ORIGINAL ARTICLE

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Training caregivers: disabilities and dental hygiene

Abstract: Objectives: The purpose of the study was to measure the effectiveness of oral health education and training among caregivers. Methods: Controlled study design. Participants were randomized from the sample n = 30. n = 14 participants in the experimental group and n = 10 in the control group. The experimental group received a lecture and hands-on training in oral hygiene procedures. The control group received a facilitated group discussion. Both groups received a pre-post test. Results: Considering the two groups independently, using a paired *t*-test, the experimental group, n = 14 had a score difference of 0.0607 (*P*-value = 0.01) and the control group n = 10, had a score difference of 0.035 (P-value = 0.14). Conclusion: This study found that knowledge was improved among caregivers following the implementation of formal oral hygiene training. Although the control group also showed some improvements with the facilitated discussion, the results are not significant to say that both the formal training and the facilitated discussion are equally important in training caregivers effectively.

Key words: developmental disabilities; oral health; oral hygiene training; special needs

Introduction

The lack of oral health in persons with developmental disabilities is prevalent and a concern to health professionals (1–15). Several studies have shown that oral health is important to maintain overall systemic health (4, 7, 15). Maintenance of oral health in people with developmental disabilities is many times the responsibility of their support staff, which in turn results in poor oral hygiene if the support staff is not well trained or has insufficient knowledge in oral care (1, 15). Caregivers' lack of oral health training compromises the client's overall systemic health (7, 16). In addition, it is important to ascertain if oral health knowledge plays a role in the direct care staff's delivery of oral care in regard to their overall educational level. Training for caregivers is crucial not only to maintain adequate oral health among their clients but equally important is their recognition that oral and systemic health are directly associated.

Studies conducted by Frenkel *et al.* in 2002 and Nicol *et al.* in 2005 showed that support staffs' knowledge was deficient when speaking of denture wear and denture related complications. In addition, support staff would stop brushing their client's teeth if their gums started to bleed (3). After appropriate oral health training was provided by oral health professionals, support staff were more effective at cleaning the client's dentures and inserting their fingers inside their client's mouth to brush their teeth



(2, 3). However, support staff continued to believe that they had to stop brushing every time their client's gums would bleed (3). The use of appropriate oral health education was effective in increasing the overall knowledge of support staff (8) Frenkel *et al.* point out that knowledge and attitude changes are prerequisites to behavioural change. It is necessary for educators to not only increase the support staff's knowledge in oral health, but also to help change their attitudes regarding bleeding gums (3).

The impact of periodontal disease on a person's health could be significant. Periodontal diseases are typically caused by poor oral hygiene and other predisposing factors such as genetic syndromes and immunocompromised health. Periodontal diseases are correlated with increased incidence of developing pneumonia, diabetes, heart disease and other associated systemic conditions (5, 12). There is also a positive relationship between periodontal diseases and an increase in cholesterol, serum iron, hypertension, and white blood cell count, among others (12, 16).

People with disabilities face many challenges when receiving oral health care. The lack of dental providers specialized in the treatment of people with disabilities, the risk of aspiration pneumonia, the increased behavioural aggression and the like are just some of the challenges people with disabilities might experience when receiving oral health.

Hypothesis

Formal oral hygiene training is more effective than an oral health discussion when providing training to caregivers of people with disabilities.

Study population and methodology

Expedited approval was obtained from the Human Research Review Committee (HRRC) at the University of New Mexico prior to the initiation of this study. Study and protocol number HRRC#: 09-456.

A convenience sample of 30 caregivers was taken from a population of 250 employees at ARCA; a non-profit organization dedicated to provide service to people with disabilities. An experimental design was used for this research study. Enrolment was established on voluntary participation and assigning participants randomly to either group A (experimental) or group B (control) based on phone calls. Random assignment of the research subjects to one of two sites was completed by the health coordinator/recruiter of ARCA. The first caller was assigned to either group A or group B, the second caller was assigned to the other group, opposite from caller number one. Equal opportunity was given to both, male and female direct care staff to participate. Participation was announced to be voluntary and participants were not penalized for withdrawing from the study. Exclusion criteria were set to only allow direct care staff from ARCA intercare to participate in the study; a direct care staff from an agency other than ARCA was not considered for the study.

The study took place at two different ARCA locations the same day and same time in Albuquerque, NM. The rationale for having the groups meet at two different locations at the same time was to avoid confounders of communication among the two groups that would bias the end result of the study. Both locations were set up in the same way, and both participants and recruiter were blinded as to which group was experimental or control.

