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ORIGINAL RESEARCH

Current Practice of Perioperative Gastric Regurgitation and Pulmonary Aspiration Management in China: A Cross-Sectional Survey

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Background and Objective: Aspiration of gastric contents is the major cause of respiratory tract-related complications, which can lead to death. Despite its significance, nationwide research on the practice of managing gastric regurgitation and pulmonary aspiration remains inadequate. We aimed to conduct a national survey to gain an in-depth understanding of the management and clinical practices surrounding perioperative gastric regurgitation and pulmonary aspiration among anesthesiologists in China.

Methods: A 26-item questionnaire was sent to all registered anesthesiologist members via WeChat and the New Youth Anesthesia Forum website.

Results: A significant portion (70.77%) of respondents reported having encountered gastric regurgitation or pulmonary aspiration, with 50.15% experiencing cases where both regurgitation and aspiration occurred. While most patients had a favorable prognosis following aspiration, 20.63% and 20.72% of respondents indicated that their patients developed severe pneumonia or died as a result. Regurgitation and aspiration events mainly occurred during emergency surgery (86.39%), with abdominal operation (78.86%) being the most common. The induction of general anesthesia was identified as the most common phase for these events (75.33%). Rapid sequence induction (RSI) was employed by 61.98% of respondents. While 59.97% of respondents reported that their departments provided training on regurgitation and aspiration, only 20.34% had training specifically in gastric ultrasound technology. Additionally, 41.63% of the respondents' institutions were equipped with gastric ultrasound devices. A small fraction (14.93%) of respondents were proficient in gastric ultrasound examination techniques, while 20.99% were completely unfamiliar with the technology.

Conclusion: Our survey revealed that gastric regurgitation and pulmonary aspiration, as major threats to the safety of perioperative patients, still pose significant challenges in the practice of anesthesia in China. There are still many deficiencies in management. Strengthening training and improving resource allocation, especially in the adoption and widespread use of gastric ultrasound technology, are the directions that need to be improved in the future.

Keywords: China, pulmonary aspiration, regurgitation, gastric ultrasound, survey

Introduction

Gastric content reflux and aspiration are among the most threatening complications during the perioperative period, and their occurrence is closely related to various pathological and physiological factors. In clinical practice, dysfunction of the gastroesophageal sphincter (such as pregnancy, obesity, diabetic gastroparesis), emergency trauma (delayed gastric emptying caused by pain/opioids), and special surgical types (gastrointestinal endoscopy) can significantly increase the risk of pulmonary aspiration. Respiratory events during anesthesia are associated with death and brain damage,[1,2] with aspiration of gastric contents being the main cause of respiratory-related death and claims.[1,3] A retrospective study indicates that the incidence of pulmonary aspiration was 1:8,325. Ten patients required intensive care, respiratory support, or developed pulmonary complications.[4] When gastric content escapes the airway protective mechanism, it

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causes a triple-hit effect on the lungs: acidic substances directly damage the alveolar epithelium, food particles cause mechanical obstruction, and bacterial colonization leads to secondary infection.[5] Gastric regurgitation and aspiration events, which should be emphasized the most, are most common during emergency surgery, bronchoscopy, endoscopy, although they can also be seen in elective cases.[6–8]

The incidence of pulmonary aspiratory has been reduced through the adoption of reasonable measures such as fasting, the use of gastric point-of-care ultrasound (POCUS), rapid sequence induction (RSI), modern technical aids such as high-flow preoxygenation or video-laryngoscopy, and the identification and prevention of patients at high risk of aspiratory.[9–14] However, it remains a significant and unavoidable issue in clinical practice.[3] In addition, the specific implementation of measures to prevent pulmonary aspiration is controversial,[15–18] and there are differences among doctors in different regions and levels.[19,20] Recent research on gastric content regurgitation and pulmonary aspiration has primarily focused on case-based retrospective observational studies[1,4,6,7,21,22] At present, the research in this field lacks large-scale investigation studies that reflect real-world practices. This study is the first to adopt a nationwide cross-sectional survey method to systematically evaluate the cognitive level and practice patterns of Chinese anesthesiologists regarding the risk of perioperative aspiration. By revealing the gap between clinical practice and guidelines, identifying key controversial points, it provides data support for formulating more operational preventive strategies.

