DCP3 Disease Control Priorities

economic evaluation for health

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CEA: Interpreting Results

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Sensitivity and uncertainty analysis

- Uncertainty analysis
  - The quantification of the simultaneous and combined effect of the uncertainty in all input variables on the outcome of interest
  - Aim: to quantify the uncertainty around the outcome, e.g. an uncertainty interval
- Sensitivity analysis
  - The quantification of the effect of variation in specific input variables on the outcome
  - Aim: to assess which variables have the largest impact on the outcome

Credit: Jan Berendregt, EpiGear International

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Why deal with uncertainty?

- The majority of cost-effectiveness analyses report a point estimate of the ICER.
- Sensitivity and uncertainty analysis attempt to quantify the uncertainty surrounding the point estimate of the ICER
- This expresses the precision of the point estimate
- With large uncertainty around the point estimate the value of the information it provides is small
- Practical reasons to quantify uncertainty
  - A virtual requirement for publication of results

Credit: Jan Berendregt, EpiGear International

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How to deal with uncertainty?

- What kinds of uncertainty arise?
  - Of parameters, eg, variability in effect size, generally due to small sample
  - Of model structure
  - Of CE threshold value, and other assumptions of the CE like generalizability, extrapolation, discount rate
- Statistical fixes for uncertainty
  - Confidence intervals around CE ratio
  - Confidence surface on the CE plane
  - Statistical analysis
  - Sensitivity analysis

Briggs, Health Econ. 7: 723–740 (1998)

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Sensitivity and uncertainty analysis: conclusion

- There have been major developments in the quantification of uncertainty in recent years
  - Ten years ago often only a one-way sensitivity analysis was done
- Current state of the art
  - Uncertainty analysis: uncertainty intervals, uncertainty on the CE plane, and CEACs
  - Sensitivity analysis: one-way and probabilistic
- What to present?
  - All of the above, since each provides different information
  - This is made possible by currently available software

Credit: Jan Berendregt, EpiGear International