Archives of Academic Emergency Medicine. 2026; 14(1): e32

OPEN ACCESS

ORIGINAL RESEARCH

Dispatcher Performance and Prehospital Outcomes in Telephone-Assisted Airway Management following Foreign Body Obstruction: A Cross-Sectional Study

Aida Jahangiri[1], Sina Valiee[2], Naser Kamyari[3], Salam Vatandost[4]*

1. Student Research Committee, Research Institute for Health Development, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, sanandaj, Iran.

2. Clinical care research center, Research Institute for Health Development, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, sanandaj, Iran.

3. Department of Public Health, School of Health, Abadan University of Medical Sciences, Abadan, Iran.

4. Social Determinants of Health Research Center, Research Institute for Health Development, School of Nursing and Midwifery, Kurdistan University of Medical Sciences, sanandaj, Iran.

Received: May 2026; Accepted: June 2026; Published online: 26 July 2026

Abstract: **Introduction:** Prehospital care plays a crucial role in early recognition and timely management of foreign body airway obstruction (FBAO). This study aimed to identify factors associated with dispatcher performance and prehospital outcomes in the telephone-assisted management of FBAO. **Methods:** This cross-sectional study was conducted through a review of recorded emergency telephone calls related to FBAO. Data were collected from the prehospital emergency medical services center over a one-year period, from March 20, 2024 to March 20, 2025. Demographic characteristics of dispatcher were obtained through self-reported questionnaires. Recorded calls were assessed using validated 13-item researcher-developed checklist based on the standardized telephone assistance algorithm for FBAO, categorized across three age groups (score range 0-1). Patient demographic characteristics, clinical characteristics, and prehospital outcomes, including recovery without dispatch of an operational team and dispatch of an operational team, were extracted from electronic medical records. Data were entered and analyzed using SPSS version 16. A p-value < 0.05 was considered statistically significant. **Results:** A total of 262 telephone assistance FBAO cases were included in the final analysis, of which 45.8% involved infants. The overall mean dispatcher performance score was 0.87 ± 0.10. Multivariable logistic regression analysis demonstrated that patient's age (adjusted odds ratio (AOR) = 1.60, 95% confidence interval (CI): 1.13–2.26, p = 0.008) and dispatcher's clinical experience (AOR = 1.44, 95% CI: 1.05–1.98, p = 0.023) were significant positive predictors of better performance of dispatcher. In contrast, contractual employment (AOR = 0.37, 95% CI: 0.21–0.68, p = 0.001), higher monthly overtime hours (AOR = 0.33, 95% CI: 0.16–0.68, p = 0.002), and non-participation in stress management workshops (AOR = 0.40, 95% CI: 0.23–0.68, p = 0.001) were negatively associated with dispatcher performance. Complete airway obstruction (AOR = 0.08, 95% CI: 0.03–0.17, p < 0.001), occurrence in an outdoor setting (AOR = 4.86, 95% CI: 1.60–16.40, p = 0.007), and involvement of non-edible foreign bodies (AOR = 0.16, 95% CI: 0.06–0.37, p < 0.001) were significant predictors of outcomes. **Conclusion:** The findings indicate that dispatcher performance in telephone-assisted management of FBAO was generally acceptable. Enhancing performance requires not only simulation-based training but also consideration of individual and occupational factors affecting dispatchers. Moreover, improving patient outcomes depends on dispatchers' awareness of patient-specific characteristics to ensure timely and context-appropriate interventions.

Keywords: Employee performance appraisal; Emergency medical dispatcher; Outcome assessment, health care; Foreign bodies; Airway obstruction

Cite this article as: Jahangiri A, Valiee S, Kamyari N, et al. Dispatcher Performance and Prehospital Outcomes in Telephone-Assisted Airway Management following Foreign Body Obstruction: A Cross-Sectional Study. Arch Acad Emerg Med. 2026; 14(1): e32. https://doi.org/10.22037/aaem.v14i1.3011.

1. Introduction

One of the essential components of prehospital emergency medical services is the care provided by emergency medical dispatchers [1]. Dispatchers perform multiple critical roles, including rescue coordination, preliminary assessment based on the patient's condition and anticipated complications, as well as supervisory and advisory functions [2]. Upon receiving an emergency call, dispatchers initially collect es-

***Corresponding Author:** Salam Vatandost; Kurdistan University of Medical Sciences Campus, Pasdaran Blvd, Sanandaj, Iran. Tel: +988783801405, Fax: +98 38380448, Email: vatandost1366@gmail.com, vatandoost.s@muk.ac.ir. ORCID: https://orcid.org/0000-0003-4189-0954.

sential information, assess the patient's condition, and provide telephone-based instructions. Subsequent actions are implemented in a structured and systematic manner, and if necessary, operational emergency teams are dispatched to the scene [3]. Foreign body airway obstruction (FBAO) is among the most common emergency complaints encountered by dispatchers in prehospital settings [4].

FBAO occurs when a foreign object such as food, small objects, or candies partially or completely blocks airflow through the respiratory tract [5]. This condition constitutes a medical emergency, and failure to provide timely intervention may result in severe neurological injury or death [6]. It is estimated that between 300 and 600 infant deaths occur annually in developed countries due to airway obstruction, with this figure nearly doubling in developing countries [7]. In Iran, between 2019 and 2020, 9,959 deaths were recorded among infants, approximately 7% of which were attributed to FBAO [8].