Methods

Definition of Gastric Regurgitation and Pulmonary Aspiration

Perioperative pulmonary aspiration is defined as aspiration of gastric contents occurring after induction of anesthesia, during a procedure, or in the immediate postoperative period. Gastric regurgitation is defined as the presence of reflux of gastric contents without pulmonary aspiration.[4,23]

Study Design and Participants

This survey was approved by the Ethics Committee of the Second Affiliated Hospital of Zhejiang University School of Medicine (0159/2024). Using the WJX platform (Changsha Ranxing IT Ltd., Changsha, China), which is compatible with both WeChat and the New Youth Anesthesia Forum website. The survey comprised 26 questions in Chinese, and participants could access it by clicking a link or scanning a QR code. The New Youth Anesthesia Forum, the largest anesthesia network platform in China, and WeChat, the most widely used Chinese multi-functional instant messaging and social media application in China, were utilized for distribution. The questionnaire link was posted in the WeChat group of the Chinese Association of Anesthesiologists. Additionally, with approval from the New Youth Anesthesia Forum Committee, the link was shared on the New Youth Anesthesia Forum website and promoted to its registered anesthesiologist members. Consent to participate was obtained at the beginning of the questionnaire, with non-consenting individuals being excluded. Each participant was allowed to submit the survey only once. The data collected were managed anonymously. The online survey was available for 30 days, from February 17, 2024, to March 17, 2024.

This questionnaire consists of 5 sections, with a total of 26 items. Part 1 (demographic information of the respondents - gender, region of practice, hospital grade, teaching hospital, current practice category, physician title, years of practice), part 2 (perioperative regurgitation and aspiration), part 3 (personal experiences), part 4 (prevention and treatment measures), part 5 (resource allocation) and part 6 (gastric ultrasound use and training). The full questionnaire is presented in Appendix 1.

Sample Size Estimation

Following the recommendations of Kotrlik et al,[24] the formula $n=Z^2*p*(1-p)/d^2$ is considered to be more suitable for sample size calculation in cross-sectional surveys. Given that there are few studies on perioperative gastric regurgitation and pulmonary aspiration, the P-value was 0.5, the confidence level was 95% (corresponding Z value was 1.96), and the acceptable error range was 5%. Therefore, the required sample size was 384. Assuming a response rate of 30%, we end up with a minimum sample size of 1280.

Statistical Analysis

Upon completion of the survey, the data were compiled into an Excel spreadsheet. Frequencies and percentages were used to express count data. All statistical analyses were performed using R version 4.0.5. Categorical variables (training on the management of perioperative regurgitation and aspiratory, training on gastric ultrasound, gender, hospital grade, teaching hospital status, physician title, and years of practice categorized into groups) were summarized as frequencies (n) and percentages (%). The Pearson chi-squared (χ^2) test was used to assess differences in the distribution of training on the management of perioperative regurgitation and aspiratory and gastric ultrasound across stratification variables (gender, hospital grade, teaching hospital status, physician title, and years of practice). To evaluate the strength of association, bias-corrected Cramér's V was derived from the chi-square statistic and interpreted according to conventional thresholds (V < 0.10 can be ignored; 0.10–0.20 is weak; 0.20–0.40 is moderate; > 0.40 is strong). All hypothesis tests were two-sided, and a P value < 0.05 was considered statistically significant.

Results

Demographics

A total of 3632 questionnaires were collected. Among the respondents, 8 disagreed to have their data used for analysis. Additionally, 21 intensive care unit physicians, 5 emergency department physicians, 77 surgeons, 15 internists, and 16 other specialists were excluded. This left 3,490 questionnaires for data analysis, consisting of 3,444 anesthesiologists and 46 anesthesia nurses. The respondents represented 31 regions across China, excluding Taiwan, Hong Kong, and Macao (Figure 1). Of these, 132 (3.8%) did not specify their region of practice. The demographic data of the respondents are presented in Table 1.

