A cross-sectional study of neurosurgical department chairs in the United States

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OBJECTIVE The position of neurosurgery department chair undergoes constant evolution as the health care landscape changes. The authors' aim in this paper was to characterize career attributes of neurosurgery department chairs in order to define temporal trends in qualities being sought in neurosurgical leaders. Specifically, they investigated the hypothesis that increased qualifications in the form of additional advanced degrees and research acumen are becoming more common in recently hired chairs, possibly related to the increased complexity of their role.

METHODS The authors performed a retrospective study in which they collected data on 105 neurosurgeons who were neurosurgery department chairs as of December 31, 2016, at accredited academic institutions with a neurosurgery residency program in the United States. Descriptive data on the career of neurosurgery chairs, such as the residency program attended, primary subspecialty focus, and age at which they accepted their position as chair, were collected.

RESULTS The median age and number of years in practice postresidency of neurosurgery chairs on acceptance of the position were 47 years (range 36–63 years) and 14 years (range 6–33 years), respectively, and 87% (n = 91) were first-time chairs. The median duration that chairs had been holding their positions as of December 31, 2016, was 10 years (range 1–34 years). The most common subspecialties were vascular (35%) and tumor/skull base (27%), although the tendency to hire from these specialties diminished over time (p = 0.02). More recently hired chairs were more likely to be older (p = 0.02), have more publications (p = 0.007), and have higher h-indices (p < 0.001) at the time of hire. Prior to being named chair, 13% (n = 14) had a PhD, 4% (n = 4) had an MBA, and 23% (n = 24) were awarded a National Institutes of Health R01 grant, tendencies that were stable over time (p = 0.09–0.23), although when additional degrees were analyzed as a binary variable, chairs hired in 2010 or after were more likely to have an MBA and/or PhD versus those hired before 2010 (26% vs 10%, p = 0.04). The 3 most common residency programs attended by the neurosurgery chairs were Massachusetts General Hospital (n = 8, 8%), University of California, San Francisco (n = 8, 8%), and University of Michigan (n = 6, 6%). Most chairs (n = 63, 61%) attended residency at the institution and/or were staff at the institution before they were named chair, a tendency that persisted over time (p = 0.86).

CONCLUSIONS Most neurosurgery department chairs matriculated into the position before the age of 50 years and, despite selection processes usually involving a national search, most chairs had a previous affiliation with the department, a phenomenon that has been relatively stable over time. In recent years, a large increase has occurred in the proportion of chairs with additional advanced degrees and more extensive research experience, underscoring how neurosurgical leadership has come to require scientific skills and the ability to procure grants, as well as the financial skills needed to navigate the ever-changing financial health care landscape.

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KEY WORDS career; chair; degree; funding; h-index; health care; neurosurgery; research

NEUROSURGERY department chairs have historically been prominent hospital-wide leaders¹³ due to their directing of a department that is typically among the most profitable in their hospitals.¹¹ These positions are few in number, highly coveted, and rarely available. There

are likely multiple factors, both tangible and intangible, influencing the selection process for neurosurgical department chair.

Possible factors influencing the selection of a neurosurgical department chair include the applicant's research

ABBREVIATIONS IQR = interquartile range; NIH = National Institutes of Health; SNS = Society of Neurological Surgeons.

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productivity, academic pedigree, age, experience, additional degrees, and whether the neurosurgeon has a previous appointment at the institution that is conducting the search. There are reasons why programs could prioritize opposite ends of the spectrum for these characteristics. For example, while increased age can be viewed as a desirable characteristic in a chair applicant due to the associated extensive experience, youth can be desirable due to its association with energy and innovative ideas. Similarly, hiring from within a department can be safer, while hiring from another institution can bring a valuable outside perspective.

To date, no studies have investigated the career attributes of neurosurgery department chairs, how the distribution of these attributes may have shifted over time, or how chair attributes vary between different types of institutions. An additional area of uncertainty is how the non-neurosurgical physicians who are members of neurosurgical chair search committees and the deans and hospital chief executive officers who make final decisions based on search committee recommendations might prioritize the different attributes listed above, which could differ from what attributes neurosurgeons might perceive to be important in neurosurgical chairs. We therefore sought to provide a descriptive profile of neurosurgery chairs to define current characteristics and temporal trends that might be informative to understanding how characteristics being sought to fill these positions have changed over time. In obtaining these data, we sought to investigate the hypothesis that more chairs are acquiring advanced degrees prior to obtaining their positions in response to the changing landscape of health care and academic medicine.

