

Mouth care after stroke

Stroke is the leading cause of adult disability in the UK. 70% of strokes occur in adults older than 65 years of age. Oral health and mouth care are usually forgotten, but are important aspects of care. Studies have highlighted the poor state of oral health in patients after stroke and poor knowledge of oral-care procedures among nursing staff throughout the UK. Despite previous evidence linking poor mouth care with risk of carotid stenosis, stroke-related functional disability, and aspiration pneumonia, oral care is still not perceived as a priority. This review aims to address the importance of mouth care after stroke in preventing infectious complications, and to highlight the current poor knowledge among nursing staff in providing adequate oral care and the need for high quality trials to evaluate effectiveness of oral health-care interventions.

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Oral care can be a challenging task for those who have physical impairments as a consequence of stroke. Physical weakness, lack of coordination, and cognitive problems that can accompany a stroke may make maintaining good oral hygiene impossible for some patients.

Elderly survivors returning to the community after stroke have significantly poorer periodontal health compared with community-dwelling elderly people who have not had a stroke, despite good objective improvement in disability after stroke and the situation does not improve much over 6 months.¹ A preliminary investigation into tooth care, dental attendance, and oral health-related quality of life in adult stroke survivors in Scotland, found that individuals who have been left disabled after a stroke may require help with or advice on oral care and information on how to access dental services in a setting appropriate to their disability.²

As with other aspects of care

after stroke, rehabilitation goals that aim to maintain or regain independent oral care skills would be appropriate in the stroke care setting. However, evidence supporting staff-led oral care practices is scarce.

Normal mouth flora and changes in stroke:

The healthy oropharynx consists predominantly of facultative Gram positive bacteria such as α -haemolytic streptococci with aerobic Gram-negative bacilli found transiently.³ Healthy individuals can resist aerobic Gram-negative bacilli although human beings do carry these organisms from day two of life.⁴

Normal flora performs four functions that prevent colonisation by potentially pathogenic bacteria:

1. They occupy receptor sites on the mucosa thereby inhibiting adherence of aerobic Gram-

negative bacilli

2. They consume the available nutrients, thereby starving out aerobic Gram-negative bacilli
3. They produce substances that are actively toxic to aerobic Gram-negative bacilli
4. They promote normal physiological processes including mucosal cell renewal, which contributes to clearance of aerobic Gram-negative bacilli

In the UK, aerobic Gram-negative bacilli are found in 7% of denture wearers,⁵ and 0% of non-denture wearers. Colonisation also correlates with severity of illness: with 37% of moderately ill patients and 73% of seriously ill patients affected. Similar findings are seen in rehabilitation and in acute stroke patients. Gosney et al⁶ have shown that high levels of carriage and colonisation by aerobic Gram-negative bacilli are seen in patients in the first 3 weeks after acute stroke, which predisposes them to aspiration pneumonia and higher mortality.⁶

Risk factors for oral mucosal breakdown

Four common factors contribute to oral mucosal breakdown in stroke patients:

1. Motor and cognitive deficits
2. Oropharyngeal musculature or dysphagia
3. Specific medications
4. Oxygen or suctioning therapies

Motor deficits after stroke with desynchronisation of the oropharyngeal musculature and dysphagia in some patients mean they cannot safely take medication or nutrition by mouth and necessitates a nasogastric tube. The absence of mastication associated with reduced oral intake decreases the stimulation of salivary and enzymatic production, both of which usually help with the removal of debris and protects the oral cavity from harmful oral flora.⁷

Stroke patients frequently have one or more comorbidities

that require treatment with xerostomia-causing medications (antihypertensives, antiepileptics, antihistamines, antidepressants, steroids, diuretics), which enhances mucosal breakdown. Oxygen therapy and suctioning devices contribute further to oral mucosal injury. The drying effect of oxygen and the trauma associated with the removal of secretions and debris create a desiccated environment in which microorganisms flourish and previously healthy tissue degrades.

