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Survey on Oral Health Prevention in Long-Term Care Facilities in Lombardy

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ABSTRACT

Aim of the Study To conduct a knowledge survey on the prevention of oral health among elderly residents in nursing homes (RSA) in Lombardy, with the aim of understanding the role of the dental hygienist in prevention and training within these facilities.
Materials and Methods A questionnaire was administered to the healthcare directors of nursing homes in Lombardy, after dividing them into three random samples (n=100) based on capacity. The responses received within the established time limits (n=33) were analyzed using descriptive variables with Excel software.
Results Oral health in nursing homes is a largely ignored but present issue. 37% of healthcare directors reported that between 50% and 75% of elderly residents in nursing homes have oral health problems, most commonly issues with dental prostheses, difficulties in chewing, difficulties in oral hygiene, and tooth loss. In 58% of facilities, there are no protocols for oral hygiene of patients. 76% of patients have never been assessed regarding their knowledge in this area. Preventive behaviors for oral health are scarce, and in no case was the presence of a dental hygienist observed within the facility, suggesting a therapeutic rather than preventive approach to oral health management.
Conclusions The role of the dental hygienist could be crucial for the promotion and maintenance of oral health among elderly residents in nursing homes and for the training of staff, favoring a shift from a therapeutic to a preventive approach and improving residents' quality of life.

Keywords Seniors, Dental hygiene, Nursing homes, Oral health

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INTRODUCTION

Oral Health: Global and Italian Overview

The World Health Organization (WHO) and the FDI World Dental Federation define oral health as "a fundamental component for essential functions, psychosocial well-being, and social participation" (1, 2, 3). However, oral health has long been neglected in the global health agenda (3, 4) and in health policy (5). Oral diseases are among the most common non-communicable diseases worldwide, affecting about 3.5 billion people. They are chronic, progressive, and cumulative (3), causing significant health and economic burdens and substantially reducing the quality of life of affected individuals (5). Most oral diseases can be prevented through personal care or treated with simple, evidence-based measures effective in various contexts, including low- and middle-income countries (3). However, oral health and related professions have become somewhat isolated and marginalized from the main developments in health policy and healthcare systems.
The current model of dental care and prevention policy does not address the global burden of oral diseases (5). Dentistry in the 21st century has largely failed to meet the global challenge of oral diseases (6, 7), representing a demand-driven service rather than a planned one, and thus poorly aligned with the oral health needs of the population (3, 8), a phenomenon defined as the "inverse care law" (9). Even in resource-rich contexts, dentistry does not meet the needs of large segments of the population and increasingly focuses on aesthetic treatments, largely driven by profit and consumerism (10). In these contexts, the current treatment-oriented approach, characterized by high technology and interventionism, does not address the underlying causes of disease or oral health inequalities (8).
Historically, Italian oral health services have been organized separately from general health services, as often happens worldwide (11). In Italy, there is a limited supply of dental services at the public level, with limited resources allocated to reimbursable services (12). Dental services covered by the National Health Service (SSN) are limited to oral health protection programs for children aged 0-14 and specific vulnerable population groups, as established by Legislative Decree 502/1992 and subsequent amend-

ments and integrations, and by the DPCM of January 12, 2017 (13). For the rest of the population, preventive, routine, or essential oral healthcare is generally not covered (14, 15), thus generating inequalities in access and use of care. Social inequalities influence access to care, with clear differences related to income, education, and place of residence (16, 17). About 19 billion and 123 thousand euros are spent annually on the treatment of oral diseases, of which 95% is represented by out-of-pocket payments by citizens (7).

Relationship between Aging, Oral Health, Systemic Health, and Quality of Life

Oral health is an essential factor for the elderly, and the need for oral care is increasing in aging societies (18). In the last fifty years, socioeconomic development in many countries has been accompanied by a strong reduction in fertility and a drastic increase in life expectancy (19, 20). This phenomenon, known as demographic transition (21), is the basis for rapid demographic changes worldwide, characterized by an increase in the percentage of elderly people in the general population over a relatively short period (20). The report published by the United Nations in 2020 states that the population aged 65 or older is 703 million, and this number is expected to double in 30 years, while the number of people aged 80 and over is 143 million and is expected to triple by 2050 (22). In this demographic context, an increase in the prevalence and incidence of chronic diseases is more likely, which rise with age (23, 24). The presence of chronicity and multimorbidity has a negative impact on levels of autonomy in essential daily activities and on quality of life, especially among the very elderly (25). Aging is the physiological change that occurs in the body over time (26). However, poor oral health is not an inevitable part of aging, as good oral care throughout life can result in the maintenance of a functional dentition even in advanced age (27, 28). The most prevalent oral health problems in the elderly population are tooth loss, caries, periodontal disease, xerostomia, and precancerous and cancerous oral lesions (21, 27). Oral health is a determining factor for maintaining quality of life, health, and general well-being (29), but is often neglected in integrated approaches to general health (30). The presence of oral problems such as missing teeth, caries, tooth mobility, prosthesis-related problems, oral lesions, and xerostomia can cause pain and discomfort. Furthermore, they can compromise chewing, communication, swallowing, smiling, socialization, and have a negative impact on quality of life (31). There is a growing body of evidence in the literature demonstrating various associations, some of which are bidirectional, between the oral cavity and systemic diseases prevalent in the elderly population, such as diabetes, cardiovascular diseases, dementia, and respiratory diseases (31). Tooth loss and periodontitis represent a disability among the elderly, resulting in reduced chewing, inadequate nutritional choices, difficulties in speaking, and psychological problems (32), weight loss, poor communication, and low levels of well-being and self-esteem (33). Poor oral health has been shown to be associated with a diet poor in quantity and quality of food for older individuals. The number of teeth is significantly associated with the number of foods that elderly people are able to eat. This is because tooth loss could influence the choice of foods with a softer consistency, resulting in a loss of pleasure in eating (34), leading to malnutrition and consequently frailty (27). The lack of nutrients exacerbates chronic disease in the elderly, predisposing them to sarcopenia and frailty. The term "anorexia of aging" has been introduced to refer to this phenomenon, which makes the elderly more vulnerable to distress factors and more prone to negative health outcomes, such as poor quality of life and reduced survival (35). The elderly population is at risk of developing not only dental diseases but also oral lesions. Therefore, regular dental visits and preventive oral care are of fundamental importance for successful aging, reducing oral inflammation and maintaining general and oral health (36). Good oral hygiene is essential for controlling total oral bacterial load, maintaining or restoring oral symbiotic balance, and preventing the spread of oral bacteria to other sites in the body (4, 37). Demographic changes in high-income countries have important implications for healthcare services. The number of people with morbidity and dependency is increasing and will continue to grow, as will the number of residents in nursing homes. In the Lombardy region, there are a total of 707 nursing homes, offering a total of 64,165 available beds. For residents in nursing homes, the prevalence of oral health problems such as caries, periodontal disease, and edentulism remains high, and poor oral hygiene is one of the main concerns in long-term care facilities (38). These oral problems can be further aggravated by cognitive and motor disorders and by a decline in general health. Moreover, when a patient's general health worsens, dental hygiene and health are often neglected (39). All residents in long-term care facilities should be regularly evaluated and monitored by qualified personnel. However, evidence shows high levels of oral diseases but poor access to dentists in these populations (40). Current preventive practices and service provision in nursing homes are often inadequate. The current approach to oral health management in elderly care is passive, as the initial stages of oral diseases are often neglected and only considered after the patient reports pain (41). In Italy, there are no specific dental services for the elderly (42). Therefore, it is necessary to provide oral health care for vulnerable elderly people, including residents in nursing homes. Integrating oral care with general care could improve the quality of daily life for the elderly and reduce healthcare costs (18). Thus, the aim of this study was to conduct a knowledge survey on the prevention of oral health among elderly residents in nursing homes to understand the role of the dental hygienist in this context.