Methods

Selection of Programs

We obtained a listing of the 2016 accredited United States neurosurgery residency training programs from the Accreditation Council for Graduate Medical Education (<http://www.acgme.org>). Departmental websites and the Society of Neurological Surgeons (SNS) (<http://www.societyns.org/>) web pages were reviewed to obtain the names of the neurosurgical chairs as of December 31, 2016. From these departmental websites, SNS webpages, curriculum vitae available online, the AANS "Find a Neurosurgeon" tool (<http://www.aans.org/Patients/Find-a-Neurosurgeon>), the AANS membership directory, and the National Institutes of Health (NIH) RePORTER (<https://report.nih.gov/>), we were able to collect and corroborate the information on the career attributes of the neurosurgical chairs in our study listed in the following section. Additionally, Scopus, which has been previously validated,⁴ was used to determine the number of publications and h-index at the time the neurosurgeon was named chair and as of December 31, 2016.

Career and Departmental Attributes

To better understand attributes of neurosurgical chairs, we obtained the following variables: neurosurgeon's age when named chair, year when named chair, whether they had previously held a chair position at a different institu-

tion, where they held a staff position prior to accepting the chair position, their neurosurgical subspecialty focus, whether they had obtained an PhD or MBA prior to accepting their chair position, where they attended residency and the year they graduated from that residency, and their history of NIH funding prior to accepting the chair position. Internal hires were defined as neurosurgeons who held a staff position at the institution immediately before being named chair. We also used previous literature to rank the neurosurgical department size (i.e., number of faculty) and research productivity of the institutions included in our study by the aggregate h-index of their faculty.^{8,9}

Variables and Data Collection

To determine the identity of the neurosurgical chair as of December 31, 2016, and when the neurosurgical chair was appointed for each of the 105 neurosurgical departments, we performed a Web search and identified the chair using the SNS (<http://www.societyns.org/>), in 70% of cases. In the other 30% of cases, we relied on a corroboration of departmental websites, departmental announcements, and curriculum vitae available online. In these 30% of cases, we used strict criteria to ensure accuracy of our findings and required explicit information and concordance between all sources. In all cases, the neurosurgical chair as of December 31, 2016, was identified, and the year of appointment to the position was identified in over 98% of cases (n = 103). These sources and methods outlined above were also used to identify the positions held previously by chairs and their departmental status in those positions. While in all cases it was identified whether chairs had previously held other chair positions, in only 78% (n = 82) of cases could the previous position (e.g., associate professor or full professor) before becoming chair definitively be identified.

Additional degrees chairs obtained prior to being named chair were identified from a corroboration of SNS profiles and the AANS membership directory in the 70% of neurosurgeons who had SNS profiles and a corroboration of the AANS membership directory profiles and departmental websites, departmental announcements, and curriculum vitae available online. Of note, 97% (n = 102) of neurosurgical chairs had searchable profiles in the AANS membership directory.

To determine the age of the neurosurgical chair at time of hire, we used the healthgrades database (<https://www.healthgrades.com/>) and found the age through this method in over 95% of cases (n = 100). For 2 other cases, age was not listed in the healthgrades database, so the birth year listed on The Society of Neurological Surgeons profile was used to calculate estimated age.

In our study, departmental exposure was defined as attending residency at the institution or holding a staff position at the institution prior to being named chair. To determine where the chairs attended residency and when they graduated residency, we corroborated information from SNS and the AANS membership directory and were able to find this information in 99% of cases (n = 104). To determine the subspecialty focus of the neurosurgeon, we used the AANS "Find a Neurosurgeon" tool, which

FIG. 1. Years in which the chairs were hired. Of the current chairs, approximately half were hired within the past decade.

FIG. 2. Ages at which the chairs were hired. Most chairs were younger than 50 years at the time they were hired.

lists a singular subspecialty focus for each neurosurgeon in the database. This method, which yielded information for 85% ($n = 89$) of chairs, was supplemented by careful review of SNS profiles in 11 additional cases, to arrive at a total of over 95% ($n = 100$) of chairs with an identified subspecialty focus.

To identify the productivity of chairs prior to their appointment, we queried the Scopus database, which allowed us to determine the number of publications and the h-index the chair had at time of appointment. While we were able to identify all of the 105 neurosurgeons in this database, only data for the 103 neurosurgeons who had an identified year of appointment were included.

