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How China anesthesiologists document and communicate difficult airway management

Xiang Luo¹, Dong Yang^{2*}, Xiao-Ming Deng², Qian-Yu Wang² and Xi-Yu Du²

Abstract

Background According to the Chinese Society of Anesthesiology, it is recommended that patients with difficult airways be documented and notified, which will provide healthcare professionals with a direct reference when managing airways. However, compliance with this initiative remains unclear. This study was conducted to investigate the current status and need for difficult airway notification at Plastic Surgery Hospital and to explore the factors contributing to noncompliance.

Methods Anesthesiologists, surgeons, and patients in Plastic Surgery Hospital were administered separate questionnaires regarding notification of difficult airway management. Participants were surveyed regarding their attitudes and current practices regarding difficult airway notification. In addition, questions were asked regarding the barriers that contribute to noncompliance.

Results A total of 632 valid responses were obtained and analyzed, giving a response rate of 99.21%. 399 patients (89.46%) felt it was very important for anesthesiologists to inform them about their difficult airway, and 91.03% felt it was very important for them to receive a letter of their airway assessment. However, twenty-two anesthesiologists (64.7%) reported verbally informing less than 50% of patients about their difficult airway after surgery, and only four anesthesiologists informed all patients they encountered. Most surgeons (91.22%) and anesthesiologists (91.18%) believe that it is vital to inform patients verbally, while 114 surgeons (77.03%) and 31 anesthesiologists (91.18%) believe that it is essential to complete a difficult airway notification alert. Among the factors causing noncompliance, 17 (34.69%) believed that absence of mandatory rules, 9 (18.37%) believed that increased workload, and 8 (16.33%) believed that notification methods were lacking.

Conclusions The compliance to difficult airway notification remains low in Plastic Surgery Hospital despite the high incidence of difficult airways. Although anesthesiologists, surgeons, and patients are strongly in favor of it. Among the barriers to compliance were the absence of a well-developed notification system and a means of notification such as an alert form for difficult airways. This may spur the anesthesiology society to publish the notification system.

Keywords Difficult airway, Airway management, Notification, Questionnaire

*Correspondence:

Dong Yang
kevinsocial@outlook.com

¹Department of Anesthesiology, Beijing Jishuitan Hospital, Capital Medical University, Beijing, China

²Anesthesiologist, Department of Anesthesiology, Plastic Surgery Hospital, Chinese Academy of Medical Science and Peking Union Medical College, Beijing, China



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Background

With the development and widespread application of difficult airway management tools, guidelines, and active airway management training, the incidence of difficult airways has decreased significantly [1–10]. Unfortunately, unanticipated difficult airways occur from time to time due to the lack of a recognized and robust evaluation system that accurately predicts difficult airways. If not treated appropriately in a timely manner, they may result in hypoxic brain injury or even death [3, 11]. In addition, numerous literatures clearly indicate that poor airway assessment and inadequate prevention system are the main causes of failed airway management and increased airway-related adverse events [10, 12–14]. As a contrast to the massive measures dedicated to predicting difficult airways, there is a paucity of information on communicating difficult airways [15].

In an effort to improve preoperative assessment of the airway, countries such as the United States, Canada, and India have advocated relatively standardized difficult airway notification systems when a difficult airway situation arises [3, 6, 8]. According to the Canadian Airway Focus Group (CAFG), this should include at least accurate documentation in the patient's medical record, personal communication with the patient and his or her surgeon and providing the patient with a difficult airway letter along with a copy for both the chart and the primary care provider [8]. In addition, the guidelines for the management of unanticipated difficult intubation in adults developed by the British Difficult Airway Society emphasize that complete documentation and detailed information about difficult airways that have occurred can significantly reduce the likelihood of serious adverse airway-related events [3]. It is recommended by the All-Indian Difficult Airway Association (AIDAA) that a comprehensive description of the difficulty, the airway management plan, as well as the complication be documented in a standard format, which should be made available in the case file and given to the patient or his/her surrogate [6]. Moreover, the CAFG and the AIDAA have published their own difficult airway notification alert form [6, 8]. And the literature suggests that the identification of difficult airway with wristbands is the least costly initiative with the greatest benefit to patient safety in the future [16]. It is also worth noting that various difficult airway registries already exist, including the United States MedicAlert™ Foundation National Difficult Airway/Intubation Registry and the National Health Index Medical Warning System [17]. In China, the Guidelines for the Management of Difficult Airway published in 2017 by the Chinese Society of Anesthesiology (CSA) recommend that difficult airway management should be documented and communicated to patients [4], but they do not specify the form and content of communication. A

