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DIFFICULT AIRWAY MANAGEMENT PRACTICES IN KARACHI'S TERTIARY CARE HOSPITALS: A CROSS-SECTIONAL ANALYSIS

Original Research

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ABSTRACT

Background: Effective management of difficult airways is essential in anesthesia practice, particularly in critical "cannot intubate, cannot ventilate" (CICV) situations, which can lead to life-threatening complications. Standardized guidelines, such as those issued by the American Society of Anesthesiologists (ASA), provide structured approaches to difficult airway management. Despite advancements in airway management strategies, disparities in practice remain, particularly in resource-limited settings. This study evaluates the current practices of anesthesiologists in tertiary care hospitals in Karachi to identify gaps in preoperative airway assessment, preferred management strategies, and overall preparedness in handling difficult airway cases.

Objective: To assess the competency of anesthesiologists in managing difficult airways, evaluate their preoperative airway assessment methods, and analyze their current management preferences in tertiary care hospitals in Karachi.

Methods: A cross-sectional study was conducted over six months, from May 2022 to October 2022, across eight tertiary care hospitals in Karachi. A total of 96 anesthesiologists were enrolled through non-probability convenience sampling. Data collection was performed using a structured, self-administered questionnaire comprising demographic details, airway assessment practices, equipment availability, and preferred management approaches. Statistical analysis was conducted using SPSS version 26.0, with categorical variables expressed as frequencies and percentages, and quantitative variables as mean ± standard deviation (SD) or median with interquartile range (IQR). Chi-square or Fisher's exact tests were applied, with a p-value <0.05 considered statistically significant.

Results: The mean age of participants was 35.35 ± 10.45 years, with a median of 32 years (IQR = 11). Male anesthesiologists constituted 62.5% of the cohort, while 37.5% were female. Among participants, 52.08% were FCPS trainees, 26.04% were FCPS consultants, and 21.88% were MCPS consultants. Participation in difficult airway workshops or CME activities in the last five years was reported by 61.5% of anesthesiologists. The most commonly available airway management devices were Laryngeal Mask Airway (LMA) (94.8%), Video Laryngoscope (90.6%), and Fiber Optic Laryngoscope (82.3%), while the retrograde wire set was the least available (42.7%). More than 90% routinely performed Mallampati classification, mouth opening, and neck mobility evaluations before administering general anesthesia, while 66.7% assessed thyromental distance and 39.6% conducted the upper lip bite test. Preferred strategies for anticipated difficult airway cases included conventional direct laryngoscopy (43.8%) and fiber optic bronchoscopy (41.7%). For unanticipated difficult intubations, 41.7% preferred fiber optic laryngoscopy, 34.4% opted to awaken and postpone the procedure, and 24% utilized supraglottic airway devices (SGADs). Awake extubation was the strategy of choice for 88.5% of anesthesiologists. CICV situations had been encountered by 30.2% of anesthesiologists, though confidence in performing emergency front-of-neck access procedures remained low.

Conclusion: Senior anesthesiologists demonstrated greater adherence to ASA Difficult Airway guidelines, whereas residents exhibited knowledge gaps and reduced confidence in managing difficult airway cases. Effective airway management requires a combination of training, experience, and resource availability. Enhancing simulation-based training, improving accessibility to advanced airway devices, and standardizing preoperative assessment protocols are essential for optimizing patient outcomes in difficult airway scenarios.

Keywords: Airway management, anesthesiologist, cricothyrotomy, difficult airway, intubation, Mallampati classification, supraglottic airway device.