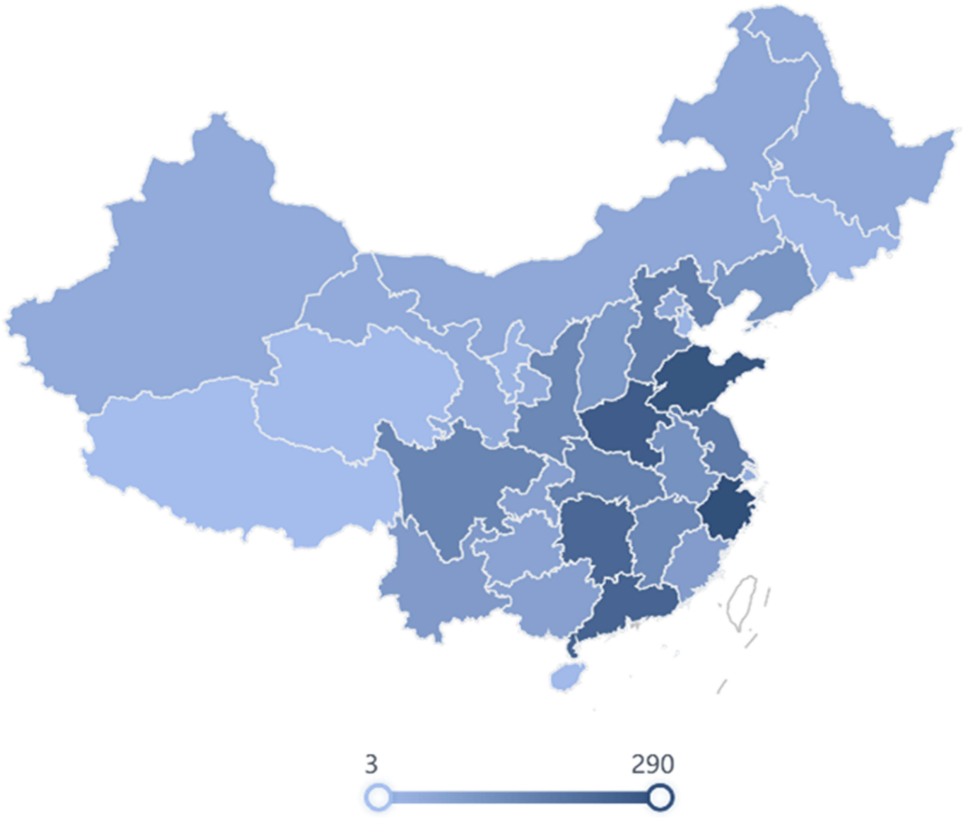

Figure 1 Geographic distribution of the respondents.

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Table 1 Respondent's Demographic Data

Demographic	n (%)
Gender	
Male	1903 (54.53%)
Female	1587 (45.47%)
Hospital grade	
Grade I	302 (8.65%)
Grade II	1119 (32.06%)
Grade III	2069 (59.28%)
Teaching hospital	
Provincial teaching hospital	662 (18.97%)
Municipal teaching hospital	1325 (37.97%)
Non-teaching hospital	1503 (43.07%)
Physician title	
Resident physicians	690 (19.77%)
Attending physicians	1475 (42.26%)
Associate chief physician	961 (27.54%)
Chief physicians	364 (10.43%)
Working experience	
0–5 years	436 (12.49%)
6–10 years	728 (20.86%)
11–15 years	797 (22.84%)
>15 years	1529 (43.81%)

Personal Experience with Gastric Regurgitation and Pulmonary Aspiration

Among the 3,490 respondents, 2,470 (70.77%) reported experiencing gastric regurgitation or pulmonary aspiration personally, 874 (25.04%) had not experienced it themselves but had colleagues who did, and 146 (4.18%) stated that they had not encountered such cases (Figure 2A). A total of 3,344 (95.82%) respondents answered open-ended questions about their experience of gastric regurgitation or pulmonary aspiration during anesthesia. Of these, 1,677 (50.15%) experienced pulmonary aspiration, 941 (28.14%) reported only gastric regurgitation without pulmonary aspiration, and 726 (21.71%) encountered both situations (Figure 2B).

Emergency surgery was the most common context for these events (86.39%), followed by painless endoscopy (41.78%) and elective surgery (20.16%). We investigated the phases during which these events occurred, the ventilation modes used, and the operative sites involved. Regurgitation and aspiration can occur at any stage of the anesthesia process, most commonly during the induction of general anesthesia (75.33%), followed by painless endoscopy (43.18%), tracheal extubation (32.18%), pre-induction (28.08%), recovery after extubation (21.89%), maintenance of general anesthesia (12.02%), regional anesthesia or monitored anesthesia care (10.68%), and postoperatively (10.59%). The ventilation modes used during these events included oxygen mask or nasal catheter ventilation (61.51%), endotracheal