Standardized telephone assistance protocols have been developed to guide dispatchers in managing various chief complaints, including FBAO. Adherence to these protocols is crucial for improving survival and preventing adverse neurological outcomes [9]. Although previous studies examining dispatcher performance in telephone assistance for airway emergencies are limited, available evidence highlights the need for dispatcher training [10] and the consistent use of standardized algorithms [6]. Research has demonstrated the positive impact of telephone assistance on outcomes among patients with foreign body airway obstruction, showing that survival rates may reach up to 95% when appropriate interventions are performed by bystanders, compared with cases in which no intervention is provided [11, 12]. Moreover, the likelihood of unfavorable outcomes, including neurological injury or death, is linked to prolonged airway obstruction, particularly beyond six minutes [13].

In addition to dispatcher performance, patient demographic and clinical characteristics, bystander-related factors, and contextual variables may also influence outcomes in cases of foreign body airway obstruction. Factors such as the correctness of bystander interventions are particularly important. Evidence suggests that correct bystander interventions are successful in approximately 48% of cases [14]. Therefore, identifying these factors is essential for future planning and targeted interventions.

Evaluating dispatcher performance is essential for identifying potential areas for improvement. Furthermore, beyond dispatcher-related factors, patient condition-related variables may significantly influence prehospital outcomes, and recognizing these factors can facilitate preventive planning and timely, appropriate interventions. Accordingly, the present study aimed to determine the factors associated with dispatcher performance and prehospital outcomes in telephone-assisted management of patients with FBAO.

2. Methods

2.1. Study design and setting

The present retrospective cross-sectional study was conducted in 2025. The study setting was the Emergency Medical Services (EMS) Center of Kurdistan Province. In this study, dispatcher performance in delivering telephone-assisted management for patients with FBAO and patients' prehospital outcomes were considered the primary objectives, with analyses conducted in relation to dispatcher demographic characteristics and patients' demographic and clinical profiles.

All dispatchers (N=35) provided written informed consent to participate in the study and completed a demographic information form. The study was conducted as part of a Master's thesis in nursing at Kurdistan University of Medical Sciences. Ethical approval was obtained from the Ethics Committee of Kurdistan University of Medical Sciences (approval code: IR.MUK.REC.1404.051). The study objectives were explained to all dispatchers, and written informed consent was obtained prior to participation. Confidentiality and anonymity of both dispatchers and patients were strictly maintained throughout all stages of the study.

2.2. Participants

The study population consisted of all electronic medical records with a chief complaint of FBAO during the period from March 20, 2024, to March 20, 2025. The inclusion criteria included dispatcher consent to participate, confirmed FBAO, and non-duplicate calls for the same patient. Exclusion criteria included incomplete recorded data and unclear or poor-quality call recordings.

2.3. Data gathering

As part of routine practice, demographic and clinical information on patients, along with dispatcher identification codes, were recorded in the electronic medical records of all individuals requesting assistance via the emergency telephone number (115). Furthermore, all telephone assistance conversations are automatically and fully recorded as part of the standard operational protocol of the EMS center.

Data were collected using a dispatcher demographic characteristics form (age, sex, marital status, clinical experience, employment type, years of service in EMS dispatch, number of dispatch centers served, number of calls per shift, number of shifts per month, shift pattern, mean monthly overtime, total monthly working hours, satisfaction with overtime, attendance at a telephone triage workshop for airway obstruction, attendance at a hands-on airway obstruction workshop, and attendance at a stress management workshop), a patient demographic and clinical characteristics form (sex, degree of airway obstruction, location of the incident, type of foreign body, caller identity, time of call, pre-existing medical conditions, prior knowledge of airway interventions, and ambulance response time), a researcher-developed check-

list for evaluating dispatcher performance, and a prehospital clinical outcome form for patients. The checklist was developed based on standardized telephone assistance algorithms for FBAO [15-18]. Item generation was guided by key procedural steps recommended in established emergency airway management guidelines. Because FBAO management differs across age groups, separate but conceptually parallel checklists were developed for three age categories: infants (0–12 months), children (1–12 years), and adults (>12 years). Each checklist initially included items reflecting essential dispatcher actions such as recognition, instruction delivery, reassessment, and escalation when necessary. The checklist items were scored using three response options: "Yes" (score = 1, indicated that the dispatcher appropriately performed the assessed item), "No" (score = 0, indicated nonperformance or failure to comply with the specified item), and "Not indicated" (items not applicable to the patient's clinical condition were excluded from the total score calculation). The total performance score for each case was calculated as the sum of applicable checklist items divided by the total number of applicable items, yielding a standardized score ranging from 0 to 1. Standardization allowed comparison of dispatcher performance across age categories despite potential differences in the number of applicable items.

Content validity was assessed by a panel of 10 experts in emergency medical services, nursing, and emergency medicine, yielding a content validity index (CVI) of 0.84 and a content validity ratio (CVR) of 0.82. To assess the reliability of the instrument, simultaneous evaluation by two independent raters was conducted on seven similar cases. Inter-rater agreement, assessed using Cohen's kappa coefficient, was 0.87, indicating high agreement between raters. These seven pilot cases were not included in the main analysis. Ultimately, a 13-item checklist was finalized for each age category and used for data collection. Dispatcher assignment for each case was identified using the recorded mission code. Patient demographic and clinical characteristics were extracted from the corresponding electronic medical records. Dispatcher performance was evaluated by listening to the recorded telephone assistance calls.

