Practical implications of differential discounting in cost-effectiveness analyses with varying numbers of cohorts

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The study assessed the influence of the number of birth cohorts used in cost-effectiveness models under differential discounting for a vaccination and/or screening strategy for human papillomavirus. The main objective of the study was to assess the use of differential discount rates on the results and not the cost-effectiveness of vaccination versus screening. The authors concluded that by varying discount rates, arbitrary study specification led to arbitrary variations in results. The conclusions appear valid.

Type of economic evaluation
Cost-utility analysis

Study objective
To assess the influence of the number of birth cohorts used in cost-effectiveness models under differential discounting using as an example a vaccination and/or screening strategy for human papillomavirus in women.

Interventions
The interventions under study were: addition of human papillomavirus (HPV) vaccination to cervical screening programmes; and a cervical screening programme. Screening was simulated as seven screens between ages 30 and 60 at five-year intervals (the Dutch programme). Vaccination was administered at age 12.

Location/setting
The Netherlands/Primary Care.

Methods
Analytical approach:
The published MISCAN model of cervical screening and HPV vaccination was used in the study by de Kok et al. (2009) (see Other Publications of Related Interest). The results of this model were compared between analyses with a single-cohort and with 10, 20 and 30 cohorts. Each cohort was defined by its year of birth and received the vaccination one year after the preceding cohort. The time horizon was the lifetime of the patient. The authors did not state the study perspective.

Effectiveness data:
Effectiveness data were the same as those in the de Kok study and compared HPV vaccination and screening with screening alone.

Monetary benefit and utility valuations:
Utility estimates were the same as those used in the de Kok study and compared HPV vaccination and screening with screening alone.

Measure of benefit:
The benefit measure was quality-adjusted life years (QALYs). Future benefits were discounted at an annual rate of 1.5%. In supplementary analyses, benefits were discounted at an annual rate of 4%.

Cost data:
The direct costs included in the analysis were those used in the de Kok study and compared HPV vaccination and screening with screening alone. Future costs were discounted at an annual rate of 4%. Costs were reported in Euros (€).

Analysis of uncertainty:
A one-way sensitivity analysis was undertaken with costs discounted at an annual rate of 4%, effects discounted at an annual rate of 1.5% and a common annual discount rate of 4%.

Results
Discounting future costs at 4% per annum, the incremental costs of adding vaccination to the Dutch screening programme were: €324,423 million for a single cohort; €273,662 million for 10 birth cohorts; €229,268 million for 20 birth cohorts and €194,470 million for 30 birth cohorts.

Discounting future benefits at 1.5% per annum, the incremental QALYs gained from adding vaccination to the Dutch screening programme were 10,839,000 for a single cohort, 10,146,000 for 10 birth cohorts, 9,444,000 for 20 birth cohorts and 8,809,000 for 30 birth cohorts.

Discounting future benefits at 4% per annum, the incremental QALYs gained from adding vaccination to the Dutch screening programme were 3,190,000 for a single cohort, 2,690,000 for 10 birth cohorts, 2,254,000 for 20 birth cohorts and 1,912,000 for 30 birth cohorts.

Costs and benefits were combined using an incremental cost-utility ratio (additional cost per QALY gained). Using a 4% discount rate for both costs and benefits, the incremental cost per QALY gained of adding vaccination to screening was €101,700 irrespective of the number of cohorts used.

Using a 4% discount rate for costs and a 1.5% rate for benefits, the incremental cost-utility ratio of adding vaccination to screening was €29,900 for a single cohort, €27,000 for 10 cohorts, €24,300 for 20 cohorts and €22,100 for 30 cohorts.

Authors' conclusions
The authors concluded that under scenarios of varying discount rates, arbitrary study specification lead to arbitrary variations in results.

CRD commentary
Interventions:
The interventions under study were adequately reported.

Effectiveness/benefits:
The authors used a previously published modelling study to assess the impact of using varying discount rates. As a result, no details were reported on the sources or methods used to identify the effectiveness and utility data and their quality and validity could not be assessed. The reference to the original study was appropriately provided. Readers should refer to the original study for more information.

Costs:
As with the effectiveness and utility information, the authors provided no information on the perspective adopted in the economic analysis and the costs included. To judge whether all relevant costs were included, and the quality of such information, interested readers should refer to the original modelling study by de Kok.

Analysis and results:
A previously published micro-simulation model was used to assess the impact of using differential discount rates. The authors adequately reported the references to the original model and provided an adequate summary of the model used. The main focus was to assess the impact of discounting on results and the sensitivity analyses focused on the impact of differing discount rates between costs and outcomes. Readers should refer to the original model to assess whether the model was appropriately assessed for uncertainty. The authors reported as a limitation to their study that they did not provide a complete discussion of the methodological implications of differential requirements and such a discussion...
would require a detailed review of theory.

Concluding remarks:
The main objective of the study was to assess the use of differential discount rates on the results and not the cost-effectiveness of vaccination versus screening. Given the scope of the authors’ study, their conclusions appear valid.

Bibliographic details
O'Mahony JF, de Kok IM, van Rosmalen J, Habbema JD, Brouwer W, van Ballegooijen M. Practical implications of differential discounting in cost-effectiveness analyses with varying numbers of cohorts. Value in Health 2011; 14(4): 438-442

PubMedID
21669368

DOI
10.1016/j.jval.2010.09.009

Original Paper URL
http://www.valueinhealthjournal.com/article/S1098-3015(10)00048-3/abstract

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Adult; Age Factors; Aged; Child; Cohort Effect; Cost-Benefit Analysis /economics /methods; Female; Humans; Middle Aged; Models, Statistical; Papillomavirus Vaccines /economics /therapeutic use; Uterine Cervical Neoplasms /economics /epidemiology /prevention & control; Young Adult

AccessionNumber
22011001632

Date bibliographic record published
12/04/2012

Date abstract record published
01/06/2012