

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

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| TITLE (PROVISIONAL) | Academic vs. non-academic neurosurgeons in China: a national cross-sectional study on workload, burnout, and engagement |
| AUTHORS | Yu, Jinli; Gao, Jiming; Chen, Junyan; Sun, Yirui |

VERSION 1 – REVIEW

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| REVIEWER | Christian Iorio-Morin Université de Sherbrooke |
| REVIEW RETURNED | 04-Feb-2019 |

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| GENERAL COMMENTS | <p>In their paper, titled "Academic vs. non-academic neurosurgeons in China: a comparison in terms of workload, burnout, and engagement", the authors present the result of a national survey of practicing Chinese neurosurgeons. Among 1 202 respondents (16% response rate), 45% met criteria for burnout, as per the Maslach Burnout Inventory, with divorce and hospital violence being strong predictors in the multivariate analysis. Academic neurosurgeons had longer working hours, higher income, less willingness to marry, lower burnout, higher job satisfaction and more enthusiasm at work.</p> <p>I live and work in Canada, so I am not familiar with the Chinese health care system and Chinese neurosurgery. With this perspective, however, I believe the paper addresses an interesting and important topic relevant to every country. Specific comments are as follow:</p> <ol style="list-style-type: none">1) While the manuscript is understandable, the level of English is under what one would expect for BMJ Open. The paper requires further proof reading and overall syntax improvement.2) The authors state that 1 202 practicing neurosurgeons responded to the survey, yet the demographics section describe the respondents as being Interns, residents, attending doctors, and senior/chief neurosurgeons. In Canada, interns and residents would not be considered practicing neurosurgeons because they are still in training and require supervision. In Canada and the US, being in practice means having the certification and authority to practice independently and this excludes interns and residents. The manuscript should be modified by changing the term "practicing neurosurgeons" to something more encompassing, such as "neurosurgery interns, residents and staff".3) Moreover, in North America, the tasks, working conditions, work hours and salary of interns and residents are very different from attending doctors and senior surgeons. I believe the paper should discuss these two groups separately in all analyses, unless the Chinese system is organized so differently that the working conditions of all these people are similar. If this is the case, this should be explained clearly for the unsuspecting north American |
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| | <p>readers.</p> <p>4) In Table 1, the distribution of interns and residents is similar between academic and non-academic centers. How can interns and residents be present in non-academic centers? Again, this might just be the way Chinese neurosurgery is organized, but in North America, if a center trains interns and residents, it is typically considered an academic center. This should be further clarified.</p> <p>5) What do the authors mean by « Hospital violence »?</p> <p>6) It is stated that the annual income of Chinese neurosurgeons is 16 000 USD. I am not familiar with the Chinese system, but this figure seems extremely low. Is the conversion from RMB correct?</p> <p>7) How does the job satisfaction results compare to other professions? Is a JDI of 102 good or bad? The authors should give comparative data in the discussion.</p> <p>8) In the same vein, are the burnout rates different from those reported in other Chin</p> |
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| REVIEWER | Neil A. Busis, MD University of Pittsburgh School of Medicine USA |
| REVIEW RETURNED | 28-Apr-2019 |

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| GENERAL COMMENTS | <p>"MBI scores of each dimension were further graded as high, intermediate, or low (low EE≤18; high EE≥27; low DP≤5, high DP≥10; low PA≤33; high PA≥40) 8. A respondent would be considered burnout if he/she had high scores in the Emotional Exhaustion or Depersonalization assessment." There is currently discussion about the different ways to score physician burnout (Rotenstein LS, Torre M, Ramos MA, Rosales RC, Guille C, Sen S, Mata DA. Prevalence of Burnout Among Physicians: A Systematic Review. JAMA. 2018 Sep 18;320(11):1131-1150.) It would be good if the authors addressed the different methods used to score burnout with the MBI.</p> <p>"This study may represent approximately 16% of Chinese neurosurgeons." Is the survey sample representative of all Chinese neurosurgeons? This is addressed in the limitations section of the Discussion, but merits further consideration. What is known of the demographics of Chinese neurosurgeons?</p> |
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| REVIEWER | Roman Kovalenko Almazov National Medical Research Centre, Russia |
| REVIEW RETURNED | 29-Apr-2019 |

