RESULTS

The patients accounted for 926 stays in the ICU in period 1 and 1157 stays in period 2. The quality of oral care differed significantly between the 2 periods, beginning on the third day of ICU stay. The VAP incidence rate fell significantly in all 5 ICUs. It was 12.8% in the first period and 8.5% in the second. The number of VAP cases per 1000 days of intubation was also significantly reduced, from 35.9 VAP per 1000 days in the first period to 25 VAP per 1000 days in the second period.

The cost of dental supplies for the second period was estimated to be €11,500 per year, whereas the previous oral care procedure cost was €680 per year. The cost for spending a day in the hospital ICU was €2000. Patients who developed VAP spent an additional 20 days in the ICU. Thus the average cost to the hospital for a case of VAP was estimated to be €41,000 (range €39,906 to €42,332).

The new protocol prevented 11 VAP cases per 1000 days of intubation, which amounted to a cost savings of €3.7 million per year. Mean costs for each hospitalization were between €11,000 and €27,000, with higher costs for patients in the medicosurgical and cardiovascular ICUs. For patients who developed VAP, mean costs were between €28,000 and €45,000.

Costs avoided by reducing VAP cases also considered the loss of revenue to the hospital. Because patients who don't develop VAP transfer out of the ICU earlier, their hospitalization and associated hospital revenue are lower than if the patients developed VAP, for an estimated loss of income of €1.8 million. The total cost-effectiveness of the new oral care program was therefore about €1.9 million. Loss of income was compensated by the cost savings related to VAP cases avoided, which were 50% greater than the loss of income.

DISCUSSION

Implementation of the new protocol resulted in a net savings of €1.9 million as well as the avoidance of 11 cases of VAP per year. This included the cost of the supplies. More importantly, the new protocol produced better oral care for the patient that resulted in reduced comorbidity and days spent in the hospital. From the hospital's point of view, the savings more than offset the loss of revenue related to fewer days spent in the hospital because fewer patients developed VAP.

Clinical Significance

The new protocol was not only cost-effective, which is important in these days of cost consciousness, but also resulted in fewer patients developing the care-intensive VAP. This reduces the strain on hospital resources and improves the quality of oral health and life for patients. The investment in new tools to accomplish oral health care for intubated patients appears to be worth it.

Ory J, Mourgues C, Raybaud E, et al: Cost assessment of a new oral care program in the intensive care unit to prevent ventilator-associated pneumonia. *Clin Oral Invest* 22:1945-1951, 2018

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Cognition and periodontitis

BACKGROUND

Mild cognitive impairment (MCI) is cognitive decline that exceeds that expected for the individual's age and educational level but does not interfere extensively with the individual's ability to perform activities of daily living. Persons who are diagnosed with MCI tend to have a higher risk for developing dementia later in life. Both impaired cognitive function and dementia have been associated with various oral health parameters. In addition, persons who have serum markers of peripheral systemic inflammation, which is a hallmark of periodontitis, are at higher risk of developing dementia. The evidence currently available is still unclear about how and whether oral health is related to cognitive impairment. An investigation into the potential association between cognitive function and periodontal parameters and tooth loss was done in a large sample of older adults.

METHODS

The 775 participants in this study ranged in age from 60 to 99 years and were divided into 3 age groups: a young old age cohort of those age 60 to 66 years, an old age cohort of those age 72 to 78 years, and an old-old age cohort of those age 81 years and older. All participants underwent a comprehensive clinical and radiographic examination and completed questionnaires to determine level of education completed. The Mini-Mental State Examination (MMSE) and clock test were done to determine

cognitive status. For the MMSE, the cut-off level was < 25 out of a maximum score of 30. A sub-analysis was done between those scoring 25 to 27 points and those scoring 28 to 30 points. For the clock test, the total score was 10 and the cut-off value was set at < 8.

RESULTS

Forty-three percent of the participants were in the young old cohort, 32% in the old cohort, and 25% in the old-old cohort. Level of education was equally distributed, with 51% having completed 9 years or less and 49% completing more than 9 years.

Bone loss was noted significantly more often in male patients at older ages than in the rest of the sample. In addition, having 1 to 19 teeth was associated with greater age and lower education. Persons who had many teeth also had many teeth with periodontal pockets $\geq$ 5 mm. Defining periodontal disease as having periodontal pockets $\geq$ 5 mm at $\geq$ 30% of the teeth, 64% of the participants had periodontal disease, with men particularly affected. Individuals who had between 1 and 19 teeth were older and had completed fewer years of education.

Sixty-four persons had a MMSE score under 25 and 167 had a score of 25 to 27. One hundred thirty-six scored less than 8 on the clock test.

Multivariate logistic regression analysis indicated that bone loss of $\geq$ 4 mm at $\geq$ 30% of readable sites was associated with a lower MMSE test outcome. The association persisted even when periodontal disease was defined as having bone loss of $\geq$ 5 mm at $\geq$ 30% of readable sites. However, fewer individuals fulfilled the criteria when the periodontal bone loss threshold was increased.

DISCUSSION

Both age and gender were associated with bone loss prevalence. In addition, older adults and those with less education had fewer teeth. The prevalence of bone loss, number of teeth, and MMSE score were also related. However, none of the periodontal variables were significantly associated with the clock test result.

Clinical Significance

Having periodontitis and missing teeth may be associated with cognitive function impairment among older adults. Based on these findings, dentists should be aware that dental diseases such as periodontitis that are associated with inflammation may predispose the patient to suffer MCI or more serious cognitive impairment.

Nilsson H, Berglund JS, Renvert S: Periodontitis, tooth loss and cognitive functions among older adults. *Clin Oral Invest* 22:2103-2109, 2018

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Erectile dysfunction and chronic periodontitis

BACKGROUND

Chronic periodontitis (CP) can cause endothelial dysfunction, which can lead to vascular pathology. Based on the pathogenic mechanisms seen in vascular disorders, CP has been shown to be a risk factor for cardiovascular disease (CVD) and acute myocardial infarct size. Erection is a neurovascular phenomenon that involves increased arterial flow in the hypogastric-penile bed coupled with activation of the veno-occlusive mechanisms of the corpora cavernosa in the presence of hormonal and psychological influences. Erectile dysfunction (ED) is the male's inability to attain and maintain erection of the penis sufficient to achieve satisfactory sexual intercourse. ED's prevalence is about 24% in the general male population. Various causes have been linked to ED, including organic, psychological, and combined entities. Fifteen articles have addressed the available evidence concerning CP and ED, with the conclusion being that larger and epidemiologically controlled studies of homogeneous populations are needed to reveal whether CP is a risk factor for ED and what the interaction between CP and ED entails. An observational study was undertaken to evaluate the CP−ED association by comparing associated clinical and biochemical variables.

METHODS

One hundred fifty-eight men participated, with 80 having ED and 78 serving as controls. For each individual, sociodemographic data were gathered. All participants underwent a periodontal examination, with measurement of various periodontal clinical variables. Other measures included testosterone level, lipid profile, C-reactive protein (CRP) level, and glycemic status as indicated by HbA1c levels. Multivariate logistic regression analyses were performed.