comprehensive and systematic system of difficult airway notification has not been established in China to date. In this study, we propose to investigate difficult airway documentation and notification at the Plastic Surgery Hospital of the Chinese Academy of Medicine in order to identify the current status of difficult airway notification in China and to provide a reference for establishing a difficult airway notification system in China. In the Plastic Surgery Hospital of the Chinese Academy of Medicine, a large number of patients (about 10% of the surgical volume) attend for proposed plastic surgery for head and neck surgeries (patients with keloid contractures after burns on the face or neck, patients after dilator placement, patients with congenital or acquired maxillofacial deformities, etc.). These patients often require multiple surgical procedures to heal. The Fourth National Audit Project (NAP4) of the Royal College of Anesthesiologists and the Difficult Airway Society prospectively collected information on major airway complications in approximately 3 million anesthetized patients across the United Kingdom. Nearly 40% of airway-related complications occurred in patients undergoing head and neck surgery; Patients undergoing head and neck surgery accounted for nearly 75% of cases requiring an Emergency Surgical Airway (ESA) due to “Can't Intubate, Can't Oxygenate” (CICO) [11]. The incidence of difficult tracheal intubation in head and neck surgical patients has been shown to be as high as 7%-9% in several large studies, which is 2–4 times higher than the incidence of difficult tracheal intubation in all surgical patients [18, 19]. In addition, Lundström et al. observed that if tracheal intubation fails in this situation, there is a high probability of it failing again in the future [20]. It is also noteworthy that the Plastic Surgery Hospital of the Chinese Academy of Medicine is the airway training center of the Chinese Medical Association's Anesthesiology Branch and holds the annual “Difficult Airway Learning Class” as a continuing education program. Compared to other general hospitals, Plastic Surgery Hospital of the Chinese Academy of Medicine has a significantly higher incidence of difficult airways, and the management of perioperative difficult airways is even more challenging. Consequently, a survey of the status of difficult airway notification in this hospital is even more urgent and necessary.

Methods

Questionnaires was developed to investigate patients, surgeons and anesthesiologists for difficult airway notification, including a survey on the current status of difficult airway information and a survey on the need for information. The questionnaire research conforms to ethical and moral standards and is considered low or negligible risk. Consequently, ethical consent may not be required, Written informed consent was waived by

the Institutional Review Board of Plastic Surgery Hospital. The content and purpose of the questionnaire was expressed at the beginning of each questionnaire. The paper questionnaires were filled out on-site, so the investigator was always available to explain relevant questions to participants. Return of anonymous completed questionnaires implied consent to participate. Responses were obtained from patients undergoing operations at the Plastic Surgery Hospital of the Chinese Academy of Medical Sciences, as well as plastic surgeons and anesthesiologists. Participants aged 18 years and older with informed consent were enrolled, while patients with definite mental illness or unconsciousness were excluded.

Questionnaire development and data collection

Three different questionnaires were designed to assess current practices from three perspectives: those of patients, surgeons, and anesthesiologists. The questions were developed based on current guidelines for airway management as well as the authors' own experiences, and it was reviewed by an expert in the management of clinical guidelines. Besides the relevant demographic surveys, the questionnaire for patients was designed to assess the current status of difficult airway notification and compliance with notification, such as the willingness to be informed and the willingness to communicate with the anesthesiologist for the upcoming surgery after being notified. The questionnaire for surgeons was designed to find out whether it was necessary for anesthesiologists to inform the patients about the difficult airway and whether they were willing to do so in concert with the anesthesiologist and whether it would interfere with their clinical work. The questionnaire for anesthesiologists was designed to explore the current status of notification, the need for postoperative notification, and the reasons for reluctance to do so.

To facilitate the collection of information, all surveys in this study were conducted using a paper version of the questionnaire that was printed by the investigators. Investigators distributed questionnaires to respondents, which were collected immediately after they were completed and sorted for information collection.

Questionnaires with all questions answered as required were deemed valid, while questionnaires with omissions were deemed invalid.

Statistical analysis

Survey responses and participant demographics were performed using descriptive statistics. Except where otherwise noted, responses were expressed as a percentage of the total number of responses for each question. Statistical analysis was conducted using SPSS 23.0 for Windows (IBM, Armonk NY, USA).

Results

Patient survey regarding difficult airway notification

448 questionnaires were distributed and 448 were returned, out of which 446 were valid, with a 100% recovery rate and a 99.55% effective rate. More than 80% of the respondents were female, 75% were under 35, and nearly 60% held a bachelor's degree or higher (Table 1). Table 2 shows the results of the survey on patients. Of the 446 respondents, 264 (59.19%) did not know about difficult airways. There were 399 (89.46%) who thought it was extremely important for the anesthesiologist to inform the patient about difficult airway; 406 (91.03%) believed the anesthesiologist should provide them with a difficult airway notification alert form documenting the complete assessment and management of the airway, and 428 (95.96%) patients would definitely inform their supervising surgeon and anesthesiologist before their next surgery.