The above factors not only work independently, but they also compound xerostomia and increase the amount of debris, the deposition of plaque and growth of infectious organisms. The resulting inflammation allows microorganisms to enter gum tissues leading to gingivitis, colonisation of the oropharyngeal cavity with infectious microorganisms and an increased incidence of local and systemic infection (figure).

Dentures

Loss of both sensation and muscle control can affect the wearing of dentures in several ways; mainly through putting dentures into the mouth and control of loose dentures. Loose dentures can rub on the mucosa causing mouth ulcers, and can make eating and speaking more difficult. Denture fixative may be useful in the short period after stroke, but continued use can mask underlying dental infections.

Simple tips such as brushing dentures with a toothbrush, denture paste, storing dentures overnight in cold water, and avoiding effervescent cleaning solutions can help prevent infection, discoloration, and bad breath. People without their natural teeth should still visit the dentist on a regular basis so that dentures can be adjusted and replaced as necessary.⁸

Oral care procedures and nurses' knowledge

Recent studies have highlighted the poor state of oral health of individuals within supported care.⁹ Despite indications that health-care staff are interested in improving this aspect of care, their knowledge is not good. A survey conducted by Talbot and colleagues across 71 stroke units in Scotland provided a national overview of oral care provision for patients in stroke care settings.¹⁰ Overall, the response rate was excellent but results showed that staff in only a third of units had received oral-care training in the previous 12 months. The use of oral care assessment tools and protocols was limited and access to staff training, assessments, protocols, and oral hygiene materials varied considerably. This study provides a valuable baseline from which to develop effective ward-based oral-care

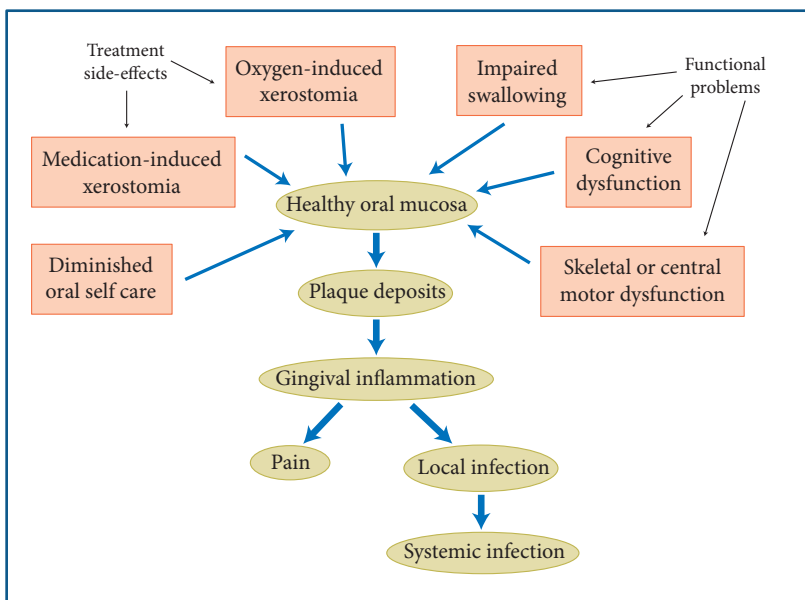


Figure: Risk factors contributing to mucosal breakdown and resulting disease pathway

interventions for stroke patients.

Dry tongue, thick secretions, and debris on the tongue were the most common problems encountered during oral care by nursing personnel and discrepancies exist between the choice of agent (eg, foam swabs, mouth wash, normal saline, hydrogen peroxide, toothbrush) used for oral care among registered nurses and unlicensed personnel. The discrepancies among product choices may reflect lack of availability or knowledge, or other issues that should be addressed.¹¹

Why mouth care is important

Many studies have linked oral health to various systemic diseases, the most important being stroke and its related complications.