Group A (n = 14). Support staff were randomly selected from the 30 participant's sample. After consents were collected, a pretest was given to the participants. A 90 min lecture and hands-on seminar were presented. The seminar entitled 'Oral Hygiene Training for Support staff' covered topics in oral health for people with developmental disabilities including tooth brushing techniques, plaque removal, progression of periodontal disease and techniques on how to approach a patient with challenging behaviour when performing oral hygiene. At the end of the training, a post-test was given to assess any changes in comprehension of basic oral health and knowledge acquisition.

Group B (n = 10). After consent forms were obtained, a pretest was administered; followed by a 30 min discussion among the participants on familiar topics. The investigator did not contribute to the discussion. Post-test was then administered.

Test design. Two different tests were created, A and B, and were administered at random to eliminate a 'learning effect' from taking the same test twice. The instrument designed by the investigator consisted of twenty basic oral hygiene questions in a multiple choice format, keeping in mind that participants might not have had experience in oral health topics. The content in both tests was the same but with different wording. Expert advice was obtained before the implementation of the instrument to assess its content.

A two-sample *t*-test was used to test whether the educational seminar was responsible for more knowledge as assessed by the difference of the pretest from the post-test. A one-sample *t*-test was used to test whether the mean for a normally distributed population is equal to zero or is different from zero. Specifically, it was determined whether the mean difference from the pretest to post-test for the subjects tested (μ) is greater than zero, indicating an improvement. Formally, the null hypothesis was tested, H0: $\mu = 0$, versus the alternative hypothesis, H1: $\mu > 0$. It was assumed the null hypothesis was true unless sufficient evidence warranted rejection of the null in favour of the alternative, determined by the *P*-value of the test being less than chosen type-I error rate $\alpha = 0.05$.

Results

Considering the two groups independently, using a paired *t*-test to examine the data, the experimental group, n = 14 had an estimated score difference of 0.061 (*P*-value = 0.01), t = 2.645, d.f. = 13, *P*-value = 0.01. There is 95% probability that the interval from -0.129 to 0.251 contains the population mean of 0.061 at a 95% confidence interval. The *P*-value = 0.01 is indicative of a significant improvement.

The control group n = 10, had an estimated score difference of 0.035 (*P*-value = 0.14), t = 1.172, d.f. = 9, *P*-value = 0.135, which is not a significant improvement. Figure 1 shows the distribution of participants. Tables 1 and 2 show baseline demographics of each group.

Minimal stress and fatigue were anticipated as a possible risks to the participants from taking a test and participating in a lecture and hands-on training. No harms were expressed by any of the participants at the conclusion of the study.

Discussion

Interpretation

The findings of the study favour the alternative hypothesis by statistical significance at the type-I error rate $\alpha = 0.05$ with a *P*-value = 0.01. The present results contribute to the results of other studies indicating the need for better training for direct care staff who work with people with disabilities. The authors conclude that there is enough evidence to support that



Fig. 1. CONSORT diagram.

Table	1.	Control	group	demogra	phics
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Participantnumber	Gender	Educational level	Pretest number	Pretest results	Post-test number	Post-test results	Score difference
09-456- 1B	Μ	College	А	18	В	18	0
09-456- 2B	Μ	High school	В	18	A	18	0
09-456- 3B	Μ	Not reported	А	12	В	15	3
09-456- 4B	Μ	College	В	18	A	17	-1
09-456- 5B	F	High school	А	16	В	19	3
09-456- 6B	Not reported	Not reported	В	17	A	17	0
09-456- 7B	Not reported	Not reported	А	18	В	19	1
09-456- 8B	F	College	В	16	A	18	2
09-456- 9B	F	High school	А	18	В	20	2
09-456- 10B	F	High school	В	19	A	16	-3

09-456- 11B did not answer test sheet correctly; therefore results were not calculated and used.

Participant number	Gender	Educational level	Pretest number	Pretest results	Post-test number	Post-test results	Score difference
09-456- 1A	М	Not reported	В	19	A	20	1
09-456- 2A	F	High school	А	16	В	17	1
09-456- 3A	F	High school	В	9	A	12	3
09-456- 4A	F	College	А	19	В	19	0
09-456- 7A	F	High school	В	20	A	19	-1
09-456- 8A	Μ	College	А	18	В	19	1
09-456- 9A	Μ	High school	В	19	A	19	0
09-456- 10A	F	High school	А	13	В	19	6
09-456- 11A	F	High school	В	17	А	18	1
09-456- 12A	F	College	А	18	В	19	1
09-456- 14A	F	High school	А	17	В	19	2
09-456- 15A	М	College	В	18	А	18	0
09-456- 16A	F	High school	А	18	В	20	2
09-456- 17A	F	College	А	18	В	18	0