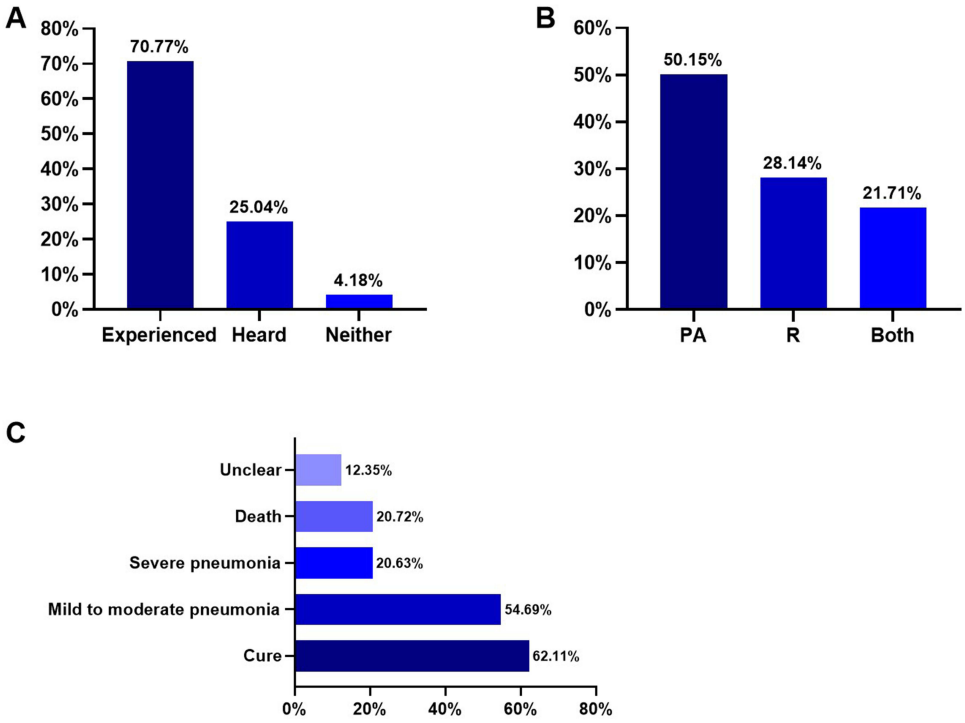

Figure 2 (**A**) Respondents' clinical experience with gastric regurgitation and pulmonary aspiration. (**B**) Percentages of gastric regurgitation (without aspiration) and pulmonary aspiration. (**C**) Outcomes of patients with pulmonary aspiration.
Abbreviations: PA, pulmonary aspiration; R, regurgitation (without aspiration).

intubation ventilation (58.25%), and laryngeal mask ventilation (23.92%). Among the 3,344 respondents, most regurgitation and aspiration events occurred during abdominal surgery (78.86%) (Table 2).

We also surveyed the clinical characteristics and prognosis of patients who experienced regurgitation and aspiration events. As shown in Table 2, common characteristics of these patients included insufficient fasting time (65.55%), intestinal obstruction, gastrointestinal perforation, acute abdomen (63.67%), difficulty or delay in gastrointestinal emptying (53.83%), coma (45.01%), gastroesophageal reflux disease (42.37%), oropharyngeal secretions or bleeding (42.02%), major trauma (41.60%), changes in stomach position (38.43%), and obesity (33.40%). Most patients had a good prognosis after experiencing regurgitation and aspiration, with 62.11% of respondents reporting complete recovery and 54.69% noting mild-to-moderate pneumonia. However, 20.63% and 20.72% reported that patients developed severe pneumonia and death, respectively (Figure 2C).

Prevention and Treatment of Patients with Gastric Regurgitation and Pulmonary Aspiration

For patients at risk of regurgitation and aspiration, 61.98% of the 3,490 respondents reported using rapid sequence intubation, followed by 35.16% who used awake intubation (Figure 3A). Additionally, 86.07% of the respondents considered it necessary to place a gastric tube and suction before anesthesia induction. The Sellick maneuver, which involves compressing the cricoid cartilage during induction, was used by 73.44%, while 69.80% positioned patients in a head-up position. Extending the fasting time for non-emergency surgery was practiced by 63.84%, 62.81% administered H2-receptor antagonists or anticholinergic drugs, and 41.29% used point-of-care ultrasound (POCUS) to assess stomach contents before induction (Figure 3B).

Regarding treatment, 98.83% of respondents stated they would immediately suction to clear refluxed material. Administration of tracheal relaxants and glucocorticoids was reported by 78.91%, 67.02% would use the head-down

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Table 2 Surgery Type, Occurrence Phase, Ventilation Mode, Operation Site and Clinical Characteristics of Patients with Gastric Regurgitation or Pulmonary Aspiration

Variables	**n (%)**
Type of surgery	
Emergency surgery	2889 (86.39%)
Elective surgery	674 (20.16%)
Painless endoscopy	1397 (41.78%)
Phase of pulmonary aspiration occurred	
Pre-induction	939 (28.08%)
During induction of general anesthesia	2519 (75.33%)
During maintenance of general anesthesia	402 (12.02%)
During regional anesthesia or monitored anesthesia care	357 (10.68%)
Painless endoscopy	1444 (43.18%)
During tracheal extubation	1076 (32.18%)
During recovery (after extubation)	732 (21.89%)
Postoperative	354 (10.59%)
Ventilation mode	
Oxygen mask or nasal catheter ventilation	2057 (61.51%)
Laryngeal mask ventilation	800 (23.92%)
Endotracheal intubation ventilation	1948 (58.25%)
Operative site	
Abdominal surgery	2637 (78.86%)
Head surgery	1030 (30.80%)
Heart and chest surgery	264 (7.89%)
Limb surgery	312 (9.33%)
Painless gastroscopy	1618 (48.39%)
Painless colonoscopy	757 (22.64%)
Painless bronchoscopy	322 (9.63%)
Others (ophthalmic surgery, thyroid surgeries, urological surgeries, painless abortion, etc.)	246 (7.36%)
Clinical characteristics	
Insufficient fasting time	2192 (65.55%)
Oropharyngeal secretions or bleeding	1405 (42.02%)
Intestinal obstruction, gastrointestinal perforation, acute abdomen	2129 (63.67%)
Gastroesophageal reflux disease	1417 (42.37%)
Gastrointestinal emptying difficulties or delays	1800 (53.83%)

(*Continued*)

Table 2 (Continued).

