European Archives of Oto-Rhino-Laryngology (2024) 281:4855–4862
https://doi.org/10.1007/s00405-024-08681-2

RHINOLOGY

Epistaxis first-aid: a multi-center knowledge assessment study among medical workers

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Received: 14 January 2024 / Accepted: 12 April 2024 / Published online: 15 May 2024
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Abstract

Purpose To assess the knowledge and confidence level regarding the basic first-aid for treating epistaxis among medical staff, including nurses and physicians across various medical disciplines. The study focused three aspects of first aid management: location of digital pressure, head position and duration of pressure.

Methods The study involved 597 participants, categorized into five groups according to their specialties: emergency medicine, internal medicine, surgery, pediatrics, and community-based healthcare. A paper-based multiple-choice questionnaire assessed knowledge of managing epistaxis. Correct answers were determined from literature review and expert consensus.

Results Most medical staff showed poor knowledge regarding the preferred site for applying digital pressure in epistaxis management. For head position, pediatricians and internal medicine physicians were most accurate (79.4% and 64.8%, respectively, $p < 0.01$), and nurses from the emergency department outperformed nurses from other disciplines; internal medicine, surgery, pediatrics, and community-based healthcare (61.1%, 41.5%, 43.5%, 60%, 45.6%, respectively, $p < 0.05$). While most medical staff were unfamiliar with the recommended duration for applying pressure on the nose, pediatricians and community clinic physicians were most accurate (47.1% and 46.0%, respectively, $p < 0.01$), while ER physicians were least accurate (14.9%, $p < 0.01$). Interestingly, a negative correlation was found between years of work experience and reported confidence level in managing epistaxis.

Conclusions Our findings indicate a significant lack of knowledge concerning epistaxis first-aid among medical staff, particularly physicians in emergency departments. This finding highlights the pressing need for education and training to enhance healthcare workers' knowledge in managing epistaxis.

Keywords Epistaxis · Health-care workers · Survey study · Health care workers · First-aid · Knowledge assessment · Urgent care

Introduction

Nosebleeds, or epistaxis, impacts nearly 60% of the general population over a lifetime. While most cases are mild and self-resolving, it can also be a life-threatening event [1]. It is estimated that about 6% of cases are referred to the emergency department (ED) [2], making it the most common otorhinolaryngology condition presenting to the ED. Recent data from a southern European tertiary care hospital reported epistaxis accounted for 1 in every 30 ED visits [3].

The cause of epistaxis is often idiopathic; however, there are numerous etiologies, including trauma, foreign body, systemic disease, blood dyscrasias, medication, and neoplasia [4]. While epistaxis can occur at any age, there is a bimodal distribution with peaks observed among children ages 2–10 years and adults aged 50–80 years, with a surge in incidence among those over 70 years [5]. Epistaxis is clinically classified into anterior or posterior bleeds, depending on the anatomical site of bleeding. The anterior source of bleeding accounts for approximately 90% of epistaxis episodes and primarily originates from a rich vascular region known as Kiesselbach's plexus [6].

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Over recent decades, the management of epistaxis has evolved with multiple options for nasal packing, cauterization or surgical intervention now available [7]. Despite these advancements, the fundamental first-aid measures for anterior epistaxis remain unchanged and are considered essential first-line treatment. These initial interventions include tilting the head forward, pinching the bilateral alae firmly to close the nostril and tamponade Kiesselbach's plexus, and applying pressure for more than 5 min. These measures can limit the severity of bleeding significantly and, in many cases, stop it completely [8].

The practices mentioned above have been included in three national guidelines. These guidelines include The British Consensus on Epistaxis [9], a set of guidelines in France [8, 10], and recommendations for primary and secondary care in Germany [6]. In addition, the American Academy of Otolaryngology-Head and Neck Surgery (AAO-NHS) has published clinical guidelines for nosebleeds in 2020 [11].