To identify the degree of public funding the chairs received prior to their appointment, we queried the NIH RePORTER, which is a government-run online database that reports all persons receiving various types of government-supported research grants (e.g., U01, K08, and R01 grants). While only 41% ($n = 43$) of neurosurgeons were found in the database, only those neurosurgeons who received any type of government funding are listed in the database. Therefore, while it is not clear if any missing data were present for this variable, we considered those neurosurgeons who were not found in the database to not have received any government funding for their research due to the high quality of the database.

Statistical Analysis

All statistics were calculated using JMP (version 13, SAS Institute). Mean values are reported with standard deviations, and median values are reported with ranges or interquartile ranges (IQRs). The chi-square and Wilcoxon rank-sum tests or t-tests were used for categorical and continuous variable comparison, respectively. Multivariate stepwise linear regression analysis was employed to determine factors associated with becoming chair at a younger age. Significance was set at $p < 0.05$.

Results

Career Attributes of Neurosurgical Chairs

We identified 105 neurosurgeons who were chairs as of December 31, 2016, at Accreditation Council for Graduate Medical Education–accredited institutions with neurosur-

gical departments in the United States were included in the study. Of these, 1% ($n = 1$) were women and 1% ($n = 1$) were interim chairs. The chairs had held their position for a median of 10 years (range 1–34 years) at the time of this cross-sectional study (Fig. 1). There was a great diversity in the residency programs the chairs attended as a part of their neurosurgical training, with 65 different institutions represented. The most common residency programs were the University of California, San Francisco ($n = 8$, 8%), Massachusetts General Hospital ($n = 8$, 8%), and the University of Michigan ($n = 6$, 6%). Four percent of chairs ($n = 4$) graduated residency at an institution outside the United States. Overall, the median age and number of years in practice postresidency of the neurosurgery chairs at acceptance of the position was 47 years old (range 36–63 years) (Fig. 2) and 14 years (range 6–33 years), respectively, and 87% ($n = 91$) were first-time chairs.

In terms of additional degrees at the time they became chair, the most common additional degree was PhD in 13% ($n = 14$) followed by MBA in 4% ($n = 4$) (Table 1). Of these additional degrees, 100% of the PhDs and 0% of the MBAs were obtained prior to residency. Interestingly, 2 additional chairs, both appointed after 2012, obtained an MBA within 3 years of being hired as chair. In terms of research funding at the time they became chair, 23% ($n = 24$) had received an R01 grant prior to being named chair (Table 1). Overall, 19% of the neurosurgeons who had NIH funding with R01 grants at the time of this cross-sectional study were appointed as chairs.⁷

The median number of publications at the time they became chair was 71 (interquartile range [IQR] 41–125), and the h-index was 17.5 (IQR 12–25). The most common subspecialty focuses of the chairs were vascular (35%, $n = 35$) and tumor/skull base (27%, $n = 27$), followed by spine (12%, $n = 12$), functional/epilepsy (11%, $n = 11$), and pediatrics (9%, $n = 9$) (Fig. 3). Through analysis of historical data,⁹ we noted that approximately 30% of all academic neurosurgeons were tumor/skull base surgeons or vascular neurosurgeons, whereas in our analyses, they accounted for over 60% of neurosurgical chairs ($p < 0.001$). Conversely, 25%–30% of academic neurosurgeons are spine surgeons,⁹ whereas our analyses revealed that they currently account for less than 15% of chairs (chi-square test, $p < 0.001$). Notably, among all NIH R01-funded neurosur-

TABLE 1. Career attributes of current neurosurgical chairs

Career Attribute	Value*	No. of Chairs w/ Reliable Data
Age in yrs, mean $\pm$ SD	48 $\pm$ 6	102
Exposure to department	63 (61)	104
Attended MGH, UCSF, or UM for residency	22 (21)	105
NIH R01 grant	24 (23)	104
PhD	14 (13)	104
MBA	4 (4)	104
No. of publications, median (IQR)	71 (41–125)	103
h-index, median (IQR)	17.5 (12–25)	103

MGH = Massachusetts General Hospital; UCSF = University of California, San Francisco; UM = University of Michigan.

Various career attributes of neurosurgical department chairs at the time they were named chair were analyzed. Most chairs were internal hires and 50 years or younger at the time of hire.

* Values are presented as the number of individuals (%) unless stated otherwise.

geons ($n = 128$), 27% were tumor/skull base, 22% were vascular, and 5% were spine surgeons, representing differences from the breakdown of these specialties among all academic neurosurgeons (chi-square test, $p < 0.001$),^{7,9} suggesting a possible role for NIH funding in the tendency for some subspecialties to be more likely to become chairs.

