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## The impact of hospitalization on oral health: a systematic review

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### CRD summary

The authors found that oral health appeared to deteriorate during hospitalisation, especially in intubated patients. Changes included an increase in dental plaque accumulation and in gingival and mucosal inflammation. Due to limitations in the review, particularly the suboptimal quality and heterogeneity of the studies, these conclusions require cautious interpretation.

### Authors' objectives

To evaluate the effect of hospitalisation on oral health.

### Searching

MEDLINE (from 1950), CINAHL (from 1982), The Cochrane Library and EMBASE (from 1981) were searched to January 2010. The following journals were hand searched: Community Dentistry and Oral Epidemiology, Gerodontology, Journal of Disability and Oral Health and Special Care in Dentistry. The reference lists of relevant reviews and articles were checked for further studies. The search was not limited by language.

### Study selection

Prospective longitudinal observational studies of hospitalised individuals of any age were eligible for inclusion. Studies were required to report changes in tooth loss, periodontal health, dental caries and/or stomatological diseases. Studies of patients with psychiatric disorders or receiving treatment with frequently observed oral complications were excluded.

Participants in most of the studies were adults with a mean age of 49 to 58 years. One study included children (age range one to 16 years). All or most participants were patients on intensive care units in USA or Europe and most were intubated. Where reported, interventions included: toothpaste, sterile water, normal saline and/or lip lubricant delivered using a child's toothbrush, foam swabs or sterile cloths; and/or antiseptics and antifungals (at the nurses' discretion). Oral care was given from 2-6 times daily (where reported). Most studies did not report adherence rates. Where reported, the mean or median duration of observation across study subgroups ranged from five to 20 days. A wide variety of outcomes were assessed, most commonly dental plaque and/or gingival inflammation. Other reported outcomes included caries, mucositis, dental health and periodontal disease. These were measured with a variety of tools such as subjective visual analogue scales, the oral assessment guide, the Community Periodontal Index for Treatment Needs and the decayed, missed and filled teeth index. In most cases it was unclear who conducted the assessment and whether they were blinded.

One reviewer conducted the initial stages of the search and two reviewers screened all full-text articles. Disagreements were resolved with the help of a third reviewer.

### Assessment of study quality

Studies were assessed with a modified version of the Newcastle-Ottawa scale for cohort studies to assess selection methodology (such as representativeness, ascertainment of exposure and demonstration that outcome of interest not present at baseline) and outcomes methodology (assessment method (such as blind assessment, record linkage and duration and adequacy of follow-up). The reviewers evaluated the power calculation, the measure used for oral health and the conduct/reporting of assessor training in each study.

Two reviewers assessed study quality.

### Data extraction

For each outcome in each study, median scores with 25% -75% quartiles or mean differences and standard deviations (for continuous outcomes) were extracted at various time-points, with p values in some cases. The authors of primary studies were contacted for more information if necessary.

Two reviewers independently performed data extraction.

## Methods of synthesis

The studies were combined in a narrative synthesis.

## Results of the review

Five studies were included in the review. All had adequate standards of representativeness, ascertainment of exposure, demonstration that outcome of interest not present at baseline and outcome assessment method (such as blind assessment and record linkage). Duration of follow-up was adequate for assessment of dental plaque and gingival changes, but not for dental caries or periodontitis. The outcome measures for oral health were of doubtful validity in at least three of the studies. Power calculation and assessor training were only reported by one study.

Two out of four studies that reported dental plaque accumulation found a statistically significant increase in plaque during hospitalisation; no significant changes were observed in the other two studies. Two out of three studies that reported gingival inflammation reported statistically significant increases in severity of inflammation and the other study found no significant changes. No significant changes were reported in periodontal disease (one study) or dental caries (two studies). Two studies found a significant increase in mucositis in intubated but not in non-intubated patients.

## Authors' conclusions

Oral health appeared to deteriorate during hospitalisation, especially in intubated patients. Changes included an increase in dental plaque accumulation and in gingival and mucosal inflammation.

## CRD commentary

The objectives and inclusion criteria of the review were clear and relevant sources were searched for studies, without restriction by language. It was unclear whether the search was limited by publication status and no specific attempt was made to find unpublished studies, so potential publication bias cannot be ruled out. The authors noted that two studies could not be retrieved in full text for assessment of eligibility. These factors meant that some eligible studies may have been missed. Steps were taken to minimise the risk of reviewer bias and error by having more than one reviewer screen full text articles, undertake validity assessment and extract the data, but the initial stages of study selection were performed by a single reviewer.

The use of a narrative synthesis to combine the studies was appropriate given the heterogeneity between them. As the authors noted, there was wide variation between the studies, for example in oral care methods and outcome measures. All studies were uncontrolled, outcome assessment was of doubtful reliability, duration of follow-up was limited and studies may have been underpowered.

In view of limitations in the review, particularly the suboptimal quality and heterogeneity of the studies, the authors' conclusions should be interpreted with caution.

## Implications of the review for practice and research

**Practice:** The authors stated that additional evidence-based protocols and guidelines were needed to guide carers and patients in oral care during hospitalisation. They should be relevant to different stakeholders and settings. Evaluation of such guidelines should be planned before implementation. Oral care that used mechanical methods to reduce dental plaque was preferable to chemical methods. The authors noted that the findings of the current review apply to intensive care unit patients and may not be generalisable.

**Research:** The authors stated that studies should be conducted in a wide range of hospital settings to evaluate the impact of hospitalisation on oral health. They should use validated outcome measures, examiners should be trained and duration of follow-up should be long (if possible) to investigate longer term outcomes such as dental caries and periodontitis.

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