From a clinical perspective, primary care physicians, emergency physicians, and nurses often encounter patients with nosebleeds, especially in triage settings rather than by otorhinolaryngologists. This condition is also frequently managed across various medical disciplines, such as internal medicine, pediatrics, and general surgery. Thus, a comprehensive understanding of basic first-aid techniques for epistaxis is essential for all physicians.

This study aimed to assess healthcare workers' knowledge and confidence level in managing epistaxis, focusing specifically on advice regarding the aforementioned first-aid interventions.

Material and methods

Ethical considerations

The study was approved by the Meir Medical Center Institutional Review Board.

Study design

This prospective study used a paper-based multiple-choice questionnaire to evaluate first-aid knowledge of epistaxis management. The survey was carried out from April-August 2023, and involved the distribution of questionnaires across two tertiary care hospitals, three secondary care hospitals, and eight community clinics. Inclusion criteria for participation were (i) medical staff and (ii) fluency in Hebrew and ability to complete the questionnaire (the survey was later translated into English for international publication purposes).

Study participants

The study involved 597 participants categorized into five groups based on their specialties: (1) Emergency medicine staff who worked full-time in adult ED, (2) Internal medicine staff included all those who worked in non-surgical departments, such as neurology, geriatrics, respiratory, cardiology, rehabilitation, and internal medicine, (3) Surgery departments that included a range of surgical fields (excluding otolaryngology): general surgery, urology, orthopedics, gynecology, and ophthalmology, (4) Pediatric departments, including general wards and ED. (5) Community-based clinics that included nurses and family physicians (consultants or residents).

Survey

The survey consisted of four closed multiple-choice questions. The first question contained three images depicting where to apply pressure during nosebleeds (rhinion, nasal bone, or ala nasi, Fig. 1). The second question concerned the correct head position (tilted backward, neutral head position, or tilted forward). The third question assessed the duration of which pressure should be applied (up to 1 min, 1–4 min, or at least 5 min). Lastly, the fourth question assessed the level of confidence of each participant (very confident, somewhat confident, or unsure). The correct response was

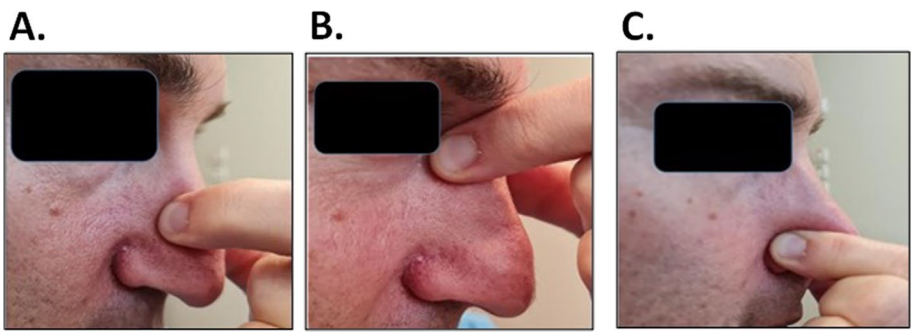

Fig. 1 Demonstrates the different locations of applying pressure. **A** Rhinion. **B** Nasal bones. **C** Ala nasi

to apply pressure on the ala nasi (Fig. 1c) for at least 5 min, with the head tilted forward. The questions and the illustration were initially confirmed and validated among otolaryngology residents and consultants, who all answered the first three questions correctly.

The questionnaires were personally distributed to participants and completed anonymously, without identifying details. Participants also provided their age, sex, workplace (hospital, department, or community), and occupation (nurse, medical intern, resident, or consultant).