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INTRODUCTION

Difficult airway management remains a critical concern in anaesthetic practice, as failure to secure an airway can lead to life-threatening complications, including cardiorespiratory arrest. A difficult airway is defined as the inability of an anaesthesiologist or trained healthcare professional to ventilate a patient's lungs effectively using bag-mask ventilation and/or perform successful tracheal intubation through direct laryngoscopy, a scenario often described as "cannot intubate, cannot ventilate" (CICV) (1). Given the potential for catastrophic outcomes, ensuring adequate oxygenation is the primary responsibility of anaesthesiologists, requiring swift and well-coordinated management strategies to minimize patient harm (2). Difficult airway management is influenced by various patient-specific anatomical and physiological factors. Obstructive sleep apnoea (OSA) is a well-documented risk factor, contributing to an increased incidence of severe respiratory complications (3). Similarly, thyroid enlargement, particularly when retrosternal extension is present, poses a considerable challenge during airway control. Pregnancy-related anatomical changes, including airway oedema and breast enlargement, further complicate airway management, particularly in obese patients (4). Additionally, pregnancy is associated with delayed gastric emptying and reduced lower oesophageal sphincter tone, heightening the risk of regurgitation and aspiration during intubation (5). Several anatomical predictors have been linked to difficult direct laryngoscopy, including restricted mouth opening, limited mandibular protrusion, narrow dental arch, reduced thyromental distance, high Mallampati classification (III or IV), decreased sternomental distance, restricted neck mobility, and increased neck circumference (6). These factors collectively hinder glottic visualization, complicating direct laryngoscopy and endotracheal intubation, especially in emergency scenarios.

In response to the need for a standardized risk assessment tool, the MACOCHA score was developed to predict difficult airway management, particularly in intensive care settings. This scoring system considers both anatomical challenges and operator-related factors, assigning points for high Mallampati classification, OSA, cervical immobility, restricted oral aperture, coma, profound hypoxaemia, and whether the operator is a non-anaesthesiologist. A maximum score of 12 predicts significant airway difficulty, while a score of zero indicates an easy intubation. Although the MACOCHA score demonstrates a sensitivity of 73% for conventional direct laryngoscopy, its applicability in video laryngoscopy remains unverified (7). The overall incidence of difficult facemask ventilation is reported to range from 0.66% to 2.5%, difficult supraglottic airway device (SAD) placement from 0.5% to 4.7%, difficult tracheal intubation from 1.9% to 10%, and combined difficulty in both facemask ventilation and tracheal intubation from 0.3% to 0.4% (8). Despite the global emphasis on optimizing difficult airway management, there remains a paucity of data on current practices in Pakistan, particularly in tertiary care hospitals in Karachi. Understanding how difficult airway scenarios are managed in real-world clinical settings is crucial for improving patient safety and aligning practices with international guidelines. This study aims to evaluate the current strategies and challenges faced by anaesthesiologists in tertiary care hospitals in Karachi, providing insight into existing practices and identifying areas for improvement. By collecting and analyzing data on difficult airway management, this research seeks to contribute to evidence-based advancements in airway management protocols, ultimately enhancing patient outcomes.

METHODS

A cross-sectional study was conducted across eight tertiary care teaching hospitals in Karachi, including The Indus Hospital, Civil Hospital Karachi, Jinnah Postgraduate Medical Centre, PNS Shifa, Liaquat National Hospital, Aga Khan University Hospital, Patel Hospital, and Ziauddin Hospital. The study spanned six months, from May 2022 to October 2022. The sample size was calculated using OpenEpi software, considering a 95% confidence interval, a 10% target precision, and an estimated 47% prevalence of anaesthetists' awareness of the ASA Difficult Airway (DA) algorithm. This resulted in a required sample size of 96 participants (9). The number of participants recruited from each hospital was determined using the formula $n(h) = n \times (N(h) / N)$, where N(h) represents the total number of anaesthesiologists at a specific hospital, N denotes the total number of anaesthesiologists across all hospitals, and n is the overall required sample size (10-13). The distribution of participants was as follows: The Indus Hospital (14), Aga Khan University Hospital (27), Liaquat National Hospital (9), Jinnah Postgraduate Medical Centre (5), Civil Hospital Karachi (12), SIUT (10), PNS Shifa (4), Abbasi Shaheed Hospital (11), and Patel Hospital (5). Participants were selected using a non-probability convenience sampling technique. Eligible participants included anaesthesia consultants and experts practicing in tertiary care hospitals, as well as final-year FCPS anaesthesia trainees working in tertiary care settings. There were no gender restrictions, and only those who provided written

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informed consent were included. Anaesthesiologists working in primary and secondary healthcare settings and those unwilling to provide consent were excluded. Ethical approval was obtained from the College of Physicians and Surgeons Pakistan (CPSP) and the Institutional Review Board (IRB) of The Indus Hospital, ensuring adherence to ethical standards. A comprehensive list of anaesthesiologists practicing at the selected hospitals was compiled before initiating the study. Meetings were arranged with the chairpersons of the anaesthesia departments at these hospitals to secure authorization for conducting the survey. The principal investigator approached eligible participants, explained the study objectives, and obtained written informed consent before distributing a printed, self-administered questionnaire.

