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Overfatigue amongst Chinese anaesthesiologists from 2017 to 2019

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Editor—Chinese anaesthesiologists are currently suffering from work overload, and sudden death is increasing dramatically. Between 1966 and 2015, 29 Chinese physicians suffered cardiac arrest caused by a heavy workload; 14 of these physicians were anaesthesiologists, with the average age of 35 yr.[1] Of six anaesthesiologists dying from overfatigue in the first half of 2017, most were young adults. Three studies conducted between 2012 and 2015[2–4] focused on the occupational status of anaesthesiologists in China. They found that Chinese anaesthesiologists were facing increased physical and mental health issues, with staff shortages as the main contributor of physician burnout. In August 2018, seven Chinese ministries and commissions jointly issued a notice of strengthening and perfecting anaesthesia medical services, referred to as Document 21.[5] We investigated whether there was any improvement in the physical and mental well-being of Chinese anaesthesiologists before and after the issuance of Document 21.

In August 2017 and September 2019, our team conducted electronic cross-sectional questionnaire surveys with the help of the New Youth Anaesthesia Forum, the Chinese Society of Anesthesiology, and the Chinese Association of Anesthesiologists (Supplementary file). Unlike previous studies, whose participants were individual anaesthesiologists, the participants for this survey were directors of anaesthesiology departments, aiming to investigate a wide range of problems with a small sample size. In August 2017, before the issuance of Document 21, 810 questionnaires were collected from directors of anaesthesiology, amongst which 626 were complete (77.2%; Exclusion criteria: 1) Age $\leq$ 35 years; 2) Answer time $\leq$ 2 minutes; 3) The IP address is a foreign website; 4) Lack of important data). In September 2019, after the first anniversary of the issuance of Document 21, 867 questionnaires were collected from directors of anaesthesiology, amongst which 752 were effective (efficacy rate: 86.7%).

In 2017, 93.5% of directors of anaesthesiology reported varying rates of excessive fatigue in their department, and 65.2% reported a shortage of medical staff (Fig. 1a). These conditions have not been improved in 2019. There was no statistical significant difference in caseload per day, prevalence of overfatigue and human resource allocation status between 2017 and 2019. There were some improvements in heavy workload, high medical risk, research work and promotion pressure, and doctor–patient relationship, whilst other criteria were worsening, including low income, poor working condition, and pressure to increase income. In both 2017 and 2019, the first three main root causes of employee turnover were low income, heavy workload, and high medical risk (Fig. 1b), and the greatest pressure on directors of anaesthesiology came from clinical anaesthesia risk, medical quality and safety (Fig. 1c). Our findings show that Chinese anaesthesiologists were still experiencing severe physical overfatigue, high mental stress and low job satisfaction in 2019.

A study in 2018 showed that China only had 53 000 anaesthesiologists and residents along with 6700 anaesthesiologist assistants to serve a total population of 1.3 billion people.[4] According to American and European standards of 2.4 anaesthesia providers per 10 000 people, China should have about 300 000 anaesthesiologists. In other words, China has a shortage of over 200 000 anaesthesiologists. Staff shortages resulted in frequent increased overtime work.[4] China is now trying to expand anaesthesiology recruitment and increase the number of anaesthesiologists in standardised training, but because the training cycle of anaesthesiologists is very long, increasing the number of staff is not a task that can be

