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Burnout Among Chinese Adult Reconstructive Surgeons: Incidence, Risk Factors, and Relationship With Intraoperative Irritability

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ABSTRACT

Background: Burnout is a major concern in human service occupations, mainly characterizing in emotional exhaustion and depersonalization. There is very limited research dealing with burnout in orthopedic surgeons. Exploring burnout prevalence, risk factors, and intraoperative irritability-related incidences is necessary to improve the quality of life for surgeons.

Methods: The study population consisted of 202 registered adult reconstructive doctors in China. Burnout was measured using a normalized translated version of the Maslach Burnout Inventory-Human Service Survey. Demographics, professional characteristics, and intraoperative irritability-related questions were also collected by electronic questionnaires. Statistical analysis was performed using SPSS 22.0. **Results:** The overall rate of burnout was 85.1%. Variables significantly associated with high emotional exhaustion scores included poor sleeping time per day ($P = .008$), more nights on call per week ($P = .048$), and absence of research ($P = .014$). For depersonalization, absence of marriage ($P < .001$) and more nights on call per week ($P < .001$) were selected as risk factors. The incidence of losing temper in operation is 58.9%, significantly higher in senior surgeons ($P = .001$). Three major reasons for irritation during operations included delays by companies providing operative devices, poor coordination of assistants, and slow movements of instrument nurses. Intraoperative irritability was found to be significantly correlated with burnout, especially in emotional exhaustion. Residents were the population having the least opportunities to lose temper in operation.

Conclusion: Burnout is highly prevalent in Chinese adult reconstructive surgeons, and it had some correlations with irritability. Further research is needed to determine more risk factors and reduce intraoperative irritability-related incidences.

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Burnout, a syndrome resulting from high levels of work stress, is primarily characterized by emotional exhaustion (EE) and depersonalization (DP) [1,2]. This syndrome is highly prevalent in human service occupations [1,3,4]. Healthcare workers, school teachers, and police officers are at high risk of burnout compared to the general population [5,6]. In the literature, the incidence of burnout varies from 37% to 53% among physicians in the United States [4,7–9]. Known risk factors of burnout in surgeons include age, work hours, gender, night calls per week, financial status, academic

ranks, program status, relationship with family or colleagues, and so on [3,8–15].

For orthopedic surgeons, burnout was ranked at a medium level among all specialties [3,7,13], varying from 40% to 60% [13,15–17]. There were no studies concerning incidence and risk factors of burnout in adult reconstructive surgeons, especially among Chinese orthopedic surgeons. However, Chinese adult reconstructive surgeons are facing more challenges than in the past century, with 200,000 cases of joint replacement in 2012 and this number increasing by 25% each year [18,19]. The overload of work may produce several results, one of which is irritability in the operating room. A surgeon losing his temper during an operation would do harm both to the surgeons and patients; yet, there are no studies reporting the relationship between burnout and intraoperative irritability.

In this study, we conducted a survey to investigate the prevalence of burnout and intraoperative anger of Chinese adult reconstructive surgeons. We attempted to determine the risk factors of

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burnout, and we hypothesized that intraoperative anger was correlated with burnout. We also investigated the possible reasons that make surgeons angry.

Materials and Methods

Participants

We sent emails to all 65 faculty leaders of the Joint Surgery Committee of the Chinese Orthopedic Association. Faculty leaders were invited to answer our electronic questionnaire and then to organize their subordinates to complete the survey. Survey responses were collected automatically when participants finished answering all questions.

Survey

The investigation was divided into 3 sections. The first section involved personal and professional characteristics of participants, including age, gender, time in practice, professional title, marriage, number of children, annual caseload as the first operator of arthroplasty, nights on call per week, hours of sleep per day, and research status. All choices were categorical and obligatory.

The second part of the survey was the validated Maslach Burnout Inventory-Human Service Survey (MBI-HSS), the most commonly adopted tool to diagnose burnout in healthcare workers [1]. For each question in the MBI-HSS scale, a 7-point Likert scale was provided, ranging from 0 (never) to 6 (everyday) according to frequency. There were 9 questions for the EE subscale and 5 questions for DP. According to the American College of Surgeons' burnout study, individuals with high EE (>27) and/or DP (>10) scores were considered to have symptoms of burnout [4,8,20].

We designed the last section of questionnaire to investigate intraoperative irritability, including frequency, possible reasons, consequences, participant's attitude, and career satisfaction. Possible reasons for surgeons losing temper in operation included poor coordination of assistants, poor sterility conception of assistants, slow movement of instrument nurses, delay in providing devices, unexpected incidents during operation, bad handling of instruments, unsatisfactory of lamplight or temperature, over-crowding of operation room, and others.