The questionnaire gathered demographic data, including age, highest qualification, years of experience, the number of general anaesthesia (GA) cases managed monthly, and the frequency of unanticipated difficult airway cases encountered. The survey also assessed routine airway assessment practices before GA, comfort levels with various airway devices and techniques, preferred management strategies for anticipated and unanticipated difficult airways, and approaches to extubation in DA scenarios. Additionally, it explored participants' experience with "cannot intubate, cannot ventilate" (CICV) situations and evaluated the availability of necessary airway management equipment. Data were entered and analyzed using SPSS version 26.0. For quantitative variables such as age, years of experience, monthly GA case load, and monthly unanticipated DA case frequency, the mean ± standard deviation (SD) or median with interquartile range (IQR) was calculated, depending on normality assumptions assessed through the Shapiro-Wilk test. Categorical variables, including gender, institutional type, highest qualification, participation in DA workshops/Continuing Medical Education (CME), familiarity with the ASA DA algorithm, availability of airway management equipment, and routine pre-GA airway assessments, were reported as frequencies and percentages. Associations between categorical variables were examined using the Chi-square test or Fisher's Exact test, as appropriate. Stratification was performed based on age groups, gender, highest qualification, years of experience, and institutional type to control for effect modifiers, with post-stratification Chi-square or Fisher's Exact test applied. A p-value of <0.05 was considered statistically significant. The study followed ethical principles, ensuring voluntary participation, confidentiality, and data protection. Participants had the right to withdraw at any stage without consequences. No personal identifiers were collected, maintaining anonymity throughout data collection and analysis.

RESULTS

A total of 96 anesthesiologists participated in the study. The mean age was 35.35±10.45 years, with a median of 32 years (IQR=11). The median years of experience were 5 (IQR=8), with a mean of 8.65±10.42 years. Among the participants, 62.5% were male and 37.5% were female. Regarding professional qualifications, 52.08% were in FCPS training, 26.04% were FCPS consultants, and 21.88% were MCPS consultants. The majority, 80%, were employed in private hospitals, while 20% worked in public hospitals. Participation in difficult airway workshops or CME events in the past five years was reported by 61.5% of anesthesiologists. The median number of general anesthesia (GA) cases handled per month was 50 (IQR=30), with a median of 3 (IQR=3) cases involving unanticipated difficult intubation. Familiarity with the ASA Difficult Airway Algorithm was reported by 86.5% of participants.

Regarding the availability of airway management equipment, the most commonly available device was the laryngeal mask airway (LMA), reported by 94.8% of anesthesiologists, followed by video laryngoscope (90.6%), fiber optic laryngoscope (82.3%), intubating LMA (78.1%), and I-gel (69.8%). The least available device was the retrograde wire set, reported by 42.7% of anesthesiologists. Preoperative airway assessment practices showed that over 90% of anesthesiologists routinely evaluated the Mallampati classification, mouth opening, and neck mobility before general anesthesia. Thyromental distance assessment was performed by 66.7%, while the upper lip bite test was included by 39.6%. In managing anticipated difficult airways, 43.8% preferred attempting conventional intubation first, while 41.7% opted for fiber optic bronchoscopy. For unanticipated difficult intubation where conventional methods failed, 41.7% chose fiber optic laryngoscopy, 34.4% opted to awaken and postpone the case, and 24% utilized supraglottic airway devices (SGADs).

Extubation strategies in difficult airway cases indicated that 88.5% preferred to extubate patients while fully awake, while 8.3% favored extubation in the post-anesthesia care unit (PACU), 2.1% in the intensive care unit (ICU), and 1% used LMA as an extubation bridge. CICV situations were encountered by 30.2% of anesthesiologists, while 69.8% reported never facing such scenarios. Stratification analysis was performed based on age, gender, experience, institutional type, and qualification concerning difficult airway equipment availability and preoperative assessment practices. Findings indicated significant variations in the availability of fiber optic laryngoscopes across different institutional types and qualification levels. Similarly, significant differences were noted in the use of intubating LMAs and I-gel devices based on professional qualifications.