Surgeon survey regarding difficult airway notification

There were 155 questionnaires distributed and 152 were returned, of which 148 were valid, giving a return rate of 98.06% and an effective rate of 97.37%. Of the 152 surgeons, 50.68% were attending surgeons, 29.72% were residents, and the remaining were chief and associate chief surgeons (Table 3). 124 surgeons (83.78%) were generally aware of difficult airways in general. As shown in Table 4, in case of a difficult airway, 135 surgeons (91.22%) believed that verbal communication with the anesthesiologist was essential, and 114 (77.03%) surgeons felt

Table 1 Patients' characteristics

Characteristic		Number	Proportion
Sex	Male	76	17.04%
	Female	370	82.96%
Age	≤ 25	141	31.61%
	26–35	193	43.28%
	36–45	72	16.14%
	≥ 45	40	8.97%
Highest degree	High school diploma and below	100	22.42%
	College degree	84	18.83%
	Bachelor's degree	193	43.28%
	Master's degree and above	69	15.47%

Table 2 Patient survey regarding difficult airway notification

Questions	n = 446 No. (%)
Patients' knowledge of difficult airway	
I know very well the definition and the associated dangers.	38(8.52)
I've heard of it and knew it may be related to anesthesia.	144(32.29)
I don't know anything about it.	264(59.19)
The need for anesthesiologists to inform	
Very essential	399(89.46)
It doesn't matter.	36(8.07)
Not necessary at all	11(2.47)
The need for anesthesiologists to provide difficult airway notification alert	
Very essential	406(91.03)
It doesn't matter.	27(6.05)
Not necessary at all	13(2.92)
Whether the patient will communicate information about the difficult airway to the healthcare provider before reoperation	
Yes	428(95.96)
Uncertainty	15(3.36)
No	3(0.68)

Table 3 Surgeons' characteristics

Characteristic	Number	Proportion	
Department	Orthopedics	148	100%
Title of the surgeons	Chief surgeon	5	3.38%
	Associate chief surgeon	24	16.22%
	Attending surgeon	75	50.68%
	Resident	44	29.72%

that a difficult airway notification alert form should be completed jointly with the anesthesiologists. In response to the question of whether difficult airway notification would affect their clinical work, 106 (71.62%) of surgeons expressed no concerns.

Table 4 Surgeon survey regarding difficult airway notification

Questions	n = 148 No. (%)
The need for anesthesiologists to inform	
Very essential	135(91.22)
It doesn't matter.	11(7.43)
Not necessary at all	2(1.35)
The need for the surgeon to complete the notification alert form with the anesthesiologist	
Very essential	114(77.03)
It doesn't matter.	30(20.27)
Not necessary at all	4(2.70)
Will difficult airway notification alert affect surgeons' clinical work	
No	106(71.62)
Uncertainly	32(21.62)
Yes	10(6.76)

Table 5 Anesthesiologists' characteristics

Characteristic	Number	Proportion	
Title of the anesthesiologists	Chief physician	4	11.76%
	Associate chief physician	6	17.65%
	Attending physician	12	35.29%
	Resident	9	26.47%
	Undergraduate	3	8.83%

Anesthesiologist survey regarding difficult airway notification

We surveyed all anesthesiologists in the department of anesthesiology of the Plastic Surgery Hospital – 34 in total. 34 questionnaires were distributed and 34 were returned, of which 34 were valid, resulting in a 100% return rate and survey efficiency. 4 chief physicians (11.76%), 6 associate chief physicians (17.65%), 12 attending physicians (35.29%), 9 residents (26.47%), and 3 postgraduates (8.83%) were among the respondents (Table 5). Table 6 presents the results of the survey on anesthesiologists.

In order to investigate the current status of difficult airway notification, this study investigated the percentage of patients who provided information regarding