Statistical analysis

Demographic data was presented in summary tables with means and standard deviations for continuous variables with normal distribution, while for categorical variables, frequencies and percentages were used. A students t-test was used for parametric continuous variables, while Mann–Whitney and Wilcoxon tests were used when parametric assumptions could not be met, even after data transformation. Parametric model assumptions were assessed using Normal-plot or Shapiro-Wilks statistic for the verification of normality and Levene's test for the verification of homogeneity of variances. Pearson's χ^2 test for contingency tables or the Fisher Exact test was used as appropriate for categorical variables. All statistical tests used confidence intervals at $\alpha = 0.05$ (2-sided) and rounded all p-values reported to three decimal places. Data was analyzed using IBM SPSS StatisticsVersion 22.0 software (IBM Corp., Armonk, New York).

Results

A total of 597 staff members participated, and all participants were included in the subsequent analysis. The characteristics of the study population are presented in Table 1. The participants' mean age was 35 ± 9 years, comprising 260 males (44%) and 337 females (56%). The cohort included 324 nurses (54%) and 273 physicians (46%). The participants were further categorized into their respective departments: 209 from internal medicine disciplines (35%), 157 from emergency medicine (26%), 118 from community-based clinics (20%), 54 from surgical departments (9%), and 59 from pediatric departments (10%). The average duration of occupation since achieving their highest qualification was 7 ± 9 years.

Pressure application

The results indicate that a large majority (88.3%) of the respondents lack sufficient knowledge about the correct location of performing digital pressure, regardless of their occupation (as shown in Fig. 2a). Among these, residents displayed the highest rate of correct responses, with 23 out of 134 (17.16%, Fig. 2a) answering correctly. No statistical differences were observed among various groups, including between nurses and physicians across different disciplines.

Head position

More than half of respondents (53.6%) correctly identified the proper head positioning for managing epistaxis (Fig. 3a). The rate of correct responses was significantly higher among interns, with 65.7% accuracy within this occupational group ($p < 0.01$). Conversely, consultants had the lowest performance, with only 44.4% accuracy. A comparison of nurses from different disciplines revealed superior performance among those working in the ED, with 61.1% accuracy (Fig. 3b, $p < 0.05$), as opposed to nurses in other departments. In contrast, emergency doctors presented the lowest rate of correct responses (43.3% within the workplace group, Fig. 3c, $p < 0.01$). Pediatricians and physicians from the internal medicine discipline presented the highest

Table 1 Participant overview

	Nurse, n (%)	Intern, n (%)	Resident, n (%)	Consultant, n (%)	Total, n (%)
Gender					
Male	145 (45%)	30 (45%)	58 (43%)	27 (37%)	260 (44%)
Female	179 (55%)	37 (55%)	76 (57%)	45 (63%)	337 (56%)
Age	35 ± 10 year	28 ± 3 year	33 ± 4 year	45 ± 9 year	35 ± 9 year
Occupational duration	9 ± 10 year	1 ± 0 year	3 ± 2 year	14 ± 8 year	7 ± 9 year
Discipline					
Community-care	68 (21%)	0	32 (24%)	18 (25%)	118 (20%)
ED	90 (28%)	35 (52%)	19 (14%)	13 (18%)	157 (26%)
Internal medicine	118 (36%)	18 (27%)	48 (36%)	25 (35%)	209 (35%)
Pediatrics	25 (8%)	10 (15%)	19 (14%)	5 (7%)	59 (10%)
General surgery	23 (7%)	4 (6%)	16 (12%)	11 (15%)	54 (9%)
Total	324 (54%)	67 (11%)	134 (22%)	72 (12%)	597 (100%)