2.4. Outcomes

Prehospital outcomes were classified into two categories: recovery without dispatch of an emergency team and nonrecovery requiring team dispatch. Outcome data were extracted from the electronic medical records. During the preliminary outcome assessment, prehospital outcomes were categorized into six groups: (1) spontaneous recovery without telephone assistance; (2) recovery after telephone-assisted intervention without ambulance dispatch; (3) ambulance dispatch with recovery without requiring active intervention by EMS personnel; (4) airway obstruction relief performed by EMS technicians with subsequent recovery; (5) successful resuscitation with hospital transfer; and (6) unsuccessful resuscitation with hospital transfer.

For statistical analysis of the association between dispatcher performance and patient outcomes, the six initial outcome categories were combined into two clinically meaningful groups: recovery without ambulance dispatch and cases requiring ambulance dispatch, to ensure a sufficient sample size in each group and provide stable, interpretable results. Several measures were taken to minimize potential sources of bias. To reduce selection bias, all eligible cases during the study period were included using a census sampling approach. To minimize information bias, data were extracted from standardized EMS dispatch records using a structured data collection form. In addition, predefined operational definitions were applied to ensure consistency in variable measurement. To address potential confounding, relevant demographic and clinical variables of both patients and dispatchers were collected and considered in the statistical analysis. Additionally, to reduce observer bias, data extraction was performed according to predefined criteria, and ambiguous cases were reviewed by a second researcher.

2.5. Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, version 16.0; IBM Corp., Armonk, NY, USA). Normality of continuous variables was assessed using the Kolmogorov–Smirnov test. Descriptive statistics were presented as mean ± standard deviation (SD) for continuous variables and as frequency (percentage) for categorical variables. An independent samples t-test and one-way ANOVA were used to compare mean dispatcher performance scores, and the chi-square test of independence was used to compare clinical prehospital outcomes. Variables that showed statistically significant associations in the bivariate analyses were considered eligible for inclusion in the multivariable logistic regression analysis. Univariable and multivariable logistic regression analyses were performed to estimate odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (CIs) for factors associated with dispatcher performance and prehospital clinical outcomes. A p-value < 0.05 was considered statistically significant.

3. Results

3.1. Baseline characteristics of studied cases

A total of 326 cases of FBAO were registered during the study period. Of these, 262 met the criteria and were included in the final analysis. Table 1 shows the baseline characteristics of studied cases. Among the included cases, 45.8% were infants, 18.3% children, and 35.9% adults. Airway obstruction was complete in 57.6%, location of incident was home in 88.9%. Type of foreign body was edible in 79.8% and 96.6% did not have prior knowledge of airway intervention.

3.2. Dispatcher performance

The overall mean dispatcher performance score was 0.87 ± 0.10. The highest mean score was observed in calls involving infants (0.89 ± 0.10), followed by children (0.88 ± 0.07) and adults (0.84 ± 0.13). There was a significant association between mean dispatcher performance scores and prehospital outcome only in adult patients (p = 0.009).

3.3. Associated factors of dispatcher performance

Univariable and multivariable beta regression analysis of factors associated with dispatcher performance score in telephone-guided management of FBAO are shown in table 2. In calls involving adult patients, Although the descriptive analysis showed a slightly higher mean performance score for infant-related calls, the multivariable beta regression analysis demonstrated that, after adjustment for potential confounding variables, calls involving adult patients were associated with significantly higher dispatcher performance compared with infant calls. This discrepancy likely reflects the influence of other variables included in the regression model (AOR = 1.60, 95% CI: 1.13–2.26, p = 0.008). Dispatcher's clinical experience was also independently associated with better performance; each additional year of experience was associated with a 1.44-fold increase in the performance score (AOR = 1.44, 95% CI: 1.05–1.98, p = 0.023). Employment status was significantly associated with performance. Dispatchers with corporate employment had significantly lower performance scores than contract-employed dispatchers (AOR = 0.37, 95% CI: 0.21–0.68, p = 0.001). Similarly, monthly overtime of 10–20 hours was associated with reduced performance compared with working less than 10 hours of overtime per month (AOR = 0.33, 95% CI: 0.16–0.68, p = 0.002). Participation in stress management workshops was also significantly associated with dispatcher performance. Dispatchers who had not participated in such workshops demonstrated lower performance scores compared with those who had participated (AOR = 0.40, 95% CI: 0.23–0.68, p = 0.001).

3.4. Associated factors of outcomes

Univariable and multivariable logistic regression analyses of factors associated with prehospital clinical improvement without the need for ambulance dispatch are shown in table 3. Multivariable logistic regression analysis demonstrated that complete airway obstruction was independently associated with a reduced likelihood of prehospital recovery (AOR = 0.08, 95% CI: 0.03–0.17, p < 0.001), indicating approximately 92% lower odds of recovery compared with partial obstruction. In contrast, incidents occurring in outdoor settings were associated with a significantly higher likelihood of recovery compared with indoor events (AOR = 4.86, 95% CI: 1.60–16.40, p = 0.007), corresponding to nearly five-fold higher odds of recovery. Additionally, involvement of non-food foreign bodies was significantly associated with poorer prehospital outcomes. Cases involving non-food objects had 84% lower odds of recovery compared with food-related foreign bodies (AOR = 0.16, 95% CI: 0.06–0.37, p < 0.001).

