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# ASSESSMENT OF EFFICACY OF TREATMENT OF CARIOUS PRIMARY MOLAR TEETH

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## 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.

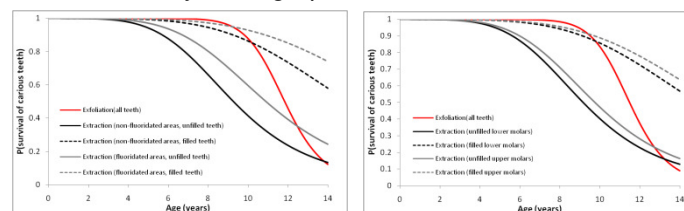
Parametric survival modelling considering the competing risks of extraction, further treatment and exfoliation under various modelling distributions was undertaken.

## RESULTS

### Marginal survival models

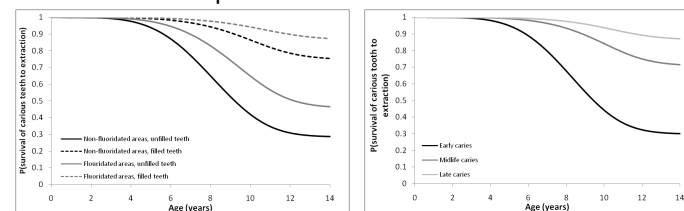
Marginal survival models - interpreted as survival experience in the absence of other risks - were derived for extraction and exfoliation, with *surface*- and *tooth*-level data nested within children. Calculation of likelihood ratio statistics showed the log-logistic distribution to be an adequate fit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



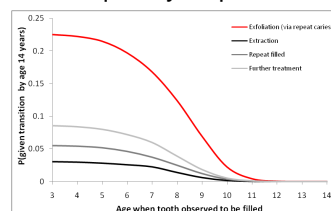
About 85% of filled carious teeth and 45% of unfilled carious teeth subsequently exfoliate by age 14 years. Early caries occurrence is associated with higher likelihood of subsequent extraction.

## 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.

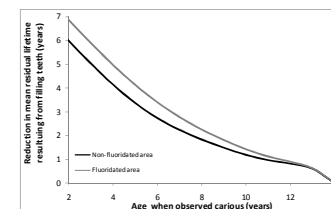


The likelihood of each outcome, conditional on caries re-occurrence, is expressed in terms of age at which the tooth is recorded as filled (no decay).

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.