

Tracheostomy: evaluation of the medical resident's knowledge

Original Article

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Abstract

Objective: To evaluate the medical residents' knowledge of tracheostomy.

Materials and Methods: We administered a questionnaire to medical residents to collect information about their training in tracheostomy during the medical course and contact with tracheostomized patients during internship ("Internato de Formação Geral" - IFG). Knowledge about tracheostomy was evaluated through eight multiple-choice questions.

Results: We obtained answers from 132 participants, of which 74.2% responded that they had not received training in tracheostomy during the medical course and 49.2% reported having had contact with patients with a tracheostomy during IFG. The mean number of correct answers was 4.60 (standard deviation [SD]=1.283). Previous training and contact with tracheostomized patients during IFG were not significantly associated with a higher mean number of correct answers ($p=0.777$ and $p=0.218$, respectively).

Conclusions: Undergraduate medical education may have shortcomings regarding tracheostomy training, due to which newly qualified doctors have insufficient knowledge about this topic.

Keywords: Otorhinolaryngology, Medical Education, Tracheostomy

Introduction

Tracheostomy is one of the oldest procedures in the history of Medicine¹. Although it was traditionally associated with the specialty of Otorhinolaryngology and Head and Neck Surgery, the advent and spread of percutaneous tracheostomy (PT) as an alternative to surgical tracheostomy (ST) has led to a widening of the spectrum of specialists who perform this procedure and, consequently, provide care to patients with a tracheostomy^{2,3}.

Before the SARS-CoV2 pandemic, there was already a clear trend of an increase in the number of tracheostomies performed worldwide, mainly PT³⁻⁵. During the pandemic,

this trend became more pronounced as a result of the high number of patients requiring prolonged intubation^{6,7}.

The complications associated with tracheostomy are well described, with a significant proportion being attributable to preventable causes^{2,8}. Some authors argue that these complications can be mitigated by adequate training of healthcare professionals that have contact with these patients⁹. In fact, several studies have shown that specialists other than otorhinolaryngologists and head and neck surgeons feel very uncomfortable when providing care to patients with a tracheostomy^{4,9,10}.

Some of these insecurities may be explained by gaps in their medical training^{10,11}.

Thus, the aim of this study was to evaluate the knowledge of newly qualified doctors on tracheostomy in Portugal, as well as the provision of care to patients with a tracheostomy.

Materials and Methods

This cross-sectional observational study involved the online administration of an anonymous questionnaire to doctors who were in their “*Internato de Formação Geral*” (IFG) in Portugal in 2022.

The questionnaire was composed of two sections. The aim of the first section was to collect information on the participants’ sociodemographic characteristics and assess the type of experience they had with tracheostomy both during the medical course and IFG.

The aim of the second section was to evaluate their theoretical and practical knowledge of tracheostomy through eight multiple-choice questions, some of which were in the clinical vignette format. These questions were developed and subsequently validated by five specialists in otorhinolaryngology and head and neck surgery at the Hospital Pedro Hispano. The questionnaire was shared through Google Forms by email with the Medical Residency boards of several Portuguese hospitals who were asked to distribute it to their residents.

All answers submitted between October 1 and October 30 of 2022 were accepted.

The statistical analysis of the results was performed using the SPSS software – version 28 (SPSS inc., Chicago IL., USA). The means were compared using the t-test for independent samples and one-way ANOVA. The level of significance was set at $p=0.05$.

Results

In the present study, the answers of 132 participants, most of whom were women ($n=95$; 72.0%), were analyzed. The median age of the respondents was 25 years.

We obtained answers from doctors trained in all medical schools in Portugal and from seven doctors who had trained abroad. The most represented Portuguese medical school in our sample was the University of Coimbra, with a total of 29 answers (22%) from doctors who had completed their studies in this institution, followed by the medical schools of the University of Porto and University of Lisbon, each with a total of 22 answers (16.7%). Most doctors who participated in this study completed their medical course in 2021 ($n=121$, 91.7%). All participants were in their IFG in 2022 and from all the Regional Health Authorities (ARSs) in the country, with the North Authority (ARS Norte) being the most represented in our sample ($n=51$; 38.6%). Table 1 describes in detail the sociodemographic data of the study participants. With regard to the evaluation of training in tracheostomy during the medical course, 74.2% (98/132) of the participants answered “No” to the question “Did you receive any training in tracheostomy during the medical course?” Only 18,2% (24/132) of the respondents answered “Yes” to this question and the remaining 7.6% (10/132) answered “Don’t know/ No answer” (Figure 1).