Comparing Internal Versus External Chair Hires

Internal hires were defined as neurosurgeons who held a staff position at the institution at the time they were named chair. Internal hires accounted for 56% of chairs ($n = 58$). Of the external hires ($n = 46$), 4% ($n = 2$) had attended residency and been staff at the institution, 4% ($n = 2$) had attended residency but had not been staff at the institution, and 2% ($n = 1$) had not attended residency but had been staff at the institution. Combining the number of internal hires with the number of external hires who had previous attending or residency connection to the institution gives a total of 61% ($n = 63$) who had spent some portion of their professional career (training or attending) at the institution before becoming chair.

The external hires ($n = 46$) came from 35 different institutions, and 3 were in private practice immediately prior to being hired. Of the 43 coming from academic centers, their academic appointment immediately before becoming chair was previous chair ($n = 12$), professor ($n = 18$), or associate professor ($n = 8$), and unknown in 12% of cases ($n = 5$). Compared with internal hires, the external hires had a greater number of publications (mean 122 vs 77, $p = 0.007$), a higher h-index (mean 20 vs 16, $p = 0.01$), tended to be older (mean age 48 vs 46 years, $p = 0.07$), and were less likely to be hired before age 50 years (53% vs 75%, $p = 0.02$) at the time they were named chair.

Temporal Trends For Neurosurgical Chair Hires

To understand how the attributes of chairs are changing over time, we analyzed differences in the characteristics

FIG. 3. Of the major neurosurgical subspecialties, over 60% of neurosurgical chairs had either a tumor or vascular subspecialty.

of the chairs as a function of the year in which they were hired. “Year of hire” as an increasing continuous variable was not associated with changes in degree of NIH R01 funding (R-square = 0.04, $p = 0.23$), the proportion of external hires (R-square = 0.03, $p = 0.46$), or having exposure to the department as a prior resident and/or staff (R-square = 0.03, $p = 0.86$). Having a later year of hire was associated with a significantly decreased likelihood that the chair had a tumor/skull and/or vascular subspecialty (R-square = 0.05, $p = 0.02$). More recent hires were also more likely to be older at the time they were hired, with an average of a 1-year increase in chair age with each subsequent 5-year period ($p = 0.02$) (Fig. 4). More recent hires were more likely to have a greater number of publications (R-square = 0.07, $p = 0.007$) and a greater h-index (R-square = 0.14, $p < 0.001$) at time of hire, with an average of a 2-point increase in h-index with each subsequent 3-year period ($p < 0.001$) (Fig. 5). Finally, chairs hired in later years tended to be more likely to have one or more additional degrees (MBA and/or PhD) (R-square = 0.03, $p = 0.09$); however, when analyzed as a binary variable chairs hired in 2010 or after were significantly more likely to have an MBA and/or PhD versus those hired before 2010 (26% vs 10%, $p = 0.04$).

Furthermore, to determine factors associated with becoming a chair at a younger age, we employed a multivariate stepwise linear regression analysis. To account for research productivity, we normalized the number of publications at the time the neurosurgeons were named chair by dividing it by the number of years postresidency (“publications/year”). Three factors were found to be significantly associated with younger age at time of hire: earlier year of hire (as a continuous variable) (F ratio = 11.3, $p = 0.001$), increased postresidency productivity (F ratio = 9.7, $p = 0.002$), and being internally hired (F ratio = 5.7, $p = 0.02$).

Differences in Chair Characteristics at Neurosurgery Departments Stratified by Departmental Academic Research Productivity

Using previously published studies,⁹ we identified the

FIG. 4. Of the current neurosurgery chairs, there was a positive linear correlation between year in which the chair was hired and increasing age.

25 institutions with the most academically productive neurosurgery departments in terms of research based on the aggregate h-index of the institution. We compared the attributes of the chairs of these programs with the attributes of the chairs at the other 80 neurosurgery departments. We found that chairs at the most academically productive research institutions were more likely to have held a previous chair position at a different institution (30% vs 12%, $p = 0.04$), tended to be more likely to have a PhD degree (24% vs 10%, $p = 0.09$), and were more likely to have an R01 NIH grant prior to becoming chair (56% vs 13%, $p < 0.001$). Finally, neurosurgery chairs at the most academically productive departments had a higher mean h-index (26 vs 18, $p = 0.008$) and more publications (mean number of publications 135 vs 85, $p = 0.003$) at the time of their hire.

