A novel estimator for incremental cost-effectiveness ratio based on number needed to treat

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Abstract

The incremental cost-effectiveness ratio (ICER) has widely been used in economic evaluations of medical technologies involved a consideration of both costs and clinical benefits. It is expressed in terms of the ratio of the change in costs of a therapeutic intervention to the change in effects of the intervention. Often, the change in effects is measured in terms of the absolute risk reduction by the intervention, while the number needed to treat (NNT) is defined as the inverse of the absolute risk reduction. The incremental cost-effectiveness ratio is then the product of the number of patients that need to be given treatment to achieve an extra unit of effectiveness and the incremental cost of treating each of those patients, and is therefore the incremental cost of achieving a unit of effectiveness from using treatment rather than standard. There is a vast amount of ICER articles regarding the continuous variables, but few of them studied the ICER based on NNT. Conventionally, NNT is estimated by simply plugging in the sample estimates of success proportions. The population NNT can alternative be expressed as the power series of parameters, which equals the truncated power series of parameters and remainder. The truncated power series of parameters are estimable by the truncated power series estimators. Comparing with the sample proportion estimator in the simulation study, the proposed estimator possesses almost always superior performance in terms of mean squared error. A substantial difference in confidence interval between the sample proportion estimator and proposed estimator is given in the example.