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| GENERAL COMMENTS | <p>Dear colleagues! I've read your manuscript with a big pleasure. A few years ago our team performed the similar survey among Russian neurosurgeons. It also revealed that our occupation associated with a significant stress that finally can lead to professional burnout. So it was very interesting to know which factors mostly impact on Chinese neurosurgeons as well as to realise how actual is that problem in general. Despite on some limitations, the study was carefully planned and covered quite big amount of responders. In my opinion it is not a problem that most of them were young specialists. On the one hand it may misrepresent some data, on the other hand we got information from the layer which will play the main role in the near future. The questionnaires were worldwide common for the investigation of professional burnout. Unfortunately the results are not satisfactory. But the main idea we should accept from this study is that so high level of burnout</p> |
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| | is not just a personal physicians' problem. It negatively impacts all healthcare system increasing the rate of professional errors, demotivating neurosurgeons in their career and transform that intelligent and creative job in hard daily routine. I hope your study will not just declare how problematic is neurosurgeons' professional sphere in China right now but will lead to rational strategy for improving that situation. |
| REVIEWER | Roger Ho National University of Singapore Singapore pcmrhcm@nus.edu.sg |
| REVIEW RETURNED | 08-May-2019 |
| GENERAL COMMENTS | <p>I have read this paper on burnout between academic vs non-academic neurosurgeons. This is an important paper and deserves to be published as it touches on unique problems in China, hospital violence and relatively low salary. The analysis was properly done and paper was well written. I have one suggestion:</p> <p>Under discussion, please state that this study could not compare burnout levels between residents and senior doctors. Please mention the findings of a recent meta-analysis which found that global prevalence of burnout of residents was 51% (Low et al 2019) but this meta-analysis did not report the prevalence of burnout of neurosurgery residents. Further research is required to compare the burnout of neurosurgery residents with other specialities.</p> <p>Reference: Low ZX, Yeo KA, Sharma VK, Leung GK, McIntyre RS, Guerrero A, Lu B, Sin Fai Lam CC, Tran BX, Nguyen LH, Ho CS, Tam WW, Ho RC Prevalence of Burnout in Medical and Surgical Residents: A Meta-Analysis. Int J Environ Res Public Health. 2019 Apr 26;16(9). pii: E1479. doi: 10.3390/ijerph16091479. Review. PMID:31027333</p> |

VERSION 1 – AUTHOR RESPONSE

Point to point response:

1) *Please complete and include a STROBE check-list. --editor*
A STROBE check-list has been uploaded.

2) *Please re-write the strengths and limitations section after the abstract.-- editor*
The strengths and limitations section has been re-written after the abstract.

3) *The paper requires further proofreading and overall syntax improvement. –Reviewer 1.*
We have conducted proofreading and revised the English expression under the assistant of a native speaker.

4) *In Canada and the US, being in practice means having the certification and authority to practice*

independently and this excludes interns and residents. The manuscript should be modified by changing the term “practicing neurosurgeons” to something more encompassing, such as “neurosurgery interns, residents and staff”. –Reviewer 1.

We agree that the training system in China is quite different from that in Canada and the US. Chinese young doctors are required to start their professional training on neurosurgery at the beginning of their postgraduate program and start to practice after graduation as interns or residents. A brief introduction of the training program for Chinese young neurosurgeon was published previously¹. We have explained this difference in the Introduction section. The term “practicing neurosurgeons” has been changed.

5) *Moreover, in North America, the tasks, working conditions, work hours and salary of interns and residents are very different from attending doctors and senior surgeons. I believe the paper should discuss these two groups separately in all analyses, unless the Chinese system is organized so differently that the working conditions of all these people are similar. –Reviewer 1.*

In China, although the duties responsibilities of attending doctors and senior surgeons are different, their working conditions are not dramatically different. We agree with the reviewer that further analyses of the two groups separately would reveal more information on the working status of Chinese neurosurgeons. In the revised manuscript, we have presented an additional analysis showing the burnout rates among different levels of neurosurgeons (Table 3). However, analyses of resident/attending/senior neurosurgeons separately in all analyses would be beyond the scope of this manuscript and would deviate from the main topic. We have added this consideration in the Discussion section and would like to conduct future studies.