INSIGHTS-JHR
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Table 1: Descriptive Statistics of Age and Experience

Statistics	Age (Years)	Years of Experience (Years)
Mean	35.35	8.65
Std. Deviation	10.45	10.42
Median	32	5
Interquartile Range	11	8
Minimum	24	1
Maximum	76	55

Table 2: Responses Regarding Workshop and GA Cases

Questions	Responses
Participated in difficult airway workshop/CME in last 5 years	Yes: 59 (61.5%), No: 37 (38.5%)
Approximate number of GA cases handled in a month (Median, IQR)	50 (30)
Number of unanticipated difficult intubation cases per month (Median, IQR)	3 (3)
Familiar with ASA difficult airway algorithm	83 (86.5%)

Table 3: Availability Of Airway Equipment

Equipment	Availability (%)
LMA	94.8
Intubating LMA	78.1
Video Laryngoscope	90.6
Fiber Optic Laryngoscope	82.3
Retrograde Wire Set	42.7
I-Gel	69.8

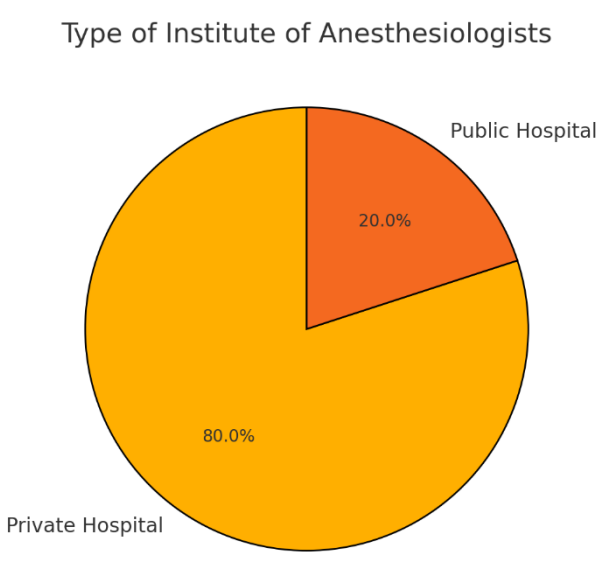
Table 4: Preoperative Airway Assessment and Preferred Management Strategies

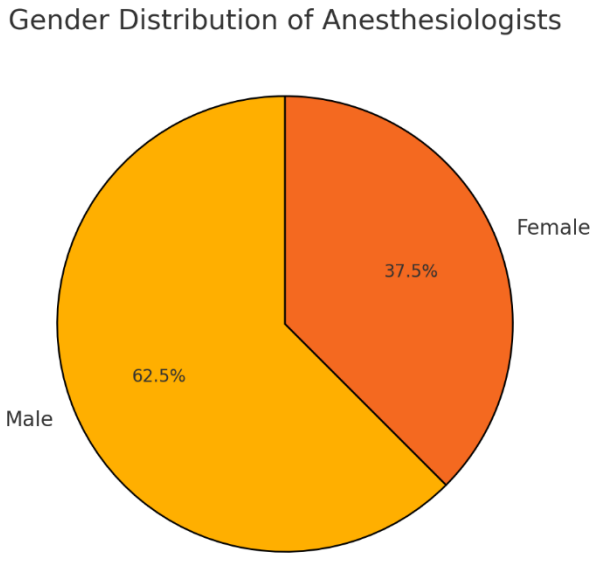
Questions	Responses
Preoperative assessment: Mallampati	96.90%
Preoperative assessment: Mouth Opening	95.80%
Preoperative assessment: Neck Movements	93.80%
Preoperative assessment: Thyromental Distance	66.70%
Preoperative assessment: Upper Lip Bite Test	39.60%
Preferred method for anticipated difficult airway	Conventional: 43.8%, Fiberoptic Bronchoscopy: 41.7%