Academic Productivity After Becoming Neurosurgical Chair and Associated Predictive Factors

Neither having a PhD nor having received an R01 grant was associated with significantly increased productivity after becoming chair (PhD: 10.6 vs 8.3 publications per year after becoming chair, $p = 0.34$; R01 grant: 10.5 vs 7.8 publications per year after becoming chair, $p = 0.15$). Neurosurgery chairs at the most academically productive research institutions were significantly more productive after becoming chair than chairs at other institutions (14.2 vs 6.6 publications per year after becoming chair, $p < 0.001$). Neither chairs appointed in more recent years nor new hires were more likely to be more academically productive after becoming chair (appointed in recent years: R-square = 0.01, $p = 0.32$); external hires: 8.1 vs 8.8 publications per year, $p = 0.68$). Finally, preappointment productivity was strongly associated with postappointment productivity (R-square = 0.35, $p < 0.001$).

Change in Academic Productivity After Becoming Chair

We found that neurosurgical chairs became more productive after their chair appointment than they had been before their chair appointment (8.5 publications per year after becoming chair to present vs 6.7 publications per year

FIG. 5. Of the current neurosurgery chairs, there was a positive linear correlation between year in which the chair was hired and increasing h-index.

from the 1st year postresidency until last the position before becoming chair; $p = 0.01$, paired t-test). This was true when analyzing chairs from the most productive academic departments (14.2 vs 8.8 publications per year, $p = 0.001$). However, chairs from academic departments with less research productivity were not significantly more productive after becoming chair (6.6 vs 6.0 publications per year, $p = 0.42$).

This increase in the number of publications appeared to be partly caused by an increase in the number of chairs who had middle authorship, as both the number and proportion of papers with the chair as a middle author [i.e., number of papers with the chair as a middle author/(number of papers with the chair as first author + number of papers with the chair as senior author)] increased after becoming chair (number of papers with the chair as a middle author per year 4.4 vs 3.1, $p = 0.003$; middle author ratio = 1.6 vs 0.97, $p < 0.001$). This was also true when analyzing chairs by whether they were from the most productive academic departments and those from other departments separately ($p < 0.05$ for all analyses).

To account for more significant involvement in and contribution toward research projects, we included only papers in which the chair held first or senior authorship positions in our subsequent analysis. When analyzing all chairs, there was no significant increase in the number of first or senior author papers per year after becoming chair (4.1 vs 3.6, $p = 0.20$). Similarly, when analyzing chairs in less-productive research departments, there was no significant increase in the number of first or senior author papers per year after becoming chair (3.0 vs 3.1, $p = 0.76$). However, when analyzing chairs in the more-productive departments, a significant increase was observed in the number of first or senior author papers per year after becoming chair (7.5 vs 5.0, $p = 0.01$).

Discussion

As the landscape of academic neurosurgery continues to evolve, neurosurgery department chairs have an increasing array of responsibilities and challenges,¹² including

complex health care financial responsibilities in an era of more complex payer mixes,³ negotiating arrangements to incorporate finances and personnel from satellite community hospitals, pressures to procure departmental research funding and the associated indirect costs, and the challenges of managing growing residency programs during the era of restricted work hours.² Accordingly, flexibility, creativity, and resourcefulness will be important to successful leadership as a neurosurgery chair. Detailed analysis of trends in neurosurgical chair hires is an important way of monitoring what priorities hospitals and medical centers are placing on attributes for neurosurgery chairs as they adapt to this changing landscape.

Research, both basic science and clinical, remains an important component in academic medicine and is especially crucial in neurosurgery. Our data reinforce the importance of a chair's leadership in the research domain by revealing an uptrend in the proportion of chairs with PhD degrees as well as a substantial increase the number of publications at the time of being named chair in recent years. We also found that the majority of neurosurgery chairs had a primary academic focus in tumor or vascular areas, although in recent years this trend has been decreasing. In terms of explanations for the underrepresentation of spine neurosurgeons relative to tumor or vascular neurosurgeons among chairs, it is possible that complex departmental structures in which spine surgery is shared between neurosurgical and orthopedic departments represent additional challenges to spine surgeons who are considering or being considered for chair positions. The overrepresentation of tumor and vascular subspecialties of chairs may likely be due to these areas being more amenable to basic science and clinical research, as evidenced by the tendency we found for these subspecialties to be overrepresented among NIH-funded neurosurgeons relative to how common these subspecialties were among academic neurosurgeons in general. In addition, personal predilections toward leadership positions in these subspecialties may contribute to their overrepresentation in chairs.