Variables	n (%)
Changes in the position of the stomach (such as partial gastrectomy, pregnancy)	1285 (38.43%)
Coma	1505 (45.01%)
Major trauma	1391 (41.60%)
Obesity	1117 (33.40%)
Advanced age	624 (18.66%)
Diabetes	384 (11.48%)
Others (pregnancy, intoxication, Parkinson's disease, tracheoesophageal fistula, weight loss drugs, etc.)	132 (3.95%)

position, 64.13% would initiate anti-infection treatment, and 58.85% would perform fiberoptic bronchoscopy suction and bronchoalveolar lavage (Figure 3C).

When asked to rank the measures to reduce the occurrence of regurgitation and aspiration, the following were ranked from most important to least important: adequate fasting time, detailed medical history inquiry, the choice of anesthesia method, gastric ultrasound assessment of gastric residual volume, and the choice of anesthesia medication.

Training

We surveyed the respondents about their training on perioperative regurgitation and aspiratory, a total of 59.97% of the respondents stated that their departments provided. But only 20.34% reported receiving training on POCUS. (Figure 4A). As shown in Table 3, the training on the management of perioperative regurgitation and aspiratory and the training on gastric ultrasound vary across different genders, hospital grades, teaching hospital statuses, physician titles, and working experience, and the differences are statistically significant.

Equipment

Regarding instrument and equipment availability, 96.88% of respondents' institutions were equipped with suction devices, 91.58% had emergency intubation kits, 64.30% had fiberoptic bronchoscopes, and less than half (41.63%, n=1453) had POCUS (Figure 4B).

Gastric Point-of-Care Ultrasound

Among the 1,453 respondents whose institutions were equipped with POCUS, 79.22% believed that assessing gastric residual volume with POCUS was very helpful in identifying patients at risk for regurgitation and aspiration. However, only 14.93% were proficient in POCUS technology, and 20.99% did not know POCUS (Figure 4C and D).

Regarding department improvement measures, respondents highlighted the importance of standardized process management (92.84%), regular training (89.43%), equipment enhancement (85.82%), and leadership attention (75.79%). Finally, most respondents (88.68%) agreed that the survey was relevant to their clinical practice, and 85.07% indicated that the survey increased their awareness of perioperative regurgitation and aspiration.

Discussion

Our survey is the most extensive survey of the status of perioperative gastric regurgitation and pulmonary aspiration in China. Respondents came from every province on the Chinese mainland, based on the locations they provided. The survey reveals that regurgitation and aspiration are common perioperative complications in Chinese medical institutions, with 70.77% of respondents reporting personal experiences of these events. Furthermore, 20.63% and 20.72% of the