MATERIALS AND METHODS

A questionnaire was developed using Google Forms, consisting of 30 closed-ended questions divided into two sections. The first section aimed to understand demographics, oral health conditions, main preventive activities related to oral health, and which professional performs them. The second section aimed to evaluate

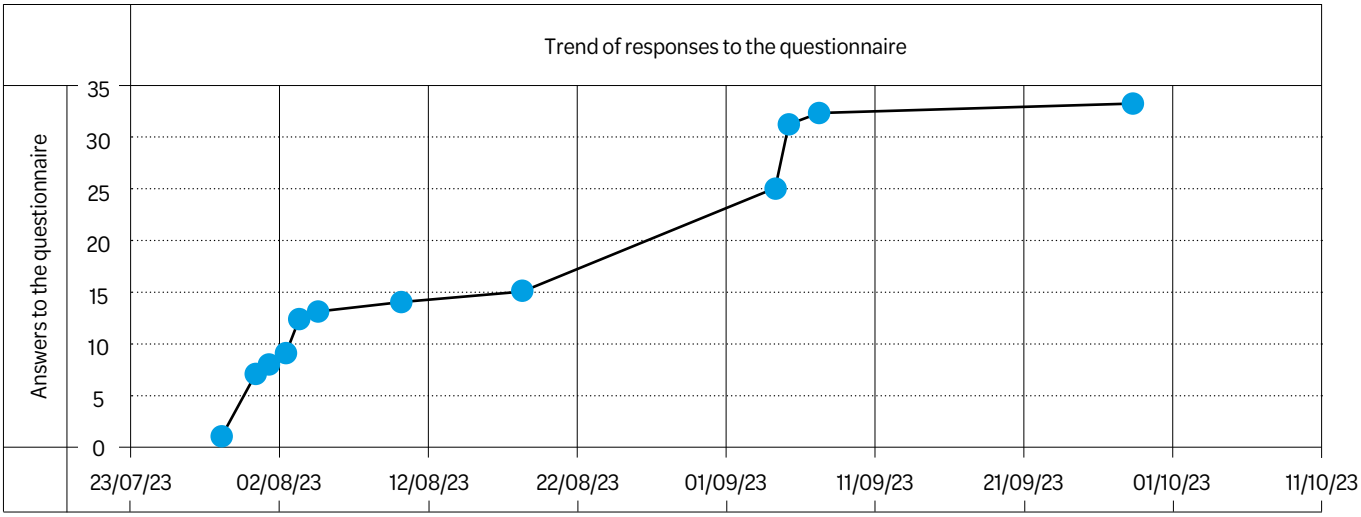

Fig. 1 Trend in responses to the questionnaire in the period from 07/29/23 to 09/28/23.

the training received by nursing home staff, particularly nurses and healthcare operators, in oral health. The selection of facilities was based on the list of nursing homes registered in Lombardy, available on the regional website, which reported 706 facilities. Subsequently, the facilities were divided according to the number of patients, classifying them into three samples:

- Small facilities: up to 50 patients (N=129).
- Medium facilities: between 50 and 100 patients (N=349).
- Large facilities: over 100 patients (N=228).

For each category, the facilities were ordered in tables and assigned an identifying number. Then, 100 identifying numbers were randomly selected for each category, obtaining three samples (n=100):

- Sample 1 (small facilities).
- Sample 2 (medium facilities).
- Sample 3 (large facilities).

Sampling was performed using the Python programming language. The code was set to provide a dataset composed of 100 random numbers between the extremes 1 and the total number of facilities in a given category. After identifying the facilities, the questionnaire was sent via email. Responses to the questionnaire were accepted in the period between July 29 and September 28, 2023 (62 days). The questionnaire was administered to the healthcare directors of the selected nursing homes. Facilities that responded to the questionnaire within the established time limits were 33. Finally, the collected data were analyzed using Microsoft Excel.

RESULTS

Response Trends

The questionnaire was administered between July 29 and September 28, 2023, during which 33 responses were obtained, with the distribution described in the graph below (Fig. 1). The responses were distributed among the samples as follows:

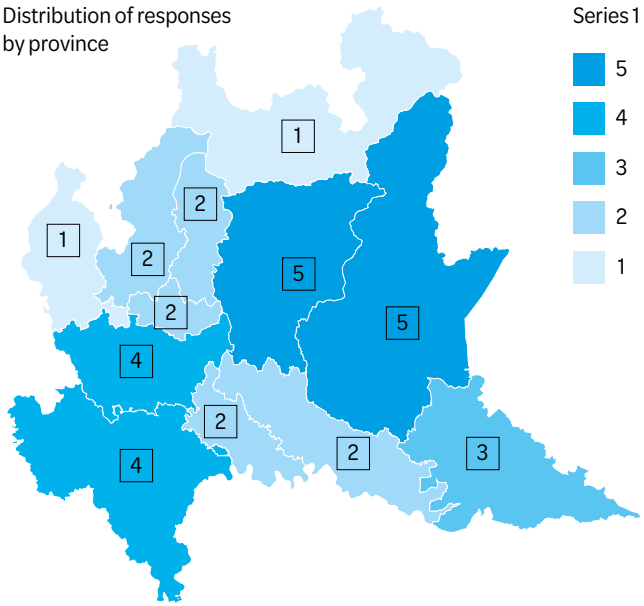

Fig. 2 Distribution of questionnaire responses by province in Lombardy.

- Sample 1: 9 responses (27%).
- Sample 2: 12 responses (40%).
- Sample 3: 11 responses (33%).

Additionally, the distribution of responses across the Lombardy region was observed. The highest response rate was in the provinces of Bergamo and Brescia, Milan and Pavia, and finally Mantua (Fig. 2).

Demographic Data

Regarding the age range of patients hosted by the facilities, it was found that globally the majority are over 80 years old, i.e., 97%. The remaining 3% are between 76 and 80 years old (Tab. 1). Regarding the level of self-sufficiency, based on the classification adopted by individual nursing homes to define patients, the following was observed (Tab. 2):

- 91% reported that the percentage of self-sufficient

Age	Sample			
	<50	50 and 100	>100	Total
65-70 years old	0 (0)	0 (0)	0 (0)	0 (0)
71-75 years old	0 (0)	0 (0)	0 (0)	0 (0)
76-80 years old	0 (0)	0 (0)	1 (3)	1 (3)
Over 80 years old	9 (27.3)	13 (39.4)	10 (30.3)	32 (97)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)

Tab. 1 Absolute and relative frequency of the variable "self-sufficiency" of patients residing in RSA.

