

A pre and post-test assessment of an oral health intervention: caregivers' knowledge and attitudes at long-term care facilities in the eThekweni district, KwaZulu-Natal

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ABSTRACT

Introduction

Oral health remains a neglected aspect of healthcare among vulnerable populations residing at long-term care (LTC) facilities. Routine oral health education and training for caregivers have the potential to improve oral health provision.

Aims and objective

To determine the effect of an oral health intervention on caregivers' knowledge and attitudes.

Methods

This cross-sectional study utilised a pre/post-test assessment approach. A total of n=145 caregivers from n=7 LTC facilities in the eThekweni district, participated in a pre-test questionnaire. An oral health education intervention in the form of a PowerPoint® presentation was implemented four weeks later. Six months later, a post-test questionnaire was administered. A Paired proportion test was used for statistical analysis. A p-value ≤ 0.05 was considered to be statistically significant.

Results

A response rate of 77.1% was obtained. In the pre-intervention phase, caregivers (n=68; 46.9%) reported that loose teeth can be a sign of gum and bone disease, compared to 89% (n=129) of caregivers in the post-intervention phase. Caregivers (n=124; 85.5%) in the pre-intervention phase felt that they should be trained in providing oral healthcare, compared to 93.8% (n=136) in the post-intervention phase.

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Conclusion

The oral health intervention had a positive effect on caregivers' knowledge and attitudes. This finding necessitates routine oral health education and training for caregivers.

Keywords

Caregivers, long-term care facilities, institutionalised residents, oral health education, oral health training

INTRODUCTION

Oral disease is a major public health concern due to the high prevalence and debilitating social impact on individuals globally.^{1,2} The prevalence of oral disease is significantly higher in dependent populations with special needs, including the elderly population, vulnerable children and cognitively or physically impaired individuals residing at LTC facilities.^{3,4,5,6} Poor oral health among residents at LTC facilities, present with far reaching consequences and have implications on preventive, promotional and future dental treatment.^{3,7,8,9} Previous international studies have postulated that the higher incidence of oral disease among institutionalised residents could be attributed to barriers in accessing appropriate oral healthcare.^{7,10} These barriers include: cost of oral healthcare services, residents' impaired mental abilities or limited physical dexterity, low perceived need for oral care by residents and caregivers, and caregivers' lack of oral health knowledge.^{7,11} Caregivers are expected to play an important role in the prevention of oral disease and deliverance of appropriate and adequate oral healthcare to satisfy the special oral health needs of residents at LTC facilities. This, however, may not always be realised due to prioritisation of other caregiving duties resulting in a deficiency of time, a lack of knowledge and skills in oral healthcare, non-communicative and uncooperative residents, and a lack of understanding of the importance of oral health among caregivers.^{7,10}

Numerous international studies have identified the lack of adequate oral health knowledge among caregivers as a recurrent contributing factor to poor oral health among institutionalised residents.^{1,7,11} Consequently, substantial international literature has highlighted the importance and effectiveness of oral health education in a variety of settings, including LTC facilities.^{1,6,7,10,12,13} It was found that the success of oral health education depends on the co-operation of caregivers and regular in-service training with frequent monitoring.⁷ Integration of oral healthcare services into routine

healthcare services is another fundamental method in achieving better oral health outcomes and, in turn, better overall quality of life for individuals.¹ This can be achieved through collaboration with nursing staff, and dental and medical professionals, in the provision of healthcare services for institutionalised residents.¹⁴ Additionally, incorporating oral examinations into routine care by caregivers has been reported by several authors as a useful tool in improving institutionalised residents' oral health.^{11,15,16}

Caregivers are often the first healthcare providers and thus have a responsibility and duty in providing oral healthcare to the institutionalised residents.¹⁸ Caregivers' oral health related knowledge and skills may directly or indirectly affect the quality of care rendered to the residents. There is a paucity of information available in South Africa exploring the oral health related knowledge and attitudes among caregivers. Thus, the aim of this study was to evaluate the impact of an oral health education intervention among caregivers at LTC facilities in the eThekweni district. The scientific hypothesis of the study was that oral health education intervention for caregivers would result in an improvement in their oral health related knowledge, attitudes and, in turn, practices.