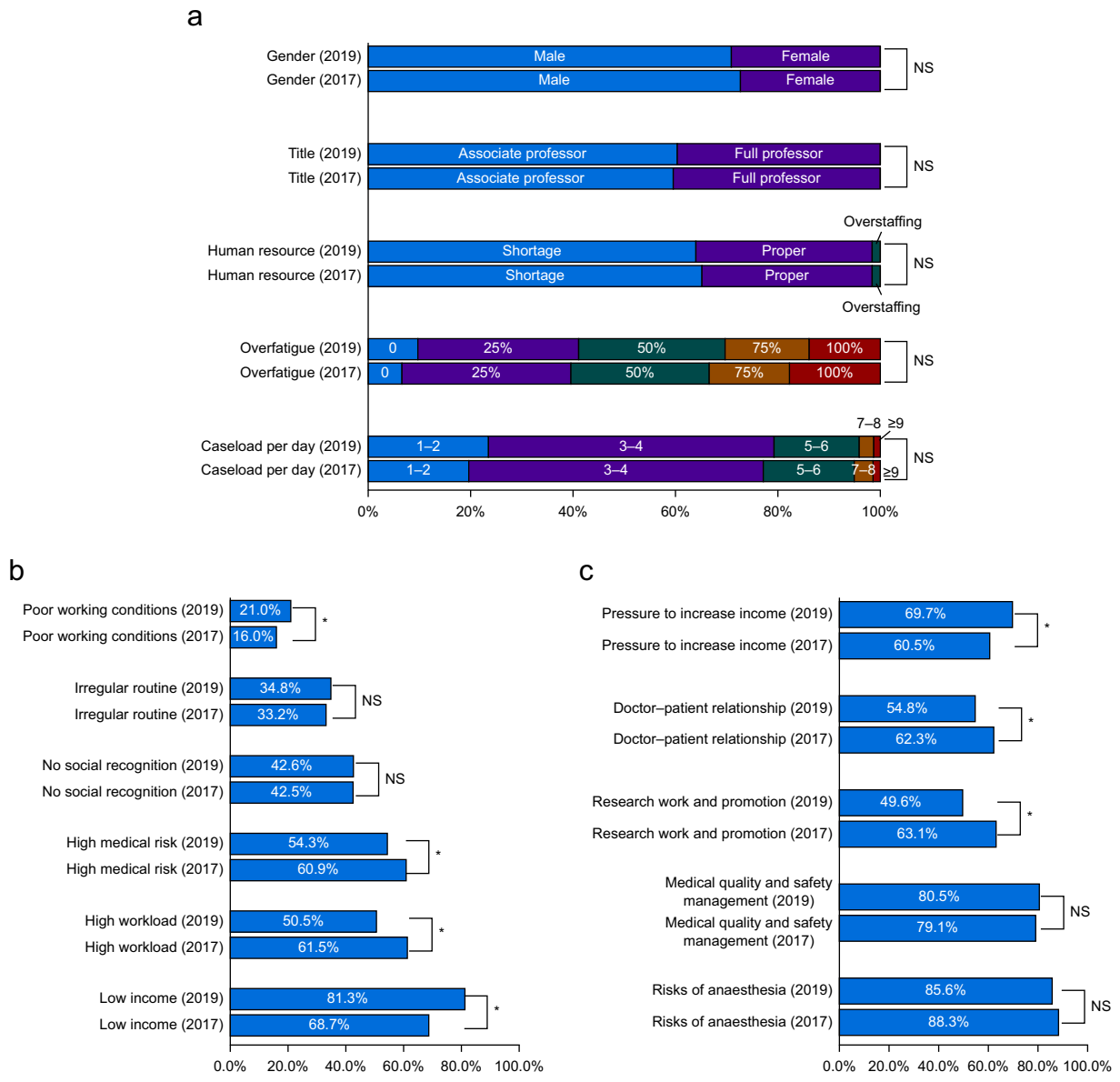

Fig 1. (a) Dissection of the occupational status of anaesthesiologists in China (single choice). (b) Reasons for quitting the job (multiple choices; limit three choices). (c) Sources of stress for the director of anaesthesiology (multiple choices; limit three choices). Data were from 626 directors of anaesthesiology in 2017 and 752 directors of anaesthesiology in 2019. The differences between 2017 and 2019 were evaluated using χ^2 test for categorical variables. *P<0.05. NS, no significance.

accomplished in a short time. So, although many hospital staff in China are working hard to learn and implement Document 21, so far the effect is modest. Document 21 explicitly called for an increase in the number of anaesthesiologists to 90 000 by 2020, 140 000 by 2030, and 160 000 by 2035. The goal is to attain a ratio of one anaesthesiologist per 10 000 people by 2035 and beyond. Although increasing the number of anaesthesiologists cannot be done quickly, there are other ways to mitigate the situation, including increasing income, improving mental health, increasing social recognition of their work to encourage higher morale, and reducing occupational exposure risk.

Declarations of interest

The authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bja.2020.09.032.

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State of the anaesthesia workforce in the United States: trends and geographic variation in nurse anaesthetist to physician anaesthesiologist ratios

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Keywords: anaesthesiologist; nurse anaesthetist; quality and patient safety; staffing; workforce

Editor—Growing demand for anaesthesia services has resulted in a push towards more nurse-led (*vs* physician-led) care. Increases in certified registered nurse anaesthetist (CRNA) employment have been facilitated by various regulations, and 41 US states currently do not require physician-anaesthesiologist supervision of CRNAs. The Centers for Medicare and Medicaid Services allows state governors to opt out of the 'federal supervision' reimbursement requirement of physician supervision of non-physician anaesthesia providers, and 18 states have elected to do so.[1] In the absence of detailed data on the anaesthesia workforce in the USA, we sought to identify state-specific patterns in anaesthesiologist and CRNA employment.

We utilised state-level data from the US Bureau of Labor Statistics (BLS) Occupational Employment Statistics to evaluate patterns in anaesthesiologist and CRNA employment in 2012 compared with 2019. If data were not available for 2012 or 2019, the next available year was used. State-specific numbers of anaesthesiology residents were obtained from the Accreditation Council for Graduate Medical Education and added to anaesthesiologist employment data. We mapped changes in CRNA to anaesthesiologist ratios in all 50 states and Washington, DC between 2012 and 2019. The 'usmap' package in RStudio version 1.1.16 was used (R version 3.5.1; R Foundation for Statistical Computing, Vienna, Austria).

In 2019, there were 30 442 anaesthesiologists and 43 690 CRNAs employed across the USA compared with 30 774 anaesthesiologists and 34 170 CRNAs in 2012. CRNAs were more common in Southern and Midwestern states. From 2012 to 2019, increases in the CRNA to anaesthesiologist ratio were mostly seen in the Southeast and Midwest with the largest increase observed in Minnesota (from 0.93 to 4.80), an opt-out state. The largest increase in a non-opt-out state was observed in Mississippi (from 1.76 to 5.42; Fig. 1).

While anaesthesiologist employment has remained stable over the past 8 yr, CRNA employment increased by 25%. This has resulted in an increase in the CRNA to anaesthesiologist ratio in Southeastern and Midwestern states, not restricted to states that have opted out of federal physician supervision