ORIGINAL ARTICLE

A Survey of Surgical Patient's Perception about Anesthesiologist in a Large Scale Comprehensive Hospital in China

Minna Li, Lulu Ma, Xuerong Yu, Yuguang Huang*

Department of Anesthesiology, Peking Union Medical College Hospital,
Chinese Academy of Medical Sciences & Peking Union
Medical College, Beijing 100730, China

Key words: patients' perception; anesthesiology; anesthesiologist; preoperative clinic

Objectives This study aim to evaluate patient's perception about anesthesiologists' job roles and investigate their expectations for anesthesia care.

Methods We designed a self-administered questionnaire for this cross-sectional survey study and delivered questionnaire forms to adult in-patients who were scheduled for elective surgery before pre-operative anesthetic visit the day before surgery. We collected information of respondents' demographic data, education background, health literacy and previous experience of anesthesia, perception of anesthesiologist's job, the expectation on anesthesia care. Descriptive analyses, χ^2 test and multiple linear regression analysis were used for data analysis.

Results Of 550 participants, 521 (94.7%) completed the questionnaire. In these respondents, 335 (64.3%) considered anesthesiology as an independent medical discipline, 225 (43.2%) believed that anesthesiology department was an independent clinical department, and 243 (46.6%) recognized anesthesiologists as qualified doctors. Only 21.5% of them knew that anesthesiologists also work in the intensive care unit and 26.9% of them knew that anesthesiologists also work in pain clinic as well. Younger patients ($\beta=-0.044$, $P<0.001$), those with higher education ($\beta=1.200$, $P<0.001$), or with better health literacy ($\beta=0.781$, $P=0.005$) had significant more knowledge about the job roles of anesthesiologists. Most patients demanded pre-anesthetic visit (80.5%), expected availability of preoperative anesthetic clinic (74.1%), wished to receive more information about anesthesia (91.3%) and anesthesiologist (77.4%).

Conclusions Patients' perception about anesthesiologists might be limited. Efforts should be made on education about anesthesia, especially for elderly patients and those under-educated patients. Preoperative anesthetic clinic is expected by most in-patients.

ANESTHESIOLOGY has been developing very fast in recent years, and the responsibilities of anesthesiologists have been expanded from the management in operating room to perioperative care, critical care, and pain relief. Some researchers have demonstrated that the patients' knowledge about anesthesia, anesthesiologists and their job responsibilities are actually very limited.^{1,2} People in different countries and regions may perceive differently on anesthesiology because of the differences in their traditional culture, socioeconomic status, literacy levels, religions and the health care systems of their countries.³⁻⁶ Patient's perception on anesthesiology may not only affect their medical choices, preoperative anxiety and satisfaction to healthcare they receive,⁷ but also impact on anesthesiologists' job satisfaction and even cause burnout.⁸ As far as we know, few studies have looked into this issue in Chinese mainland people, the largest population of the world.

The aim of this study is to evaluate Chinese patients' perception regarding anesthesiologists' job nature and their roles. We also tried to discover the characteristics of patients who had better perception about anesthesia, and patients' expectation on preoperative anesthetic visit, preoperative clinic and education about anesthesia.

MATERIALS AND METHODS

Patients and methods

This cross-sectional survey study was approved by the Institutional Review Board (Ethical audit number: S-K 030). A self-administered questionnaire in Chinese was designed, tested and delivered to in-patients who were scheduled for elective surgery from June 2016 to July 2017. Patients whose medical condition were stable with normal comprehension in written Chinese and can write properly were invited to participate in this survey. Exclusion criteria: younger than 18 years old, refused to participate, unable to answer questions because of poor medical condition, unable to read Chinese, scheduled for gynecology and obstetrics procedures because of gender bias.

After explicit consent, we asked participant to fill out the questionnaire form before preoperative anesthetic visit the day before surgery. The questionnaire was answered without help from trained person or family members. The completed questionnaires were collected and coded to maintain anonymity and confi-

dentiality of the respondents.