Table 6 Anesthesiologist survey regarding difficult airway notification

Questions	n=34 No. (%)
Access to information on previous difficult airway management for patients	
Verbal notification by anesthesiologists	19(55.88)
Verbal notification by surgeons	3(8.83)
Anesthesiologists and/or surgeons informed in writing.	7(20.58)
No access to information	5(14.71)
Proportion of patients actively providing difficult airway management information to anesthesiologists preoperatively	
Almost all (100%)	0
The vast majority (51–99%)	2(5.88)
A small number of (6–49%)	13(38.24)
Very few ($\leq 5\%$)	17(50.00)
Never	2(5.88)
Proportion of patients who had been informed verbally about their difficult airway after surgery	
Almost all (100%)	4(11.76)
The vast majority (51–99%)	8(23.54)
A small number of (6–49%)	11(32.35)
Very few ($\leq 5\%$)	11(32.35)
Never	0
The need for anesthesiologists to verbally inform	
Very essential	31(91.18)
Uncertainly	3(8.82)
Not necessary at all	0
The need for anesthesiologists to inform in writing	
Very essential	33(97.06)
Uncertainly	1(2.94)
Not necessary at all	0
The need for anesthesiologists to complete the notification alert form with the surgeons	
Very essential	31(91.18)
Uncertainly	1(2.94)
Not necessary at all	2(5.88)
Implications for anesthesiologists to obtain information on patients' previous difficult airway management	
Very meaningful	24(70.59%)
Meaningful	10(29.41%)
Uncertainly	0
Meaningless	0
Totally pointless	0
Reasons why anesthesiologists are reluctant to inform verbally/in writing	
Absence of mandatory rules	17 (34.69)
Increased workload	9 (18.37)
Not sure how to tell.	8 (16.33)
Concern about the exposure of misjudgment and mishandling	6 (12.24)
Others	9 (18.37)

difficult airway management to anesthesiologists during the preoperative visit and the percentage of patients to whom anesthesiologists verbally informed postoperatively about previously managed difficult airways, and the results indicated that the current status of difficult airway notification is not optimistic.

In half of the anesthesiologists' estimates, only 5% of patients disclosed their preoperative difficult airway management information, while 13 (38.24%) anesthesiologists indicated that only 6–49% of patients disclosed their preoperative difficult airway management information. In the case of previously managed difficult airways, more than half of the anesthesiologists verbally informed

a small percentage of patients (0–49%) postoperatively, whereas only four anesthesiologists (11.76%) informed all patients postoperatively.

Furthermore, anesthesiologists were asked about how patients in this country access information regarding difficult airway management during previous surgeries from the questionnaire. According to 19 anesthesiologists (55.88%) who were asked what the current method of difficult airways notification was, it was verbal information from the anesthesiologist, while 7 (20.58%) believed that this was done in writing by the anesthesiologist and/or surgeon, and 5(14.71%) believed that no current method of communication existed.

However, 31 (91.18%) of anesthesiologists believed patients should be informed verbally about their difficult airway after surgery, while 33 (97.06%) believed patients should be informed in writing. Additionally, 31 (91.18%) anesthesiologists believe that the written information should be completed in cooperation with the surgeon. Furthermore, all anesthesiologists believe that information about the patient's previous difficult airway management is useful.

Among the reasons why anesthesiologists were reluctant to perform difficult airway notifications, 17 (34.69%) believed that there were no mandatory rules or requirements regarding such notification. Nine (18.37%) believed that information increased workload, eight (16.33%) believed that they did not know how to perform it, six (12.24%) feared that the information would reveal miscalculations and mishandling in their own airway management, and the remaining reasons included the fear that patients would not understand, the lack of an appropriate time for informing, and the fear that improper notification would result in doctor-patient conflict. The anesthesiologists' reasons why they are reluctant to inform are presented in Fig. 1.

Discussion

The literature and guidelines indicate that healthcare professionals involved in airway management can use information regarding patients' previous difficult airway management as a direct reference [2–6, 8]. Furthermore,

documenting and informing patients about difficult airway information is a relatively inexpensive initiative with the greatest potential benefit for patients' safety [16]. An unexpected difficult airway with management recommendations was published by the Canadian Airway Focus Group (CAFG) in 1998. In accordance with the recommendations of this taskforce, a note detailing the difficulties encountered and how they were addressed should be written, and the anesthesiologist should provide this information to the patient in a letter. Also, a report detailing the difficult airway should be sent to the primary care/family physician. As part of the taskforce, corresponding sample letters for patients and physicians were published. It may also be considered to register the patient's information with a reliable database such as Medic-Alert [21]. According to updated guidelines published in 2003 by the ASA Difficult Airway Taskforce, information about difficult airways is an important predictor of recurrence and can provide useful information for managing difficult airways in the future. It is important to document the type of difficulty airway (difficult mask ventilation/laryngeal mask placement/intubation) and how it was handled, while communicating this to the patient should describe the occurrence, cause, and possible complications. As noted in the guideline, the notification systems should include a written report or letter to the patient, a written report in the medical chart, communication with the patient's surgeon or primary caregiver, as well as a notification bracelet, or