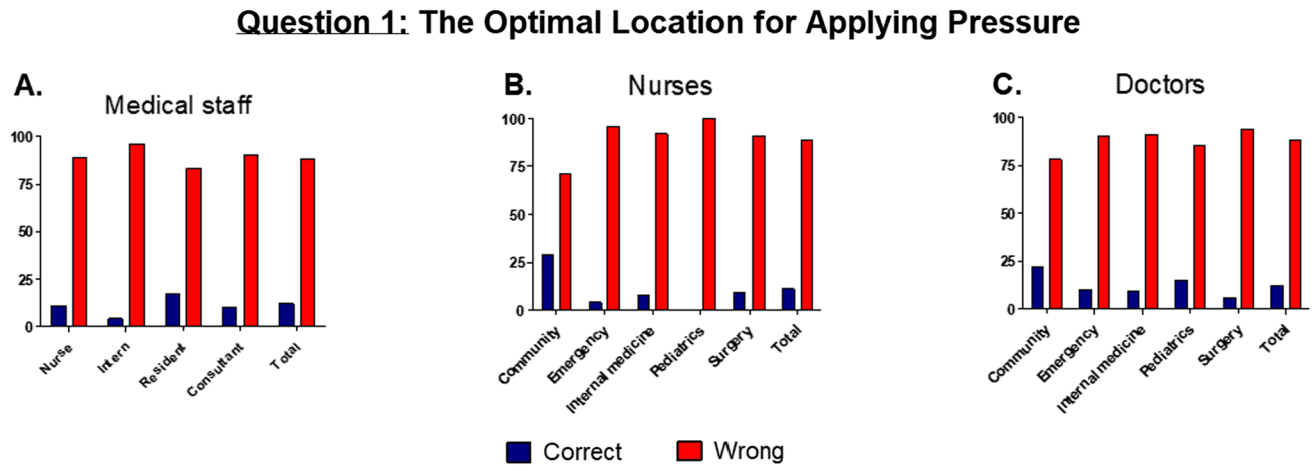

Fig. 2 The accuracy of responses regarding the correct pressure site for epistaxis. **A** Distribution of responses by profession. **B** Nurse responses categorized by medical field. **C** Doctor responses by specialty, with each bar indicating the proportion of correct and incorrect responses

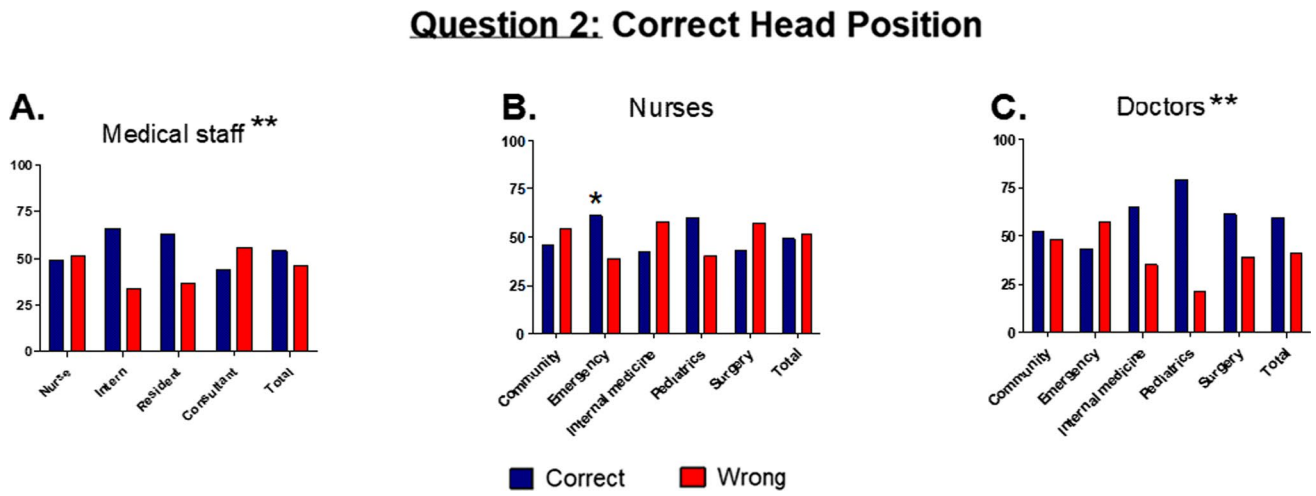

Fig. 3 The rates of correct identification for the optimal head position during epistaxis. **A** Distribution of responses by profession. **B** Nurse responses categorized by medical field. **C** Doctor responses by specialty, with each bar indicating the proportion of correct and incorrect responses. Statistical significance is indicated by *($p<0.05$) and **($p<0.01$)

correct response rates for this question, at 79.4% and 64.8%, respectively.