Self-sufficiency	Sample			
	<50	50 and 100	>100	Total
<25%	8 (24.2)	12 (36.4)	10 (30.3)	30 (90.9)
25-50%	1 (3)	1 (3)	0 (0)	2 (6.1)
50-75%	0 (0)	0 (0)	0 (0)	0 (0)
>75%	0 (0)	0 (0)	1 (3)	1 (3)
I don't know	0 (0)	0 (0)	0 (0)	0 (0)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)

Tab. 2 Absolute, relative and cumulative frequency of oral health problems in patients residing in nursing homes at the time of the survey.

subjects is less than 25%.
- 6% reported that the percentage of self-sufficient subjects is between 25% and 50%.
- 3% reported that the percentage of self-sufficient subjects is over 75%.

Oral Health Conditions

Regarding oral health conditions, the following was observed (Fig. 3):
- 9% reported that less than 25% of patients have oral problems.
- 33% reported that between 25% and 50% of patients have oral problems.
- 37% reported that between 50% and 75% of patients have oral problems.
- 18% reported that more than 75% of patients have oral problems.
- 3% reported not knowing the percentage of patients with oral problems.

Regarding the most frequent types of oral problems in nursing home residents, the following emerged globally (Tab. 3):
- Problems with prostheses (21.3%).
- Difficulties in chewing (17.6%).
- Difficulties in oral hygiene (15.4%).
- Tooth loss (15.4%).

Oral Hygiene Procedures in Nursing Homes

Regarding the presence of protocols or specific treatment plans for managing oral or dental problems in patients, it emerged that in 58% of the interviewed facilities, there are no specific protocols or treatment plans, while 42% reported that protocols are present (Fig. 4).
Regarding the operator responsible for performing oral hygiene in non-self-sufficient patients, it was found that:
- In 91% of cases, it is the healthcare operator.
- In 9% of cases, it is the nurse.

In self-sufficient patients, the operator responsible for checking or supervising oral hygiene procedures is:
- The healthcare operator in 64% of cases.
- The nurse in 33% of cases.
- Collaboration among all healthcare operators and the doctor in 3% of cases.

Regarding the main aids or devices used to perform oral hygiene procedures in non-self-sufficient patients, it was found globally that in 33.3% of cases, it is performed

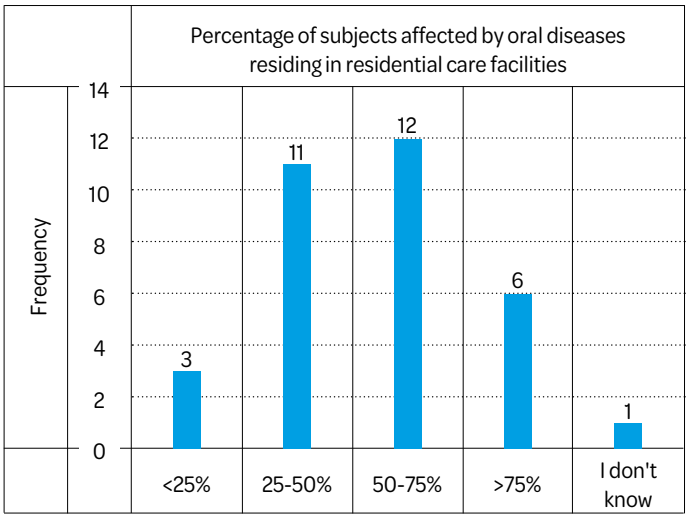

Fig. 3 Frequency of the percentage of subjects affected by oral diseases residing in nursing homes at the time of the survey 09/28/23.

Oral health problem	Frequency		
	absolute	relative	cumulative
Tooth decay	4	2.9%	2.9%
Oral candidiasis	6	4.4%	7.3%
Dry mouth (xerostomia)	11	8.1%	15.4%
Gingivitis or periodontitis	20	14.7%	30.1%
Tooth loss	21	15.5%	45.6%
Hygiene difficulties	21	15.5%	61.1%
Chewing difficulties	24	17.6%	78.7%
Denture problems	29	21.3%	100%
Total	136	100	-

Tab. 3 Absolute, relative and cumulative frequency of oral health problems in patients residing in nursing homes at the time of the survey.

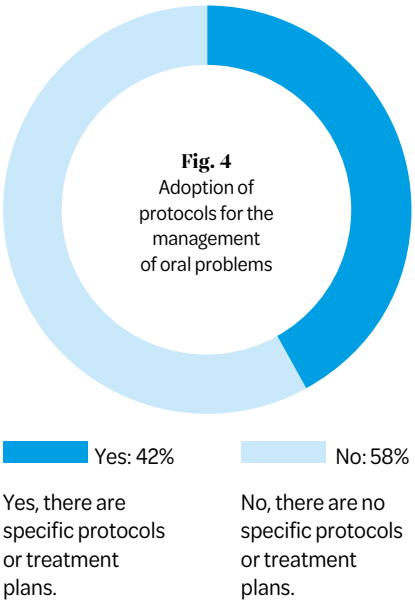

Fig. 4 Adoption of protocols for the management of oral problems

	Samples			
Prevalence of oral problems	< 50	50 and 100	> 100	Total
<25%	1 (3.1)	2 (6.25)	0 (0)	3 (9.4)
25-50%	7 (21.9)	3 (9.4)	4 (12.5)	14 (43.8)
50-75%	0 (0)	5 (15.6)	4 (12.5)	9 (28.1)
>75%	1 (3.1)	2 (6.25)	2 (6.25)	5 (15.6)
I don't know	0 (0)	1 (3.1)	0 (0)	1 (3.1)
Total	9 (28.1)	13 (40.6)	10 (31.2)	32 (100)
Type of oral problems	< 50	50 and 100	> 100	Total
Tooth decay	1 (3.1)	2 (6.25)	0 (0)	3 (9.4)
Oral candidiasis	7 (21.9)	3 (9.4)	4 (12.5)	14 (43.8)
Dry mouth (xerostomia)	0 (0)	5 (15.6)	4 (12.5)	9 (28.1)
Gingivitis or periodontitis	1 (3.1)	2 (6.25)	2 (6.25)	5 (15.6)
Tooth loss	0 (0)	1 (3.1)	0 (0)	1 (3.1)
Hygiene difficulties	9 (28.1)	13 (40.6)	10 (31.2)	32 (100)
Chewing difficulties	0 (0)	1 (3.1)	0 (0)	1 (3.1)
Denture problems	9 (28.1)	13 (40.6)	10 (31.2)	32 (100)
Total	36 (26.5)	54 (39.7)	46 (33.8)	136 (100)

Tab. 4 Absolute, relative and cumulative frequency of oral health problems in patients residing in nursing homes at the time of the survey.

through direct assistance by a healthcare operator with the aid of disposable toothbrushes or sponges (Tab. 5).
Regarding the frequency of oral hygiene procedures, it was found that:

- 94% of facilities perform them daily.
- 3% reported not knowing the frequency with which procedures are performed.
- 3% reported that oral hygiene procedures are performed less frequently.

