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Stephenson, John, Chadwick, B.L., Playle, R.A. and Treasure, E.T.

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ASSESSMENT OF EFFICACY OF TREATMENT OF CARIOUS PRIMARY MOLAR TEETH

J Stephenson, BL Chadwick, RA Playle, ET Treasure

Applied Clinical Research & Public Health, School of Dentistry, Cardiff University, Cardiff, GB-CF14 4XY

INTRODUCTION

The fate of 5,168 carious primary molar teeth from a cohort study of 2,654 children aged ~5 years at baseline undertaken by Cardiff University School of Dentistry in 1999-2003 was investigated.

AIMS & OBJECTIVES

- To model the survival experience of carious primary molar teeth and surfaces using competing risks parametric survival analysis methods, within the framework of a hierarchical frailty model
- To assess the effect of restorative treatment on survival experience, in terms of likelihood of subsequent extraction, exfoliation or further treatment
- To identify any links between age at caries occurrence, tooth parameters and demographic factors with subsequent requirement for further treatment

MATERIALS & METHODS

Children were selected from fluoridated areas in the West Midlands and non-fluoridated areas in South Wales. Caries data was recorded on all surfaces of all primary molar teeth on 3 occasions at intervals of ~2 years. The gender, age at each exam and socio-economic status of all children was recorded. Tooth and surface parameters were also recorded. DPB treatment data from consenting children (~51%) was incorporated into the data set. Parallel analyses were undertaken on surface data and on the data transformed into *tooth*-level responses.

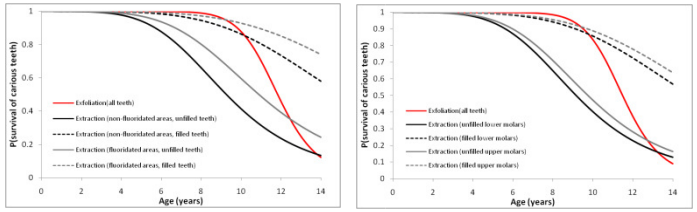
Parametric survival modelling considering the competing risks of extraction, further treatment and exfoliation under various modelling distributions was undertaken.

RESULTS

Marginal survival models

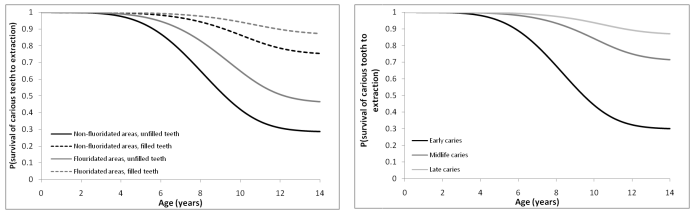
Marginal survival models - interpreted as survival experience in the absence of other risks - were derived for extraction and exfoliation, with *surface*- and *tooth*-level data nested within children. Calculation of likelihood ratio statistics showed the log-logistic distribution to be an adequate fit to the data. *Tooth*-level results are illustrated.

Restorative treatment had the greatest effect on expected outcome. Fluoride had a more limited effect on marginal survival to extraction, with other covariates showing little substantive effect. Exfoliation rates were not affected by treatment, or by demographic or tooth factors.



Cumulative incidence survival functions

Cumulative incidence survival functions for extraction give actual survival experience for this failure mode.



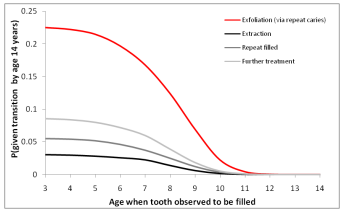
About 85% of filled carious teeth and 45% of unfilled carious teeth subsequently exfoliate by age 14 years. Early caries occurrence is associated with higher likelihood of subsequent extraction.

RESULTS (continued)

Calculation of odds ratios showed treatment to be significantly associated with subsequent extraction (odds ratio 0.13: 95% confidence interval (0.12, 0.14). Time of caries occurrence was also significant.

Assessing treatment efficacy: (i) multiple transitions

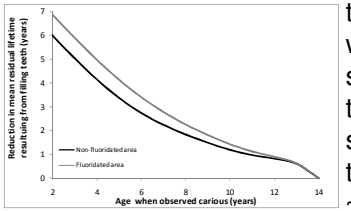
Caries may re-occur in filled teeth, which may subsequently require further treatment.



The likelihood of each outcome, conditional on caries re-occurrence, is expressed in terms of age at which the tooth is recorded as filled (no decay). Further decay is negligible in teeth recorded as filled with no decay beyond ~10 years.

(ii) Mean residual decay lifetime (MRDL)

MRDL is the expected time that a carious tooth remains in a decayed state before loss from the mouth. Restorative treatment reduces MRDL, which may be beneficial to successional permanent teeth. A tooth filled at 8 years saves ~2 years MRDL. A tooth filled at 11 years saves ~1 year MRDL.



CONCLUSIONS

Filling carious primary molar teeth significantly increases the likelihood of subsequent exfoliation, with the greatest benefits arising from earlier treatment. Fluoride also has a beneficial effect on tooth survival.