METHODS

The study utilised a cross-sectional, analytical and comparative research design and a pre/post-test assessment approach. Study sites included n=39 LTC facilities operated by non-profit organisations selected from "eThekweni health and well-being service provider directory 2018" and n=28 private or semi-private operated LTC facilities from a website called "Senior service retirement places" on search engine company Google.^{19,20} Every facility from the above-mentioned directory and website were purposively included in the selection process. A total of seven (n=7) long-term care facilities participated in the study, which included six (n=6) old age homes and one (n=1) children's home in eThekweni, all of which offer long-term care. Caregivers at the participating LTC facilities were purposively sampled using a criterion and snowball sampling technique. A sample of one hundred and eighty-eight (n=188) questionnaires were distributed among voluntary participants of which one hundred and forty-five (n=145) were suitable for further analysis, yielding a response rate of 77.1%.

Prior to conducting the research, details of the study were explained and written permission was obtained from managers of each facility. Participants were invited to partake in the study and informed consent was obtained. Study participants were informed that the study was voluntary and were free to withdraw from the study at any stage, without any negative consequences.

In consultation with the gatekeepers of each facility, overseeing the completion of the questionnaires was not permissible due to the Covid-19 risk. In keeping with Covid-19 protocols and policy of each facility, in order to minimise contact with staff and caregivers the pre and post-test self-administered questionnaires were distributed to participating caregivers by the managers or nurses of each facility.

A pre-test self-administered questionnaire was distributed among participants and used to gather baseline quantitative data. An oral health education intervention in the form of a PowerPoint® presentation was implemented one month later. Six months later, a post-test self-administered questionnaire was distributed among the same participants to evaluate the effect of the oral health education intervention.

A 15-item questionnaire was developed in English to assess caregivers' oral health related knowledge and attitudes pre and

post-intervention. The first section of the questionnaire included questions on participants' biographical information such as: gender, age, level of education and years of work experience. The second part included questions on knowledge such as: denture care, recognition and management of common oral conditions, recognition of oral side effects of medications, nutrition and diet, and paediatric dentistry in the form of a Likert scale with the format of responses: 1-strongly agree, 2-agree, 3-not sure, 4-disagree and 5-strongly disagree. Other questions included knowledge of oral hygiene, understanding of dental terms and mechanism of dental decay. The third part of the questionnaire focused on participants' attitudes regarding care for residents, recognition of residents' special oral health requirements, oral health training and existing oral health protocols, which was presented in the form of a Likert scale. Closed ended questions were used in this questionnaire. The oral health education intervention in the form of a PowerPoint® presentation, focused on the importance of the caregivers' role in maintaining adequate oral hygiene for the residents, which included management of common oral conditions, special oral health care practices for residents, diet and nutrition, and proper oral hygiene instructions such as brushing and flossing techniques. Video clips demonstrating proper oral hygiene and brushing techniques and utilising dental aids were also included. The oral health education intervention was based on guidelines outlined by the World Health Organisation.²¹ The researcher provided the participants with toothbrushes, toothpaste, flossing aids and pamphlets on oral hygiene education to enhance the effectiveness of the oral health education intervention.

Before commencing the study, a pilot study was conducted among (n=8) caregivers at a long-term care facility in eThekweni, who were excluded from the final questionnaire. Inconsistencies, ambiguity and grammatical errors were rectified before conduction of the study.

Pre and post-test evaluation of oral health scores were performed using the same semi-structured self-administered questionnaire. The collected data were entered into Microsoft Excel 2007 and subjected to statistical analysis using SPSS version 27.0 (IBM Statistics Inc, Chicago, Illinois, USA). The Paired proportion test was used to find the significance of change in proportion from pre to post-intervention. A p-value ≤ 0.05 was considered to be statistically significant.

The study was granted ethical clearance by the Biomedical Research Ethics Committee at the University of KwaZulu-Natal (BREC/00002633/2021). All other ethical issues, such as confidentiality and anonymity, were maintained.