Duration of pressure

Only 212 of 597 participants (35.5%) identified the correct duration for applying pressure on the nose (more than 5 min) (Fig. 4a). The rates of correct responses varied significantly by occupation. Nurses, residents, and consultants had similar rates of correct responses (35.5%, 47.8%, and 45.8%, respectively), while all interns answered this question incorrectly (0% correct, $p<0.01$). Among nurses in different specialties, there were no notable differences. In comparison, physicians in ED demonstrated a markedly lower accuracy rate (14.9%, Fig. 4c, $p<0.01$) than those in other specialties. On the other hand, pediatric and community clinic physicians displayed the highest correct response rates (47.1% and 46.0%, respectively, Fig. 4c, $p<0.01$).

Overall performance

Only 38 respondents (6.3%) correctly answered all of the questions. The overall performance rates for correctly answering the questions were 42.5% for residents, 33.3% for consultants, 32.1% for nurses, and 23.4% for interns, as illustrated in Fig. 4.

When categorized physicians by discipline, the correct response rates were as follows: pediatricians 47%, community medicine 40%, internal medicine 38%, surgery 35%, and ED 23%.

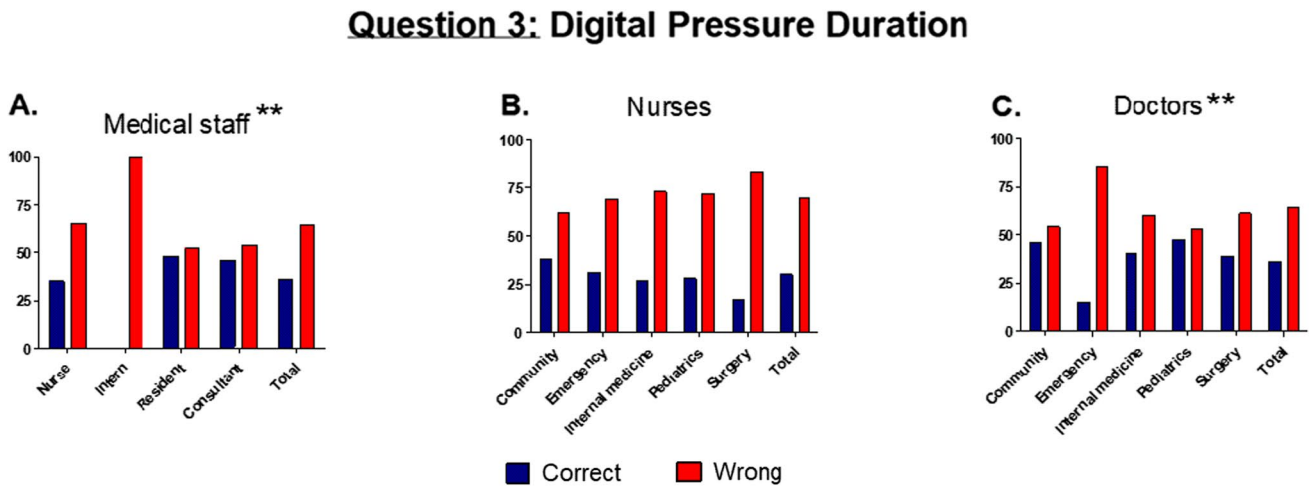

Fig. 4 The accuracy of correct responses on the appropriate duration for pressure application during epistaxis. **A** Distribution of responses by profession. **B** Nurse responses categorized by medical field. **C** Doctor responses by specialty, with each bar indicating the proportion of correct and incorrect responses. Statistical significance is indicated by **($p < 0.01$)

When divided by discipline, the correct response rates among nurses were: community medicine 38%, ED 32%, pediatrics 29%, internal medicine 26%, and surgery 23%. Table 2 depicts the accuracy of responses to the three questions concerning first-aid management of epistaxis in a heat map.