Questionnaire

The questionnaire was designed to include following items: demographics information (gender, age, residence type), the highest level of education, health literacy, and the previous experience of anesthesia. The health literacy was determined according the method developed by chew,⁹ which is to answer the question "how confident are you when filling out medical forms by yourself?" Patients' knowledge about anesthesia, anesthesiologists' job nature and their roles in hospital patient care were also assessed. Additional questions addressing the sources of information they have, the demand for preoperative anesthetic visit, and their expectations on preoperative clinic as well as educational information delivery were also included.

Statistical analyses

Patients' responses to questions about knowledge in the role of anesthesiologists were scored as 1 if yes, or 0 if no/do not know. Scores of these items were summed up ranging from 0 to 12. Higher score reflected higher level of knowledge about anesthesiologists' role.

Data were analyzed by SPSS (version 19.0, Chicago, IL, USA). Descriptive analyses were done for all the demographic variables and the responses. Continuous data were expressed as means $\pm$ SD. Categorical data were summarized as counts and percentages. Chi-square test was used to compare the response data between subgroups of demographics characteristics. Multivariate linear regression analysis was used to identify the predictive independent variables that are associated to patients' knowledge score. A *P* value less than 0.05 was considered statistically significant.

RESULTS

Patient demographics

Of the 550 participants, 521 completed the form successfully and were eligible for analysis. The overall response rate was 94.7%. Patients who did not return the survey form were because they had to leave the ward for preoperative consultation or preoperative examination at the moment. The mean age of respondents was 51.26 ± 15.49 years, with a range of 18-91 years. Demographic data and background information of these patients are presented in

Table 1.**Knowledge of job nature and qualification about anesthesiologist**

For the work nature of an anesthesiologist, 243 (46.6%) respondents recognized that anesthesiologists were qualified doctors, 58 (11.1%) of respondents thought anesthesiologists as specialized technicians, 67 (12.9%) and 57 (10.9%) of respondents considered anesthesiologists as assistants to surgeons and pharmacists, respectively. In contrast, 73.5% (25/34) with medical education background perceived anesthesiologists as medical doctors.

There were 64.3% (335/521) respondents who considered anesthesiology as an independent medical discipline. For anesthesiology as an independent department of hospital, 43.2%(225/521) respondents overall considered it as a clinical department, compared to 58.8%(20/34) respondents who had background of medical education considered anesthesiology as a clinical department.

The analysis of relationship between the responses and their demographic characteristics showed that patients with high level of education, background of medical education as well as urban residency are

Table 1. Demographic and background information of the respondents ($n=521$)

Variables	Characteristics	Patients (n)	Percentage (%)
Gender	male	253	48.6
	female	268	51.4
Age(years/old)	18-65	426	81.8
	≥66	95	18.2
Residence	urban	428	82.1
	rural	93	17.9
Educational level	high school or below	277	53.2
	college or above	244	46.8
Medical education*	no	483	93.4
	yes	34	6.6
Health literacy [#]	inadequate	122	23.8
	marginal	197	38.5
	adequate	193	37.7
Previous anesthetics	no	184	35.3
	yes	337	64.7

For specific questions, *total respondents were 517; [#]total respondents were 512.

more likely to perceive truthful views on the topic "An anesthesiologist is a qualified doctor". Patients aged 65 or below, reside in urban area, with college or above education, have medical education background and have self-cognition of adequate health literacy are more likely to perceive truthful view on "anesthesiology is an independent medical discipline" (**Table 2**).

Views on anesthesiologists' education and workplace

There were 49.3% (257/521) respondents who believed that the education and training duration for a qualified anesthesiologist should be the same as a surgeon, while 10.6% (55/521) and 3.1% (16/521) respondents considered it should be longer and shorter than surgeons, respectively. There were 37% (193/521) respondents declined to answer this question.

Of all respondents, 79.5%(414/521) respondents believed that anesthesiologists work in the operating room(OR) during the whole period of the surgery to ensure patients' safety, while 5.0% (26/521) patients thought the anesthesiologist would leave the OR during the operation when the patient' condition came to be stable.