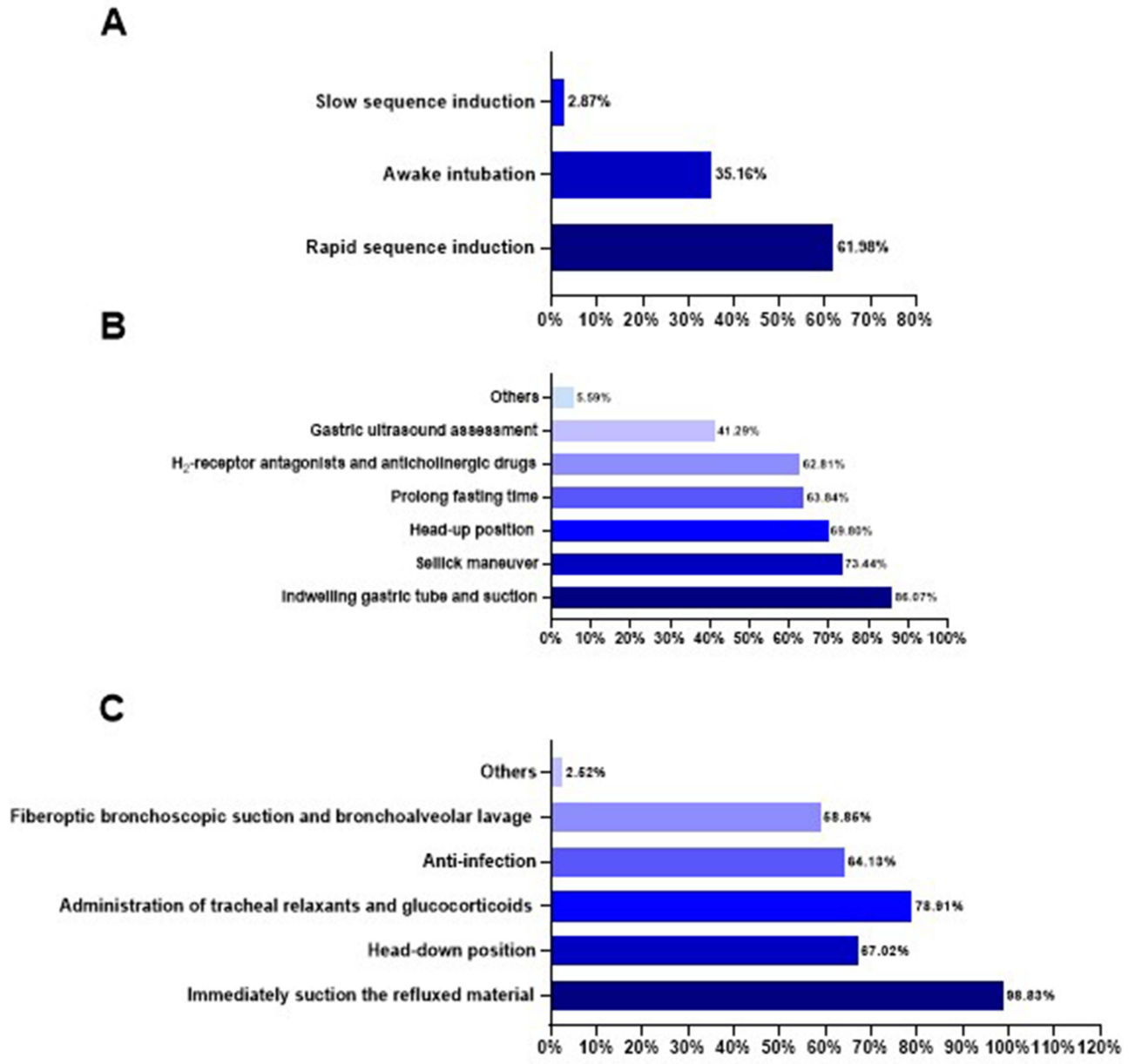

Figure 3 Respondents' prevention and management practices for patients at risk for regurgitation and pulmonary aspiration. (**A**) Anesthesia induction methods commonly used by respondents. (**B**) Preparation measures often taken by respondents before anesthesia induction. (**C**) Treatment strategies commonly adopted by respondents after reflux and pulmonary aspiration occurred.

respondents reported having patients who experienced severe pneumonia and death, respectively. This indicates that regurgitation and aspiration remain critical issues in perioperative patient safety management.

Emergency surgery is recognized as a significant risk factor for pulmonary aspiration.[3,4] In adult patients, the incidence of pulmonary aspiration during emergency surgery is 4.3 times higher than during elective surgery.[25] This incidence is even higher in pediatric patients, where it is more than 10 times greater than in elective procedures.[26] Despite recent trends showing a decrease in pulmonary aspiration during emergency surgeries,[6,22] our survey found that 86.39% of respondents reported experiencing regurgitation or aspiration events during such surgeries. Several factors contribute to this high incidence. First, most emergency surgical patients do not fast for a sufficient period. Second, gastric emptying is often impaired in emergency patients due to conditions such as intestinal obstruction, intra-abdominal lesions, trauma, pain, and stress.[3,27,28] The total number of gastrointestinal endoscopies is estimated to reach 14 million cases per year in