Of those who reported having received some type of training in tracheostomy during the medical course, 79.2% (19/24) only received theoretical training, 16.7% (4/24) received theoretical and practical training, and only one (4.2%) received practical training alone.

With regard to the course unit (“*Unidade*

Table 1
Sociodemographic characteristics of the participants

Sociodemographic characteristics	n = 132
Sex	n (%)
- Female	95 (72,0)
- Male	37 (28,0)
Age (y)	Median (min-max)
	25 (24-37)
School where the medical course was completed	n (%)
- School of Medicine – University of Minho	7 (5,3)
- Instituto de Ciências Biomédicas Abel Salazar - Universidade do Porto	15 (11,4)
- Faculdade de Medicina - Universidade do Porto	22 (16,7)
- Faculdade de Medicina - Universidade de Coimbra	29 (22,0)
- Faculdade de Ciências da Saúde - Universidade da Beira Interior	10 (7,6)
- Faculdade de Medicina - Universidade de Lisboa	22 (16,7)
- Nova Medical School/ Faculdade de Ciências Médicas - Universidade Nova de Lisboa	18 (13,6)
- Faculdade de Medicina e Ciências Biomédicas - Universidade do Algarve	2 (1,5)
- School abroad	7 (5,3)
Year in which the medical course ended	n (%)
2015 - 2018	3 (2,3)
2019 - 2021	129 (97,7)
ARS where the intern is doing the IFG	n (%)
- North	51 (38,6)
- Center	25 (18,9)
- Lisbon and Vale do Tejo	35 (26,5)
- Alentejo	1 (0,8)
- Algarve	10 (7,6)
- Autonomous Region Madeira	7 (5,3)
- Autonomous Region of Azores	3 (2,3)

Abbreviations: ARS, Regional Health Authority; IFG, Internato de Formação Geral.

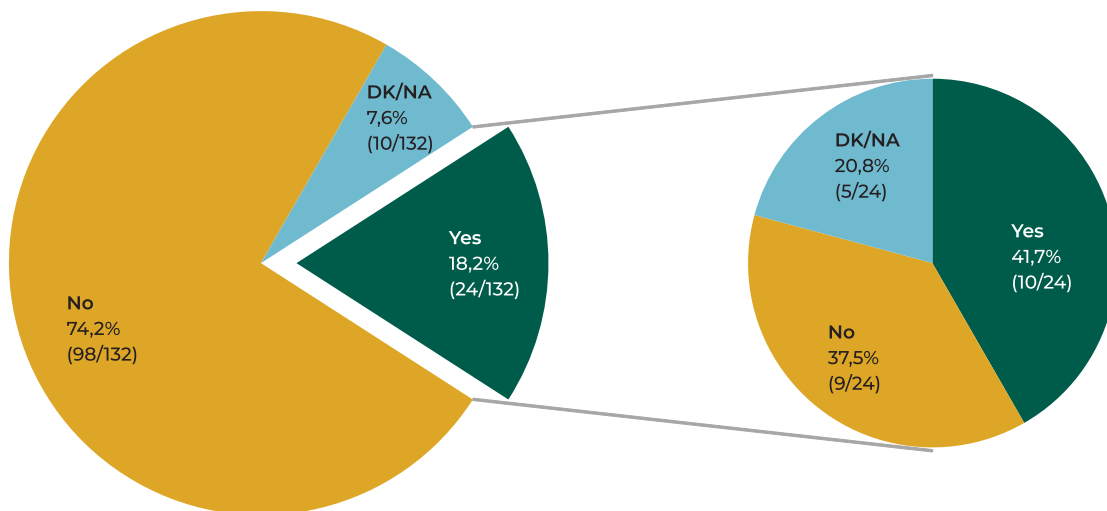
Curricular - UC) that included the training in tracheostomy, 41.7% (10/24) participants indicated otorhinolaryngology, 20.8% (5/24) answered “Don't know/ No answer”, and the remaining 37.5% (9/24) mentioned other UCs, predominantly intensive medicine and anesthesiology (Figure 1). With regard to having had contact with patients with a tracheostomy during IFG, 49.2% (65/132) of the participants answered “Yes” and the remaining answered “No”. In the majority of cases, contact with patients with a tracheostomy occurred in the context of hospitalization (n=53; 81.5%), followed by the emergency department (n=9; 13.8%) and outpatient clinic (n=3; 4.6%). The distribution of the answers to the questions regarding the participants' knowledge about tracheostomy is shown in Figure 2. The mean number of correct answers was 4.60