Perception of anesthesiologists' job role

This survey found that the job roles of anesthesiologists both in OR and outside OR were not well understood (**Table 3**). 58.7% (306/521) respondents believed anesthesiologists determined whether or not a patient was suitable for an operation. Only 26.5% (138/521) patients knew that anesthesiologist should monitor blood loss and performed transfusion when necessary. For anesthesiologists' roles outside OR, 26.9% (140/521) and 21.5% (112/521) of respondents knew that anesthesiologists also worked in pain clinic and intensive care unit (ICU), respectively.

Factors affecting perception of anesthesiologists' job roles

The patients' knowledge score on roles of anesthesiologists was 6 (4-8). Multivariate linear regression analysis found that younger patients ($\beta=-0.044$, $P<0.001$), those received higher education($\beta=1.200$, $P<0.001$), or with better health literacy ($\beta=0.781$, $P=0.005$) had significant more knowledge about job roles of anesthesiologists (**Table 4**).

Table 2. Responses to descriptions about anesthesiology, department of anesthesiology and anesthesiologists

Characteristics	<i>n</i>	Anesthesiology is an independent medical discipline			Anesthesiology department is a clinical department			Anesthesiologist is a qualified doctor		
		Yes <i>n</i> (%)	χ^2	<i>P</i>	Yes <i>n</i> (%)	χ^2	<i>P</i>	Yes <i>n</i> (%)	χ^2	<i>P</i>
Gender										
male	253	168(66.4)	0.962	0.327	113(44.7)	0.492	0.483	118(46.6)	0.000	1
female	268	167(62.3)			112(41.8)			125(46.6)		
Age										
18-65	426	282(66.2)	3.897	0.048*	186(43.7)	0.233	0.630	193(45.3)	1.675	0.196
≥66	95	53(55.8)			39(41.1)			50(52.6)		
Residence										
urban	428	291(68.0)	14.708	<0.001*	199(46.5)	10.818	0.001*	221(51.6)	24.032	<0.001*
rural	93	44(47.3)			26(28.0)			22(23.7)		
Education										
high school or below	277	147(53.1)	34.204	<0.001*	94(33.9)	21.039	<0.001*	92(33.2)	42.853	<0.001*
college or above	244	188(77.0)			131(53.7)			151(61.9)		
Medical education										
no	483	298(61.7)	19.600	<0.001*	202(41.8)	4.446	0.035*	216(44.7)	10.594	0.001*
yes	34	33(97.1)			20(58.8)			25(73.5)		
Health literacy										
inadequate	122	65(53.3)	10.657	0.005*	45(36.9)	8.475	0.014*	51(41.8)	2.640	0.267
marginal	197	127(64.5)			78(39.6)			89(45.2)		
adequate	193	137(71.0)			99(51.3)			98(50.8)		
Previous anesthesia										
no	184	114(62.0)	0.627	0.429	71(38.6)	2.300	0.129	89(48.4)	0.341	0.582
yes	337	221(65.8)			154(45.7)			154(45.7)		
Total respondents	521	335(64.3)			225(43.2)			243(46.6)		

*statistically significant.

Table 3. Patients' knowledge in the job roles of anesthesiologists (*n*=521)

Description items about the job roles of anesthesiologists	Positive <i>n</i> (%)
Determining if a patient is fit for surgery	306(58.7)
Putting patients to sleep before surgery	347(66.6)
Relieving pain during surgery	383(73.5)
Monitoring vital signs during surgery to make sure patients are stable	315(60.5)
Monitoring blood loss during surgery, giving patient blood if needed	138(26.5)
Waking patient up after surgery is completed	389(74.7)
Taking care of patients in the recovery room	280(53.7)
Preventing and treating post-operative pain, nausea and vomiting	233(44.7)
Treating acute and chronic pain	140(26.9)
Treating patients in the intensive care unit (ICU)	112(21.5)
Helping emergency room and other departments with resuscitation	164(31.5)
Doing research and writing papers	207(39.7)

