An oral care training system for caregivers*

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K. Nakajima, Y. Sumi, T.Tamura. An oral care training system for caregivers. Gerontechnology 2003; 2(3):263-266 **Objective**. We developed a support system for oral care consisting of a power brush with water supply and vacuum pump that can be used by dentists, nurses, and caregivers. This oral care support system is effective in removing food debris and dental plaque, and may be effective in preventing aspiration pneumonia in the elderly. Although designed for easy use, this system requires prior training for caregivers without previous experience in oral care. To reduce the risk of aspiration using this oral care support system, we developed a training program to allow caregivers to quickly acquire necessary oral care skills. **Methods**. The training system consisted of a mannequin, an electronic balance, and the oral care support equipment. The mannequin provides an anatomically accurate oral model, including a tongue and teeth, with a drain tube placed at the pharynx. Water leaks from the drain tube when the caregiver fails to vacuum wash water. We assumed that the amount of water leakage, as measured with an electronic balance corresponded to the subjects' oral care skill. Seven volunteers with no prior oral care experience participated in a training program consisting of ten trials of two minutes each. **Result**. At the beginning of the training program, 50% or more of the total water supply leaked; after the seventh trial, leakage was 20% or less. **Conclusion**. The training system may be useful for teaching inexperienced caregivers necessary oral care skills and use of the oral care support system.

Key words: training system, oral care, caregiver, aspiration pneumonia

In Japan, the proportion of elderly citizens has been increasing. The government predicts that by the year 2025, more than 25% of all citizens will be over 65 years of age. Presently the total number of older citizens needing nursing care is about three million and one million of them are in nursing homes. Dentists and caregivers treating the elderly are interested in the interaction between oral health and disease prevention[1-3]. Persons with poor oral health have a greater risk of colonisation by respiratory pathogens and contracting a respiratory infection[2]. Recently it has been reported that good oral care reduces the risk of pneumonia among institutionalised elderly[4]. However, compared with other aspects of care of the elderly, oral care does not often seem to be a priority within institutions.

When performing oral care on elderly patients, the caregiver often has a narrow field of vision or works in an uncomfortable posture. Thus, we believe that development of an instrument to simplify and support oral care is a matter of some urgency, to relieve the strain on caregivers[5-6]. We have developed a system of support equipment for oral care[7] that is effective in removing food debris and dental plaque from teeth; it may also be effective in preventing aspiration pneumonia in the elderly. Although dentists and nurses trained in oral care may find this system simple to use, caregivers with little oral care experience require prior training to use the equipment. In nursing homes in Japan, the supplier provides information about new equipment, but at home the general public has to rely on manuals. For addressing this need, we developed a training system to help inexperienced caregivers quickly acquire necessary skills in oral care. The aim of this study was to evaluate the oral care training system for caregivers that were inexperienced in oral care using the oral care support equipment.

METHODS

We used oral care support equipment as part of the training system. It consisted of a power brush (D9011, Braun-Gillette, Germany) with water supply, and a vacuum pump. Figure 1 shows the head of the power brush. The centre of the brush has a small tube for spreading drops of an antibacterial agent or just water, which are dispersed in all directions within a horizontal plane. Details of the support equipment have been reported in a previous paper[7].

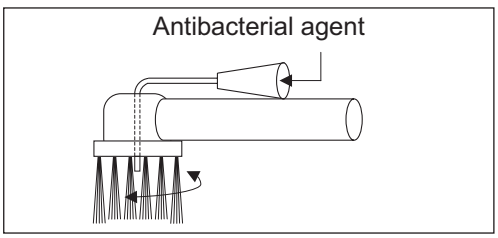

Figure 1. A cross-sectional diagram of the modified head of the power brush

Oral care training system

In this study, we developed a training system to quickly and easily teach oral care skills to inexperienced caregivers (Figure 2). The training system consists of a mannequin with universal joint stand, a beaker with an electronic balance, a power brush with water supply and a digital control pump (Master Flex 7524-50, Cole-Parmer Instrument Co., Vernon Hills, IL, USA), a suction apparatus and a vacuum pump (Care Clinic YK-2000, Yamanaka, Osaka, Japan). The mannequin accurately simulates the oral anatomy, including a tongue and teeth, with a silicone drain tube at the pharynx. Outer and inner diameters of the drain tube were 6 mm and 4 mm, respectively. The digital control pump supplied water to the power brush at a precise flow rate of 10 ml/min. The suction apparatus consists of a plastic straw with a 15 mm^3 sponge connected to the vacuum pump. This pump is normally used in dental clinics at its maximum rate of 54 l/min air. Outer and inner diameters of the straw were 6 mm and 5 mm, respectively. Water leaked from the drain tube when the caregiver failed to vacuum all of the wash water. We assumed that the volume of water leakage, as measured with the electronic balance, corresponded inversely to the subject's oral care skill.