(standard deviation [SD]=1.283). There was no significant difference in the mean number of correct answers between the participants who received training in tracheostomy during the medical course and those who did not (Table 2). In addition, there was no difference in the mean number of correct answers according to the type of training (theoretical alone vs. theoretical with some practical component). There was no statistically significant difference in the mean number of correct answers (Table 2) of doctors who had contact with tracheostomized patients during IFG and those of doctors who did not. Moreover, a comparison of the mean number of correct answers according to the school where the medical studies were completed did not show a statistically significant difference (p=0.383).

Figure 1
Distribution of answers to the questions pertaining to training in tracheostomy during the medical course

Did you receive any training in tracheostomy during the medical course?

Was this knowledge acquired in any Otorhinolaryngology and Head and Neck Surgery UC?



DK/NA - Don't know/ No answer

Figure 2
Distribution of the answers to the questions on the participants' knowledge about tracheostomy

1 - All of the following are indications for tracheostomy, with the exception of:

Severe subglottic stenosis	3,0%
Severe and refractory obstructive sleep apnea	31,8%
Acute Obstruction of the upper airway	7,6%
Obstruction of the lower trachea	57,6%

2 - Which of the following statements is true?

Percutaneous tracheostomy can be performed in an intensive care unit	70,5%
Surgical tracheostomy is performed between the thyroid cartilage and cricoid cartilage	26,5%
Percutaneous tracheostomy replaces the indication for surgical tracheostomy	3,0%
A tracheostomy is always an emergency procedure	0,0%

3 - A patient with a tracheostomy was admitted in your ward. You were not given information about this patient and you did not have the opportunity to inspect the medical record. Which of the following presumptions is true?

The patient should be transferred to the Otorhinolaryngology ward	2,3%
The patient may eventually vocalize	93,2%
The patient is laryngectomized	1,5%
This patient's tracheostomy is permanent and can never be closed	3,0%

4 - After inspecting the patient's records, you realize that he/she was submitted to total laryngectomy approximately 5 years ago. In light of this information, which of the following presumptions is true?

Laryngectomy was performed in a surgery before tracheostomy	23,5%
The patient cannot stop using a tracheostomy tube	57,6%
The patient is not at risk for aspiration	2,3%
The patient cannot be fed orally	17,4%

5 - You have another patient with a tracheostomy under your care in the ward. Which information should you pass on to the nursing team?

The aspiration of secretions must be performed by an otorhinolaryngologist	0,8%
The patient should be isolated in a ward	2,3%
The external tube can be attached to a band that is placed around the neck	61,4%
The external tube should be removed for the cleaning of secretions several times a day	35,6%

6 - The patient has a tube similar to the one shown in Figure (cuffed fenestrated). Which of the following statements is true?



The diameter of the tubes does not change	0,0%
The cuff should be high-pressure and low-volume	12,9%
If the cuff is inflated and covers the external hole of the tube, the patient is able to breath through the mouth	22,0%
If necessary, the patient can be ventilated by positive-pressure ventilation through this tube	65,2%

7 - Select the correct statement about the tube that is shown in Figure (uncuffed fenestrated).



It is especially designed for laryngectomized patients	31,8%
In order to function properly, it cannot have the internal cannula inserted	42,4%
It should not be used in patients at risk of aspiration	4,5%
It is necessary to cover the fenestrae so that the patient can vocalize	21,2%

8 - You are called by a nurse in your ward because a patient is having dyspnea. On approaching the patient, you see that he/she is laryngectomized. Which of the following actions is the most correct?

You should immediately remove the external cannula	6,8%
You should apply an O2 nasal cannula	68,2%
You should try to pass a suction catheter after removing the internal cannula	11,4%
You should administer a bolus of physiological saline through the tracheostomy cannula	13,6%

The distribution of results is in the form of a percentage. For each of the questions, the answer considered, the correct one is the one with a darker tone.

