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ORIGINAL ARTICLE

Tracheostomy prevalence at Skilled Nursing Facilities

F. Pereira[a,*], A.Maia Silva[a], I.Machado Vaz[b], S. Viamonte[b], J.C. Winck[b]

[a] *Hospital Senhora da Oliveira - Guimarães, Portugal*
[b] *Centro de Reabilitaçao do Norte, Portugal*

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Abstract The incidence of chronically ill subjects with prolonged mechanical ventilation has significantly increased over the last decade. Many patients get discharge to Skilled Nursing Facilities with an artificial airway, which do not have the means to properly progress on weaning. In Portugal this prevalence is unknown. Our aim was to establish the prevalence of tracheostomized patients at SNF in the North of Portugal, characterizing these units and its population, in a cross-sectional study, through an online questionnaire answered on the same day. Of the 75 SNF, 30 answered: 13 long-term, 2 medium-term, 2 short-term, 12 had beds of both medium and long-term and 1 had the three typologies. 33 had tracheostomy ventilation (prevalence 3.36%), all admitted at long-term units, the majority transferred from previous hospital admission ($n = 27$, 90%). Only one was under mechanical ventilation. The most frequent reason for tracheostomy placement was acute respiratory failure ($n = 10$, 33.3%). The most commonly presented cannula was the fenestrated non-cuffed ($n = 17$, 59%). Only 4 were performing occlusion training, 21 needed frequent secretion suctioning and 1 used the mechanical in-exsufflation. Regarding motor function, 16 (53.3%) were unable to achieve sitting balance and 20 (66.7%) had no orthostatic balance or walking ability. 14 (46.7%) had percutaneous endoscopic gastrostomy. Although low response rate may induce some bias, this study revealed a significant prevalence of tracheostomized patients at SNF. These facilities do not have the resources to safely and effectively progress on ventilatory weaning. It is essential to establish new referral criteria and create specialized weaning units.

Introduction

Mechanical ventilation (MV) is the most commonly used technique for short-term life support worldwide, and it is

* Corresponding author.
E-mail address: filipacarvalhopereira@gmail.com (F. Pereira).

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used in daily practice for a diverse spectrum of indications.[1] An increasing number of patients are undergoing this technique due to demographic changes (aging populations with more comorbidities) and a greater incidence of respiratory and cardiovascular pathologies.[2] Improved intensive care unit (ICU) care has resulted in many patients surviving acute respiratory failure and requiring prolonged MV during recovery.[3]

Endotracheal tubes and tracheostomies are both considered as artificial airways. Approximately 10% of critically ill patients receive a tracheostomy in order to facilitate weaning from prolonged MV support. The decision to perform the technique is predominantly based on the predicted duration of MV. Tracheostomy has some advantages, such as better tolerance, simpler bedside procedures, little or no need for sedation, allowing oral feeding and phonation, and facilitating lung volume recruitment and mechanically assisted cough techniques. Although it decreases time until discharge from the ICU, the duration of decannulation ends up being prolonged.[4–7] When patients are no longer in the acute phase and clinical stability is achieved, they can be discharged from the ICU to medical or surgical wards.[2,8] Tracheostomy allows them to be transferred to other step-down units.[6]

It has been claimed that ICUs are expensive, but an unguided ventilatory weaning process has higher medium to long-term economic costs, and above all, it is associated with lower quality of life, higher morbidity, and mortality.[2,7,8]

After hospital discharge, many tracheostomized patients are admitted to intermediate-care facilities in order to release hospital beds and continue their rehabilitation process before returning home. This also improves patient independence, recovery of physical condition, and ventilatory weaning.[9]

A multidisciplinary tracheostomy team is recommended to facilitate ventilatory weaning and should include physicians, nurses, physiotherapists (PT), speech and language therapists (SLT), occupational therapists (OT), nutritionists, psychologists, and social workers.[2,5]

Patients with prolonged weaning are frequently transferred from acute-care hospitals to Skilled Nursing Facilities (SNFs). These facilities do not have the means, experienced multidisciplinary teams, or medical equipment to carry out weaning or decannulation safely and effectively.

In Portugal, the number of tracheostomized patients admitted to SNFs remains unknown. The aim of this study was to conduct a questionnaire at SNFs in the north of Portugal and establish the prevalence of patients who need tracheostomy ventilation. The facilities' characteristics and tracheostomized populations are also described.

Material and methods

Study design

This study had a one-day cross-sectional design. An online questionnaire was sent to SNFs in the northern region of Portugal and used to collect data.