We noted factors predicting chairs productivity after their hire, with chairs at the most productive programs and chairs who had higher prechair productivity having significantly greater research productivity as chair. Our results also suggest that, regardless of the institutional productivity, chairs take on more supervisory and/or collaborative roles in research than they had prior to their appointment, evidenced by a large proportional increase in the number of middle author papers published per year after chair appointments versus before. While the increased research productivity observed in chairs from less productive academic departments is likely solely due to institution-wide efforts in many cases, the increased productivity observed in chairs from the most productive academic departments is likely due to both institution-wide efforts and personal efforts, suggesting that chairs in more productive academic departments are more likely to take on an active leadership role in research.

Furthermore, with the financial complexities and challenges of increasingly large departments,⁵ MBA degrees may continue to be valued and increasingly common among department chairs. Interestingly, we found that PhD degrees tended to be earned alongside MD degrees, while

none of the MBA degrees in this series were earned as part of MD/MBA programs.¹⁰ Further analysis is needed to determine whether these MBA degrees are being pursued as part of a necessity in the day-to-day practice of these neurosurgeons or because of the perception that it will increase their chances of obtaining a chair position. In addition, as with the PhD degree, further analysis is needed to determine the impact that the MBA degree has on the ability of these chairs to carry out their chair duties.

Multiple factors, such as program culture, candidate experience, and time to fill the position, impact the decision to recruit and hire leadership internally or to hire an external candidate.¹⁷ Our results reveal that a large proportion of neurosurgery chairs are hired internally, and in recent years this proportion accounts for over half of cases. Additionally, we found that internal hires have fewer publications and are more likely to be hired at a young age (i.e., estimated age < 50 years). Taken together, these findings suggest a sort of "home field advantage" when it comes to the chair selection process, which could reflect the familiarity of search committees with internal candidates,⁶ reducing the threshold that these candidates must meet in terms of experience or academic accomplishments to be selected.

Our data suggest an underrepresentation of women in chair positions, with only 1 female neurosurgery chair at the time our cross-sectional study was conducted; within a few months of the completion of our study, another female neurosurgeon was named chair. With the important and substantial contributions that WINS (Women in Neurosurgery Society)^{11,15} has made to the field of neurosurgery and the society's encouragement of strong female leadership, as well as the increased proportion of female neurosurgery residents in recent years,^{15,16} we expect and look forward to having more and more female neurosurgeons occupying chair positions in the very near future.

There are several limitations to this study, most notably its limited numbers. The long turnover time associated with the position of chair disallowed investigation of a large cohort of chairs. The lack of reliable data on the predecessors of current chairs made it impossible to study all chairs holding positions over a fixed multiple-decade time interval. Finally, while our analysis revealed characteristics in chairs who were hired and included a brief analysis of factors influencing research productivity of chairs after they were hired, it is difficult if not impossible to identify metrics that could be used to evaluate the success of these chairs in program building years¹⁴ after being hired and correlate these metrics with their characteristics at the time they were hired to determine what characteristics should be considered truly important. Another area of intriguing future research would be to develop similar data in other countries with a sufficient number of academic neurosurgical departments and define differences in metrics needed for success in other countries versus the United States.

Conclusions

Most neurosurgery department chairs matriculated into the position before the age of 50 years and, despite selection processes usually involving a national search, most chairs had a previous affiliation with the department hiring them, a phenomenon that has been stable over the years.

In more recent years, a large increase has occurred in the proportion of chairs with additional advanced degrees, underscoring how academic medical centers benefit from bringing in leaders with the ability to procure grant funding and the associated indirect costs, as well as the need for financial skills in these positions to direct departments that are getting increasingly larger and more regionally spread out at a time when fiscal pressures continue to arise due to the ever changing health care landscape.

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Disclosures

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Author Contributions

Conception and design: Aghi, Flanigan, Jahangiri. Acquisition of data: Aghi, Flanigan, Golubovsky, Karnuta, May. Analysis and interpretation of data: Aghi, Flanigan, Jahangiri, Golubovsky, Karnuta, Berger. Drafting the article: Aghi, Flanigan, Jahangiri. Critically revising the article: Aghi, Flanigan, Jahangiri, Golubovsky, May, Berger. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Aghi. Statistical analysis: Aghi, Flanigan, Karnuta. Administrative/technical/material support: Aghi, Flanigan, May. Study supervision: Aghi, Flanigan.

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