09-456- 5A and 09-456- 13A were not from this group, therefore data were not used. 09-456- 6A withdrew from the study before completion of post-test.

significance level was reached when calculating the two groups together with a *P*-value = 0.005 and when testing the experimental group alone with a *P*-value = 0.01. Both groups show an increase in scores, however, the experimental group shows almost twice the increase as the control group (0.061 versus 0.035). The standard deviation of both of these groups is fairly large (around 0.09). Table 3 shows the statistics obtained for group A and B in terms of sample size (*n*), mean (*M*), standard deviation (SD), median (MDN), minimum and maximum score obtained from the difference of pre and post-test, and *P*-value.

This study assessed overall knowledge acquisition after oral hygiene training was given. In comparison with the studies conducted by Frenkel *et al.* in 2002 and Nicol *et al.* in 2005, this study provided participants with positioning techniques to provide better oral hygiene, discussion of the importance of the associations between oral and systemic health and the overall need to improve the individual's oral health.

Limitations

There were some limitations to the present study that could have an impact in the findings, interpretation and implications. The overall knowledge of direct care staff on oral health was found to be more advanced than it was anticipated by the investigator. Participants had at least a high school diploma

Table 3.	Statistics	for	groups	Α	and	В
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Group	n	М	SD	MDN	Min score	Max score	<i>P</i> -value
Group A	14	0.061	0.086	0.050	-0.05	0.30	0.0**
Group B	10	0.035	0.094	0.025	-0.15	0.15	0.14

***P*-value significant at $\alpha = 0.05$.

M, mean; SD, standard deviation; MDN, median; Min, minimum; Max, maximum.

and many of them had some type of college education. As the investigator was expecting some lack of oral health knowledge among direct care staff, the measuring tools were designed to assess very basic to no knowledge in oral health topics. It was expected to obtain low scores on the pretest; however, on the pretest both control and experimental groups scored rather high. Given that both groups scored high on the pretest, there was not a lot of room for improvement on the post-test since both pre- and post-tests were limited to twenty questions.

Another factor influencing the results was that both the control group and experimental group were found to have some problems understanding the appropriate method to record their answers on the answer sheet. Likewise, some participants were confused as to which location they were supposed to attend. The confusion ended up with a lack of participants on the control group and extra participants on the experimental group. If both locations would have been in the same building, participants could have been sent over to the correct location, however, since locations were about 20 min apart and the study took place at the same time on both locations, participants were not able to go to their assigned place once they showed up to the incorrect location.

External validity is a limitation for this study as well. As the convenience sample taken from the accessible population was small and not randomly selected from a much larger population there is a threat to external validity. The results could be applied to caregivers in similar settings; however, the results cannot be generalized to all caregivers working in different settings other than group homes.

Conclusion

The present study supports the hypothesis that formal oral hygiene training is more effective compared to an oral health discussion when training caregivers of people with disabilities. It seems that the benefit of formal training including lecture and hands-on training is thus far a better way to train caregiv-

ers. The lecture portion helps caregivers with concepts and technique background, whereas the hands-on training not only reinforces lecture material but most importantly puts into practice the learned concepts that a caregiver would be using on a daily basis. Oral health discussion on the other hand is also beneficial to some extent but not compared with formal training as seen by the results of the study.

It is the responsibility of administrators of group homes, nursing homes and other facilities to increase oral health knowledge among their support staff by including oral health information within their training for new hires as well as continuing education for existing employees. A more robust study is needed to not only measure effectiveness of oral hygiene training before and after an intervention but most importantly to measure the effectiveness of the training by assessing clinical outcomes following training.

Clinical relevance

Scientific rationale

This article intends to review the challenges people with disabilities face when receiving oral hygiene care from support staff who lack the adequate knowledge to perform such duties and how adequate training is essential for support staff to feel confident when providing dental care for the people they care for (1).

Principal findings

The need for training programmes to support the education, behavioural techniques and promotion of oral health among caregivers is essential.

Practical implications

Educating direct care staff through appropriate oral health training promotes quality of service to people with disabilities. Primary prevention of oral health for persons with disabilities who rely on others for their care is the responsibility of caregivers, and support staff; thus, agencies in charge of training these individuals should allocate some resources to improve or implement a well-designed oral health training programme to improve overall health of people with disabilities.

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