Ethical considerations

The questionnaire was developed by the research group and approved by the Ethical Committee of Santa Casa da Misericordia do Porto, Portugal. The patients were anonymized, and no intervention was planned. Very little time was needed to complete the questionnaire, and it did not have any implications for patient care.

Data collection and statistical analysis

Initially, all SNFs in the north of Portugal were identified, and an online questionnaire was sent to each facility. The questionnaire was related to the same specific day for all units to prevent the risk of the same patient being included more than once or excluded in cases of patient discharge. The study was conducted on October 12, 2017.

The questionnaire had two parts: one referring to SNF characteristics and another about each tracheostomized patient that was admitted to the facilities (other patients were not analyzed).

For each SNF, we collected baseline data, including the type of SNF typology (short-term units for patients admitted for 31 days, medium-term units for 90 days, or long-term units for more than 90 days), and the number of beds per facility. We also recorded the number of Physical and Rehabilitation Medicine physicians (responsible for patient diagnosis and treatment, as well rehabilitation process coordination using multi-professional team), PT (who aim to restore, either in full or in part, patients' movement and functional ability), OT (work with activities to achieve maximum independence in daily life), and SLT (help with speech, language and swallowing problems) worked hours per week.

For each patient requiring tracheostomy ventilation, we collected data that included demographics, the hospital admission date, the primary medical diagnosis, the date and reason for the tracheostomy, the SNF admission date, the consciousness evaluation using the Glasgow Coma Scale (GCS), respiratory support (the type of tracheostomy cannula, ventilator/oxygen supply, cough assistance, secretion suctioning), feeding evaluation, neuromotor evaluation (control balance in seated and orthostatic positions, walking ability), skin evaluation (number and type of ulcers).

The results of the questionnaires were given to the same researcher after they were completed. The data were analyzed using SPSS v23 and descriptive statistics. Only variables with complete data were analyzed. Numbers, percentages, means, and the distributions of minimum and maximum values were used to evaluate descriptive data.

Results

The online questionnaire was sent to 75 SNFs, and responses were obtained from 30 facilities. Table 1 summarizes the information obtained about SNF characteristics. The majority were medium and medium/long-term units ($n = 25$; 83.3%). Overall, long-term units had more admitted patients (mean 26.7 patients). All facilities except one had a Physical and Rehabilitation Medicine (PRM) physician coordinating the rehabilitation care. All 30 facilities had a PT, 28 had an OT, and 26 had an SLT in their unit.

Table 1 Description of SNFs characteristics (SNF: Skilled Nursing Facility; PRM: Physical Rehabilitation and Medicine, FT: Physiotherapy; OT: Occupational Therapy; SLT: Speech and Language Therapy).

Type of SNF	Number of units	Bed capacity per unit (mean)	Number of PRM Physician hours/week	Number of PT hours/week	Number of OT hours/week	Number of SLT hours/week
Short-term unit	2 (6.7%)	19	7.75	110	30.5	12.5
Medium-term unit	2 (6.7%)	26	10	75	35	7
Long-term unit	13 (43.3%)	28	4.8	35	27	4.6
Medium/long-term unit	12 (40%)	16/22	5.25	67.3	19.6	12.8
Short/medium/long-term unit	1 (3.3%)	14/18/32	11	108	65	9

Table 2 Demographic and clinical characteristics (SNF: Skilled Nursing Facility).

Description	*n* (%)
Age (mean)	65.2 years
Gender	
Male	18 (60%)
Female	12 (40%)
Hospitalization before SNF admission	
Yes	27 (90%)
No, from home	2 (6.7%)
No, from another facility	1 (3.3%)
Primary diagnosis for admission	
Stroke	9 (30%)
Tumor (laryngeal/tongue cancer)	8 (26.7%)
Acute respiratory failure	3 (10%)
Anoxic encephalopathy	3 (10%)
Spinal cord injury	2 (6.7%)
Amyotrophic Lateral Sclerosis	1 (3.3%)
Cerebral palsy	1 (3.3%)
Sudden Cardiac Arrest	3 (10%)
Reason for tracheostomy	
Acute respiratory failure	10 (33.3%)
Postoperative care	3 (10%)
Neuromuscular disease	1 (3.3%)
Stroke	8 (26.7%)
Cardiovascular disease	2 (6.7%)
Other	6 (20%)

regard to the time spent at the facilities, short and medium-term units had the highest amount of support from PRM physicians. Long-term units had the lowest support with fewer hours per week from PT, OT and SLT to treat their patients. Generally, the SNFs were understaffed and with a low ratio of therapists to patients. Four units did not have SLT, which are important for tracheostomized patients for managing communication and swallowing disorders.