4. Discussion

Based on main findings, dispatcher clinical experience, better employment status, and participation in stress management workshops were significantly associated with higher performance. In contrast, monthly overtime, was associated with lower performance in dispatchers. Also, complete airway obstruction was independently associated with a reduced likelihood of prehospital recovery. In contrast, incidents occurring in outdoor settings were associated with a significantly higher likelihood of recovery compared with indoor events, corresponding to nearly five-fold higher odds of recovery. Additionally, involvement of non-food foreign bodies was significantly associated with poorer prehospital outcomes. Cases involving non-food objects had 84% lower odds of recovery compared with food-related foreign bodies. Based on the findings, the highest incidence of FBAO was observed among infants. This finding aligns with previous studies reporting elevated prevalence in infants' populations [8, 19, 20]. The increased frequency in infants under one year is primarily due to immature swallowing, narrower airways, and limited neuromuscular control [21]. Preventive strategies should include caregiver education on age-appropriate feeding, correct breastfeeding positions, and restricting access to small objects [6]. Early screening for congenital airway anomalies and raising parental awareness of warning signs may also reduce both the incidence of and complications associated with this condition [8].

Although overall dispatcher performance was acceptable, timely airway clearance remains critical for patient outcomes, emphasizing strict adherence to standards. Dispatcher performance was lower for adult patients than for children and infants. No previous studies have directly assessed dispatcher performance in telephone assistance for foreign body airway obstruction; however, related research indicates higher triage accuracy in pediatric populations and more variable performance in adults. For example, Islam et al. (2024) reported correct triage rates of 72.5% in older adults and 98.5% in children [22]. Review studies also suggest more accurate, and sometimes over-triaged, performance in younger age groups [5, 23].

The lower performance in adults in first analysis may reflect the greater complexity of diagnosing airway obstruction in this group, due to symptom overlap with common comorbidities, such as neurological disorders, intoxication, or altered consciousness, which complicates dispatcher decision-making [24]. In addition, training programs and standardized protocols often emphasize pediatric management, potentially reducing dispatcher confidence and proficiency in adult scenarios [24, 25]. To improve adult-focused performance, training and simulation programs should include complex adult scenarios, protocols should be regu-

larly updated, and telephone decision-support tools should be made available.

Comparison of dispatcher performance by patient outcomes revealed a statistically significant difference only in adults, with higher performance observed in cases requiring ambulance dispatch. Regression analysis confirmed that performance in adult cases was 1.6-fold higher than in infants. These findings differ from analyses comparing dispatcher performance alone, indicating that factors beyond dispatcher skill such as clearer clinical signs, more effective verbal communication, faster decision-making for ambulance dispatch, and reduced reliance on bystander intervention may influence whether patients recover solely through telephone guidance.

Dispatcher experience was another significant factor influencing performance. Prior studies confirm that greater experience may help dispatchers identify problems more quickly [26, 27], and is associated with a reduced need for consultation [26], lowers cognitive errors, is associated with better caller stress management, and enables more targeted instructions, collectively improving performance scores. Shift scheduling should ensure a mix of experienced and less experienced staff to optimize service quality. Although clinical experience was positively associated with higher performance scores, causality cannot be inferred.

Employment status also affected performance. Dispatchers with corporate employment, which represents lower job security, performed significantly worse. Low job security can reduce motivation, limit access to integrated training, and decrease job satisfaction [28, 29]. Enhancing employment stability, for example through permanent contracts, may improve dispatcher performance and the quality of care provided. The observed association between employment type and performance should be interpreted cautiously, as unmeasured organizational and motivational factors may have contributed to this finding.

Excessive monthly overtime (>10 hours) was associated with poorer performance, consistent with studies linking overtime to job dissatisfaction, stress [30], errors, fatigue, decreased alertness, and higher incidence of adverse events [31, 32]. Sufficient staffing is recommended to minimize excessive or mandatory overtime.

Participation in stress management workshops was another influential factor. Dispatchers without prior training scored 20% lower than those with workshop experience. High stress and anxiety from frequent emergency calls can negatively affect performance [33]. Mindfulness-based interventions have been shown to reduce stress and are associated with higher performance [34], while structured stress management training enhances clinical decision-making [35]. Regular and structured stress-reduction programs should, therefore be incorporated into both academic and in-service training for emergency dispatchers.

Regression analysis identified three independent predictors of patient outcomes: airway obstruction severity, incident location, and foreign body type. Complete obstruction significantly reduced the likelihood of prehospital recovery, with odds of recovery approximately 92% lower than in cases of partial obstruction. Previous studies similarly report an inverse relationship between obstruction severity and outcomes [13, 36, 37], highlighting the need for dispatchers to assess severity carefully and provide detailed airway clearance instructions while prioritizing rapid ambulance dispatch in suspected complete obstruction.