Table 4. Predictors of knowledge regarding roles of anesthesiologists

Variables	β	<i>SE</i>	<i>P</i>	95%CI
Gender	-0.007	0.275	0.980	-0.546 to 0.533
Age	-0.044	0.009	<0.001*	-0.062 to -0.026
Residence	-0.473	0.387	0.222	-1.232 to 0.287
Education	1.200	0.304	<0.001*	0.604 to 1.797
Health literacy	0.781	0.280	0.005*	0.231 to 1.332
Previous anesthesia	0.533	0.283	0.061	-0.024 to 1.090

CI, confidence interval; *SE*, standard error.

*statistically significant.

Source of patients' knowledge about anesthesia

Television (49.5%) and doctors/nurses (45.6%) were the most common sources patients learn about anesthesia from. Other information sources included internet (29%), relatives or friends (29%), books (27.6%), newspapers and journals (17.1%), social media such as Wechat (5%).

Patient's expectation on anesthetic care

Four hundred and eighteen (80.5%) respondents demanded preoperative anesthetic visit and 338 (72.6%) respondents expected the availability of preoperative clinic to communicate with an anesthesiologist before being hospitalized. Most respondents wished to receive more information about anesthesia (475, 91.2%) and their anesthesiologist (401, 77.4%) (**Table 5**).

DISCUSSION

Patients' insufficient knowledge about anesthesia and anesthesiologists may increase preoperative anxiety, impair the respects and trust to anesthesiologists, and reduce patients' compliance.⁴ Patients do not know whom they should seek help from when they encounter problems. This affects the quality of medical care and patients' satisfaction. Meanwhile, patient's misunderstanding may affect anesthesiologists' vocational choice, job satisfaction and cause burnout.⁸

This survey showed that the knowledge of patients about anesthesiologists was very limited. About 64.3% respondents considered that anesthesiology was an independent medical discipline, while a study in India found that only 38.3% of respondents knew the fact.⁶ The majority (56.8%) of subjects in this research did not know that anesthesiology department was an independent clinical department, and many people regarded it as an auxiliary department in hospital which doesn't treat patients directly. The anesthesiology department usually works "behind the screen" in hospital, and anesthesiologist is often misunderstood by patients as an assistant of the surgeon.

In this survey, only 46.6% respondents considered anesthesiologist as a qualified doctor. Compared with previous studies, this proportion in Chinese patients was lower not only than patients in developed countries such as USA (86%),¹⁰ Australia (83.5%)¹ and Switzerland (99%),⁵ but also lower than patients in some developing countries such as India(57.3%)⁶

and Irish(78%).¹¹ The term "anesthesiologist" in Chinese "麻醉师", for some people, may indicate a non-medical person not requiring qualification to practice. A correct Chinese translation as "麻醉医师" or "围术期医生" should be introduced and extended to both patients and medical staff.¹²

We found that urban patients, those aged younger than 65 years old, and those received college or above education, or with medical education background had statistically significant better understanding about anesthesiologists' job nature, which was similar to results in previous studies.¹

Most patients in this survey knew some of intra-operative responsibilities that anesthesiologists have, such as putting patients to sleep (66.6%) and waking patients up (74.7%). Consistent with previous studies, we found few recognized the leading role of an anesthesiologist in the patient care during surgery,^{1,9} such as monitoring blood loss, performing blood transfusion if needed (26.5%), taking care of patients in the recovery room (53.7%), and preventing or treating post-operative syndromes such as pain, nausea and vomiting (44.7%). The main causes of this may lie in that anesthesiologists have less contact with conscious patients than other specialists. The knowledge of patient regarding the anesthesiologist's responsibilities outside the OR was poor as well. Only 21.5% and 26.9% of patients knew that their anesthesiologists also treat patients in ICU and deal with acute and chronic pain, respectively. This may because that the patients are usually not fully conscious during perioperative period or during an episode of critical illness.