Among all SNFs, 33 patients had undergone tracheostomies. Three were excluded because of incomplete questionnaires. The demographic information of the patients requiring tracheostomy ventilation is provided in Table 2. The average age was 65.2 years and ranged from 18 to 91 years. There were 12 (40%) female and 18 (60%) male patients. All of them were adults and institutionalized at long-term units. The majority were admitted after hospital discharge ($n = 27$, 90%).

Overall, the most frequent diagnoses for admission were stroke and laryngeal or tongue cancer ($n = 17$, 56.7%). The indications for tracheostomy were divided into six categories: acute respiratory failure, postoperative care, neuromuscular disease, stroke, cardiovascular disease, and other reasons. The most common cause was acute respiratory failure ($n = 10$, 33.3%). Most tracheostomies ($n = 20$, 66.7%) were performed during the first and second week after hospital admission. The mean time between tracheostomy placement and SNF admission was 74.9 days.

Fig. 1 shows that the majority of patients had a non-cuffed fenestrated tube ($n = 9$, 30%). Four (13.3%) needed O_2 supplementation via tracheostomy tube (1.5–8 l/min). One needed ventilatory support (a patient with laryngeal cancer). Only 4 patients were progressing in ventilatory weaning and undergoing occlusion training. In addition, only one had a mechanical in-exsufflation, but 21 patients (70%) needed tracheal suctioning (1–6 times per day). This suggests that mechanical cough assistance was probably necessary but was not available.

Table 3 summarizes the levels of consciousness (using the GCS), feeding evaluation, neuromotor evaluation, and skin assessment of the sample at the same point in time. According to the CGS, 14 patients scored below 8 points, 6 patients scored between 9 and 12 points, and 10 patients scored higher than 10 points. A high percentage of subjects were being fed enterally, including 14 (46.7%) who had had a percutaneous endoscopic gastrostomy (PEG) and 11 (36.7%) who had a nasogastric tube (NGT). More than half of the patients were unable to maintain sitting balance (53.3%) and more were unable to stand or walk (66.7%). There were 16 bedridden patients (53.3%). A minority had pressure ulcers ($n = 4$, 13.3%), including one case of grade I, one case of grade II, and two cases of grade IV. None were on a dialysis program.

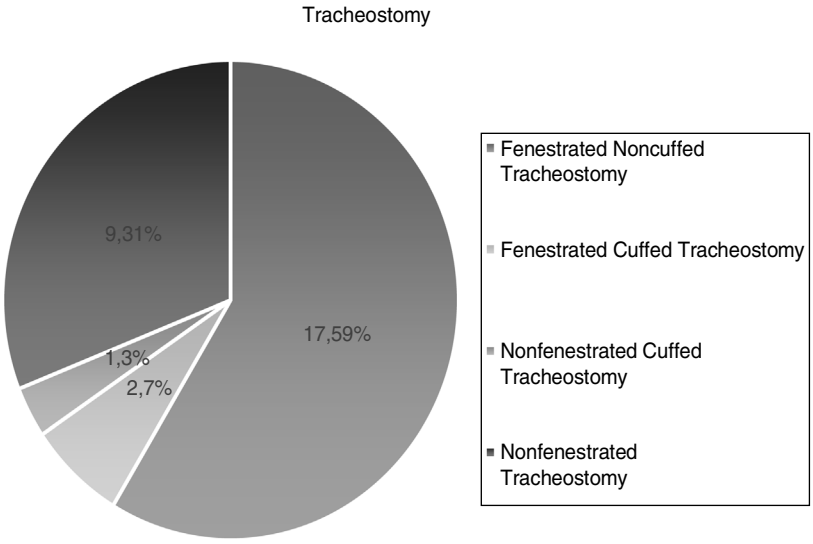

Figure 1 Types of tracheostomy tubes used at SNFs.

Table 3 Level of consciousness, feeding/neuromotor evaluation and skin assessment of tracheostomized patients (reported at the same time point).