Incidents occurring outside the home were associated with a substantially higher likelihood of recovery approximately five times greater than indoor incidents. This association may reflect several contextual and behavioral factors. In-home incidents often involve delayed recognition and response due to limited caregiver awareness, slower access to emergency services, and lower likelihood of trained bystander intervention. Young children, particularly those under five years of age, are more vulnerable in these settings, as caregivers may have insufficient knowledge of first-aid measures, and airway obstruction symptoms may be less immediately recognized [38]. In contrast, public or out-of-home settings may offer faster and more effective assistance, as bystanders are more likely to have first-aid training, emergency resources are more readily available, and dispatcher instructions can be executed promptly. These environmental and social factors are likely associated with the observed higher recovery rates outside the home. Although the current findings highlight the potential role of incident location in influencing outcomes, caution is warranted due to the relatively small number of out-of-home cases and the wide confidence interval. The observed associations may also be influenced by unmeasured factors, such as variability in bystander intervention quality, differences in case severity, or dispatcher familiarity with atypical locations. Further studies with larger and more diverse samples are needed to confirm these associations and to explore how environmental, patient, and dispatcher-related factors jointly contribute to outcomes in different settings. Overall, these results underscore the importance of rapid dispatcher intervention, particularly in home-based incidents, and suggest that strategies such as heightened triage sensitivity, early identification of high-risk cases, and targeted caregiver education may be associated with improved prehospital outcomes.

Finally, involvement of non-food foreign bodies significantly decreased the likelihood of prehospital recovery. Patients with non-food foreign body obstruction often require more frequent hospitalization, higher treatment costs, and are more likely to undergo tracheotomy [39, 40]. Non-food objects are typically rigid, incompressible, and non-degradable, resulting in prolonged airway obstruction and increased hypoxia severity [41]. For dispatchers, the type of foreign body should be considered a key risk indicator during telephone triage, with cases involving non-food items managed with higher priority, rapid ambulance dispatch, and immediate airway-clearance instructions. Attention to these factors can

play a critical role in improving outcomes for patients experiencing foreign body aspiration.

5. Limitations

First, cases with incomplete documentation or missing audio recordings were excluded from the analysis. Although this approach improved data accuracy and reduced information bias, it may have introduced selection bias if excluded cases systematically differed from included cases. Second, the final sample consisted of 262 cases, including 120 infants, 48 children, and 94 adults. The relatively small number of cases in some subgroups, particularly children, may have reduced statistical precision and limited the power of subgroup analyses. Third, as the study was conducted within a single EMS dispatch system, the findings may not be fully generalizable to other settings with different organizational structures or training protocols. Fourth, if excluded cases were more likely to involve complex or chaotic emergencies, dispatcher performance may have been overestimated. However, given that exclusions were limited to cases with insufficient data quality, the magnitude of this bias is likely moderate.

6. Conclusions

The findings of this study indicate that the overall performance of dispatchers in managing airway obstruction-related calls was assessed as acceptable, significant differences were observed across patients' age groups, clinical outcomes, and certain occupational factors. The severity of obstruction, location of the incident, and type of foreign body were identified as the most important predictors of patient outcomes, such that complete airway obstruction, incidents occurring at home, and non-food foreign bodies were associated with poorer outcomes. Moreover, greater work experience, job security, the amount of overtime, and participation in stress management workshops played significant roles in improving dispatcher performance. Accordingly, updating training programs, strengthening occupational support, and implementing stress reduction strategies may contribute to improving the quality of telephone triage and ultimately enhancing patient outcomes.

7. Declarations

7.1. Acknowledgments

The authors would like to express their sincere gratitude to the Research Deputy of Kurdistan University of Medical Sciences, the Emergency Medical Services Center, and all dispatchers and participants who generously cooperated in conducting this study.

7.2. Authors' contributions

All authors contributed to the study design, data collection, analysis, and interpretation of the results. The first author drafted the initial manuscript, and the other authors critically reviewed and revised the manuscript. All authors read and approved the final version of the manuscript.

7.3. Funding/Support

No funding.

7.4. Conflict of Interest

The authors declare that there is no conflict of interest regarding the conduct and publication of this study.

7.5. Competing interests

The authors declare no competing interests.

7.6. Data availability

The datasets generated and/or analyzed during the current study are not publicly available due to information about the personal issues of the participants in this study contradicts the confidentiality of information but are available from the corresponding author on reasonable request.

7.7. Using artificial intelligence chatbots

ChatGPT (OpenAI) was used solely to assist with English language editing and improvement of writing style.

References

1. Bazyar, J., et al., Accuracy of Triage Systems in Disasters and Mass Casualty Incidents; a Systematic Review. Arch Acad Emerg Med, 2022. 10(1): p. e32.
2. Rydell, E., U. Jakobsson, and S. Stjernswärd, Nurses' experiences of text-based digital triage at primary healthcare centres in Sweden: a qualitative interview study. BMC Nurs, 2025. 24(1): p. 48.
3. Abbasi Ghocham, S., et al., Level of Self-Care and Patient Care Against COVID-19 Among Emergency Medical Services Personnel; a Cross-sectional Study. Arch Acad Emerg Med, 2023. 11(1): p. e4.
4. Møller, T.P., et al., Why and when citizens call for emergency help: an observational study of 211,193 medical emergency calls. Scand J Trauma Resusc Emerg Med, 2015. 23: p. 88.
5. Sexton, V., et al., Service use, clinical outcomes and user experience associated with urgent care services that use telephone-based digital triage: a systematic review. BMJ Open, 2022. 12(1): p. e051569.
6. Birkun, A., Toward development of the standardized dispatcher algorithm for telephone assistance in choking. Acad Emerg Med, 2022. 29(11): p. 1401-1402.
7. White, J.J., et al., Evaluation and Management of Airway Foreign Bodies in the Emergency Department Setting. J Emerg Med, 2023. 64(2): p. 145-155.
8. Habibelahi, A., et al., Clinical cause of neonatal mortality in Iran: analysis of the national Iranian Maternal And Neonatal network. BMJ Paediatr Open, 2024. 8(1): p. 1-7.