Additionally, regarding the evaluation of patients' oral hygiene level, the following was observed:

- In 53% of cases, the method used is direct visual observation of the patient's mouth and teeth.
- In 43% of cases, the method used is the evaluation of the degree of cleanliness of the teeth during oral hygiene procedures.
- In 4% of cases, no evaluation is performed.

Oral Prevention in Nursing Homes

Regarding the execution of periodic evaluations to assess patients' oral health needs, it emerged that:

- In 21% of cases, a periodic evaluation is performed.
- In 55% of cases, an evaluation is performed only in specific cases.
- In 24% of cases, no periodic evaluation is performed.

Regarding the promotion of preventive practices for oral health, it was observed that:

- In 52% of cases, no preventive practice is promoted.
- In 45% of cases, preventive practices are promoted.
- In 3% of cases, it was reported that it is not known whether preventive practices are promoted or not.

Regarding the frequency of dental check-ups for nursing home residents, the following was observed in the table (Tab. 7).

	Frequency		
Oral hygiene aids/devices for RSA	absolute	relative	cumulative
Use of auxiliary tools	6	8%	8%
Use of specific oral hygiene solutions or products	20	26.7%	34.7%
Use of disposable toothbrushes or oral hygiene sponges	24	32%	66.7%
Direct assistance from a healthcare professional	25	33.3%	100%
Total	75	100%	-

Tab. 5 Absolute, relative and percentage frequency of oral hygiene devices and aids adopted in residential care homes.

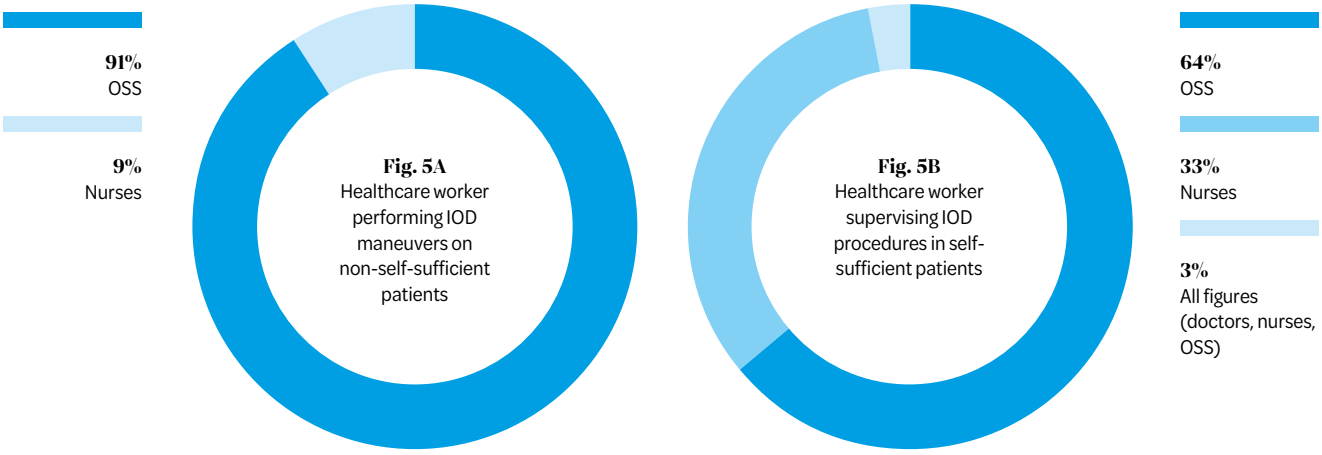

Fig. 5 Graphs showing the operator performing/supervising IOD procedures in non-self-sufficient and self-sufficient patients, respectively.

	Samples			
Presence of protocols	< 50	50 and 100	> 100	Total
No	3 (9.1)	9 (27.3)	7 (21.2)	19 (57.6)
Yes	6 (18.2)	4 (12.1)	4 (12.1)	14 (42.4)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Non-self-sufficient workers				
Healthcare assistants	9 (27.3)	12 (36.4)	9 (27.3)	30 (90.9)
Nurses	0 (0)	1 (3)	2 (6.1)	3 (9.1)
Total	9 (27.3)	13 (39.4)	11 (33.4)	33 (100)
Self-sufficient workers				
Healthcare assistants	4 (12.1)	9 (27.3)	8 (24.3)	21 (63.7)
Nurses	4 (12.1)	4 (12.1)	3 (9.1)	11 (33.3)
Healthcare assistants, nurses, and doctors	1 (3)	0 (0)	0 (0)	1 (3)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Oral hygiene devices/aids				
Direct assistance from a healthcare worker	8 (10.7)	9 (12)	8 (10.7)	25 (33.3)
Use of auxiliary instruments	2 (2.7)	2 (2.7)	2 (2.7)	6 (8.1)
Use of disposable toothbrushes or sponges for oral hygiene	6 (8)	11 (14.7)	7 (9.3)	24 (32)
Use of specific oral hygiene solutions or products	6 (8)	6 (8)	8 (10.7)	20 (26.7)
Total	22 (29.4)	28 (37.4)	25 (33.3)	75 (100)
Frequency of patient oral hygiene				
Daily	8 (24.2)	12 (36.4)	11 (33.3)	31 (94)
Every two days	0 (0)	0 (0)	0 (0)	0 (0)
Every three days	0 (0)	0 (0)	0 (0)	0 (0)
Less frequently	1 (3)	0 (0)	0 (0)	1 (3)
I don't know	0 (0)	1 (3)	0 (0)	1 (3)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Oral hygiene assessment methods				
Direct visual observation of the patient's mouth and teeth	7 (14.9)	9 (19.1)	9 (19.1)	25 (53.1)
Assessment of the degree of cleanliness of teeth and gums during oral hygiene procedures	5 (10.6)	7 (14.9)	8 (17)	20 (42.5)
Use of specific indices to assess the degree of oral hygiene	0 (0)	0 (0)	0 (0)	0 (0)
Not assessed	0 (0)	1 (2.1)	1 (2.1)	2 (4.2)
Total	12 (25.5)	17 (36.1)	18 (38.2)	47 (100)

Tab. 6 Absolute and relative frequencies of variables related to the execution of oral hygiene maneuvers divided by samples.

Frequency of dental check-ups in nursing homes	Frequency		
	absolute	relative	cumulative
Never	2	6.1	6.1
Every 3-6 months	3 9.1	15.2	7,3%
I don't know	5	15.2	30.4
Once a year	5	15.2	45.6
Rarely	18	54.5	100
Total	75	100	-

Tab. 7 Absolute, relative and cumulative frequency of dental check-ups for RSA patients.