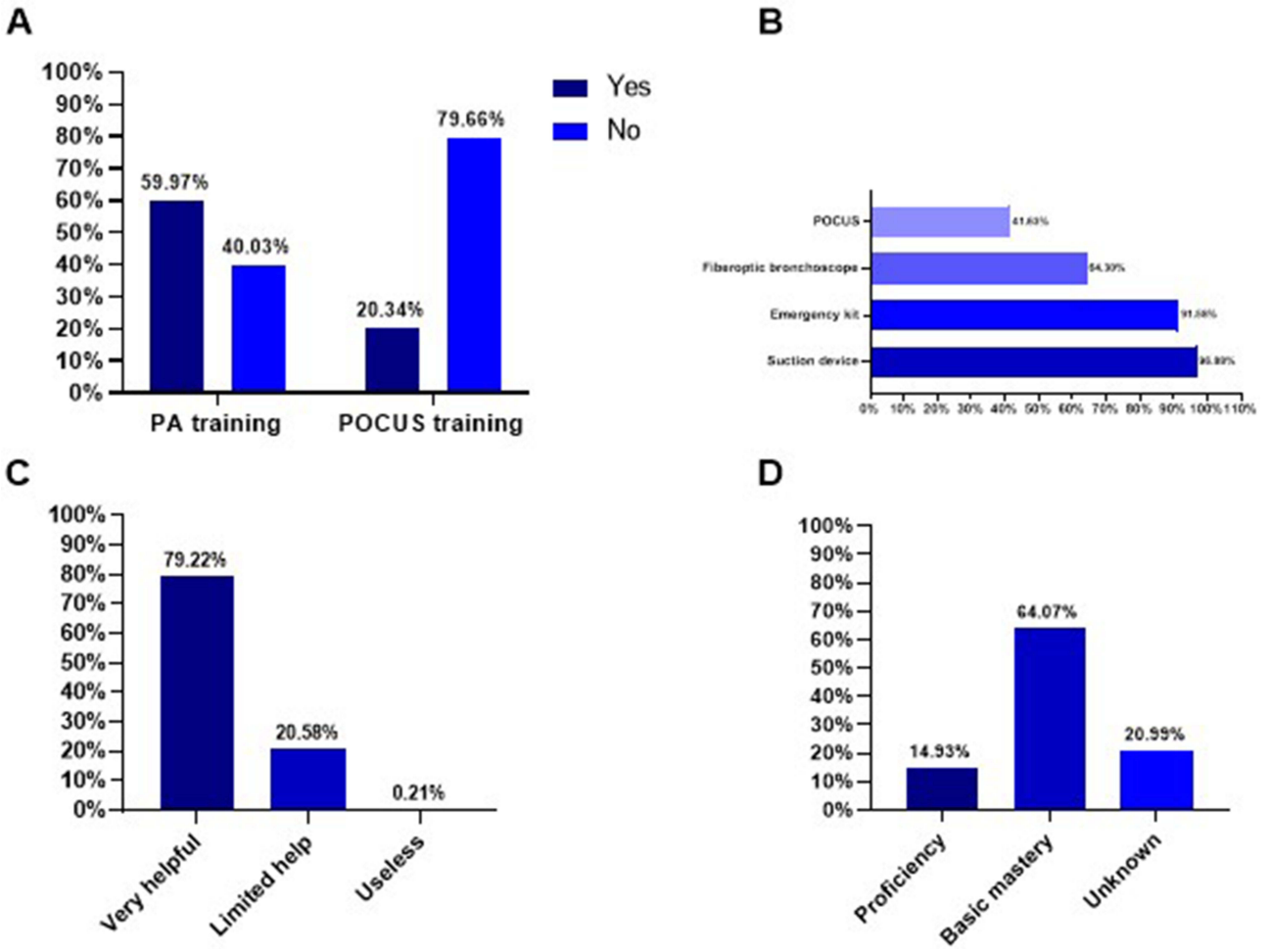

Figure 4 (**A**) The training on pulmonary aspiration management and gastric point-of-care ultrasound in the institution of the respondents. (**B**) The equipment configuration of the respondents' institutions. (**C**) Respondents' views on gastric point-of-care ultrasound. (**D**) Respondents' mastery of gastric point-of-care ultrasound technology.
Abbreviations: PA, pulmonary aspiration; POCUS, gastric point-of-care ultrasound.

China.[29] With the dramatic increase in gastrointestinal endoscopies under anesthesia-assisted sedation, regurgitation and aspiration events have become significant complications in painless endoscopy.[7,8,21,30] Our survey showed that 41.78% of the respondents experienced regurgitation or aspiration events during painless endoscopy. This may be related to the

Table 3 Correlation Analysis and Difference Analysis of Management of Perioperative Regurgitation and Aspiratory and Gastric Ultrasound Training Among Different Variable

Variable	Training on the Management of Perioperative Regurgitation and Aspiratory			Training on Gastric Ultrasound		
	Chi-Square	P Value	Cramers.V	Chi-Square	P Value	Cramers.V
Gender	4.404	<0.05	0.036	14.031	<0.001	0.067
Hospital grade	84.787	<0.001	0.156	138.389	<0.001	0.199
Teaching hospital status	108.803	<0.001	0.177	178.838	<0.001	0.228
Physician title	34.947	<0.001	0.100	53.507	<0.001	0.123
Working experience	30.878	<0.001	0.094	11.365	<0.01	0.090

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weakening of protective airway reflexes during endoscopy under sedation, decreased esophageal sphincter tone, and injection of air and fluid.[8,31–33]

Regurgitation and aspiration can occur at any point during the perioperative period. Our survey indicates that these events most frequently occur during the induction of general anesthesia (75.33%), a finding consistent with previous studies.[1,3,6] Numerous risk factors contribute to pulmonary aspiration, including a full stomach, intestinal obstruction, gastroesophageal reflux disease, gastrointestinal bleeding, postoperative gastrointestinal surgery, coma, trauma, obesity, and diabetes.[1,3,4,22,34] In our survey, the majority of patients presented with multiple risk factors. Abdominal surgery was identified as the most common procedure associated with regurgitation and aspiration. For patients with a full stomach, inserting an indwelling gastric tube for gastrointestinal decompression is a feasible strategy to prevent pulmonary aspiration.[18] However, some studies have raised concerns that inserting a gastric tube before the induction of anesthesia may reduce the pressure of the esophageal sphincter, potentially increasing the risk of aspiration.[13,35] Despite this, our survey found that more than 80% of respondents preferred to insert and indwell a gastric tube before induction. Although evidence-based data do not conclusively define the best practices for gastric tube management, the prevailing belief is that the benefits of using a gastric tube outweigh the potential disadvantages, especially in patients with conditions like intestinal obstruction.[18]

