Multivariate Poisson distribution to model longitudinal count data with nonlinear behavior

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Poisson distribution is frequently used to model count data. Multivariate Poisson distribution seems suitable to model longitudinal count data, allowing for modelling the covariance structure and expressing the parameters involved as covariate functions. An additional aspect is that in growth curves studies it is expected the response variable to have nonlinear behavior. In this context, we propose using multivariate Poisson distribution to model the dependence generated by longitudinal count data having nonlinear behavior along time, assuming equal covariances between repeated counts. We also assume that data come from randomized blocks design, block effects treated as fixed and random. Maximum likelihood method via EM algorithm is used to parameters estimation and simulations studies are done to assess the methodology. The process produced good results in the nonlinear model parameters and covariance parameters estimation but it shows itself to be inefficient in the estimation of the random effects variance.