Furthermore, from the questionnaire responses, it emerged that the main activities for the promotion and prevention of oral health (if present), detailed in the graph (Fig. 6), are predominantly represented by education on correct daily oral hygiene behaviors (38.4%). In particular, regarding patient education on daily oral hygiene procedures, it was found that 67% do not provide any education to patients. Instead, 30% report providing specific training. Finally, 3% report not knowing whether education is provided or not.
Moreover, it was observed that in 30% of cases where specific education is provided, the methodologies reported in the table (Tab. 8) are used, occurring in 58.8% of cases through individual training sessions.

Collaboration with Dental Hygienists and/or Dentists

Regarding collaboration with external dental hygienists and/or dentists for the management of oral health problems, it was found that:

- 33% collaborate occasionally with these professionals.
- 15% collaborate regularly with these professionals.
- 12% do not collaborate with any of these professionals.

Regarding the presence of dental hygienists and/or dentists within the nursing home, it emerged that:

- In 21% of facilities, a dentist is present.
- In 18% of facilities, there is active collaboration with external operators.
- In 61% of facilities, there is neither a dental hygienist nor a dentist.
- In no facility is a dental hygienist present.

Recording of Oral Health Data

Regarding the recording of oral health and oral hygiene data by staff working in the nursing home, it was found that:

Frequency of dental check-ups in nursing homes	Frequency		
	absolute	relative	cumulative
Audiovisual materials (videos, presentations)	1	2.9	2.9
No response	2	5.9	8.8
Written materials (brochures, pamphlets, flyers)	5	14.7	23.5
Educational sessions are not held	6	17.7	41.5
Individual training sessions	20	58.8	100
Total	75	100	-

Tab. 8 Absolute, relative and cumulative frequency of methodologies used for oral hygiene education activities for patients residing in nursing homes.

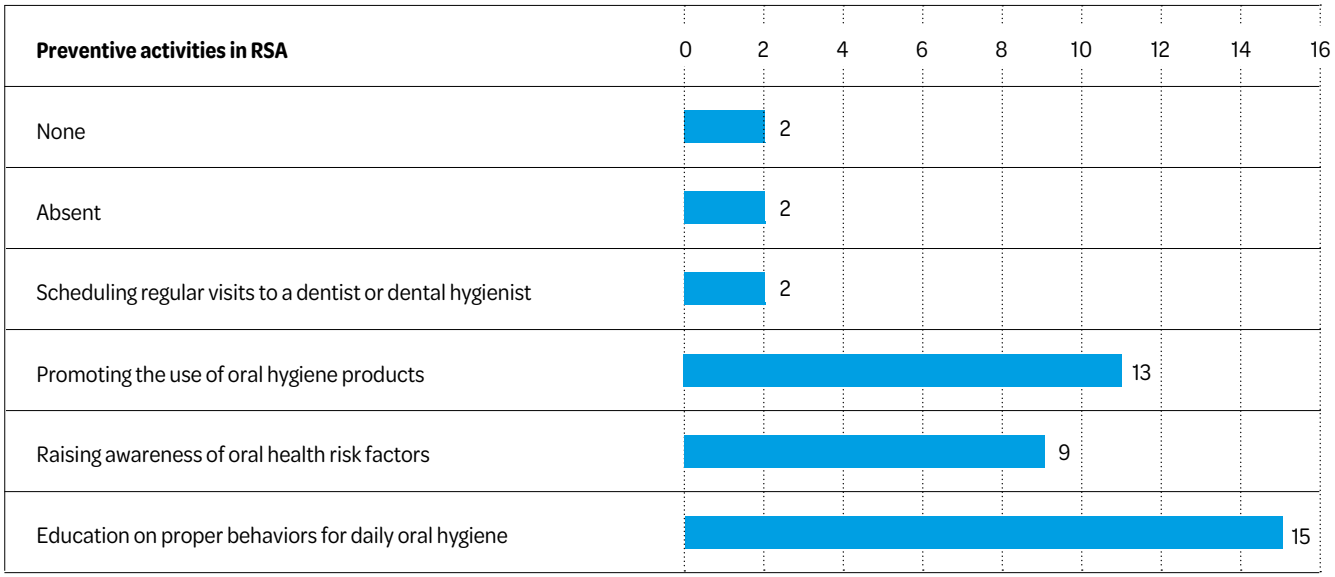

Fig. 6 Preventive activities adopted by RSAs.

	Samples			
Assessment of oral health needs	< 50	Tra 50 e 100	> 100	Total
Yes, a periodic assessment is performed	4 (12.1)	0 (0)	3 (9.1)	7 (21.2)
Yes, it is performed only in specific cases	3 (9.1)	8 (24.2)	7 (21.2)	18 (54.5)
No, a periodic assessment is not performed	2 (6.1)	6 (18.2)	1 (3)	7 (21.2)
I don't know	0 (0)	0 (0)	0 (0)	0 (0)
Total	9 (27.3)	13 (42.4)	11 (33.3)	33 (100)
Frequency of dental checkups				
Never	1 (3)	1 (3)	0 (0)	2 (6.1)
I don't know	1 (3)	3 (9.1)	1 (3)	5 (15.1)
Every 3-6 months	0 (0)	2 (6.1)	1 (3)	3 (9.1)
Rarely	6 (18.2)	7 (21.2)	5 (15.2)	18 (54.6)
Once a year	1 (3)	0 (0)	4 (12.1)	5 (15.1)
Total	9 (27.3)	13 (39.4)	11 (33.4)	33 (100)
Promotion of preventive practices				
Yes, preventive practices are promoted	5 (15.2)	4 (12.1)	6 (18.2)	15 (45.5)
No, preventive practices are not promoted	4 (12.1)	8 (24.2)	5 (15.2)	17 (51.5)
I don't know	0 (0)	1 (3)	0 (0)	1 (3)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Preventive activities				
Education on proper daily oral hygiene behaviors	6 (14.3)	5 (11.9)	4 (9.5)	15 (35.7)
Awareness of oral health risk factors	1 (2.4)	4 (9.5)	4 (9.5)	9 (21.4)
Promotion of the use of oral hygiene products	3 (7.1)	6 (14.3)	4 (9.5)	13 (30.9)
Scheduling regular visits to a dentist or dental hygienist	0 (0)	0 (0)	2 (4.8)	2 (4.8)
None	0 (0)	2 (4.8)	0 (0)	2 (4.8)
No response	1 (2.4)	0 (0)	0 (0)	1 (2.4)
Total	11 (26.2)	17 (40.5)	14 (33.3)	42 (100)
Patient oral hygiene education activities				
Yes, specific training is provided	5 (15.1)	0 (0)	5 (15.1)	10 (30.3)
No, specific training is not provided	4 (12.1)	12 (36.3)	6 (18.1)	22 (66.7)
I don't know	0 (0)	1 (3)	0 (0)	1 (3)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Patient oral hygiene education activities				
Individual training sessions	7 (20)	6 (17.1)	8 (22.9)	21 (60)
Written materials (brochures, brochures, flyers)	1 (2.9)	2 (5.7)	2 (5.7)	5 (14.3)
Audiovisual materials (videos, presentations)	1 (2.9)	0 (0)	0 (0)	1 (2.9)
Educational sessions are not held	0 (0)	5 (14.3)	1 (2.9)	6 (17.1)
No response	2 (5.7)	0 (0)	0 (0)	2 (5.7)
Total	11 (31.4)	13 (37.1)	11 (31.4)	35 (100)

Tab. 9 Absolute frequencies of variables relating to oral prevention in nursing homes divided by sample.