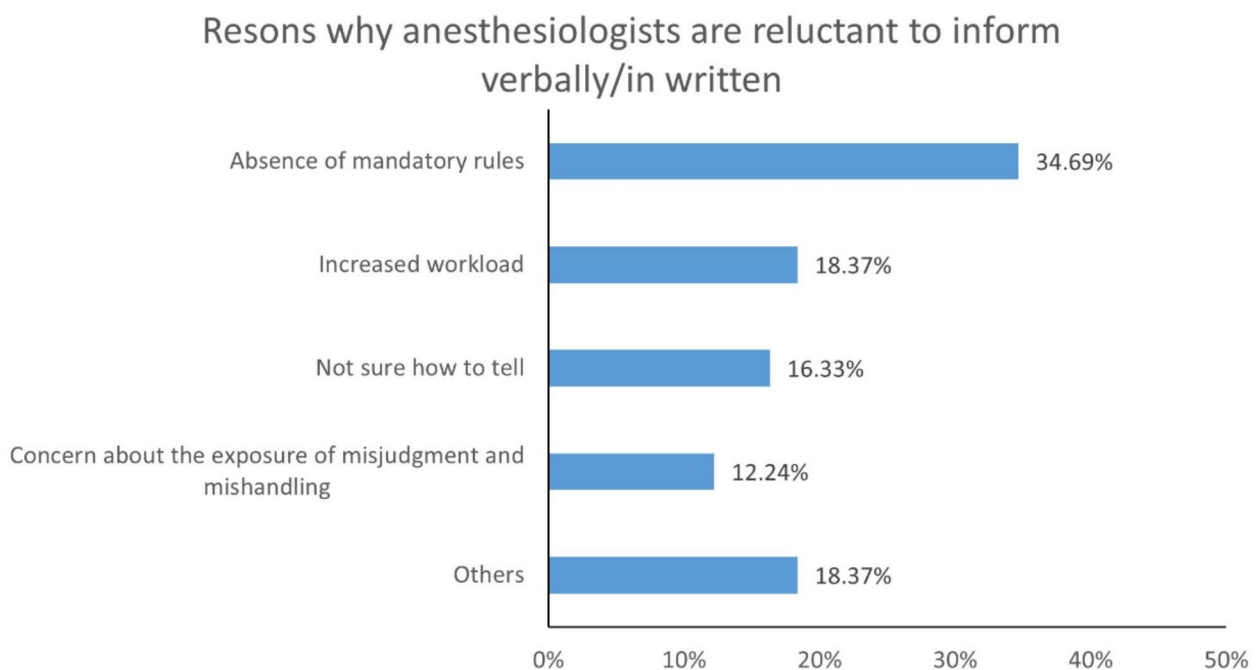


Fig. 1 Reasons why anesthesiologists are reluctant to inform verbally/in written

equivalent identifying device [22]. In the same year, Barron proposed an Airway Alert template that included a checklist for anesthesiologists to follow in completing the written notification. The alert template was checked to ensure that it was given to the patient, the surgeon, and stored in the medical record and database of the anesthesiology department. The checklist makes the notification more procedural and rigorous [15]. The Anesthesia Patient Safety Foundation (APSF) published a study in 2010 proposing a standardized written notification template that was electronically available in local hospitals. It was noted that postoperative verbal information was insufficient, and timing of postoperative information should be considered [23]. In 2013, the CAFG advocated a multi-layered strategy adapted to the local system when a difficult airway had been encountered, including, at the very least, (1) clear and unambiguous documentation in the patient's medical record, (2) informing the patient and the surgeon personally, and (3) writing a difficult airway letter and giving it to the patient, along with copies to the chart and primary care provider. Aside from this, it advocates the inclusion of cases in local or national databases, as well as providing a sample template for difficult airway alert letter [8]. The letter combines the sample letter for patients and the sample letter for physicians issued in 1998 into one, thereby ensuring that the notification is the same for the patient as well as for the primary care or family physician, resulting in more efficient documentation and notification. Similarly, the DAS issued guidelines in 2015 emphasizing the importance of informing and documenting, noting that communication of difficult airway information is inadequate and recommending completion of the airway alert form (developed by F. A. Barron in 2003) [3]. The All India Difficult Airway Association (AIDAA) proposed in 2016 a standard locally difficult airway alert form, and emphasizes that anesthesiologists should inform patients and their surrogates that the form contains information concerning the difficulties encountered during the patient's recent anesthesia and that this information may be helpful in the future to the doctor treating the patient. It is important to provide the patient with instructions to maintain the form carefully and to show it to any future doctors treating them as well as the anesthesiologists if surgical procedures are required [6]. Based on previous efforts, the ASA released guidelines in 2022 recommending that the anesthesiologist instruct the patient to register with an emergency notification service [24].