Confidence in epistaxis management

Upon analyzing the relationship between work experience (measured in years) and the correct response rate in applying pressure, a positive correlation was observed across all groups.

Most participants described themselves as either "very confident" or "somewhat confident" in their answers (45.7% and 44.5%, respectively).

Confidence level and the rate of correct responses were positively correlated among residents categorized by occupational subgroupings. Those who considered themselves "very confident" demonstrated a significantly higher accuracy rate regarding head positioning and the recommended timeframe for applying pressure.

Meanwhile, a negative correlation was apparent within the intern group. Despite all declaring themselves as "very confident," none answered correctly regarding the duration for applying pressure (0 out of 67, 0% correct within the "very confident" group, $p < 0.05$). Only 3 out of 67 (5% in the "very confident" group, $p < 0.05$) correctly identified the location of the digital pressure application.

Further, a negative correlation was observed when analyzing the connection between work experience (measured in years) and confidence level. Nurses, residents, and consultants reported lower confidence levels as their years in the profession increased.

Table 2 Heatmap of right answer for each group (%)

	Q1: Location	Q2: Head Position	Q3: Duration	Total
Nurse	11.42	49.38	35.49	32.1
Consultant	9.72	44.44	45.83	33.33
Resident	17.16	62.69	47.76	42.54
Intern	4.48	65.67	0	23.38
Total	11.73	53.6	35.51	33.61

Discussion

Our study aimed to assess nurses' and physicians' current knowledge and confidence levels regarding first-aid principles in epistaxis management. The study surveyed 597 medical staff from various disciplines, which included 118 community participants (20%) and 479 hospital participants (80%), encompassing a range of disciplines. Among the whole cohort, only 38 respondents (6.3%) answered all three questions correctly, highlighting the poor general knowledge of epistaxis management in both nurses and physicians. Residents demonstrated the highest overall performance in essential epistaxis management (42.5%).

Misconceptions and realities in epistaxis management—key findings

Interestingly, applying pressure on the ala nasi is one of the oldest treatments for epistaxis in recorded history, dating back to Hippocrates around 500 BC [12]. However, our study found that most medical staff lacked knowledge regarding the correct location for this treatment. Out of 597 participants, only 70 answered this question correctly (11.7%).

This result is consistent with other studies that assessed knowledge among both the general public and medical staff. This misconception has been shown to be common in the general public [12, 13], including in a survey from Saudi Arabia of 1760 individuals with only 5.6% correctly identifying the location for pressure [14]. Unfortunately, this trend also extends to medical staff; a study by Sowerby et al. of 102 Canadian healthcare workers found that the majority of respondents misplaced pressure [15]. Similarly, a UK study focusing on ED nurses showed that 12% to 14% of nurses answered questions correctly regarding the head position, location of pressure, and duration [16]. In our study, we engaged a broad spectrum of healthcare workers, including staff in community clinics.

Another prevalent misconception regarding treating active nosebleeds is that the head should be tilted backward, which potentially puts the airway at risk from clot and aspiration. Our finding indicates that most medical staff correctly identify the appropriate head positioning during nosebleeds. Notably, nurses working in the ED performed better than nurses from other disciplines ($p < 0.05$); this is opposed to emergency physicians showing the lowest rates of correct responses to this question ($p < 0.01$). According to a survey in the United Kingdom involving 500 patients visiting the Ear, Nose, and Throat Department, only 11% were aware of the correct head position and pressure location for treating epistaxis [13].

The AAO-NHS guidelines for managing epistaxis suggest applying digital pressure for at least 5 min to control bleeding, which might help to distinguish between anterior and posterior bleeding. Our results showed that approximately one-third of the participants responded correctly to this technique. When comparing physicians from various disciplines, we noted a significantly lower rate of correct answers among emergency medicine doctors than physicians from other departments (14.9% within the workplace group $p < 0.01$). Whereas pediatricians and community clinic physicians demonstrated the highest accuracy rates (47.1% and 46.0%, respectively, $p < 0.01$).

