by regional agencies for health (ARH/ARS) (*Décret n°° 2007-364 du 19 mars 2007, relatif aux conditions d'implantation applicables aux activités de soins de neurochirurgie*). Based upon strict criteria, these agencies provide renewable agreements for centres that apply for cranial neurosurgery [3]. The need to concentrate their expertise in dedicated environments that incorporate modern operative facilities, intensive care units, connected interventional neuroradiology and vascular units which legitimates this type of regulation. Thus, we observe regional concentrations of the BCNs working primarily in places where the medical, educational and research network are identified; this concentration is also driven by places where quality of life is potentially higher.

A total of 24% of BCNs obtained their qualification outside of France, compared to an overall 16% rate for surgical specialities. This is a natural answer to the lack of neurosurgeons that our country is facing; most of them come from the EU which is supposed to guarantee a certain level of competency. On one hand UEMS provides guidelines to promote a high standard and harmonized the level of education and competency of medical specialities in Europe. EANS offers a non-compulsory 4-year course, regular based CME courses, and accreditations of neurosurgical training programs in Europe [4]. However, there is no European control to verify the competency of neurosurgeons. On the other hand and not surprisingly, our patients expect a high standard of care. This is illustrated by several indi-

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https://doi.org/10.1016/j.neuchi.2018.10.003

cators: speciality-based ranking of public and private hospitals in periodic journals, multiplication of demands for doctors opinion when confronting their disease, explosion of "e-reputation" judgement of doctors by patients, the steady increase of legal procedures for supposed malpractices. To better educate our young doctors, the reform of the residency studies that was launched in 2017 offers a template and a pattern to harmonize the educational resources we provide to our students. The SIDES e-platform is an opportunity to check their aptitudes at regular intervals and to trace them. This is a national answer to a national challenge. Moreover, BCNs are pressured to be involved in the CME/DPC/accreditation processes which are still far from recertification but at least insure a trend for a better standard and security of care.

Forty-nine and 44 are respectively the mean age of these BCNs at work in male and female groups. Eighteen percent are older than 60 while 26% are under 40.

Twenty-one is the number of residency positions that were allocated by the government for new residents in 2017/2018 (as in each year) with a total number of 100 residents involved in a neurosurgical program to cover the French geographical area. In a paper published in our European journal [2], the total number of trainees was presented as a percentage of the number of certified neurosurgeons in each country. The median was 28.5% and the mean was 30.2%. In France, we are far from this number with an 18.5% proportion of trainees. The current national policy is to compensate the number of BCNs who will retire by the ones who will be involved in the career. By regulating our demography in such a way, several issues are underestimated:

- a European directive (European Working Time directive 2003/88/EC) regulates the weekly duty hours [5] imposed to our junior and senior doctors, regardless of their opinion about it. A recent study published in Acta Neurochirurgica [6] shows interesting figures regarding the amount of work the juniors are offering in different countries in Europe and how they in fact behave when dealing with this directive. Comparison between trainees coming from EU clearly demonstrate that "countries positively associated with higher working hours were both France and Turkey (OR 4.72, 95% CI 1.29–17.17, $P = 0.019$)". In another survey published in 2015 [7] about the working conditions of young neurosurgeons in France, it was shown that the average weekly working time of 76.8 hours was deemed to be excessive. Security rests after overnight shifts were lacking or incomplete in 91% of cases. Theoretical teaching was considered unsatisfactory (2.43 points in a 0–5 scale) as well as the time allocated to academic work (approximately 1.58 half-days per month). However, practical teaching was considered rewarding (3.63/5). Therefore, the current generation of trainees are no longer prepared to work more than 70 hours per week as their seniors did routinely, and in fact they are not allowed to comply to this regimen anymore. The reform of the residency program acknowledges that juniors need more time to educate themselves and to rest after an on-call period. The reform suggests that their involvement in the daily care should be reduced during the 4 years of the first part of their program and that they are not supposed to be involved equally as in the past. However, in contrast, the amount of neurosurgical tasks for our patients still remains the same; and we do not have any more doctors available. Therefore, there is an urgent need to compensate this situation;
- the second key point is the growth potential of our specialty. Are we in an era of shrinkage or expansion in the fields of neurosurgery? Some fields are changing in our country in occidental countries: traumatology is decreasing while functional NS and radiosurgery, are expanding very quickly; spine and brain diseases linked to aging are also growing.

Overlooking these issues could expose neurosurgery to serious consequences. A national policy could be to reduce the number of accredited centres in order to concentrate the manpower on selected neurosurgical specialties; the other risk could be to focus the field of our job on brain diseases which could be deleterious for the standard of care of spine diseases.

A total of 14% is the proportion of female BCNs. This percentage matches with the average gender distribution in surgical specialities with a range from 5% in orthopaedic surgery to 45% in paediatric surgery. As everywhere in Western Europe, our female group of neurosurgical trainees account for more than 25%. This has been changing sharply because currently the gender distribution of young students who start their medical studies indicates that 70% of them are female. Evolution of the surgical techniques and field of interests in neurosurgery render the surgical tasks less physically demanding and more intellectual and women are prepared for that.

Ten is the ranking of attractiveness of neurosurgery among the medical specialities while plastic surgery, ophthalmology, ENT are respectively ranked 1, 2 and 8. New fields of interest with less invasiveness of our surgery, better connection to the neurosciences and research, expected compliance to working hour regulations, mediatisation and socially rewarding perception of the job might have fostered the interest brought by our speciality. Conditions of practice have changed since 327 BCNs are working as employees in public institutions, 124 are working in private practice and 89 benefit from both systems. Younger surgeons are keen to be part of a team, which is no longer the exclusivity of public university hospitals. The burden of constraints that affect our academic and public hospitals added to less attractiveness of the so-called prestigious academic careers, in particular the job opportunities offered by private institutions might explain why private practice is gaining popularity in our neurosurgical landscape.

1. Conclusion

This report sheds light on the mismatch between our neurosurgical demography and current needs in France. It's time to change our political decisions to comply with the European laws and standards of care. It is important for academic neurosurgeons to acknowledge that our speciality will be stronger and will have more impact if we involve and mentor the younger surgeons with diversified profiles. In fact, the majority working senior neurosurgeons were trained by mentors who were reluctant to broadly involve trainees probably because they could not offer them a sustainable career in their specialty area. This view should change since our residents are much more mobile than in the past and they look for job opportunities not only in their area of residency but also in other places in France and Europe. They still accept to be very professional and available but consider their "work-life" balance as a priority. This last point has been outlined by a recent nationwide survey conducted among neurosurgeons in the US about career satisfaction and burnout. Results were significant since 56.7% of responders indicated they experienced burnout, which is one of the highest rates reported among the medical community. Among the 6 independent predictors of burnout, good work life balance and adequate time for personal development were strong protectors [8]. Those who will have the mission, responsibility and privilege to train the future neurosurgeons should bear in mind this important point.

Disclosure of interest

The authors declare that they have no competing interest.

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