In China, the guideline on difficult airway management issued by CSA in 2009 did not mention difficult airway documentation and notification [25], however, in 2013, a guideline suggested recording the difficulty and type of difficult airway in the anesthesia record and informing the patient or family after the operation to provide

guidance on managing a difficult airway in the future [26]. There are no significant changes from 2013 to 2017 in the recommendations [4]. According to the expert consensus on difficult airway assessment published in 2023, a patient's history of a difficult airway is important when assessing the patient for a difficult airway [27]. It is apparent that the Chinese guidelines do not contain much content on documentation and notification, and do not provide detailed information on the content of the documentation, the recipients of notification, and how a notification system should be established. Neither written notification nor a database of patients with difficult airways are mentioned in the guidelines, and templates for difficult airway alert form are not published. It is possible that too few studies and guidelines for difficult airway documentation and notification have led to the non-adherence to this initiative. In light of this, the purpose of this study was to determine the current status of difficult airway notification at the Plastic Surgery Hospital of the Chinese Academy of Medicine, as well as investigate whether it was necessary to establish a difficult airway notification system and to propose a standardized difficult airway alert form in China.

According to the Canadian Airway Focus Group (CAFG), patients and responsible persons have a right to know about the occurrence and management of difficult airways during perioperative periods. A difficult airway notification alert form supports the patient's right to be informed regarding difficult airways [8]. According to some research, when a patient fails this tracheal intubation, there is a high likelihood of a repeat failure under the same circumstances in the future [8]. When patients with a difficult airway require reoperation, notification can serve as a vehicle for transmitting medical information, ensuring the airway safety of patients. This enables the patients to take full advantage of the important role of intact preservation and practical transmission of difficult airway information [2, 20]. In this study, we found that although most patients were unaware of the definition and risks associated with difficult airways, they felt that the anesthesiologist should inform them of the difficult airway after surgery and to provide them with a difficult airway alert form which documents the assessment and management of their airway, as well as the fact that most patients were willing to inform their healthcare providers of their difficult airway prior to reoperation to ensure their perioperative safety.

According to the results of this study, most plastic surgeons are familiar with difficult airways; most plastic surgeons recognize the importance of postoperative difficult airway notification and are willing to collaborate with anesthesiologists to complete a difficult airway notification alert form. Regarding the question of whether the implementation of difficult airway notification will affect

the clinical work of surgeons, in designing this question, two considerations were taken into account: firstly, whether surgeons will consider the difficulty of the airway itself as well as the implementation of difficult airway notifications when admitting patients to hospitals. Secondly, whether the implementation of difficult airway notification, which requires surgeons' participation, will significantly increase surgeons' workloads, thereby impairing their ability to implement their own clinical duties. As a result of the study, more than two thirds of surgeons felt that the difficult airway notification did not hinder their clinical work, but 32 surgeons (21.62%) felt that the difficult airway notification would interfere with their own clinical work, which surgeons may consider when admitting patients.

Regarding the notification status, 55.88% of anesthesiologists indicated that fewer than 5% of their patients provided them with information about difficult airway management after previous surgery, and only two anesthesiologists (5.88%) reported receiving information about difficult airway management from previous surgeries from more than 50% of patients. It is likely that anesthesiologists received limited information from patients themselves about difficult airways prior to surgery, which may be associated with the fact that the majority (64.70%) anesthesiologists seldom informed patients verbally postoperatively that they had successfully managed their airways. It was found that just four anesthesiologists (11.76%) informed their patients verbally about difficult airways following surgery in this orthopedic hospital with a relatively high incidence of difficult airways. As a result, patients are unable to access information about previous difficult surgical airways, which makes it difficult for them to play an important role in preserving and transmitting information due to the lack of written documentation detailing the patient's assessment and management of the airway.

However, almost all anesthesiologists felt it was necessary to inform patients both verbally and in writing about difficult airways, as well as to complete a written difficult airway notification alert form with the surgeon; all anesthesiologists considered it to be important to inform patients about difficult airways encountered during previous surgeries for the present airway management. When anesthesiologist were asked about their reasons why they are reluctant to inform, some of these reasons include: the absence of mandatory rules or requirements, the increased workload caused by postoperative notification, a lack of knowledge about how to inform, a fear that postoperative notification would expose their mistakes and mishandlings when managing airways, as well as other reasons including fear that patients may not understand and improper informing would lead to doctor-patient conflict, as well as an inability to inform