6) *In Table 1, the distribution of interns and residents is similar between academic and non-academic centers. How can interns and residents be present in non-academic centers? Again, this might just be the way Chinese neurosurgery is organized, but in North America, if a center trains interns and residents, it is typically considered an academic center. This should be further clarified. . –Reviewer 1.*

Again, this is the unique characteristic of the Chinese medical system. In China, both academic and non-academic recruit young doctors after their postgraduate or undergraduate program. These young doctors receive further training and eventually become practicing neurosurgeons. Although young trainees may apply to work in different hospitals after training, the number of successful applicants is very limited. We also have added this information into the Introduction section.

7) *What do the authors mean by « Hospital violence »? . –Reviewer 1.*

Hospital violence means workplace violence against doctors or other medical workers. In the past decades, Chinese doctors have faced increasing threats to their personal safety at work. Doctors have been abused, injured, and even murdered by patients or relatives of patients in hospitals and clinics across the country. This issue has attracted attention of many parties and reported several times in international journals^{2,3}. We have changed the phrase “hospital violence” into “workplace violence” for better understanding.

8) *It is stated that the annual income of Chinese neurosurgeons is 16 000 USD. I am not familiar with the Chinese system, but this figure seems extremely low. Is the conversion from RMB correct? –Reviewer 1.*

It is the truth that Chinese doctors have low income. The average income has been published on the official website of the National Bureau of Statistics of China (<http://data.stats.gov.cn/easyquery.htm?cn=C01>). The conversion from RMB was correct, derived from online currency rates.

9) *How does the job satisfaction results compare to other professions? Is a JDI of 102 good or bad? The authors should give comparative data in the discussion. –Reviewer 1.*

The JDI was designed to measure the construct of job satisfaction, defined by P. C. Smith et al.⁴. Previous studies have been conducted in other countries using JDI to measure job satisfaction. For example, Rahnavard et al., and Lee et al., reported a mean JDI between 175-190 of mental health professionals and nursing staff^{5,6}. A JDI of 102 of this study is significantly lower (indicating a lower level of job satisfaction) than the scores reported by other authors. We have clarified this in the Results section.

10) *In the same vein, are the burnout rates different from those reported in other Chinese specialties or in neurosurgical communities in other countries in Asia or around the world? –Reviewer 1.*

Professional burnout has been previously investigated among neurosurgeons in the U.S. (burnout rate 27% in 2013 and 56.7% in 2015)^{7,8} and in Europe (one-quarter of neurosurgeons being burnout)⁹. In this study, the burnout rate among Chinese non-academic neurosurgeons was 58.84%, which was similar to the results of the U.S. but significantly higher than that of Europe. We have added relative information into the Discussion section.

11) *There is currently discussion about the different ways to score physician burnout (Rotenstein LS, Torre M, Ramos MA, Rosales RC, Guille C, Sen S, Mata DA. Prevalence of Burnout Among Physicians: A Systematic Review. JAMA. 2018 Sep 18;320(11):1131-1150.) It would be good if the authors addressed the different methods used to score burnout with the MBI. --Reviewer: 2*

We have carefully studied the review mentioned above. We have recognized the heterogeneity of burnout assessment, not only the variations in questionnaires but also the cut-off scores and calculation methods. For this consideration, we have chosen the most often used 22-item MBI version and cut-off scores for burnout investigation. The intention was to make it easier to compare results from other researchers. However, due to the limitation of the space, it is hard to conduct every different burnout assessment in this manuscript. Yet, it would be an interesting topic for our future studies. We have introduced the heterogeneity of burnout assessment in the Methods section of the revised manuscript.

12) *Is the survey sample representative of all Chinese neurosurgeons? This is addressed in the limitations section of the Discussion, but merits further consideration. What is known of the demographics of Chinese neurosurgeons? --Reviewer: 2*

There has been no formal publication describing the demographics of Chinese neurosurgeons. According to the World Federation of Neurosurgical Societies (WFNS)¹⁰ and the Chinese Neurosurgeon Society (CNS), China has approximately 11,000 registered neurosurgeons. This is the largest group of neurosurgeons in the world. Based on this information, although a number of 1,202 respondents has been similar to the U.S. studies^{7,8}, the respondents may still present approximately 16% of all Chinese neurosurgeons. Selection bias may be possible considering the percentage of respondents. Yet, a small increase in the percentage means significant time and funding consumption. We have discussed this limitation in the previous version manuscript. An update has been made in both the Introduction and the Discussion section of the revised manuscript.

