

## **3416 Modeling multilevel clustered grouped survival data using Cox regression model**

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Objective: To illustrate the Bayesian approach to multilevel modeling of clustered grouped survival data using Cox regression model. Methods: Data from a longitudinal study in evaluating the performance of 268 ART restorations placed in 185 children by 5 dentists were used. Clinical status of the ART restorations was evaluated annually for 6 years after placement, therefore the failure times of the restorations could only be recorded as between baseline and 1st year (first interval), between 1st and 2nd year (2nd interval), °K, between 5th and 6th year (6th interval), i.e. grouped survival data. A 3-level model was considered to account for the clustering effects from dentist, child and restoration. The gender of the child, tooth type and size of the restoration were included as covariates. A Cox regression model for grouped survival data using Bayesian approach was performed using WinBUGS. Posterior distributions of the parameter estimates were computed based on 10000 simulations using MCMC algorithms. Results: Clustering effect among the log failure times of the different restorations from the same child was moderate (corr=0.32) but could be negligible for dentist (corr=0.06). Gender effect was found to be insignificant and no significant difference in failure times was found between small restorations on molars and non-molars (95% credible interval included 0). Large restorations on molars were found to have significantly shorter failure times compared to small restorations (95% credible interval not including 0). The 6-year survival of the large restorations on molars was 53%, for small restorations on molars was 90% and for small restorations on non-molars was 83%. Conclusion: Bayesian approach in analyzing clustered grouped survival data can easily be applied with the use of the software WinBUGS. It is recommended that this approach should be used to analyze complex dental data at which observations are not necessarily independent .

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