Rapid sequence induction (RSI) and awake tracheal intubation are commonly used anesthetic techniques for managing patients at risk of aspiration. According to our survey, over 60% of respondents employed RSI, while about 35% preferred awake tracheal intubation. In addition, more than 70% of the respondents preferred the use of cricoid pressure (Sellick maneuver). During RSI, operators use the Sellick maneuver to apply pressure to the cricoid cartilage to prevent gastric inflation during mask ventilation and to reduce the risk of regurgitation and aspiration. However, the clinical application of cricoid pressure remains controversial. There is currently no clear evidence supporting the effectiveness and safety of cricoid pressure in reducing aspiration risk.[16,17] Some studies suggest that it may increase the difficulty of intubation, leading certain guidelines to no longer recommend the Sellick maneuver in clinical practice.[36–38] The majority of respondents in our survey still reported using cricoid pressure, which may be related to previous literature on classical RSI.[39]

When regurgitation and aspiration occur, a range of symptomatic treatments is available. Our survey found that the most commonly used methods among respondents included immediate suction, positioning the patient in a head-down position, administering bronchodilators and glucocorticoids, performing bronchoalveolar lavage, and providing anti-infective therapy. Immediate suction and the head-down position help to minimize the entry of regurgitated material into the lungs. Bronchodilators and glucocorticoids were the second most frequently used treatments, following suctioning. However, some studies have shown limited benefits of corticosteroids in treating aspiration.[40] In cases of severe pulmonary aspiration, endotracheal suctioning and alveolar lavage via bronchoscopy may be necessary to clear regurgitant material from the lungs. While routine antibiotic therapy is generally not recommended, targeted antibiotic treatment may be initiated after obtaining cultures from the alveolar lavage fluid.[41]

Gastric POCUS is a non-invasive, reusable, cost-effective, and bedside tool used to evaluate gastric contents by qualitatively examining the gastric antrum and calculating the volume of its contents.[11,12,42,43] Gastric ultrasound is highly sensitive and specific for identifying a full stomach, making it an increasingly important part of preoperative assessments for patients at risk of regurgitation and aspiration.[10] In this survey, 41.29% of respondents reported using POCUS to assess gastric contents before the induction of anesthesia in at-risk patients. Despite this, only 41.63% of the respondents' institutions were equipped with POCUS, and just 20.34% offered specific training in the technique. Among the 1453 respondents from institutions with POCUS, only 14.93% were proficient in its use, while 20.99% did not know the technology at all. Our findings suggest that the clinical application of gastric ultrasound in China is still limited, primarily due to gaps in equipment availability and training within institutions. Therefore, most of the respondents expressed a desire for improvements in several areas, including system process management, equipment availability, training, and increased attention from leadership. More than two-thirds of the respondents felt that the survey was relevant to their clinical practice and that it heightened their awareness of regurgitation and aspiration issues. Additionally, over half indicated that the survey provided them with new knowledge.

This study has several limitations. First, the survey study could not exclude recall bias and could not confirm the accuracy and reliability of responses. Second, although the survey covered all regions of China, the response rate was low in some regions, which may limit the representativeness and generalizability of the findings. Furthermore, this survey did not differentiate between solid foods and liquid drinks, did not distinguish between adults and children, did not differentiate between the types or duration of diabetes, and the treatment with GLP-1 agonists and did not incorporate modern technological aids (such as high-flow preoxygenation, video laryngoscopy). In addition, the survey focused on physicians' retrospective reviews of regurgitation and aspiration events and their perceptions, which may not fully reflect the most current clinical practices. Nevertheless, this survey represents the largest study to date on regurgitation and aspiration in China, and its findings could be valuable for guiding future research in this area.

Conclusion

This survey suggests that regurgitation and aspiration remain a major safety concern for perioperative patients, with considerable variation in the prevention and management strategies employed by anesthesiologists. Identifying risk factors for aspiration in patients undergoing anesthesia-assisted therapy is essential, and proactive clinical interventions are needed to better detect and reduce the incidence of perioperative pulmonary aspiration. To address these challenges, it is crucial to updating of protocols, creation of checklists, high level of standardization, provision of training and encouraging the acceptance of evidence-based innovations, such as gastric point-of-care ultrasound technology.

Abbreviations

RSI, Rapid sequence induction; ASA, American Society of Anesthesiology; POCUS, Point-of-care ultrasound.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Acknowledgments

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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