A study found that patients' knowledge had significant association with educational level and the number of previous surgeries.⁹ This study found that younger patients and those with higher education or good health literacy had statistically significant more knowledge about anesthesiologist's job roles. But interestingly, people with previous experiences of anesthesia did not have more knowledge than others.

Table 5. Expectation of patients about preoperative anesthetic visit, preoperative clinic and information delivery

Expectations items	Yes <i>n</i> (%)	Unsure <i>n</i> (%)	No <i>n</i> (%)	Total respondents <i>n</i> (%)
Preoperative anesthetic visit	418 (80.5)	74 (14.3)	27 (5.2)	519(99.6)
Preoperative anesthetic clinic before hospitalization	338 (72.1)	114 (24.3)	17 (3.6)	469(90.0)
More information about anesthesia	475 (91.3)	43 (8.3)	2 (0.4)	520(99.8)
More information about anesthesiologist	401 (77.4)	108 (20.9)	9 (1.7)	518(99.4)

Note: Total percentage of each item does not equal to 100%, as some patients selected "not to answer".

This finding reflects the insufficient patient education on anesthetic before operation in China; besides, the time that anesthesiologists spend on communicating with conscious patients is usually not sufficient enough because of the shortage in anesthesiologists in China. So, we suggest that it is essential to conduct more preoperative education on anesthesia for patients, especially those elderly patients and those under-educated patients.

Researches have shown that preoperative educations for patients not only increase their knowledge, but also reduce their anxiety and postoperative pain, improve the doctor-patient relationship, even improve patient satisfaction.^{7,13,14,15} Patients with higher knowledge scores expressed a higher level of trust in anesthesiologists.⁶ For these benefits, preoperative education for patients should gain more attention. Most of patients in our study desired to receive more information about anesthesia (91.3%) and anesthesiologists (77.4%).

We also found even in respondents with medical education background, the knowledge of anesthesia is somewhat poor. Previous studies in patients, health professionals, clinical staff and politicians reported that they did not fully understand who anesthesiologists are, what they do, and how they are trained.^{16,17} Patient's misunderstanding may affect anesthesiologists' vocational choice, self-esteem, job satisfaction and burnout.^{8,18} There is an obvious shortage of anesthesiologists in China, but medical graduate students hesitate to join department of anesthesiology. It is crucial to improve public awareness of anesthesiologist's job nature and their important roles in patients' care. The education about anesthesiology in medical school should be reinforced too.

In this survey, one of the main information sources were doctors and nurses. Anesthesiologist should take the responsibility individually to educate patients during preoperative interview or clinic. The preoperative visit is usually done in a hurry because of the shortage of anesthesiologist and the consequent heavy work burden. Most respondents in the survey demanded preoperative visit by anesthesiologists and expect hospital to provide preoperative clinic, which works in hospitals of many other countries, but is very few in mainland China. So efforts need to be taken to establish preoperative anesthetic clinic in Chinese hospitals.

Another information source that patients learn

about anesthesia was TV shows. In some countries, preoperative education is conveyed to patients by printed booklet, media-based video and website.¹⁴ Comparatively, few is available in mainland Chinese hospitals. So, video, booklet or website should be produced for the purpose of patients' preoperative education in Chinese hospitals.

Since this survey was conducted in a single medical center in China, the results of this study might not be extrapolated to all Chinese patients. However, the medical center has a large referral base which is geographically and socioeconomically diverse; the participants in this survey came from more than 30 different provinces all over China. So it could represent patients from different regions of China. Further studies need to be conducted in multiple medical centers to get a larger sample size and be more representative for Chinese patients.

Conflict of interest statement

All authors declared no conflict of interests.