9. Nakubulwa, M.A., et al., To what extent do callers follow the advice given by a non-emergency medical helpline (NHS 111): A retrospective cohort study. PLoS One, 2022. 17(4): p. e0267052.
10. Birkun, A.A., Dispatcher Telephone Assistance on First Aid: An Important but Unexplored Area for Research. Prehospital and Disaster Medicine, 2022. 37(6): p. 858-859.
11. Birkun, A.A., Public Comments on social media Regarding Self-management of Foreign Body Airway Obstruction; a Letter to Editor. Arch Acad Emerg Med, 2024. 12(1): p. e68.
12. Ro, Y.S., et al., Effect of Dispatcher-Assisted Cardiopulmonary Resuscitation Program and Location of Out-of-Hospital Cardiac Arrest on Survival and Neurologic Outcome. Ann Emerg Med, 2017. 69(1): p. 52-61.e1.
13. Igarashi, Y., et al., Airway obstruction time and outcomes in patients with foreign body airway obstruction: multicenter observational choking investigation. Acute Med Surg, 2022. 9(1): p. e741.
14. Otomune, K., et al., Neurological outcomes associated with prehospital advanced airway management in patients with out-of-hospital cardiac arrest due to foreign body airway obstruction. Resusc Plus, 2021. 7: p. 100140.
15. Olasveengen, T.M., et al., European Resuscitation Council Guidelines 2021: Basic Life Support. Resuscitation, 2021. 161: p. 98-114.
16. Wise, S.L., C.L. Freeman, and P.F. Edemekong, EMS prearrival instructions. 2017.
17. Panchal, A.R., et al., Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation, 2020. 142(16_suppl_2): p. S366-S468.
18. Greif, R., et al., 2024 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations: summary from the basic life support; advanced life support; pediatric life support; neonatal life support; education, implementation, and teams; and first aid task forces. Circulation, 2024. 150(24): p. e580-e687.
19. Zheng, P., et al., Global, regional, and national assessment of foreign body aspiration (1990-2021): novel insights into incidence, mortality, and disability-adjusted life years. Scand J Trauma Resusc Emerg Med, 2025. 33(1): p. 40.
20. Wu, Y., et al., Changes in the global burden of foreign body aspiration among under-5 children from 1990 to 2019. Front Pediatr, 2023. 11: p. 1235308.
21. Abo Elmagd, E., et al., Etiological profile of upper airway obstruction in infants. The Egyptian Journal of Otolaryngology, 2020. 36(1): p. 36.
22. Islam, F., et al., Are telephone-triage services less safe and efficient for managing unplanned care needs of older adults? Health Policy and Technology, 2024. 13(2): p. 100866.
23. Blank, L., et al., The appropriateness of, and compliance with, telephone triage decisions: a systematic review and narrative synthesis. J Adv Nurs, 2012. 68(12): p. 2610-21.
24. Holmström, I.K., et al., The perspectives of Swedish registered nurses about managing difficult calls to emergency medical dispatch centres: a qualitative descriptive study. BMC Nursing, 2021. 20(1): p. 150.
25. Mohammadi, F., et al., Exploring the challenges to telephone triage in pre-hospital emergency care: a qualitative content analysis. BMC Health Serv Res, 2022. 22(1): p. 1195.
26. Wennlund, K.T., et al., Emergency medical dispatchers' experiences of managing emergency calls: a qualitative interview study. BMJ open, 2022. 12(4): p. e059803.
27. Møller, T.P., et al., Medical dispatchers' perception of the interaction with the caller during emergency calls - a qualitative study. Scand J Trauma Resusc Emerg Med, 2021. 29(1): p. 45.
28. Muñoz Medina, F., et al., Employees Perceptions of Job Insecurity and Performance: A Qualitative Approach. Int J Environ Res Public Health, 2022. 19(24): p. 1-14.
29. Sverke, M., et al., A Meta-Analysis of Job Insecurity and Employee Performance: Testing Temporal Aspects, Rating Source, Welfare Regime, and Union Density as Moderators. Int J Environ Res Public Health, 2019. 16(14): p. 1-29.
30. Rivard, M.K., et al., The Impact of Working Overtime or Multiple Jobs in Emergency Medical Services. Prehosp Emerg Care, 2020. 24(5): p. 657-664.
31. Olds, D.M. and S.P. Clarke, The effect of work hours on adverse events and errors in health care. J Safety Res, 2010. 41(2): p. 153-62.
32. Brachet, T., G. David, and A.M. Drechsler, The effect of shift structure on performance. American Economic Journal: Applied Economics, 2012. 4(2): p. 219-246.
33. Osório, C., et al., Systematic review and meta-analysis on the mental health of emergency and urgent call-handlers and dispatchers. Occupational Medicine, 2025. 75(6): p. 282-291.
34. Lilly, M., et al., Destress 9-1-1—an online mindfulness-based intervention in reducing stress among emergency medical dispatchers: a randomised controlled trial. Occupational and environmental medicine, 2019. 76(10): p. 705-711.
35. Babamiri, G. and Z. Karimiankakolaki, Investigating the impact of crisis management training on clinical decision-making and management of stress factors in the personnel of emergency medical services: randomized controlled trial. BMC Medical Education, 2025. 25(1): p. 1180.
36. Dunne, C.L., et al., Evaluation of basic life support interventions for foreign body airway obstructions: A population-based cohort study. Resuscitation, 2024. 201: p. 110258.