Risk of stroke

A cross-sectional study of veterans aged 60 years and older, showed that several dental and oral conditions can be significantly associated with the diagnosis of a cerebral vascular accident with or without many of the known risk factors for stroke. The plaque index and oral hygiene habits related to brushing, flossing, and frequency of having teeth cleaned by a dentist or hygienist were significantly associated with stroke. Among these oral hygiene therapy tests, needing help in brushing one's teeth and an annual visit to the dentist for teeth cleaning remained significant in dependant living participants.

The need for help in brushing one's teeth could reflect the fact that many subjects had reduced manual dexterity as a result of stroke and required this extra care. However, dependant living individuals who

reported that they did not have their teeth cleaned at least once a year were 4.76 times more likely to have had a stroke, which suggests a pattern of oral neglect might be associated with developing stroke.¹²

Risk of carotid stenosis

Schillinger and others investigated the association of dental and periodontal status with the presence and future progression

of carotid stenosis. A random selection of participants from the prospective Inflammation and Carotid Artery Risk for Atherosclerosis Study were assessed using three WHO-validated indexes; Decayed, Missing, Filled Teeth; Silness-Loe Index and Communitive Periodontal Index for Treatment Needs, respectively. Dental status, oral hygiene and particularly tooth

Box: Oral health-care for dependent, dysphagic, critically ill, and terminally ill patients¹⁶

Oral care for dependent patients

- Prepare appropriate oral hygiene materials
- Place the patient in a sitting or semi-Fowlers position to protect the airway
- Protect clothing
- Remove dentures or other removable appliances

Dentate patient

- If necessary insert a mouth prop to gain access
- Floss interproximal surfaces of teeth, taking care not to traumatise gingivae
- Brush all surfaces using fluoride tooth paste or chlorhexidine gel
- Rinse or aspirate to remove saliva and toothpaste

Dentate and edentulous patients

- Gently retract cheeks and brush inside surfaces with soft, gentle strokes
- Using gauze to hold the tongue, gently pull the tongue forward and brush surface gently from rear to front
- Gently brush palate
- Towel or swab mouth if tooth brushing is not possible
- Aspirate throughout procedures if airway is at risk

Dentures and removable appliances

- Brush vigorously with unperfumed household soap
- Pay particular attention to clasps
- Rinse well in cold water
- Saliva substitute may be required before replacing denture in the mouth

Intubated patients

- Reposition tube frequently to prevent lip soreness
- Ensure tube is secure before proceeding with oral care
- Proceed with oral care as appropriate

loss are associated with a degree of carotid stenosis and predicted future progression of disease.¹³

Several possible explanations exist for the association between dental and periodontal disease and development and progression of atherosclerosis. First, it may merely reflect confounding by traditional risk factors such as smoking, obesity, or diabetes which are equally important determinants for both dental and vascular diseases. Second, dental disease and atherosclerosis may reflect the individual's susceptibility to develop disease in response to specific endogenous or exogenous stimuli. Third, inflammation in the periodontal tissue may exaggerate an inflammatory vascular disease, thus promoting the progression of atherosclerosis. Fourth, the infectious theory may hold true when transient bacteraemia from periodontal foci leads to inoculation of pathogens in atherosclerotic plaques.

Increased stroke-related functional disability

Prospective longitudinal work by Zhu et al¹⁴ found a significant increase in oral carriage of yeasts rather than coliform bacteria in acute stroke patients. *Candida albicans* and *Klebsiella pneumoniae* were the predominant yeast and coliform bacteria, respectively. Stroke-related difficulty in tooth brushing and wearing dentures were associated with higher oral yeast carriage. Use of aspirin was associated with a lower oral yeast carriage in people suffering from stroke. They also concluded that the oral yeast carriage was closely linked to the level of stroke-related functional disability that improved over time but had not totally resolved 6 months after hospital discharge.¹⁴