- In 18% of cases, data are systematically recorded.
- In 55% of cases, data are recorded only in specific cases.
- In 27% of cases, data are not recorded.

In particular, among those who record data, in 78.8% of cases, data are entered into the patient's general medical record.

The frequency of recording oral hygiene and oral health data is:

- Daily in 24% of cases.
- Monthly in 3% of cases.
- Only during specific visits or evaluations in 55% of cases.
- Not performed in 15% of cases.

Additionally, 3% reported not knowing whether data are recorded or not.

	Samples			
Collaboration with external professionals	< 50	Tra 50 e 100	> 100	Total
Yes, regularly	0 (0)	2 (6.1)	9 (27.3)	11 (33.3)
Yes, occasionally	8 (24.2)	10 (30.3)	0 (0)	18 (54.6)
No, there is no external collaboration	1 (3)	1 (3)	2 (6.1)	4 (12.1)
I don't know	0 (0)	0 (0)	0 (0)	0 (0)
Total	9 (27.2)	13 (39.4)	11 (33.3)	33 (100)
Presence of internal professionals				
Yes, there is a dentist	0 (0)	2 (6.1)	5 (15.2)	7 (21.1)
Yes, there is a dental hygienist	0 (0)	0 (0)	0 (0)	0 (0)
No, there is an external dentist or dental hygienist	3 (9.1)	1 (3)	2 (6.1)	6 (18.2)
No, there is neither an internal dentist nor dental hygienist	6 (18.2)	10 (30.3)	4 (12.2)	20 (60.6)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)

Tab. 10 Absolute frequencies of variables relating to the collaboration of nursing homes with a dental hygienist and/or a dentist.

	Samples			
Recording	< 50	Tra 50 e 100	> 100	Total
Yes, they are recorded systematically	1 (3)	6 (18.2)	4 (12.2)	11 (33.3)
Yes, they are recorded only in some specific cases	7 (21.2)	1 (3)	5 (15.2)	13 (39.4)
No, they are not recorded	1 (3)	6 (18.2)	2 (6.1)	9 (27.3)
I don't know	0 (0)	0 (0)	0 (0)	0 (0)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Place of recording				
In the patient's general health record	8 (24.2)	9 (27.3)	9 (27.3)	26 (78.8)
In a specific oral hygiene record	0 (0)	1 (3)	0 (0)	1 (3)
In both records, both in the general health record and in a specific record	0 (0)	0 (0)	1 (3)	1 (3)
They are not recorded	1 (3)	3 (9.1)	1 (3)	5 (15.2)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Recording frequency				
Daily	1 (3)	3 (9.1)	2 (6.1)	6 (6.1)
Weekly	0 (0)	0 (0)	0 (0)	0 (0)
Monthly	0 (0)	0 (0)	0 (0)	0 (0)
Only during specific visits or assessments	4 (12.1)	7 (21.2)	7 (21.2)	18 (54.5)
I don't know	1 (3)	0 (0)	0 (0)	1 (3)
They are not recorded	1 (3)	3 (9.1)	1 (3)	5 (15.2)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Type of data recorded				
Assessment of the oral hygiene index	1 (2.7)	1 (2.7)	3 (8.1)	5 (13.5)
Specific conditions of the teeth, gums, or dentures	7 (18.9)	7 (18.9)	9 (24.3)	23 (62.2)
Specific oral hygiene habits reported by the patient	3 (8.1)	3 (8.1)	2 (5.4)	8 (21.6)
Not recorded	0 (0)	0 (0)	0 (0)	0 (0)
Performance of oral hygiene procedures	0 (0)	1 (2.7)	0 (0)	1 (2.7)
Total	11 (29.7)	12 (32.4)	14 (37.8)	37 (100)

Tab. 11 Absolute frequency of variables related to the recording of oral health data in nursing homes.

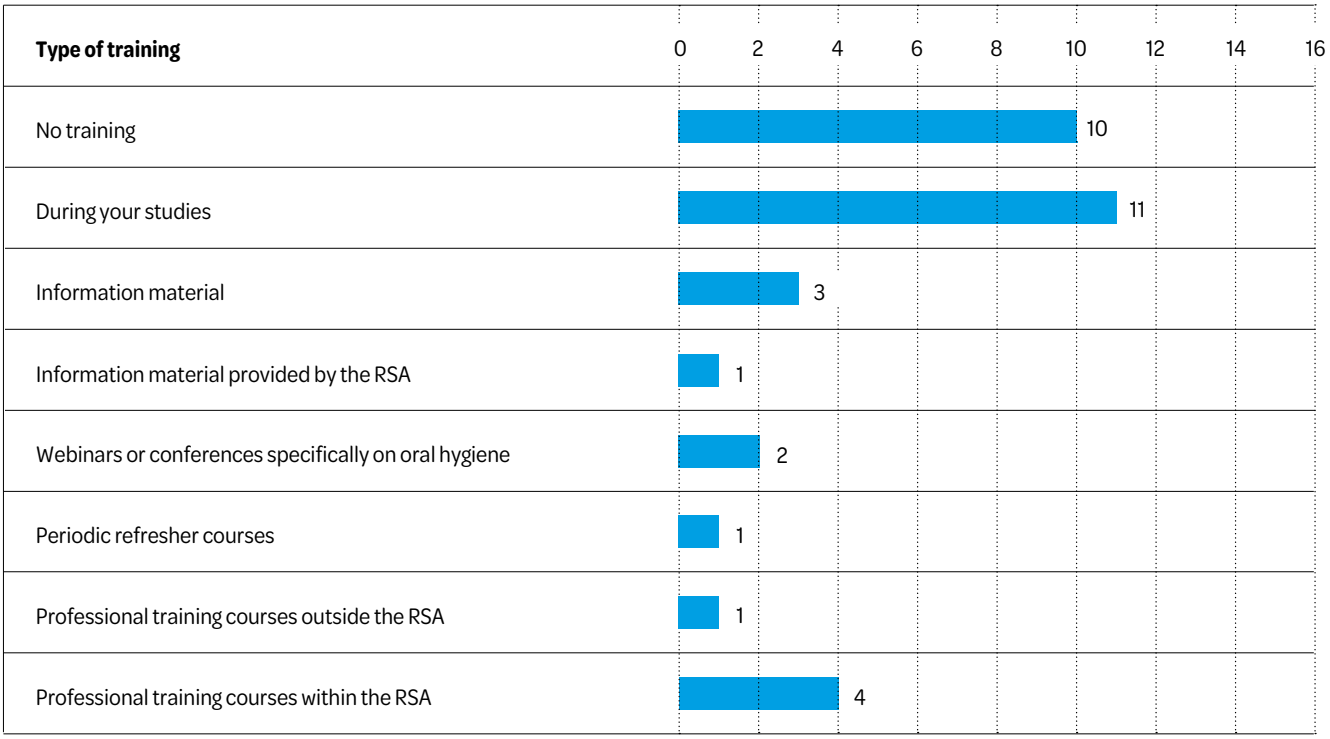

Fig 7 Absolute frequencies relating to the type of training received.