Performance analysis

Epistaxis is a cross-disciplinary condition occurring in a broad spectrum of clinical environments. Therefore, all medical providers must be familiar with the basic first-aid treatment of epistaxis. This is particularly important for those who work in ED and community health care settings, as most cases of epistaxis often occur outside hospital settings. Our study showed that medical staff in community health care had a relatively high overall performance. Specifically, physicians demonstrated a 40% accuracy rate, and nurses demonstrated a 38% accuracy rate. In contrast, while ED nurses performed better than almost all other disciplines except community-care nurses, ED physicians were the group with the worst performance. The knowledge gap regarding the initial management of epistaxis among ED physicians has also been highlighted in other studies [17, 18].

In the current study, many participants were "very confident" or "somewhat confident" in their knowledge. This exposes the pervasive misunderstanding among healthcare workers regarding treating patients with epistaxis. The onus is on otolaryngologists, as experts in all things sinonasal, to advocate and assist in better educating the broader healthcare community.

Outcomes of poor epistaxis care

Although anterior epistaxis is generally less severe than posterior epistaxis, successful early management can stop the majority of spontaneous anterior nosebleeds [19]. Prompt treatment of epistaxis not only reduces blood loss and the risk of life-threatening events, but it can also reduce patient anxiety. Additionally, effective management can aid in minimizing unnecessary economic burdens on the healthcare system. This is achieved by potentially reducing referrals to emergency rooms or further consultations with otolaryngology specialists and preventing some hospital admissions [20]. Invasive, higher-cost interventions can be avoided with successful early management

[11], which can also help to mitigate unnecessary economic burden on the healthcare system. A Nationwide Emergency Department Sample study in the United States found that the mean charge for managing epistaxis in patients admitted to the ED was $1,146.21 [21]. This cost rises when patients are admitted due to epistaxis, with an average hospitalization cost of $6,925 per person and an average length of stay of 3.24 days [22].

Inadequate knowledge of healthcare providers not only impairs proper treatment but also contributes to the poor general knowledge of the public, as physicians and nurses educate patients and caregivers on first-aid treatment. Educating patients can reduce patient anxiety, reduce the recurrence of medical issues, and reduce medical utilization [11]. Neshewat et al. [23] showed that an epistaxis-management educational program for anticoagulated patients successfully lowered the rates of epistaxis and epistaxis-related ED visits. Moreover, Eze et al. showed that proper education on managing epistaxis to ED physicians reduced recurrent epistaxis visits to the ED [20]. This emphasizes the critical role of healthcare workers in providing information to the general public, particularly those prone to epistaxis.

Educating healthcare workers on first aid epistaxis management is essential. Management of epistaxis should be incorporated within the first aid syllabus of medical training. Thus, nursing and medical schools should ensure that clinical rotations are well-structured, supervised by experienced clinicians, and provide opportunities for active participation and reflection. Moreover, basic management of medical emergencies; i.e. epistaxis, should be included within basic life support courses that are routinely accomplished by the staff.

Conclusion

Our study identifies a significant knowledge gap among various medical disciplines in providing first-aid for epistaxis. Basic first-aid techniques for anterior epistaxis are crucial in limiting bleeding severity, yet most medical staff, particularly ED physicians, are unfamiliar with them. This highlights the pressing need for education and training to enhance healthcare workers' knowledge and confidence in managing epistaxis, which can reduce the number of ED interventions and improve overall patient care and safety. Our study sheds light on the pitfalls in current epistaxis management, suggesting that future research should focus on educational strategies, including medical rounds and visual aids like brochures or instructional videos.

Funding No funding was procured for this work.

Declarations

Conflict of interests The authors have no relevant conflicts of interest to declare.

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