Risk of aspiration pneumonia

M Gosney and colleagues¹⁵ have shown that high levels of isolation and carriage of aerobic Gram negative bacteria were seen in the first few weeks in acute stroke patients and may predispose to aspiration pneumonia. They have also shown that selective decontamination of the digestive tract an oral gel containing a combination of carefully chosen antimicrobial drugs, applied topically to the mouth four times a day, reduces the presence of pathogenic microorganisms and thus reduces the incidence of aspiration pneumonia among acute stroke patients.¹⁵

Interventions for improving oral hygiene

Standard oral-care procedures are outlined in the box.¹⁶ In a 2008 Cochrane review, randomised controlled trials that evaluated one or more interventions designed to improve oral health recruited from a health-care setting with a mixed population were included provided it was possible to extract the data specific to the individuals post stroke.¹⁷ A comprehensive, valid and reliable measurement tool for assessing oral hygiene is currently lacking, so a range of outcomes that correspond to different aspects of oral hygiene and oral health-care delivery were recorded.

Primary outcomes were dental plaque and denture plaque, and secondary outcomes were patient satisfaction (care received, oral comfort, and appearance), presence of oral disease (gingivitis, denture induced stomatitis, periodontal disease), and knowledge and attitudes of staff about oral health.

Although attitudes of nursing

and health-care staff to oral care appear to vary, the provision of oral care for dependent patients is viewed as a core nursing responsibility. Nursing staff, however, are frustrated by restricted training opportunities, and by poor access to equipment, assessment tools, and professional dental support. With limited availability of support it is not surprising that oral care provision is not perceived as a priority. Good oral health is essential to optimise an individual's speech, nutritional intake, systemic health, rehabilitative outcomes, and quality of life. Oral care should be given greater priority in stroke care and staff need to be supported in their delivery of this care.

Frenkel et al¹⁸ evaluated an oral health-care education training programme delivered to care assistants in 22 nursing homes. The training included a description of the role of plaque in oral disease and a demonstration of cleaning techniques for dentures and natural teeth. The control group gave usual care to patients but were provided with the training intervention after the trial was completed.¹⁸

This study showed that the training intervention targeted at health-care staff had a positive impact not only on workers' knowledge and attitudes, but also had a beneficial effect on their patients' oral hygiene. A month after the training, residents had less plaque on their dentures than had those in the homes where training was delayed. The results of this study are encouraging, because the benefits of the oral-care training intervention (as measure by denture plaque) were still evident 6-months after the intervention, despite the characteristically high staff turnover rates in nursing homes.

Conclusion

From the limited available evidence we can conclude that dental and periodontal disease is associated with atherosclerosis, possibly through sharing a common inflammatory pathway thereby linked with diagnosis of stroke, progression of carotid stenosis, and functional recovery after stroke. Oral care is still not perceived as a care priority as there are few training or care policies in place.

Even one hour-long training session delivered by a dental health professional can change health-care workers' knowledge and attitudes towards administering oral care, and it has a positive impact on patients' oral hygiene as measured by denture cleanliness. Training offers potential benefits for denture care and staff knowledge, but further investigation is needed to identify the interventions that best increase intra-oral care. Additionally, high-quality trials are needed to evaluate the effectiveness of oral health-care interventions in patients after stroke.

Specific goals within a rehabilitation setting might for example progress from oral care for those dependent on a carer, to support oral care, to the eventual goal of independent oral care. Although the evidence identified in this review relates to a training programme, trials that evaluate the effectiveness of the various oral-care assessment tools, agents, equipment, or oral-hygiene promotion packages currently available are urgently needed to fill the evidence gap that exists in this area.

We have no conflict of interest.

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Key points

- Poor oral health and mouth care is strongly associated with diagnosis of stroke, progression of carotid artery stenosis, stroke related functional disability, and risk of aspiration pneumonia
- Oral care is yet not perceived as a care priority and there are few training or care policies in place
- Further research is needed to evaluate the effectiveness of oral health-care interventions, other than training in patients after stroke

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