Questions	Responses
Preferred method for unanticipated difficult intubation	Fiberoptic Laryngoscopy: 41.7%, Awaken & Postpone: 34.4%, SGADS: 24%
Preferred extubation strategy in difficult airway	Extubate fully awake: 88.5%, Extubate in PACU: 8.3%, Extubate in ICU: 2.1%

Table 5: Equipment Utilization Based on Experience and Institutional Type

Equipment	Utilization by Experienced Anesthesiologists (%)	Utilization by Less Experienced Anesthesiologists (%)	Utilization in Private Hospitals (%)	Utilization in Government Hospitals (%)
LMA	93.7	100	94.7	94.7
Intubating LMA	77.2	82.4	80	68.4
Video Laryngoscope	89.9	94.1	92	84.2
Fiber Optic Laryngoscope	82.3	82.4	90.7	47.4
Retrograde Wire Set	40.5	52.9	44	31.6
I-Gel	70.9	64.7	69.3	73.7





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DISCUSSION

The proficiency of anesthesiologists in managing difficult airways is closely associated with their level of experience, practice exposure, and familiarity with airway management protocols. Findings indicate that both experienced and less experienced anesthesiologists predominantly rely on the laryngeal mask airway (LMA) as a rescue device in unanticipated difficult airway situations, whereas video laryngoscopy is preferred by more experienced practitioners for anticipated airway challenges. Less experienced anesthesiologists demonstrated a greater inclination toward awake intubation techniques. Senior anesthesiologists were more likely to attempt conventional direct laryngoscopy before utilizing alternative devices, which aligns with prior literature indicating a preference for standard methods before resorting to advanced airway tools (15-18). The demographic distribution in this study revealed a predominance of male anesthesiologists, with a significant proportion being in FCPS training or serving as consultants. More than half of the participants had attended a difficult airway workshop or CME event within the last five years, suggesting an awareness of the importance of continued professional development. Comparisons with existing literature indicate variations in training patterns, as some studies have reported higher participation in structured airway management training programs, particularly in developed healthcare systems (19,20).

Resource availability remains a key factor influencing airway management practices. The findings demonstrate that teaching hospitals are generally better equipped with advanced airway devices, whereas non-teaching institutions face notable limitations. The availability of video laryngoscopes, fiber optic bronchoscopes, and supraglottic airway devices varies across institutions, highlighting disparities in resource distribution. Previous studies from high-resource settings have reported near-universal availability of fiber optic bronchoscopes among anesthesiologists, while studies from developing regions indicate significant gaps in access to such equipment. The limited availability of advanced airway tools in some hospitals underscores the need for policy-driven resource allocation to ensure standardized airway management practices across all healthcare settings (21,22). Equipment preference in difficult airway scenarios reflected current clinical trends, with LMA being the most frequently used device, followed by video laryngoscopes and fiber optic laryngoscopes. The retrograde wire set was the least commonly used device, indicating its limited adoption in clinical practice. Comparisons with previous studies suggest that while LMA remains a widely utilized adjunct for airway rescue, the preference for fiber optic bronchoscopy varies depending on institutional policies and individual clinician confidence. Training gaps in fiber optic intubation techniques have been identified as a barrier to its widespread use, reinforcing the need for increased hands-on training opportunities (23-25).

Preoperative airway assessment practices showed that the majority of anesthesiologists routinely evaluated Mallampati classification, mouth opening, and neck mobility before administering general anesthesia. However, assessments such as thyromental distance and the upper lip bite test were performed less frequently, suggesting variability in airway evaluation protocols. In anticipated difficult airway scenarios, a considerable proportion of anesthesiologists favored conventional direct laryngoscopy or fiber optic bronchoscopy, whereas in unanticipated difficult intubations, fiber optic laryngoscopy, postponing the procedure, or supraglottic airway devices were among the primary strategies. The preference for awake fiber optic intubation in difficult cases was observed more frequently among experienced practitioners, which is consistent with previous reports highlighting the impact of clinical exposure on decision-making in airway management (26). Extubation strategies in difficult airway cases demonstrated a strong preference for extubating patients while fully awake, with fewer anesthesiologists opting for extubation in the post-anesthesia care unit (PACU) or intensive care unit (ICU). Studies from other regions have similarly indicated that awake extubation remains the preferred approach due to its safety benefits in maintaining airway patency and reducing the risk of post-extubation complications. The incidence of encountering a "cannot intubate, cannot ventilate" (CICV) situation was reported by a significant proportion of anesthesiologists, yet confidence in performing emergency front-of-neck access procedures remained low. Literature suggests that simulation-based training improves competency in performing cricothyrotomy and other emergency airway interventions, supporting the need for increased simulation-based learning opportunities (22).

