

Cost-effectiveness of Drugs for Smoking Cessation in Norway

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Background

Smoking is an important risk factor for several diseases, including different cancers, lung- and cardiovascular diseases. About 21% of the Norwegian population are daily smokers. In Norway, two prescription drugs are available for use in smoking cessation; varenicline (Champix[®] or Chantix[®]) and bupropion (Zyban[®]). In addition, several options for nicotine replacement therapy (NRT) are available, such as nicotine-gum, patches and lozenges.

Purpose

To evaluate the cost-effectiveness of drugs for smoking cessation in a Norwegian setting. The economic evaluation will inform a revised treatment guideline for smoking cessation in primary care and be used for reimbursement decisions.

Method

We performed a model based economic evaluation of nicotine replacement therapy, bupropion and varenicline for smoking cessation. The drugs were compared to placebo and to each other.

The cost-effectiveness was evaluated through a mortality based Markov model with the health states “Smoker”, “Quitter”, “Ex-smokers”, “Resumers” and “Death”, cf. Figure 1. Quitters were defined as being smoke free less than five years, while

Resumers had started smoking again less than five years ago. Smokers were given one attempt to quit. Efficacy data were taken from our systematic review of the literature, cf. Table 1.

Uncertainty surrounding to the efficacy estimates related to the quality of the evidence was incorporated through probability distributions related to the GRADEing of the documentation. Efficacy estimates supported by high quality documentation were allowed narrower confidence intervals than estimates with moderate or low quality.

Mortality risks connected to smoking in the different health states were taken from Norwegian registry data with 48 682 individuals (data from the Norwegian institute of public health) cf. Table 2.

Health state costs were taken from published studies, allowing smokers and quitters to have different health care expenditures and allowing health care costs to vary with age. Costs and health effects were discounted with a factor of 4 %.

Results

All treatments were less costly and more effective than no treatment. Compared to no treatment, nicotine replacement therapy, bupropion and

varenicline yielded respectively 0.019, 0.055 and 0.155 additional life years and additional savings of respectively US \$ 31, 88 and 252 per person treated, cf. Table 3. NRT, bupropion and no treatment were dominated by varenicline in the base case results.

In the probabilistic sensitivity analysis, varenicline had a probability of 99 % of being cost effective compared to no treatment assuming a willingness to pay per life year gained of US \$ 83 000., cf. Figure 2.

Conclusion

Nicotine replacement therapy (NRT), bupropion and varenicline can all be considered cost-effective compared to no treatment. Varenicline is likely to yield the largest health gains and the largest savings.

Figure 1: Model structure

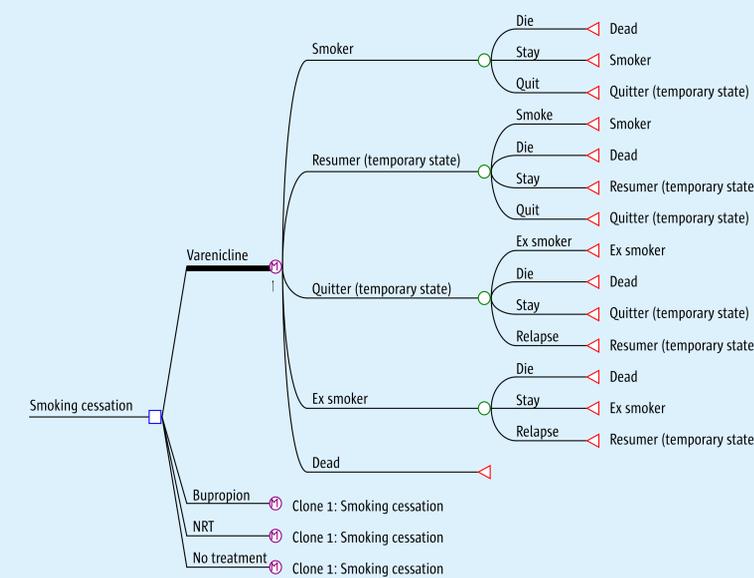


Figure 2: Cost-effectiveness scatter plot

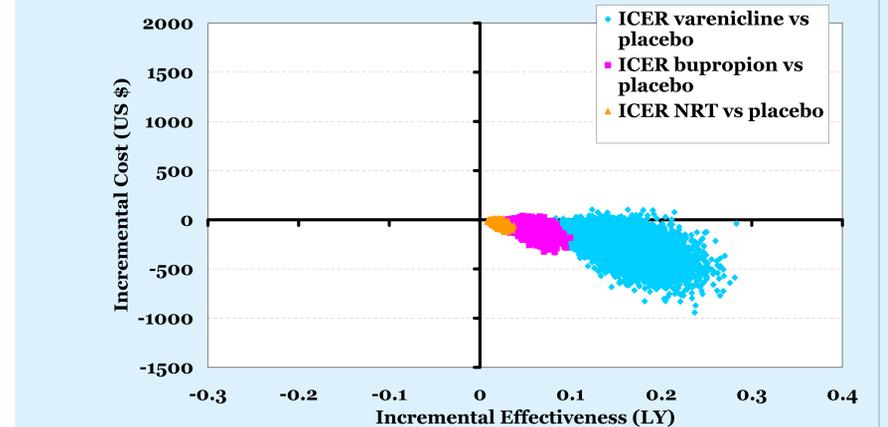


Table 1: Efficacy data

Treatment	Efficacy vs. placebo in relative risks (RR)	Outcome
NRT vs. placebo	1.58 (1.50-1.66)	Abstinent at 6-12 months
Bupropion vs. placebo	1.69 (1.53-1.85)	Abstinent at 6 + months
Varenicline vs. placebo	2.33 (1.95-2.80)	Continuous abstinence at 24 or more weeks
Bupropion vs.NRT	1.45 (0.50-4.18)	Continuous abstinence at 52 weeks
Varenicline vs.bupropion	1.46 (1.18-1.81)	Continuous abstinence at 52 weeks

Table 2: Mortality risks connected to model health states

Health States	Relative hazard of dying women	Relative hazard of dying men
Non-smokers	1.00	1.00
Smokers	2.49 (2.29-2.71)	2.61 (2.40-2.85)
Resumers	1.40 (1.08-1.81)	1.59 (1.32-1.91)
Quitters	1.64 (1.38-1.95)	1.39 (1.23-1.58)
Ex-smokers	1.06 (0.90-1.26)	1.07 (0.96-1.19)

Table 3: Base case results, all treatments compared to no treatment

	Cost (US \$)	Incremental cost	Effect in life years gained	Incremental effect	NHB
No treatment	50 955		14.598		
NRT	50 923	-31	14.617	0.019	0.020
Bupropion	50 867	-88	14.651	0.054	0.055
Varenicline	50 703	-252	14.752	0.155	0.158