REFERENCES

1. Braun AR, Leslie K, Morgan C, et al. Patients' knowledge of the qualifications and roles of anaesthetists. *Anaesth Intensive Care* 2007;35(4):570-4. doi: 10.1177/0310057X0703500417.
2. Singh T, Sharma S, Banerjee B, et al. Knowledge regarding anesthesiologist and anesthesiology among patients and attendants attending a rural hospital of New Delhi. *J Educ Health Promot* 2018; 7:12. doi: 10.4103/jehp.jehp_52_17.
3. Gottschalk A, Seelen S, Tivey S, et al. What do patients know about anesthesiologists? Results of a comparative survey in an U.S., Australian, and German university hospital. *J Clin Anesth* 2013; 25(2): 85-91. doi: 10.1016/j.jclinane.2012.06.017.
4. Nagrampa D, Bazargan-Hejazi S, Neelakanta G, et al. A survey of anesthesiologists' role, trust in anesthesiologists, and knowledge and fears about anesthesia among predominantly Hispanic patients from an inner-city county preoperative anesthesia clinic. *J Clin Anesth* 2015; 27(2):97-104. doi: 10.1016/j.jclinane.2014.05.012.
5. Kindler C, Harms C and Alber C. The patients' perception of the anaesthetist in a Swiss university hospital. *Anaesthesist* 2002; 51(11):890-6. doi: 10.1007/s00101-002-0382-x.

6. Mathur SK, Dube SK, Jain S. Knowledge about anaesthesia and anaesthesiologist amongst general population in India. *Indian J Anaesth* 2009; 53(2):179-86.
7. Klapfta JM, Roizen MF. Current understanding of patients' attitudes toward and preparation for anesthesia: a review. *Anesth Analg* 1996; 83(6):1314-21. doi: 10.1097/00000539-199612000-00031.
8. Li H, Zuo M, Gelb AW, et al. Chinese anesthesiologists have high burnout and low job satisfaction: a cross-sectional survey. *Anesth Analg* 2018; 126(3): 1004-12. doi: 10.1213/ANE.0000000000002776.
9. Chew LD, Griffin JM, Partin MR, et al. Validation of screening questions for limited health literacy in a large VA outpatient population. *J Gen Intern Med* 2008; 23(5):561-6. doi: 10.1007/s11606-008-0520-5.
10. Garcia-Marcinkiewicz AG, Long TR, Danielson DR, et al. Health literacy and anesthesia: patients' knowledge of anesthesiologist roles and information desired in the preoperative visit. *J Clin Anesth* 2014; 26(5): 375-82. doi: 10.1016/j.jclinane.2014.01.013.
11. Smith A, Mannion S. Irish patients knowledge and perception of anaesthesia. *Ir Med J* 2013; 106(2):50-2.
12. Zieger J, Häberle HA. Anesthesiology and outcome-impact of the perioperative process. *Anesthesiol Intensivmed Notfallmed Schmerzther* 2017; 52(7/8): 525-41. German. doi: 10.1055/s-0042-118828.
13. Guo P. Preoperative education interventions to reduce anxiety and improve recovery among cardiac surgery patients: a review of randomised controlled trials. *J Clin Nurs* 2015;24(1-2):34-46. doi: 10.1111/jocn.12618.
14. Ji L, Zhang X, Fan H, et al. drawMD APP-aided preoperative anesthesia education reduce parents anxiety and improve satisfaction. *Patient Educ Couns* 2016; 99(2):265-70. doi: 10.1016/j.pec.2015.08.027.
15. Batuman A, Gulec E, Turktan M, et al. Preoperative informational video reduces preoperative anxiety and postoperative negative behavioral changes in children. *Minerva Anestesiol* 2016; 82(5):534-42.
16. Strunin L. Anaesthesia, what's in a name?—time for change. *Anaesthesia* 2000; 55(10):941-2.
17. Nicolescu T, Doerfel J, Khan Q. Patient perceptions of the care received from their anesthesiologist: a survey study. *J Okla State Med Assoc* 2016; 109(10): 481-3.
18. Jenkins K, Wong D. A survey of professional satisfaction among Canadian anesthesiologists. *Can J Anaesth* 2001;48(7):637-45. doi: 10.1007/BF03016196.