Training on Oral Hygiene for Staff

Regarding training on oral hygiene, the following emerged (Fig. 7):

- 55% have received training on oral hygiene.
- 45% have not received training on oral hygiene.
- In most cases, training was received during studies.

Regarding the time elapsed since the last training in oral health, it was observed that in most cases, no specific training was received and the time elapsed is more than 5 years (Fig. 8).

Regarding the evaluation of competencies related to the execution of oral hygiene procedures, it was found that (Fig. 9):

- Overall, in 12% of cases, a regular or occasional assessment of competences related to oral hygiene procedures was received.
- In 76% of cases, no assessment was ever received.

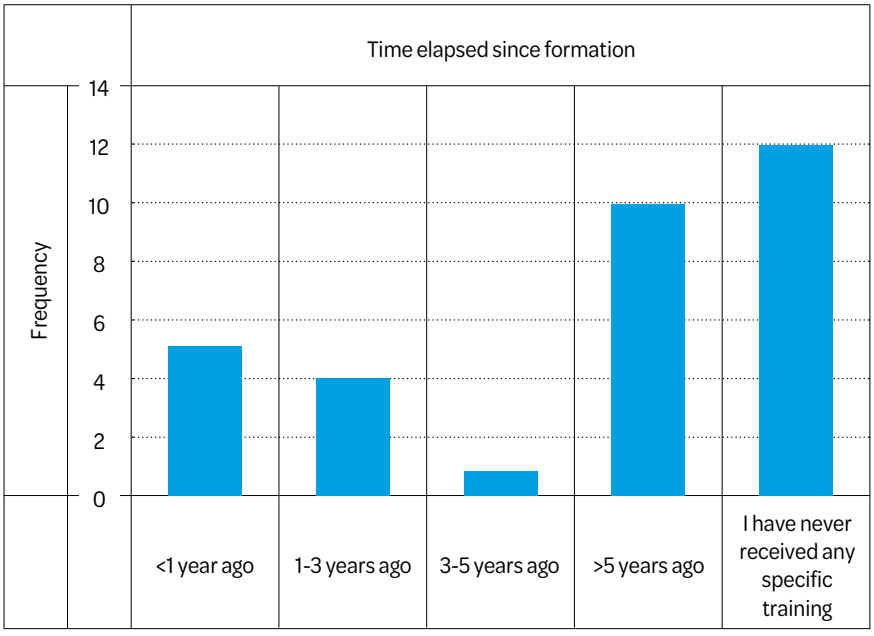

Fig 8 Graph showing the time elapsed since the last training in oral health.

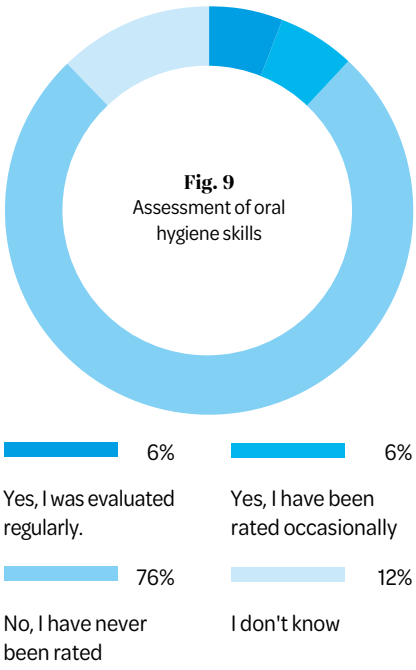

Fig. 9
Assessment of oral hygiene skills

	Samples			
Oral hygiene training	< 50	Tra 50 e 100	> 100	Total
Yes, I have received specific training	5 (15.2)	5 (15.2)	8 (24.2)	18 (54.5)
No, I have never received specific training	4 (12.1)	8 (24.2)	3 (9.1)	15 (45.5)
I'm not sure	0 (0)	0 (0)	0 (0)	0 (0)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Type of training				
Professional training courses within the nursing home	2 (6.1)	1 (3)	1 (3)	4 (12.1)
Professional training courses outside the nursing home	0 (0)	0 (0)	1 (3)	1 (3)
Periodic refresher courses	0 (0)	1 (3)	0 (0)	1 (3)
Webinars or specific conferences on oral hygiene	2 (6.1)	0 (0)	0 (0)	2 (6.1)
Informational material provided by the nursing home	0 (0)	0 (0)	1 (3)	1 (3)
Informational material	0 (0)	1 (3)	2 (6.1)	3 (9.1)
During studies	2 (6.1)	5 (15.2)	4 (12.1)	11 (33.3)
No training	3 (9.1)	5 (15.2)	2 (6.1)	10 (30.3)
Total	9 (27.3)	13 (39.4)	11 (33.3)	33 (100)
Time since last training				
Less than 1 year ago	1 (4)	3 (12)	2 (8)	6 (24)
1 to 3 years ago	0 (0)	0 (0)	0 (0)	0 (0)
3 to 5 years ago	0 (0)	0 (0)	0 (0)	0 (0)
More than 5 years ago	4 (16)	7 (28)	7 (28)	18 (72)
I have never received specific training	1 (4)	0 (0)	0 (0)	1 (4)
Total	6 (24)	10 (40)	9 (36)	25 (100)
Skills assessment				
Yes, I have been regularly assessed	2 (6.1)	0 (0)	0 (0)	2 (6.1)
Yes, I have been occasionally assessed	0 (0)	0 (0)	2 (6.1)	2 (6.1)
No, I have never been assessed	7 (21.2)	11 (33.3)	7 (21.2)	25 (75.8)
I don't know	0 (0)	2 (6.1)	2 (6.1)	4 (12.1)
Total	*9 (27.3)*	*13 (39.4)*	*11 (33.3)*	*33 (100)*

Tab 12 Absolute frequencies of variables relating to oral hygiene training received.

Finally, the absolute frequencies divided by sample for variables relating to the training of healthcare workers on oral hygiene are shown in Table 12.

