Various models of Tumor Control Probability (TCP) are often used to compare quantitatively rival treatment plans. Among the plans satisfying normal tissue constraints a plan with higher TCP is judged to be superior. However, there is not much clinical data to validate these models, and the available data are noisy. Consequently, model predictions have wide confidence bounds and can be considerably biased. TCP models are also used in computer optimization of dose distribution on the premise that they correctly rank rival plans. To investigate this clinically important issue we performed sensitivity analysis using dose-volume histograms (DVH) from multi-institutional comparative study and the Poisson-based TCP model. Conformal dose distributions were optimized at each institution using various treatment techniques. Target DVHs were calculated and the corresponding TCPs were estimated using “best-guess” parameter s adjusted to coincide the model predictions with the observed tumor control rate. The TCPs for three plans selected for analysis ranged from 75% to 85% and the corresponding DVHs intersected. We analyzed variation in TCPs and in rank order of plans as a function of model parameters. The space of parameters was constrained by requirement of conformity with the clinical experience with similar dose distributions indicating that the observed local control rate is 60%±20%. The results demonstrate that rank order of plans is quite stable over a wide range of model parameters even though the individual TCPs vary considerably. This is because individual TCPs are highly correlated and vary, as a function of model parameters, following a similar pattern.