Description	Frequency, *n* (%)
Level of consciousness – Coma Glasgow Scale	
3–8 (severe)	14 (46.7%)
9–12 (moderate)	6 (20%)
13–15 (mild)	10 (33.3%)
Feeding	
Oral (without restrictions)	1 (3.3%)
Oral (thickened liquids)	2 (6.7%)
Percutaneous endoscopic gastrostomy (PEG)	14 (46.7%)
Nasogastric tube (NGT)	11 (36.7%)
PEG + oral training	1 (3.3%)
Sitting balance	
Good (static and dynamic)	6 (20%)
Good (only static)	5 (16.7%)
Fair	1 (3.3%)
Poor	2 (6.7%)
Absent	16 (53.3%)
Orthostatic balance	
Good	7 (23.3%)
With walking device	1 (3.3%)
With third-person aid	2 (6.7%)
Absent	20 (66.7%)
Walking	
Good	7 (23.3%)
With walking device	1 (3.3%)
With third-person aid	2 (6.7%)
Absent	20 (66.7%)
Skin assessment	
Pressure ulcers	4 (13.3%)

Discussion

This study provides insight into an understudied population of tracheostomized patients who are admitted to an SNF. The 30 units that responded to the online questionnaire had a total bed capacity of 983 patients (53 short-term, 263 medium-term, and 667 long-term). As of June 2017, a total of 2428 beds were available at SNFs in the north of Portugal.[10] Thus, the response rate was 40.1%.

In our sample, 33 patients needed tracheostomy ventilation, which corresponds to a prevalence of 3.36%. All of them were admitted to long-term units. The clinical spectrum included patients with stroke, cancer, acute respiratory distress syndrome, spinal cord injury, neuromuscular diseases, cerebral palsy, and cardiac failure.

In 2001, data from the Eurovent survey indicated the existence of 18 patients who underwent tracheostomy ventilation, indicating a prevalence of 0.17:100,000 in Portugal.[11] Another survey conducted by Portuguese home care companies identified a total of 84 patients with tracheostomy ventilation as of November 2018. There were 50 patients located in the north of Portugal. Only 14 patients were institutionalized, of which 7 were adults. The most common reason for tracheostomy was neuromuscular diseases.[12] In our sample, the most common indication for tracheostomy was acute respiratory failure. Our study included a smaller percentage of neuromuscular patients, which was possibly a result of this population receiving care at home instead of being institutionalized.

Furthermore, we found a higher number of patients who required tracheostomy ventilation (33 patients compared to 7 in the previous study). Only one patient used mechanical in-exsufflation, and another one had ventilator dependency. The remaining 28 patients probably would not be included in the Portuguese home care companies' survey because they did not have any equipment. Therefore, tracheostomized patients at SNFs constituted an understudied population.

Decannulation is a complex and multidisciplinary process, and there is no standard protocol. Patients' ability

to tolerate tube occlusion, their level of consciousness, the effectiveness of cough to manage secretions, and protected airways are factors to consider in determining whether to perform decannulation.[6,7] We concluded that only a few patients were undergoing tracheostomy capping. Moreover, SNFs in our study were understaffed and provided less rehabilitation therapy.

In some countries, specialized weaning units have been established to manage stable patients who have prolonged MV via artificial airways. These units provide proper rehabilitation equipment with a strong focus on ventilator weaning due to higher levels of expertise.[2,4,8] Some studies have described that these specialized facilities can have higher rates of weaning success with lower rates of complications and mortality.[13] This population could benefit from hospital discharge to such units.

This study had some limitations, such as a small sample size and a lack of clinical information in patient records (especially during ICU stays, which may influence the weaning process, or anthropometrics data). Also, we did not have information about health status of the other non tracheostomized patients admitted to the SNFs.

Conclusions

Prolonged MV is an important and complex issue that requires appropriate attention and support. This study provided useful information to improve the understanding of the current situation of tracheostomized patients who are admitted to SNFs in the north of Portugal. Despite the lower response rate, which may have induced bias, the results revealed a significant prevalence of institutionalized patients requiring tracheostomy ventilation. These facilities hardly provide the necessary care to perform decannulation safely and effectively due to understaffing and a lack of technical equipment.

The significant number of patients in this situation makes it important to identify reasons for keeping these subjects in SNFs. Further studies with larger populations are needed to better characterize this population and improve the planning and management of healthcare resources. There is increasing evidence that coordinated multidisciplinary teams can favorably influence the weaning process and the quality of care of tracheostomized patients. When patients cannot be fully weaned after the critical illness is resolved, there is often no place for them to receive the appropriate care. Alternative places should be considered, such as specialized weaning facilities with multidisciplinary teams that have knowledge in this area.

Conflicts of interest

The authors have no conflicts of interest to declare.

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