Despite its contributions to understanding airway management practices, this study has several limitations. The cross-sectional design limits causal inferences between training, experience, and airway management outcomes. The reliance on self-reported data introduces the possibility of response bias, where participants may overestimate adherence to best practices. Additionally, the sample size, while adequate for descriptive analysis, may not fully capture the diversity of airway management practices across all tertiary care hospitals in the region. The study does not evaluate long-term patient outcomes following airway interventions, which could provide further insights into the effectiveness of different management strategies (22,23). Future research should focus on longitudinal assessments to evaluate how training and experience influence airway management competency over time. Expanding the study to include a broader

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range of healthcare institutions, including primary and secondary care settings, would offer a more comprehensive understanding of airway management practices. Additionally, integrating objective measures such as clinical audits and real-time observations could enhance the accuracy of data on airway management protocols and outcomes. Addressing resource disparities through policy interventions and enhancing simulation-based training programs may contribute to improving difficult airway management and patient safety in diverse healthcare settings.

CONCLUSION

The findings of this study highlight that consultants demonstrate proficiency in managing difficult airways and adherence to the ASA Difficult Airway Algorithm, while residents exhibit gaps in both theoretical knowledge and practical execution. Effective airway management requires a combination of expertise, thorough preoperative assessment, continuous education, clinical experience, and access to essential airway equipment. Strengthening training programs, enhancing hands-on skill development, and ensuring resource availability are crucial for optimizing difficult airway management and improving patient safety in anesthesia practice.

Author Contribution

Author	Contribution
Harmit Kumar	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Adeel Ur Rehman*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Tarique Aziz	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Mahendar Wanwari	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Kashif Naeem	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Ajeet Kumar	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

REFERENCES

1. Edelman DA, Perkins EJ, Brewster DJ. Difficult airway management algorithms: a directed review. Anaesthesia. 2019;74(9):1175-85.

2. Shamim F, Yahya M, Ikram MJA. Awake fiberoptic intubation in a patient with known difficult airway due to huge thyroid goiter. Pain Care Int. 2019:94-7.

3. Ahmad I, El-Boghdadly K, Bhagrath R, Hodzovic I, McNarry A, Mir F, et al. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. Anaesthesia. 2020;75(4):509-28.

4. Apfelbaum JL, Hagberg CA, Connis RT. 2022 American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway. Anesthesiology. 2022;136:31-34.

5. Kuzmanovska B, Shosholcheva M, Kartalov A, Jovanovski-Srceva M, Gavrilovska-Brzanov A. Survey of current difficult airway management practice. Open Access Maced J Med Sci. 2019 Sep 9;7(17):2775.

6. Nazir N, Saxena A. Airway management practices in Covid ICU during the first and second phase of Covid-19 pandemic: experience from a tertiary care hospital of Western Uttar Pradesh, India. Anaesth Pain Intensive Care. 2021;25(5):689-90. doi: 10.35975/apic.v25i5.1640.

7. Kiss EE, Olomu P, Johnson RF. Determining the odds of difficult airway resolution among pediatric patients: a case series. Otolaryngol Head Neck Surg. 2021;165(6):592-6. doi: 10.1177/0194599820986570.

8. Lean LL, Chin BZ, Koh LY, Loh N, Loh MH. The hospital difficult airway team: experience and implications for patient care. Ir J Med Sci. 2021;190(4):1561-3. doi: 10.1007/s11845-020-02471-5.

9. Chow YM, Tan Z, Soh C, Ong S, Zhang J, Ying H, Wong P. A prospective audit of airway code activations and adverse events in two tertiary hospitals. Ann Acad Med Singap. 2020;49(11):876-84. doi: 10.47102/annals-acadmedsg.2020242.