RESULTS

Socio-demographic profile of caregivers

All participants were females with the majority being within the age group 37-42 years old (n=37; 25.5%), holding a secondary level of education (n=99; 68.3%), and having had 6-10 years of caregiving experience (n=69; 47.6%), as demonstrated in Table 1.

Pre and post-test evaluation of caregivers' oral health related knowledge

About 16.6% (n=24) of the caregivers disagreed with the statement that a person can chew and eat as well with false teeth (dentures) as with natural teeth in the pre-intervention phase, compared to 50.3% of the study sample (n=73) in the post-intervention evaluation who disagreed with the statement, as demonstrated in Table 2.

Table 1. Participants' sociodemographic profile

Variable	Categories	n (%)
Gender	Female	145 (100)
	Male	0 (0)
Age group	24-29 years old	18 (12.4)
	30-36 years old	36 (24.8)
	37-42 years old	37 (25.5)
	43-47 years old	33 (22.8)
	48-53 years old	12 (8.3)
	54-59 years old	8 (5.5)
	60-66 years old	1 (0.7)
Level of education	No formal schooling	2 (1.4)
	Secondary education	99 (68.3)
	Tertiary education	44 (30.3)
Work experience	1-5 years	44 (30.3)
	6-10 years	69 (47.6)
	11-15 years	28 (19.3)
	>15 years	4 (2.8)

Before the oral health education intervention, less than half of the caregivers (n=63; 43.4%) agreed that false teeth (dentures)

that do not fit well can cause ulcers and, in some cases, oral cancer. In the post-intervention evaluation, the majority of the caregivers (n=112; 77.2%) agreed with the statement.

With regard to the statement: "Losing teeth is expected as part of the ageing process", few caregivers (n=20; 13.8%) disagreed with the statement in the pre-intervention phase. In the post-intervention evaluation, 57.9% of the caregivers (n=84) disagreed with the statement. Less than half of the caregivers (n=68; 46.9%) in the pre-intervention phase agreed that loose teeth can sometimes be a sign of gum and bone disease, while 89% of caregivers (n=129) in the post-intervention agreed.

Some participants (n=61; 42.1%) in the pre-intervention phase indicated that dry mouth management can include chewing on ice chips and sugar-free gum, compared to n=108 caregivers (74.5%) in the post-intervention phase with the same response.

In the pre-intervention phase, 49.7% of the caregivers (n=72) disagreed with the statement: "Drinking an adequate amount of water between meals is not very beneficial in maintaining good oral health", compared to 60% of caregivers (n=87) in the post-intervention evaluation who disagreed. Caregivers' theoretical oral health related knowledge pre and post-intervention is demonstrated in Table 3.

Table 2. Pre and post-test evaluation of caregivers' clinical oral health related knowledge

Statements on knowledge	Pre-test				Mean value	Post-test			Mean value	p-value
	Agree n (%)	Unsure n (%)	Disagree n (%)	Agree n (%)		Unsure n (%)	Disagree n (%)			
A person can chew and eat just as well with false teeth (dentures) as with natural teeth	104 (71.7)	17 (11.7)	24 (16.6)	2.45	66 (45.5)	6 (4.1)	73 (50.3)	3.05	<0.001**	
False teeth (dentures) that don't fit well can cause ulcers and, in some cases, oral cancer	63 (43.4)	49 (33.8)	33 (22.8)	2.79	112 (77.2)	12 (8.3)	21 (14.5)	2.37	<0.001**	
Losing teeth is expected as part of the ageing process	110 (75.9)	15 (10.3)	20 (13.8)	2.38	58 (40)	3 (2.1)	84 (57.9)	3.18	<0.001**	
Loose teeth can sometimes be a sign of gum and bone disease	68 (46.9)	42 (29)	35 (24.1)	2.77	129 (89)	8 (5.5)	8 (8.5)	2.17	<0.001**	
Dry mouth management can include chewing on ice chips and sugar-free gum	61 (42.1)	47 (32.4)	37 (25.5)	2.83	108 (74.5)	29 (20)	8 (5.5)	2.31	<0.001**	
Mouth rinsing is a good alternative to daily brushing teeth and flossing	102 (70.3)	16 (11)	27 (18.6)	2.48	79 (54.5)	6 (4.1)	60 (41.4)	2.87	<0.001**	
Drinking an adequate amount of water between meals is not very beneficial in maintaining good oral health	45 (31)	28 (19.3)	72 (49.7)	3.19	40 (27.6)	18 (12.4)	87 (60)	3.32	0.150	
Cleaning the tongue by brushing or scraping is a very important part of oral hygiene practices	122 (84.1)	7 (4.8)	16 (11)	2.97	138 (95.2)	3 (2.1)	4 (2.8)	3.62	<0.001**	
In children, decayed teeth are normal and do not need to be treated as they will fall out soon	66 (45.5)	17 (11.7)	62 (42.8)	3.46	24 (16.6)	7 (4.8)	114 (78.6)	3.77	<0.001**	
Smelly breath in children is normal	31 (21.4)	16 (11)	98 (67.6)		14 (9.7)	5 (3.4)	126 (86.9)		<0.001**	

