Statistical methods for cost-effectiveness analysis: A selected review

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Identifying treatments or interventions that are cost-effective (more effective at lower cost) is clearly important in health policy decision making, especially in the allocation of health care resources. Various measures of cost-effectiveness that are informative, intuitive and simple to explain have been suggested in the literature, along with statistical inference concerning them. Popular and widely used measures include the incremental cost-effectiveness ratio (ICER), defined as the ratio between the difference of expected costs and the difference of expected effectiveness in two populations receiving two treatments. Although very easy to interpret as the additional cost per unit of effectiveness gained, being a ratio, the ICER presents difficulties regarding interpretation in certain situations, for example, when the difference in effectiveness is close to zero, and it also presents challenges in the statistical inference. Yet another measure proposed in the literature is the incremental net benefit (INB), which is the difference between the incremental cost and the incremental effectiveness after multiplying the latter with a "willingness-to-pay parameter". Both ICER and INB are functions of population means, and inference concerning them has been widely investigated under a bivariate normal distribution, or under a log-normal/normal distribution for the cost and effectiveness measures. In the talk, we will briefly review these, focusing on recent developments. An alternative probability-based approach will also be introduced, referred to as cost-effectiveness probability (CEP), which is the probability that the first treatment will be less costly and more effective compared to the second one. Inference on the CEP will also be discussed. Numerical results and illustrative examples will be given.