A semiparametric Bayesian model for examiner agreement in periodontal research

Elizabeth H. Slate* **and Elizabeth G. Hill**

Medical University of South Carolina

E-Mail: slate@musc.edu; hille@musc.edu

Abstract: An important measure of the severity of periodontal disease is the probing pocket depth (PPD), which is measured on up to 6 sites for each tooth in the mouth. Establishing and monitoring agreement among multiple examiners is critical to high quality periodontal research. We develop a Bayesian hierarchical model that links the true, observed and recorded values of PPD, permitting correlation among the measures within patient. Tooth-site-specific examiner effects are modeled as arising from a Dirichlet process mixture, facilitating discovery of subgroups among the periodontal sites according to degree of agreement with a reference examiner. We analyze data from a PPD calibration study and illustrate the effects of correlation on assessments of examiner agreement.