**Statistically significant p≤0.05

Table 3. Pre and post-test evaluation of caregivers' theoretical oral health related knowledge

Statements	Pre-test n (%)	Post-test n (%)
Calculus is a germ-containing substance that collects on the surface of the teeth, calcifies and causes gum and bone disease over a period of time.	36 (24.8)	114 (78.6)
Fluoride has been proven to prevent tooth decay and helps strengthen teeth.	104 (71.7)	128 (88.3)
Plaque is a germ-containing substance that collects on the surface of teeth and causes decay.	68 (46.9)	120 (82.8)
Bacteria in the mouth stick on to the sugary tooth surface and create acid which leads to the formation of cavities.	58 (40)	107 (73.8)

ATTITUDES

Less than half of the participants (n=54; 37.2%) in the pre-intervention phase reported that insufficient oral health promotion and education has been provided for caregivers and residents at LTC facilities. In the post-intervention evaluation, 46.2% of caregivers (n=67) had the same response, as illustrated in Table 4.

Most of the sample population (n=124; 85.5%) indicated to feel that caregivers should be trained to perform oral screening and provide oral health education for residents in the pre-intervention phase, compared to almost all participants (n=136; 93.8%) in the post-intervention evaluation who shared the same sentiment.

With regard to the statement: "I feel there are no guidelines on how to manage the oral needs of residents at long-term care facilities", before the oral health intervention, 35.2% of the caregivers n=51 agreed with the statement. In the post-intervention evaluation, 42.1% of caregivers n=61 reported to feel the same.

DISCUSSION

All participants in the study were female, which coincides with several studies involving caregivers at LTC facilities.^{22,23,24} A possible reason for this could be attributed to the perceived cultural stereotype where jobs involving care and nurturing are reserved for females.²⁴ The majority of the caregivers in the current study reported to hold a secondary level of education (68.3%). Similarly, a study evaluating the impact of an oral health educational programme for caregivers of institutionalised residents found that the majority of caregivers (64.3%) had only obtained elementary school education.¹² Walid, Nasir and Naidoo, (2004) suggested that although not ideal, in developing and underresourced countries such as South Africa, non-healthcare workers can contribute to the promotion of oral health through training and education and, in turn, improve oral health outcomes for residents at LTC facilities.²⁵

Oral health related knowledge among caregivers

The results of the study indicated that caregivers' overall oral health knowledge increased from baseline to post-intervention. Similar studies have postulated that implementation of oral health interventions, regardless of the measured variables, may result in better oral health outcomes for institutionalised residents due to improved knowledge among caregivers.^{12,26}

Due to physical and cognitive limitations, self-care oral hygiene practices may not be adequate, inevitably resulting in unmet oral health needs and reduced quality of life among residents.² Thus, caregivers have a significant

responsibility towards providing residents with optimal oral healthcare. However, numerous studies have reported that the oral health knowledge among caregivers is inadequate, perpetuating poor oral health among residents.^{1,3,7,12,27,2} Therefore, many authors have postulated that by improving oral health knowledge among caregivers through education and training, oral hygiene practices among care-dependent residents could improve.^{10,22,2,30}