10. Govardhane B, Shinde AD, Gehdoo RP, Arora S. Current practice pattern among anaesthesiologists for difficult airway management: a nationwide cross-sectional survey. Indian J Anaesth. 2023;67(10):809-14. doi: 10.4103/ija.ija_20_23.

11. Miller KA, Goldman MP, Nagler J. Management of the difficult airway. Pediatr Emerg Care. 2023. doi: 10.1097/PEC.0000000000002916.

12. Endlich Y, Beckmann L, Choi SW, Culwick M. A prospective six-month audit of airway incidents during anaesthesia in twelve tertiary level hospitals across Australia and New Zealand. Anaesth Intensive Care. 2020;48(4):389-98. doi: 10.1177/0310057X20945325.

13. Abuokra KS, Hamza AJ, Emhmed SR, Al Farnouk AM, Abooadn MA, Al Taloua MM. Assessment of difficult airway management protocols used in selected Libyan hospitals and identification of major complications: a survey. Libyan J Med Res. 2022. doi: 10.54361/ljmr.16209.

14. Malhotra S, Gandhi K. Airway management in critically sick in intensive care. Anaesth Pain Intensive Care. 2020. doi: 10.35975/apic.v22i1.1194.

15. McDonald V, Harrington J, Clark VL, Gibson P. Multidisciplinary care in chronic airway diseases: the Newcastle model. ERJ Open Res. 2022;8. doi: 10.1183/23120541.00215-2022.

16. Barnes R, Au J. Transtracheal jet ventilation in a general tertiary hospital: a 7-year audit. Anaesth Intensive Care. 2021;49:316-21. doi: 10.1177/0310057X211002525.

17. Buasuk T, Khongcheewinrungruang N, Suphathamwit A. Difficult airway code activation for emergency endotracheal intubation outside the operating room in a tertiary care university hospital in Thailand: a single-center retrospective observational study. Medicine. 2023;102. doi: 10.1097/MD.0000000000034907.

18. Liu HH, Wang Y, Zhong M, Li YH, Gao H, Zhang JF, Ma W. Managing the difficult airway. Medicine. 2020;100. doi: 10.1097/MD.0000000000027181.

19. Shukairy M, Chadwick L, LaPorte CM, Pudwill J, Syslo JA, Fitzgerald J, Bier-Laning C. Implementing an interprofessional difficult airway response team to identify and manage high-risk airways. Otolaryngol Head Neck Surg. 2023. doi: 10.1002/ohn.357.

20. Tang Y, Pham T, Bradley WP, Brewster FM, Brewster DJ. A comprehensive audit of difficult airway trolleys in selected Victorian hospitals. Anaesth Intensive Care. 2024. doi: 10.1177/0310057X241265722.

21. Pirlich N, Berk A, Hummel R, Schmidtmann I, Epp K, Kriege M, Wittenmeier E. Awake tracheal intubation in routine airway management: a retrospective analysis in a tertiary centre. PLoS One. 2024;19. doi: 10.1371/journal.pone.0299071.

22. Berisha G, Boldingh A, Blakstad E, Rønnestad A, Solevåg A. Management of the unexpected difficult airway in neonatal resuscitation. Front Pediatr. 2021;9. doi: 10.3389/fped.2021.699159.

23. Jung H. A comprehensive review of difficult airway management strategies for patient safety. Anesth Pain Med. 2023;18:331-9. doi: 10.17085/apm.23123.

24. Vegesna AR, Al-Anee KN, Bashah M, Faraj J. Airway management in bariatric surgery patients, our experience in Qatar: A prospective observational cohort study. Qatar Med J. 2020;2020. doi: 10.5339/qmj.2020.2

25. Dalesio NM, Ullah MN, Lester L, Zaidi MA, Chu R, Mendez A, et al. Preemptive airway management planning: A retrospective evaluation of the pediatric difficult airway consultation service. Acta Anaesthesiol Scand. 2024. doi: 10.1111/aas.14488

26. Bashir A, Azhar M. Emergency management of difficult airway in COVID-19 patient with carcinoma larynx. J Pak Med Assoc. 2021;2:68-69. doi: 10.48111/2021.02.13