37. Dodson, H., S. Sharma, and J. Cook, Foreign body airway obstruction, in StatPearls [Internet]. 2024, StatPearls Publishing.
38. Wang, W.-y., et al., Analysis of risk factors for complications of foreign body aspiration in children. Respiratory Medicine, 2025. 248: p. 108363.
39. Wanstreet, T., J. Ramadan, and M.M. Carr, Airway foreign bodies in pediatric patients: an analysis of composition and age via HCUP KID. International Journal of Pediatric Otorhinolaryngology, 2021. 142: p. 110559.
40. Uçar, M.T. and E. Donmez, Epidemiological Insights from Media Reports on Foreign Body Aspiration in the Trachea: A Retrospective Descriptive Study. Eurasian Journal of Medical Investigation, 2025. 9(2): p. 79.
41. Johnson, K., M. Linnaus, and D. Notrica, Airway foreign bodies in pediatric patients: anatomic location of foreign body affects complications and outcomes. Pediatric surgery international, 2017. 33(1): p. 59-64.

Table 1: Demographic and clinical characteristics of patients with foreign body airway obstruction, stratified by age group

Variable	Total (n = 262)	Age group (n)		
		Infants (120)	Children (48)	Adults (94)
Sex				
Female	101 (38.5)	48 (40.0)	8 (16.7)	45 (47.9)
Male	161 (61.5)	72 (60.0)	40 (83.3)	49 (52.1)
Degree of airway obstruction				
Partial	111 (42.4)	64 (53.3)	5 (10.4)	42 (44.7)
Complete	151 (57.6)	56 (46.7)	43 (89.6)	52 (55.3)
Location of incident				
Home	233 (88.9)	117 (97.5)	39 (81.3)	77 (81.9)
Out-of-home	29 (11.1)	3 (2.5)	9 (18.8)	17 (18.1)
Type of foreign body				
Food/Edible	209 (79.8)	85 (70.8)	36 (75.0)	88 (93.6)
Other objects	53 (20.2)	35 (29.2)	12 (25.0)	6 (6.4)
Caller identity				
Family member	211 (80.5)	103 (85.8)	38 (79.2)	70 (74.5)
Other	51 (19.5)	17 (14.2)	10 (20.8)	24 (25.5)
Time of call (24-hour clock)				
4:00 – 8:00	26 (9.9)	25 (20.8)	0 (0.0)	1 (1.1)
8:00 – 12:00	78 (29.8)	19 (15.8)	36 (75.0)	23 (24.5)
12:00 – 16:00	60 (22.9)	30 (25.0)	5 (10.4)	25 (26.6)
16:00 – 20:00	24 (9.2)	4 (3.3)	5 (10.4)	15 (16.0)
20:00 – 24:00	34 (13.0)	12 (10.0)	0 (0.0)	22 (23.4)
24:00 – 4:00	40 (15.3)	30 (25.0)	2 (4.2)	8 (8.5)
Pre-existing medical condition				
No	201 (76.7)	109 (90.8)	44 (91.7)	48 (51.1)
Yes	61 (23.3)	11 (9.2)	4 (8.3)	46 (48.9)
Prior knowledge of airway intervention				
No	253 (96.6)	91 (75.8)	46 (95.8)	94 (100)
Yes	9 (3.4)	7 (5.8)	2 (4.2)	0 (0.0)
Ambulance response time (minutes)				
5 – 10	144 (55.0)	76 (63.3)	34 (70.8)	34 (36.2)
10 – 15	53 (20.2)	17 (14.2)	14 (29.2)	22 (23.4)
> 15	65 (24.8)	27 (22.5)	0 (0.0)	38 (40.4)

Data are presented as number (%).

Table 2: Univariable and multivariable beta regression analyses of factors associated with dispatcher performance score in telephone-guided management of foreign body airway obstruction