patients after surgery at an appropriate time. In light of this, it is imperative that an institutional notification system be established for difficult airways, a no-blame culture should be fostered by the department, and anesthesiologists should be encouraged to report unexpected difficult airway events to the department [28]. All mistakes should be treated as learning opportunities, regardless of the physician's experience or position, in order to prevent further occurrences and improve patient safety in the future [29]. A uniform postoperative difficult airway notification protocol will enable anesthesiologists to better understand the difficult airway notification system and consciously assume responsibility for notification. What's more, it is important to make postoperative difficult airway notification as efficient as possible to reduce the workload of anesthesiologists, and a standardized difficult airway alert form can provide this solution. With this in mind, we have produced a trial version of the difficult airway alert form (Appendix) based on references to the writing patterns and contents of difficult airway notification letters issued in other countries and based on the difficult airways information recorded in the anesthesia records of Plastic Surgery Hospital of the Chinese Academy of Medicine. Three main parts are included in this alert form, the first is a record of the information related to the difficult airway, which includes: the type of difficult airway, the reasons for its occurrence, the specific management process, complications during the process, and recommendations for the next operating anesthesiologist. The second is to inform the patient of the occurrence of difficult airway and recommend that he/she keep it and show it to the relevant medical staff at the next visit and wear a medic alert bracelet. The third component is a checklist to ensure that the anesthesiologist's postoperative verbal and written notification is executed and that the information regarding the patient's difficult airway is archived effectively. This letter will allow anesthesiologists to complete a comprehensive difficult airway notification in a short period of time.

This study was restricted to the Plastic Surgery Hospital of the Chinese Academy of Medical Sciences, which has a higher incidence of difficult airways and a higher number of patients requiring secondary surgery than general hospitals, making difficult airways a priority for anesthesiologists, surgeons, and patients; Due to the small number of anesthesiologists in this study, some bias in the statistical results was inevitable; secondly, there was some reporting bias in the survey as respondents avoided embarrassing or professionally unacceptable responses. Unfortunately, as a result of the questionnaires used in this study, it is not possible to accurately assess the feasibility of establishing a difficult airway notification system from three perspectives: patients, surgeons, and anesthesiologists.

Conclusions

In conclusion, the results of this study indicate that even in Plastic Surgery Hospital where the incidence of difficult airway is high, few anesthesiologists perform postoperative notification of difficult airway, and it is necessary and practical to establish a difficult airway notification system and to write a difficult airway notification alert form. Based on the results of the present study, we propose to further expand the number of respondents in the future by conducting questionnaire surveys concerning the current status of difficult airway notification among anesthesiologists, surgeons of different specialties, patients who are about to undergo a variety of surgical treatments, and patients with difficult airways who have already undergone surgery, aimed at exploring the current status of difficult airway notifications in China in greater depth and promoting the development of a difficult airway notification system in China.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12871-024-02739-8>.

Supplementary Material 1

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Author contributions

Xiang Luo: Conceptualization, Questionnaire collection, Methodology, Formal analysis, Writing-Original Draft. Dong Yang: Conceptualization, Methodology, Writing-Review&Editing. Xiao-Ming Deng: Conceptualization, Writing-Review. Qian-Yu Wang: Questionnaire collection, Conceptualization. Xi-Yu Du: Questionnaire collection, Conceptualization.

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Data availability

All data generated or analyzed during this study are included in this published article.

Declarations

Ethics approval and consent to participate

According to the ethical review guideline issued by the Plastic Surgery Hospital Institutional Review Board, formal ethical approval was not required for this study. Written informed consent was waived, by the Plastic Surgery Hospital Institutional Review Board and return of anonymous completed questionnaires implied consent to participated. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