Statistical Analysis

Statistical analysis was performed in consultation with a biostatistician using SPSS 22.0 (SPSS Inc, Chicago, IL). A linear regression was used to determine the risk factors of burnout on each domain. The variables we used in the regression model were age, marriage, number of children, annual caseload, annual revisions, professional rank, sleep per day, nights on call, and research status. The backward elimination method was used to select significant variables, with the value $P < .05$ as a cutoff.

Comparisons of burnout scores in surgeons with or without intraoperative irritability and in surgeons with different career choices were tested by Student's *t*-test. Comparisons of burnout, incidence of losing temper, and career choices in the 4 professional ranks were tested by chi-squared test and partition of chi-squared test.

Results

A total of 1643 Chinese arthroplasty surgeons from 20 provinces were invited to answer the questionnaire, and 202 surgeons (12.3%)

Table 1
Personal and Professional Characteristics of Investigated Surgeons.

Personal Characteristics	n (%)	Professional Characteristics	n (%)
Gender		Professional rank	
Male	202 (100)	Resident	25 (12.4)
Female	0 (0)	Attending	73 (36.1)
Age		Vice Chief	63 (31.2)
<30	17 (8.4)	Chief	41 (20.3)
30-34	51 (25.3)	Nights on call per week	
35-39	52 (25.7)	0	50 (24.8)
40-44	34 (16.8)	0-1	47 (23.2)
45-49	27 (13.4)	1-2	81 (40.1)
50-54	18 (8.9)	2-3	16 (7.9)
>55	3 (1.5)	>3	8 (4.0)
Relationship		Annual caseload	
Single	14 (16.9)	0	35 (17.3)
Married	188 (93.1)	1-50	39 (19.3)
Number of children		51-100	29 (14.4)
0	24 (11.9)	101-200	15 (13.3)
1	143 (70.8)	201-400	43 (21.3)
2	34 (16.8)	>400	21 (10.4)
>2	1 (0.5)	Annual revisions	
Sleep hours per day		0	70 (41.9)
<5	5 (2.5)	1-20	79 (47.3)
5-6	66 (32.7)	21-50	14 (8.4)
6-7	111 (55.0)	>50	4 (2.4)
7-8	19 (9.4)	Research status	
>8	1 (0.5)	Yes	93 (46.0)
		No	109 (54.0)

responded the survey. Demographic and professional characteristics of the investigated surgeons are summarized in Table 1.

All surveyed adult reconstructive surgeons were male, and more than half were between 30 and 40 years old. Most surgeons were married, and over 70% had one child. More than 67% of participants were senior doctors or Vice Chief. Forty percent of investigated surgeons had 1 or 2 nights on call per week, while 25% did not need to attend night shifts due to higher positions. More than half of surgeons slept 6-7 hours per day, and 46% currently had research to conduct. Seventeen percent of surveyed surgeons did not currently have an independent surgical practice, while 31.7% have more than 200 cases per year. More than 47% (47.3%) of surgeons performed 1-20 revision surgeries annually, and 4 surgeons had more than 50 revisions per year.

According to MBI-HSS evaluation, the average score of EE among all participants was 33.17 ± 9.31 , and the average score of DP was 13.55 ± 5.51 . Individuals with high EE (>27) and/or DP (>10) scores were diagnosed of burnout. A total of 172 surgeons (85.1%) met burnout criteria.

A linear regression was used to determine the independent risk factors of burnout on each domain (Table 2). We identified sleeping time per day ($P = .008$), nights on call per week ($P = .048$), and research status ($P = .014$) as risk factors for EE. For DP, marriage status ($P < .001$) and nights on call per week ($P < .001$) were the risk factors.

More than half of the investigated surgeons (119, 58.9%) reported having lost their temper during an operation at least once during the past month, including 24.0% of residents, 58.9% of attendings, 65.0% of vice chiefs, and 70.7% of chiefs (Table 3). The 3 most common reasons for a surgeon's irritability in the operating room were delays in providing operative devices (56.3%), poor coordination of assistants (55.5%), and slow movements of instrument nurses (51.3%). Less common reasons for surgeons' emotional change were poor handling of instruments (42.0%), poor sterility conception of assistants (34.5%), over-crowding of operating room (32.8%), unsatisfactory lamplight or temperature (31.9%), and unexpected incidence during operation (30.3%). More than half of our investigated surgeons reported that they would choose the same occupation if provided another opportunity.

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