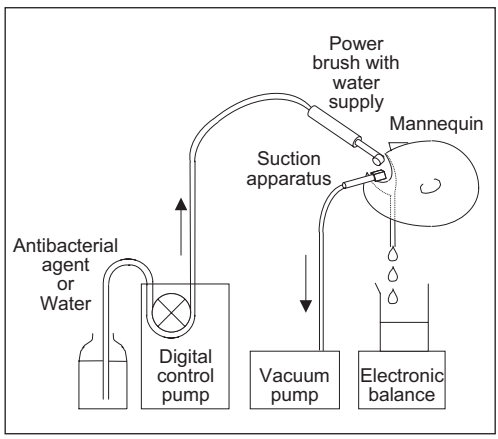

Figure 2. Block diagram of the oral care training equipment

Subjects and training protocol

Seven volunteers (5 female, 2 male, mean age ± SD = 31.4 ± 4.4 years) participated in the study. They had no previous experience in oral care. These subjects participated in a ten-session protocol using the oral care training system. The rate of water supply was 10 ml/min and the vacuum power was set at the maximum. The training protocol lasted 45 minutes at most: 5 minutes of preparation, ten training sessions of 2 minutes each, and at most 20 minutes evaluation of leak water. Statistical analysis was performed by t-test to compare performance in the first and each subsequent training session.

Before the experiment began, volunteers received an explanation of the study and gave informed consent.

RESULTS

The mean volume of water leakage for the ten training sessions is presented in Figure 3. At the onset, 50% of the total volume of water supply was leaked. The mean volume of water leakage declined to 20% or less after the seventh trial. Mean losses decreased with increased training times. Significant differences were observed between the mean volume of water leakage after the first trial and the subsequent seven to ten trials ($p<0.01$).

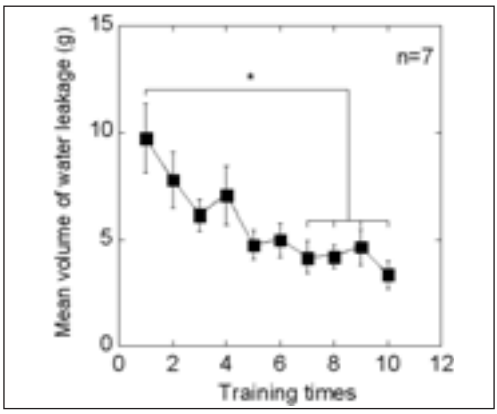

*Figure 3. Mean volume of water leakage vs. training times. The rate of water supply was 10 ml/min and the vacuum power was applied at maximum rate. Asterisk * shows significant difference by t-test ($p < 0.01$).*

DISCUSSION

In this preliminary study, we used a 10 ml/min rate of water supply, higher than the 5 ml/min used in clinical settings. Although 50% or more of the total volume of water supply was leaked in the first trial, water leakage was 20% or less after the seventh trial. The decrease in volume of water loss depended on the training times. Even after training there was still a loss of 2-3 ml of water, but ideally there should be no loss at all. Even if some small amount of water remained in the mouth, it might not present a problem if the client could swallow saliva. If this condition is not fulfilled, the care equipment should not be used. In this study, we did not evaluate cleanness of the teeth. Unfortunately, we have no data for the skill of the ten-times-trained volunteers afterwards.

In the anatomical model used in this study, the drain tube was at the centre of the pharynx. The path of flow of saliva and cleaning water depends on the angle of the patient's head. Moreover, the anatomical structure of the oral cavity differs between healthy subjects and patients with hemiplegia. There are currently no reports on the path of flow of saliva and cleaning water during oral care; this issue should be addressed by further study.

CONCLUSION

We developed a training system for quick and easy teaching of oral care skill for caregivers with no previous oral care experience. Ten sessions of two minutes each proved effective for improving their oral care skill considerably.

Acknowledgement

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