Caregivers (n=73; 50.3%) in the post-intervention phase acknowledged that individuals with dentures cannot chew as efficiently as those individuals with natural teeth. Hence, caregivers also play an important motivational role in advising and assisting denture wearing residents with proper denture education, including food selections, in order to avoid gastro-intestinal ailments and nutritional deficiencies.⁸ The majority of the caregivers (n=112; 77.2%) in the post-intervention phase reported that ill-fitting dentures can cause ulcers and, in some cases, oral cancer. This finding concurs with a study conducted by Manoharan, Nagaraja and Eslick (2014), who found that the use of dentures – and more so ill-fitting dentures – increases the risk of developing cancer. It is thus imperative that caregivers' knowledge in denture care be optimal and that preventive measures such as oral screenings and checking of dentures are made mandatory at LTC facilities, in order to prevent denture related conditions such as denture stomatitis, oral candidiasis and ulcerations, which can manifest into more sinister conditions if left untreated.^{8,31}

Vulnerable, abandoned and disadvantaged children form a socially marginalised population and therefore tend to experience more oral diseases.³² Khedekar *et al.* (2015) investigated the oral hygiene status of orphanage children in India and found that the majority of the orphaned children (59%) had experienced toothache and almost all children did not visit the dentist.³² In the current study, caregivers' knowledge regarding the importance of seeking professional dental treatment for decayed teeth in children in the pre-intervention phase was low (n=62; 42.8%). This finding highlights the fact that children's oral health is neglected and not deemed a priority by caregivers, which can be attributed to the lack of knowledge and expertise among caregivers in recognising symptoms of dental diseases. Khedekar *et al.* (2015) further found that bad breath and bleeding gums were a common finding among the children at the orphanage in India.³² Some caregivers (n=31; 21.4%) in the pre-intervention phase reported that smelly breath in children was normal, which raises a major concern with regard to a lack of oral hygiene reinforcement by caregivers and indicates a lack of paediatric dental knowledge. While this response decreased (n=14; 9.7%) following the oral health intervention, the documented high prevalence of

Table IV. Pre and post-test evaluation of caregivers' oral health attitudes

Statements on attitude	Pre-test			Mean value	Post-test			Mean value	p-value
	Agree n (%)	Unsure n (%)	Disagree n (%)		Agree n (%)	Unsure n (%)	Disagree n (%)		
I feel compassion and a desire to improve the oral health status of residents at long-term care facilities	126 (86.9)	12 (8.3)	7 (4.8)	2.01	132 (91)	12 (8.3)	1 (0.7)	1.87	0.103
I am afraid of performing oral screening for residents at long-term care facilities because they might infect me	15 (10.3)	9 (6.2)	121 (83.4)	3.80	7 (4.8)	19 (13.1)	119 (82.1)	4.00	0.063
I am unaware of the special oral needs of residents at long-term care facilities	36 (24.8)	16 (11)	93 (64.1)	3.46	60 (41.4)	11 (7.6)	74 (51)	3.06	0.003
Not enough oral health promotion and education is provided for caregivers and residents at long-term care facilities	54 (37.2)	31 (21.4)	60 (41.4)	3.02	67 (46.2)	16 (11)	62 (42.8)	2.92	0.250
I feel it is my duty as a caregiver to provide optimal oral health services to residents at long-term care facilities	128 (88.3)	5 (3.4)	12 (8.3)	1.98	134 (92.4)	9 (6.2)	2 (1.4)	1.77	0.056
I feel that caregivers should be trained to perform oral screening and oral health education for residents	124 (85.5)	6 (4.1)	15 (10.3)	2.08	136 (93.8)	4 (2.8)	5 (3.4)	1.79	0.009**
I feel there are no guidelines on how to manage the oral needs of residents at long-term care facilities	51 (35.2)	22 (15.2)	72 (49.7)	3.12	61 (42.1)	22 (15.2)	62 (42.8)	2.94	0.131

**Statistically significant $p \leq 0.05$

dental caries and oral disease among children residing in orphanages necessitates more attention towards improving the knowledge and skills of caregivers and creating oral health awareness at LTC facilities. Likewise, both authors Khedekar *et al.* (2015) and Bushra and Othman (2022) noted significant improvement in caregivers' knowledge, attitudes and practices following an oral health education programme involving oral health provision for orphaned children.^{32,33}