DISCUSSION

Oral health is an important component of health, well-being, and quality of life. Good oral care is fundamental for maintaining oral health and forms the basis for preventing oral diseases among elderly residents in long-term care facilities (43).
However, this study showed that oral health within nursing homes remains a present but largely ignored issue, as evidenced by the low questionnaire response rate (11%). In fact, 37% of surveyed facilities reported that between 50% and 75% of elderly residents in nursing homes have oral problems, most frequently issues with prostheses (21.3%), difficulties in chewing (17.6%), problems with oral hygiene (15.4%), and tooth loss (15.4%).
The systematic review by Pino et al. (2003) reported that maintaining good oral health among elderly residents in long-term care is a crucial aspect for improving psychosocial well-being, which confirms the neglect of this area. It also reported that, generally, nursing home staff do not recognize the seriousness of poor oral health (44). Concerning the prevalence of oral diseases, literature reports that these are common in the elderly and include tooth loss, poor oral hygiene, dental caries, periodontal disease, absence of prosthetic rehabilitation or defective prosthetic devices, hyposalivation, and oral lesions

associated with prosthesis use or pre-cancerous or cancerous states (45), confirming the results of this study. The consensus report of group 4 of the EFP/ORCA joint workshop stated that epidemiological trends of caries and periodontal disease in this population group cannot be described due to the scarcity of data, but it was possible to demonstrate that non-self-sufficient elderly and those with cognitive decline have worse oral health than independent elderly without cognitive decline (46).

Furthermore, several studies have shown that neglect of oral health, resulting in poor oral hygiene, can trigger both local and systemic infections and inflammations. Oral infections were shown to be correlated with atherosclerosis, diabetes, and aspiration pneumonia (47, 48). In particular, Sjøgren et al. indicated that improved oral hygiene could have prevented about 10% of deaths due to pneumonia in nursing homes (49). Finally, compromised chewing function resulting from poor oral health has been associated with changes in eating habits, malnutrition, and cognitive decline (48).

This study further found that in 58% of the participating facilities there are no specific protocols or treatment plans for the oral hygiene of patients, who in most cases are non-self-sufficient. The person responsible for performing oral hygiene maneuvers for these patients is the healthcare assistant (91%) through direct assistance (53%) with disposable toothbrushes or sponges. For self-sufficient patients, supervision of oral hygiene is provided by nurses in 33% and by healthcare assistants in 64%. With regard to oral hygiene training, 55% of interviewees had received specific training, in most cases during their studies, while the remaining 45% had not received any training. The time since the last training was predominantly more than 5 years, and 76% had never had their competencies assessed.

Oral hygiene is an integral part of daily care in long-term care facilities. Nurses and care workers are responsible for oral hygiene in these facilities. Although various oral hygiene protocols may be established, these are often neither sufficiently frequent nor in-depth, leaving residents' oral hygiene suboptimal. Furthermore, the low priority, lack of knowledge and skills in oral health are factors that prevent workers from carrying out oral hygiene maneuvers (50). Another study reported that the most frequently reported barriers by workers are lack of knowledge and competences, resistant behaviors especially among dementia patients, lack of suitable oral hygiene routines, absence of systems for documenting oral health problems, high workload, and lack of a control system (47). The literature shows that educational programs not only increase knowledge but also improve attitudes among care workers regarding oral hygiene (50). A study by Garry et al. showed that increasing the level of knowledge and skills related to oral hygiene is an effective strategy for improving patients' oral health (51).

With respect to the adoption of preventive behaviors regarding oral health among nursing homes, this study showed that it is rather poor. In 52% of cases, no preventive practices are promoted. Regarding the execution of periodic assessments to evaluate the oral health status of patients, in 55% of cases this only occurs in specific cases, which suggests a therapeutic rather than preventive approach to oral health. Supporting this, the data showed that dental check-ups are rarely scheduled in 54.5% of cases, oral health data are recorded only in specific instances in 55% of cases, and 67% of facilities do not provide patients with any oral education.

A recent systematic review showed that although oral diseases are among the most common chronic conditions and represent a significant public health problem due to their prevalence and the high cost of treatment, there is a general but mistaken belief that oral hygiene and dental care are not important (52). Furthermore, it has been reported that removal of dental plaque at least twice a day (morning and evening) is fundamental in maintaining oral health, especially in dependent elderly people. However, despite the crucial role that hospital and other long-term care facility staff could play in maintaining and improving oral health in this patient category, they are often unaware of specific oral care and hygiene protocols, except in some cases (such as mechanical ventilation) (52, 53).

It is also reported that oral problems in the elderly are largely underdiagnosed due to barriers or preconceptions about oral health. As people age, they tend to forego routine dental care, while the number of consultations with non-dental healthcare providers increases, but few of these are well trained to assess oral problems, advise on or perform appropriate oral care, or identify problems that should be referred to a dental professional (45). Indeed, regarding collaboration with such professionals, this study found that 55% of the surveyed facilities occasionally collaborate with them. Within the nursing home, it was found that in 61% of cases there is neither a dentist nor a dental hygienist; a dentist was present in 21% of facilities, and in no case was there a dental hygienist. These data confirm a generally passive approach to oral health.

However, most chronic oral diseases, like caries, periodontal disease, and many oral lesions, can be prevented and successfully treated if diagnosed early (45), and oral pathologies and conditions associated with aging require greater preventive, periodontal, and restorative dental care (54). Dental hygienists are qualified oral health professionals, specifically trained to develop personalized oral care plans and prevention programs to reduce oral diseases in the community (55).

The study by Vigild et al. (1998) showed that an oral health care program for residents of nursing homes or long-term care facilities, which provided oral examinations, dental treatments, oral prophylaxis, and instructions both to nursing staff and residents, reduced the number of carious lesions, the need for periodontal treatments, the prevalence of prosthesis-related stomatitis, and improved prosthesis hygiene (56). Consistently, the study by Yoneyama et al. (2002) demonstrated that brushing teeth by nurses and caregivers, combined with professional oral care by dentists and dental hygienists, was associated with reduced pneumonia, fewer fever days, reduced pneumonia mortality, and improved daily living activities and cognitive functions among institutionalized elderly people (57).

The vulnerability to diseases among the elderly can be influenced by various factors, such as comorbidities, frailty, medication use, reduced salivary secretion, widespread use of fixed and removable dentures, and changes in vision, tactile sensitivity, cognitive and motor functions, including the ability to perform effective oral hygiene. Thus, a personalized oral healthcare plan is particularly important for vulnerable elderly people (46).

Nonetheless, a World Health Organization survey on the oral health of elderly patients revealed that programs targeting this population segment are rather rare, noting that the approach tends to be therapeutic rather than ideally preventive (52, 58), confirming the findings of this study. For these reasons, hospitalization or long-term residency in care facilities represents an excellent opportunity to provide dental care that might otherwise not be available (52).

The standard of oral healthcare in nursing homes or facilities is rarely comparable to that of the general population. Dental hygienists, as providers of preventive oral care, have a great opportunity to fill this gap and raise the standard of care (59, 60). In this way, vulnerable elderly residents in these facilities need not resign themselves to losing their teeth or having a lower quality of life due to lack of access to care (59).

CONCLUSIONS

Taking into account the results of the present study and those already present in the literature, it is possible to deduce that the role of the dental hygienist could be crucial for promoting and maintaining the oral health of elderly residents in nursing homes. In addition, the involvement of this professional could play a key role in training staff on oral hygiene, helping to shift from a therapeutic towards a more prevention-centered approach and improving the residents' quality of life.

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