**Caries Risk Prediction models in medical healthcare setting**

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**Abstract**

**INTRODUCTION**: Despite development of new technologies for caries control, tooth decay in primary teeth remains a major global health problem. Caries risk assessment models for toddlers and preschoolers are rare. Among them, almost all models use dental factors (e.g. past caries experience) to predict future caries risk, with limited clinical/community applicability owing to relatively uncommon dental visits compared to frequent medical visits during first year of life.

**OBJECTIVES**: To construct and evaluate risk prediction models using information easily accessible to medical practitioners to forecast caries at 2- and 3-years of age.

**METHODS:** Data was obtained from Growing Up in Singapore Towards healthy Outcomes (GUSTO) mother-offspring cohort. Caries was diagnosed using modified ICDAS criteria. Risk prediction models were constructed using multivariable logistic regression coupled with Receiver Operating Characteristic (ROC) analyses. Imputation was performed using Multiple Imputation by Chained Equations to assess effect of missing data.

**RESULTS:** Caries rates at ages 2-years (n=535) and 3-years (n=721) were 17.8% and 42.9%, respectively. Risk prediction models predicting overall caries risk at 2 and 3 years demonstrated AUC (95%CI) of 0.81 (0.75-0.87) and 0.79 (0.74-0.84), respectively, while those predicting moderate-extensive lesions showed 0.91 (0.85-0.97) and 0.79 (0.73-0.85), respectively. Post-imputation results showed reduced AUC of 0.75 (0.74-0.81) and 0.71 (0.67-0.75) at Year 2 and 3, respectively for overall caries risk; while AUC was 0.84 (0.76-0.92) and 0.75 (0.70-0.80), respectively for moderate-extensive caries. Addition of anterior caries significantly increased AUC in all Year-3 models with/without imputation (all P<0.05). Significant predictors/protectors were identified including ethnicity, prenatal tobacco smoke exposure, history of allergies before 12 months, history of chronic maternal illness, maternal brushing frequency, childbearing age, etc.

**CONCLUSION:** Integrating oral-general healthcare using medical CRA models may be promising in screening caries susceptible infants/toddlers, especially when medical professionals are trained to “lift the lip” to identify anterior caries lesions.

**Keywords:** medical community, longitudinal study, risk prediction, preschoolers, early childhood caries