Variable	Univariate model		Multivariable model	
	OR (95% CI)	P-value	AOR (95% CI)	P-value
Age (year)				
< 1	1	-	1	-
1 – 14	1.31 (0.92–1.88)	0.133	0.93 (0.59–1.48)	0.766
> 14	1.46 (1.10–1.93)	0.01	1.60 (1.13–2.26)	0.008
Sex of dispatcher				
Female	1	-	-	-
Male	1.11 (0.80–1.53)	0.527	-	-
Marital Status				
Single	1	-	-	-
Married	1.09 (0.84–1.43)	0.497	-	-
Clinical experience				
Years	1.16 (1.01–1.33)	0.039	1.44 (1.05–1.98)	0.023
Employment type				
Contract-based	1	-	1	-
Corporate	0.60 (0.39–0.92)	0.022	0.37 (0.21–0.68)	0.001
Permanent-contract	0.95 (0.68–1.33)	0.786	0.68 (0.37–1.26)	0.223
Official	1.02 (0.76–1.36)	0.917	0.89 (0.44–1.81)	0.745
Experience of service in EMS dispatch (year)				
≤ 2	1	-	1	-
> 2	0.70 (0.51–0.96)	0.023	1.23 (0.55–2.77)	0.614
Number of dispatch centers served				
One	1	-	-	-
More	0.97 (0.73–1.30)	0.845	-	-
Number of calls per shift				
< 50	1	-	-	-
50 – 100	1.12 (0.81–1.56)	0.502	-	-
> 100	0.91 (0.66–1.27)	0.601	-	-
Number of shifts per month				
10	1	-	-	-
10 – 20	0.95 (0.72–1.25)	0.703	-	-
20 – 30	0.97 (0.63–1.50)	0.899	-	-
Shift pattern				
Morning	1	-	1	-
Evening	0.77 (0.34–1.72)	0.524	NA	-
Night	0.60 (0.39–0.91)	0.017	0.80 (0.37–1.70)	0.553
Rotating	0.70 (0.52–0.94)	0.018	0.91 (0.40–2.07)	0.816
Mean monthly overtime (hours)				
< 10	1	-	1	-
10 – 20	0.46 (0.27–0.79)	0.004	0.33 (0.16–0.68)	0.002
> 20	0.76 (0.54–1.06)	0.105	0.82 (0.48–1.39)	0.459
Total monthly working hours				
< 100	1	-	1	-
100 – 150	0.50 (0.31–0.79)	0.003	1.17 (0.45–3.03)	0.747
150 – 200	0.69 (0.47–1.02)	0.069	1.04 (0.46–2.38)	0.918
> 200	0.62 (0.39–0.99)	0.039	0.96 (0.38–2.39)	0.925
Satisfaction with overtime				
No	1	-	-	-
Yes	0.92 (0.69–1.22)	0.549	-	-
Attendance at telephone triage workshop for airway obstruction				
No	1	-	-	-
Yes	1.10 (0.83–1.45)	0.513	-	-
Attendance at hands-on airway obstruction workshop				
No	1	-	-	-
Yes	1.12 (0.84–1.48)	0.44	-	-
Attendance at stress management workshop				
Yes	1	-	1	-
No	0.80 (0.61–1.06)	0.117	0.40 (0.23–0.68)	0.001

OR: Mean ratio; CI: Confidence interval; AOR: Adjusted odds ration; NA: Not available.

Table 3: Univariable and multivariable logistic regression analyses of factors associated with prehospital clinical improvement without the need for ambulance dispatch

Variable	Univariate model		Multivariable model	
	OR (95% CI)	P-value	AOR (95% CI)	P-value
Age (year)				
< 1	1	-	-	-
1 – 14	0.83 (0.42 – 1.64)	0.585	-	-
> 14	0.83 (0.48 – 1.44)	0.512	-	-
Sex				
Female	1	-	1	-
Male	0.44 (0.26 – 0.74)	0.002	0.58 (0.28 – 1.17)	0.129
Degree of airway obstruction				
Partial	1	-	1	-
Complete	0.14 (0.08 – 0.25)	< 0.001	0.08 (0.03 – 0.17)	< 0.001
Location of incident				
Home	1	-	1	-
Out-of-home	2.45 (1.05 – 6.39)	0.048	4.86 (1.60 – 16.40)	0.007
Type of foreign body				
Food/Edible	1	-	1	-
Non-edible	0.38 (0.20 – 0.71)	0.002	0.16 (0.06 – 0.37)	< 0.001
Caller identity				
Family member	1	-	-	-
Other	0.76 (0.41 – 1.41)	0.379	-	-
Time of call (24-hour clock)				
4:00 – 8:00	1	-	1	-
8:00 – 12:00	4.0 (1.60 – 10.61)	0.004	2.33 (0.66 – 8.55)	0.194
12:00 – 16:00	5.19 (1.98 – 14.52)	0.001	3.53 (1.06 – 12.32)	0.442
16:00 – 20:00	1.13 (0.35 – 3.64)	0.832	1.09 (0.24 – 4.89)	0.914
20:00 – 24:00	1.49 (0.52 – 4.38)	0.457	1.38 (0.34 – 5.72)	0.655
24:00 – 4:00	2.56 (0.94 – 7.34)	0.072	1.45 (0.40 – 5.40)	0.572
Pre-existing medical condition				
No	1	-	1	-
Yes	0.67 (0.37 – 1.19)	0.172	1.81 (0.72 – 4.82)	0.218
Prior knowledge of airway intervention				
No	1	-	1	-
Yes	0.08 (0.01 – 0.46)	0.020	0.46 (0.02 – 3.43)	0.507
Ambulance response time (minutes)				
5 – 10	1	-	-	-
10 – 15	1.35 (0.71 – 2.63)	0.363	-	-
> 15	0.99 (0.55 – 1.81)	0.998	-	-

OR: Odds ratio; AOR: Adjusted odds ration; CI: Confidence interval.