Oral health related attitudes among caregivers

Almost all caregivers (n=132; 91%) in the post-intervention phase expressed compassion and optimism to improve the oral health status of the residents under their care and felt that providing optimal oral healthcare to the institutionalised residents was their desire and duty (n=134; 92.4%). Conversely, Cornejo-Ovalle *et al.* (2013) found that approximately one third of caregivers felt obligated to work at a LTC facility for the elderly because of necessity.²⁴

Additionally, Wardh, Andersson and Sorensen (1997) found that caregivers were not keen on cleaning the residents' mouths and preferred conducting other nursing duties, in effect neglecting the residents' oral health.³⁴ Encouraging was the finding that the majority of caregivers (n=119; 82.1%) in the current study's post-intervention phase were not afraid to examine the residents' mouths and perform oral screenings. The post-intervention results indicated that many caregivers (n=67; 46.2%) felt that insufficient oral health promotion and education programmes were conducted at LTC facilities, and 42.1% of the caregivers (n=61) reported to feel that there were no guidelines on how to manage the special oral needs of residents. These findings are significant as they highlight the lack of oral health prioritisation at LTC facilities and indicate the dire need for clear oral health guidelines and protocols.

Almost all caregivers in the post-intervention phase of the current study (n=136; 93.8%) strongly felt that they should be trained to perform oral screenings and oral health education for residents. Similarly, studies conducted by Lago *et al.* (2017) and Cornejo-Ovalle *et al.* (2013) found that caregivers at LTC facilities reported to request more training in oral health.^{12,24} The finding of the current study necessitates the implementation of oral health education for caregivers as a means to prioritise and promote oral health and, in turn, provide adequate oral health services to the residents at LTC facilities. Petrovski *et al.* (2019), proposed that oral health education programmes must include evaluation of the oral health status of the institutionalised residents, oral health education tailored towards the integral role caregivers play in heeding to the special oral health needs of residents, and planning of oral hygiene practices for the residents, so as to meet the basic criteria for prevention of oral diseases and appropriate management thereof.¹⁰

STUDY LIMITATIONS

Due to the Covid-19 pandemic and the subsequent regulations on lockdown, the number of participating LTC facilities were limited to seven n=7 from a total sample of n=67. Access to study sites was prohibited to visitors, including the researcher, which resulted in a delay of the data collection. The use of self-reported questionnaires may have resulted in over or underreporting by reason of social desirability, thereby not necessarily demonstrating the current situation^{35,36} The study was limited to the eThekweni district and cannot be generalised to other regions of KwaZulu-Natal. Further research on a larger scale is required to explore the effect of an oral health education intervention on the oral health related knowledge, attitudes and practices of caregivers at long-term care facilities in South Africa.

RECOMMENDATIONS

The results of this study can be used to make recommendations to oral health planners and stakeholders to develop clear and comprehensive oral health policies within LTC facilities, and on a national level. More emphasis needs to be placed on oral health promotion during the planning process of oral health policies to address the special needs of individuals residing at LTC facilities. Additionally, the nursing curriculum should be more inclusive of oral health education to ensure better oral disease management and appropriate referral pathways are followed, thereby facilitating prompt treatment and improving overall quality of life among residents. Regular in-service oral health training can equip caregivers with the necessary knowledge and skills to provide preventive and promotional activities, such as oral screenings, to the residents under their care. Furthermore, a multidisciplinary and multisectoral approach can be formed with dental professionals, dental students and other healthcare professionals and sectors, to provide oral screenings to the residents as a means of increasing access and improving the oral and overall health of residents.³⁷

CONCLUSION

The results of the study showed that there was an improvement in the oral health knowledge and attitudes among the caregivers in the post-intervention phase. The study revealed the importance and effectiveness of an oral health education intervention and therefore highlights the need for a scale up in oral health education and training at LTC facilities.

Conflict of interest

The authors declare they have no financial or personal relationships that may have inappropriately influenced them in writing this article. The authors consent to publication and declare there are no conflicting interests.

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