- Asai Takashi. Video laryngoscopes: do they truly have roles in difficult airways? *Anesthesiology*. 2012;116: 515–17.
- Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, Connis RT, Nickinovich DG, et al. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the difficult Airway. *Anesthesiology*. 2013;118:251–70.
- Frerk C, Mitchell VS, McNarry AF, Mendonca C, Bhargath R, Patel A, et al. Difficult Airway Society intubation guidelines working group. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. *Br J Anaesth*. 2015;115:827–48.
- Ma WH, Deng XM, Zuo MZ. The guidelines for management of the difficult airway. In: Xiong LZ, Deng XM, editors. *Chinese Anesthesiology guidelines and Expert Consensus*. Beijing: People's Medical Publishing House; 2017. p. 49.
- Piepho T, Cavus E, Noppens R, Byhahn C, Dörjes V, Zwissler B, et al. S1 guidelines on airway management: guidelines of the German society of Anesthesiology and Intensive Care Medicine. *Anesthetist*. 2015;64:27–40.
- Myatra SN, Shah A, Kundra P, Patwa A, Ramkumar V, Divatia JV, et al. All India Difficult Airway Association 2016 guidelines for the management of unanticipated difficult tracheal intubation in adults. *Indian J Anaesth*. 2016;60:885–98.
- Japanese Society of Anesthesiology. JSA airway management guideline 2014: to improve the safety of induction of anesthesia. *J Anesth*. 2014;28:482–93.
- Law JA, Broemling N, Cooper RM, Drolet P, Duggan LV, Griesdale DE, et al. The difficult airway with recommendations for management – part 1 – difficult tracheal intubation encountered in an unconscious/induced patient. *Can J Anesth*. 2013;60:1089–118.
- Higgs A, McGrath BA, Goddard C, Rangasami J, Suntharalingam G, Gale R, et al. Guidelines for the management of tracheal intubation in critically ill adults. *Br J Anaesth*. 2018;120:323–52.
- Myatra SN, Ahmed SM, Kundra P, Garg R, Ramkumar V, Patwa A, et al. The all India difficult airway association 2016 guidelines for tracheal intubation in the intensive care unit. *Indian J Anaesth*. 2016;60:922–30.
- Frerk C, Cook TM. Management of the can't intubate can't ventilate situation and the emergency surgical airway. In: 4th National Audit Project of the Royal College of Anaesthetists: Major complications of airway management in the UK. The Royal College of Anaesthetists and the Difficult Airway Society. 2011. <https://www.nationalauditprojects.org.uk/downloads/NAP4> Full Report. Accessed 30 March 2016.
- Xue FS, Liu YY, Li HX. Difficult Airway Management Strategies - Current issues and future directions. *J Clin Anesthesiology*. 2018;34:89–91.
- Deng XM, Zeng YM, Huang YG. *Miller's Anesthesia*. Beijing: Peking University Medical Press; 2016. p. 1489.
- Ramachandran SK, Mathis MR, Tremper KK, Shanks AM, Kheterpal S. Predictors and clinical outcomes from failed laryngeal mask airway Unique™. A study of 15,795 patients. *Anesthesiology*. 2012;116:1217–26.
- Barron FA, Ball DR, Jefferson P, Norrie J. Airway alerts: How UK anaesthetists organise, document and communicate difficult airway management. *Anaesthesia*. 2003;58:73–7.
- Chhabra S, Mohammed S. Difficult airway alert card: a good deed comes around. *Indian J Anaesth*. 2021;65:775.
- Baker PA, Moore CL, Hopley L, Herzer KR. Mark. Dissemination of critical airway information. *Anaesth Intensive Care*. 2013;41:334–41.
- Iseli TA, Iseli CE, Golden JB, Jones VL, Boudreaux AM, Boyce JR, et al. Outcomes of intubation in difficult airways due to head and neck pathology. *Ear Nose & Throat J*. 2012;91:E1–5.
- Heinrich S, Birkholz T, Irouschek A, Ackermann A, Schmidt J. Incidences and predictors of difficult laryngoscopy in adult patients undergoing general anesthesia: a single-center analysis of 102,305 cases. *J Anesth*. 2013;27:815–21.
- Lundström LH, Møller AM, Rosenstock C, Astrup G, Gätke MR, Wetterslev J, et al. A documented previous difficult tracheal intubation as a prognostic test for a subsequent difficult tracheal intubation in adults. *Anaesthesia*. 2009;64:1081–88.
- Crosby ET, Cooper RM, Douglas MJ, Doyle DJ, Hung OR, Labrecque P, et al. The unanticipated difficult airway with recommendations for management. *Can J Anesth*. 1998;45:757–76.
- American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the difficult Airway. *Anesthesiology*. 2003;98:1269–77.

23. Heidi M, Koenig MD. No more difficult Airway, again! Time for consistent standardized written patient notification of a difficult Airway. *APSF NewsL*. 2010;25:33–4.
24. Apfelbaum JL, Hagberg CA, Connis RT, Abdelmalak BB, Agarkar M, Dutton RP, et al. American Society of Anesthesiologists Practice Guidelines for Management of the difficult Airway. *Anesthesiology*. 2022;136:31–81.
25. Tian M, Deng X, Zhu YS, Zuo M, Li ST, Wu XM. Expert Consensus on difficult Airway Management. *J Clin Anesthesiology*. 2009;25:200–3.
26. Yu BW, Wu XM, Zuo M, Deng X, Gao X, Tian M. Guidelines for difficult Airway Management. *J Clin Anesthesiology*. 2013;29:93–8.
27. Xia M, Ma W, Zuo M, Deng X, Xue F, Battaglini D, et al. Expert consensus on difficult airway assessment. *Hepatobiliary Surg Nutr*. 2023;12:545–66.
28. Pandit JJ, Marshall SD. The 2015 Difficult Airway Society guidelines: what about the anticipated difficult airway? A reply. *Anaesthesia*. 2016;71:468–69.
29. Kaniyil S, Pavithran P, Rajesh MC, Arun Krishna AK, Venugopal V, Samuel SJ. All India Difficult Airway Association guidelines in practice-A survey. *Indian J Anaesth*. 2021;65:471–78.

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