13) *I hope your study will not just declare how problematic is neurosurgeons' professional sphere in China right now but will lead to rational strategy for improving that situation. Reviewer: 3*

We appreciate the positive feedback from the reviewer. As we stated in the manuscript, we hope the results of this study would promote rational reforms to improve the working environment for Chinese neurosurgeons. Fortunately, some changes have been made in China recently. The Chinese authority recently has increasingly emphasized the guarantee of normal medical order and the protection of the legitimate rights and interests of doctors. The change may take a long time, but the future is promising. We have updated the manuscript and emphasized this point of view.

14) Under discussion, please state that this study could not compare burnout levels between residents and senior doctors. Please mention the findings of a recent meta-analysis which found that global prevalence of burnout of residents was 51% (Low et al 2019) but this meta-analysis did not report the prevalence of burnout of neurosurgery residents. Further research is required to compare the burnout of neurosurgery residents with other specialities. Reviewer: 4

In fact, we have conducted additional analysis to compare burnout levels between junior and senior doctors. Data was shown in the new Table 3. Also, we have updated the discussion accordingly and included the findings of this recent study ¹¹. We are very interested to conduct future studies to compare the burnout and working status of neurosurgeons and other specialists.

15) Authors must include a statement in the methods section of the manuscript under the sub-heading 'Patient and Public Involvement'.--editor

The sub-heading of 'Patient and Public Involvement' and the statement have been included in the Methods section.

Reference

1. Zhao JZ, Zhou LF, Zhou DB, et al. The status quo of neurosurgery in China. *Neurosurgery*. 2008;62(2):516-20; discussion 20-1.
2. Zhao L, Zhang XY, Bai GY, et al. Violence against doctors in China. *Lancet*. 2014;384(9945):744.
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4. Smith PC, Kendall LM, Hulin CL. The measurement of satisfaction in work and retirement. . Chicago: Rand McNally; 1969.
5. Lee CD, del Carmen Montiel E. The correlation of mentoring and job satisfaction: a pilot study of mental health professionals. *Community mental health journal*. 2011;47(4):482-7.
6. Rahnavard F, Sadati AK, Hemmati S, et al. The impact of environmental and demographic factors on nursing job satisfaction. *Electronic physician*. 2018;10(4):6712-7.
7. Klimo P, Jr., DeCuyper M, Ragel BT, et al. Career satisfaction and burnout among U.S. neurosurgeons: a feasibility and pilot study. *World Neurosurg*. 2013;80(5):e59-68.
8. McAbee JH, Ragel BT, McCartney S, et al. Factors associated with career satisfaction and burnout among US neurosurgeons: results of a nationwide survey. *J Neurosurg*. 2015;123(1):161-73.
9. Pranckeviciene A, Tamasauskas A, Deltuva VP, et al. Professional burnout and its correlates in Lithuanian neurosurgeons. *Acta Neurochir (Wien)*. 2016;158(8):1437-45.
10. Societies WFoN. Global Neurosurgical Workforce Map [cited 2018 September 27]. Available from: <https://www.wfns.org/menu/61/global-neurosurgical-workforce-map>.
11. Low ZX, Yeo KA, Sharma VK, et al. Prevalence of Burnout in Medical and Surgical Residents: A Meta-Analysis. *International journal of environmental research and public health*. 2019;16(9).

VERSION 2 – REVIEW

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| REVIEWER | Christian Iorio-Morin |
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| | Université de Sherbrooke |
| REVIEW RETURNED | 29-Jun-2019 |
| GENERAL COMMENTS | The authors have greatly improved their manuscript and addressed all reviewer's concerns. |
| REVIEWER | Roger Ho National University of Singapore Singapore |
| REVIEW RETURNED | 17-Jun-2019 |
| GENERAL COMMENTS | I recommend publication. |

VERSION 2 – AUTHOR RESPONSE

We have revised our manuscript according to the reviewers' and your suggestions. Changes in the title and first point of the strengths and limitations section are listed as follows.

1. The new title: Academic vs. non-academic neurosurgeons in China: a national cross-sectional study on workload, burnout, and engagement
2. The new first point of the strengths and limitations: This is the first national cross-sectional survey to assess the working status of Chinese neurosurgeons.

We apologize for the delay of the revision due to an problem of the email system.

Once again, we deeply appreciate your help.