

GRADUATE SEMINAR

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Understanding bias in probabilistic analysis in model-based health economic evaluation

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Via Zoom

Abstract: Guidelines of economic evaluations suggest that probabilistic analysis provides less biased estimates than deterministic analysis owing to the non-linear relationship of model inputs and model outputs. However, other factors can also impact the magnitude of bias for model results. Point estimates often represent the most likely value of the parameter in the population, given the observed data. Therefore, compared with inputs with lower likelihoods, model inputs with larger likelihoods (point estimates) may result in less bias in model outputs, even if non-linear relationships exist between model inputs and model outputs. Further, when the variance of a parameter is large, simulations from probabilistic analyses may yield extreme values that tend to bias the results of some non-linear models. We evaluate bias in probabilistic analysis and deterministic analysis through three simulation studies. The simulation studies illustrate that, compared with deterministic analyses, probabilistic analyses may be associated with greater biases in model inputs, as well as model outputs. We conclude that there is no definitive answer on which analytical approach is associated with a less-biased estimate in non-linear models. Deterministic analysis may provide a less biased estimate in some situations, such as when the variance of random variables is large.

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