Table 2

Mean number of correct answers to the questions on the knowledge about tracheostomy

Participants	n (%)	Correct answers	
		Mean (Standard deviation)	p-value
Total	132 (100)	4,60 (1,283)	
With training during the medical course ^a	24 (18,2)	4,54 (1,341)	p=0,777
Without training during the medical course ^a	98 (74,2)	4,63 (1,135)	
With contact during IFG ^b	65 (49,2)	4,46 (1,352)	p=0,218
Without contact during IFG ^b	67 (50,8)	4,74 (1,203)	

^a – Participants with or without training in tracheostomy during the medical course;

^b – Participants with or without contact with patients with a tracheostomy during internship (IFG)

Discussion

In the present study, which included 132 residents, the training in tracheostomy received during the medical course and the recently qualified doctors' knowledge of tracheostomy were assessed for the first time. Although answers were obtained from only 5.5% of all residents in 2022, the participants were doing IFG in all medical schools in Portugal and from all ARSs across the country and even from some schools abroad. As was expected, the vast majority of the respondents finished their medical course in 2021.

Most participating doctors (74.2%) stated that they did not receive training in tracheostomy during the medical course. Only 41.7% of those who received training in tracheostomy underwent it in the otorhinolaryngology department. The imparted knowledge was mainly theoretical (79.2%).

In 2016, although reporting on a different training reality, Tokarz et al. obtained similar results in a study of interns in the US in which 86% of the participants stated not having trained in tracheostomy during the medical course⁹. Several other studies by authors in the US showed similar results, implicating limited exposure of medical students to otorhinolaryngology during their undergraduate studies as one of the causes of this phenomenon^{10,12}.

Therefore, our results demonstrate a concerning reality and gap in the medical training in Portugal. The fact that performing

PT and caring for patients with a tracheostomy now involves other specialties may have contributed to the neglect of this topic in the training programs of these departments. However, the historical role and accumulated experience of otorhinolaryngology mean that this department has an extra responsibility in the teaching of this topic to medical students. A significant percentage of the respondents (49.2%) reported having had contact with patients with a tracheostomy during their IFG, and the ward was the setting where care was given to these patients more frequently.

Our results confirm that contact with patients with a tracheostomy is a frequent reality across a variety of specialties¹¹. In fact, over a period of only 10 months, almost half of the participants had already provided care to these patients, although otorhinolaryngology was not a part of the IFG rotations.

The knowledge of tracheostomy was evaluated through eight multiple-choice questions especially developed for this purpose. The mean number of correct answers was only 4.60, which corresponds to slightly more than half of the total number of answers.

These results suggest that newly qualified doctors have difficulties and lack knowledge regarding this topic. Similarly, several previously published studies have described significant gaps in the medical residents' knowledge of tracheostomy in the US^{5,11,13}.

Contrary to what would be expected, there were no statistically significant differences

between the results of the participants who received training on this topic during the medical course and those who did not. These findings suggest one of the two hypotheses: 1) the questions asked were not sensitive enough to differentiate between these two groups of participants (in fact, the lack of a validated instrument for assessing this type of knowledge was one of the limitations of the present study), but we sought to overcome this limitation by ensuring a thorough validation of the questionnaire by five specialists in otorhinolaryngology and head and neck surgery at the Hospital Pedro Hispano; 2) the training given during the medical course was insufficient and not very effective in transmitting basic and essential knowledge of this topic.

The absence of differences in the results between the doctors who had contact with patients with a tracheostomy during the IFG and those who did not was somewhat expected, considering the short duration of this contact.

Thus, doctors in a variety of specialties may see patients with a tracheostomy and care for them in very different contexts¹¹. Data from the UK National Confidential Enquiry into Patients Outcomes and Death reveal significant mortality and morbidity among patients with a tracheostomy due to preventable errors and complications¹⁴. Part of the solution to this problem is better training and qualification of the healthcare professionals who manage these patients, including doctors⁸. Therefore, to improve the quality of care provided to these patients and provide doctors with adequate skills to perform these tasks, it is important to promote training in tracheostomy during undergraduate medical education, and, in our opinion, otorhinolaryngology and head and neck surgery should lead this process.

Conclusion

Management of patients with a tracheostomy can be a major challenge for healthcare professionals, especially doctors.

To improve the care provided to these

patients, training should be given to medical professionals from as early as medical school. It appears that there is a gap in the knowledge of newly qualified doctors about tracheostomy in Portugal that may be partly attributed to deficient training in this area during the medical course.

Otorhinolaryngology should be responsible for imparting appropriate and better quality training to medical students in tracheostomy.

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Conflict of Interest

The authors declare no conflict of interest regarding this article.

Data confidentiality

The data were collected anonymously.

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Availability of scientific data

There are no publicly available datasets related to this study.

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