

# THE COST-EFFECTIVENESS ANALYSIS OF VARENICLINE FOR SMOKING CESSATION IN POLAND

Walczak J., Nogas G., Dybek-Karpiuk A., Augustyńska J., Stelmachowski J., Garbacka M., Obrzut G., Pawlik D.  
Arcana Institute, Cracow, Poland

## INTRODUCTION:

Tobacco smoking is a global health problem. It is estimated that one in three adults smoke, with over 1 billion people smoking worldwide. Tobacco smoking is a dominant risk factor for developing cardiovascular diseases, carcinomas and chronic obstructive pulmonary disease [1, 2].

In Poland about 10 million adults smoke, 39% of men and 23% of women [2, 3]. Available data for Polish population shows, that about 30% of adult men deaths and 6% of adult women deaths in years 1990-1994 were direct consequences of tobacco smoking [1]. Champix<sup>®</sup>, a new non-nicotine tablet, is reported to have the potential to be a significant therapeutic advance over existing therapies supporting smoking cessation.

## OBJECTIVES:

The aim of the analysis was to estimate the costs and effectiveness of varenicline in comparison with existing smoking cessation strategies in Poland (bupropion, nicotine replacement therapy (NRT), unaided cessation and placebo).

## METHODS:

The cost-utility and cost-effectiveness analyses were conducted.

**Population:** The target population consisted of adult smokers. The size of cohort included in the model was estimated using Polish demographic and epidemiologic data.

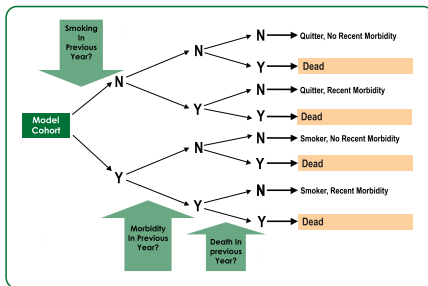
**Intervention and comparators:** The following smoking cessation strategies were considered: varenicline, bupropion, nicotine replacement therapy (NRT), unaided cessation and placebo.

**Outcomes:** The quality adjusted life-years (QALY), life years gained (LYG), additional smoking cessation case and additional avoidance of chronic obstructive lung disease (COPD) were used to estimate effectiveness of treatment strategies.

**Perspective and time horizon:** The analysis was performed from both payers' perspective (National Health Fund and patient) with a lifetime horizon.

**Discounting:** The costs and benefits were discounted at 5% and 3.5% annual rate respectively.

**Design:** A Markov model, the Benefits of Smoking Cessation on Outcomes (BENESCO) constructed in MS Excel<sup>®</sup> was used in the analysis. The following states were considered in the model: "no current morbidity", "chronic obstructive pulmonary disease (COPD)", "lung cancer", "coronary heart disease (CHD)", "stroke", "asthma exacerbation" and "death". Simplified model structure presenting possible events during each 1-year cycle illustrates figure below.



Transition probabilities determine movement between model states for each successive cycle. The transition probabilities are based on both the patient's smoking status and their morbidity status in the previous year. At the end of each cycle patients may remain in the same state, transition to another morbidity state or die from a smoking-related illness or other causes. Patients are modeled as being distributed throughout the age bands (age 18-34, 35-64 and >65 years), and so each year, as the cohort ages, a proportion of subjects leave their current band and enter the subsequent band. The risks of developing the modeled morbidities are assumed to increase with age, independent of smoking status.

A probabilistic and univariate sensitivity analysis was performed to estimate variability of the obtained results relative to used data.

**Clinical effectiveness:** The measure of clinical effectiveness was continuous abstinence rates to 52 weeks. Treatment effects for analysis come from identified RCTs assessing the effects of considered smoking cessation strategies [4-9].

## RESULTS:

**Cost-utility analysis:** Cost of gaining one additional QALY using varenicline versus bupropion, NRT, unaided cessation or placebo was respectively 8 750 PLN, 6 140 PLN, 8 827 PLN and 14 130 PLN.

Intervention	Cost (million PLN)	QALY (thousand)	ICER (PLN/QALY)
Varenicline	23 537	30 598	-
Bupropion	23 051	30 543	8 750
NRT	22 294	30 589	6 140
Unaided cessation	22 287	30 457	8 827
Placebo	22 052	30 493	14 130

1€ = 4.11 PLN; 24.08.2009

Cost of one additional smoking cessation case using varenicline versus existing smoking cessation strategies was from 6 260 PLN to 10 247 PLN and costs of one avoidance of COPD case was from 27 PLN to 62 PLN.

The robustness of the models was tested in the univariate and probabilistic sensitivity analyses which proved stability of the results. Varenicline remains more expensive and more effective therapy than other considered smoking cessation strategies. In the case of assumption of higher bupropion cost, higher NRT cost or lack of discounting, treatment with varenicline becomes the dominant strategy.

## CONCLUSIONS:

Results of the analysis indicate that varenicline is more effective and more expensive than alternative options for smoking cessation. Incremental cost-effectiveness ratios are below the acceptable threshold in Poland, therefore the varenicline can be considered as highly cost-effective smoking cessation strategy.

## REFERENCES:

- Bala M, Leśniak W. Skuteczność niefarmakologicznych metod leczenia uzależnienia od tytoniu-metaanaliza. *Polskie Archiwum Medycyny Wewnętrznej* 2007; 117 (11-12).
- Jankowski P, Kawecka-Jaszcz K, Jassem J. Dlaczego warto uchwalić w Polsce nową ustawę antynikotynową? *Kardiologia* 2009; 67: 101-105.
- Górecka D. Leczenie uzależnienia od tytoniu. W: *Choroby wewnętrzne. Szczeklik A (red.)* Wyd. 1. Vol 1. *Medycyna Praktyczna*, Kraków 2006; 683-690.
- Aubin HJ, Bobak A, Britton JR. Varenicline versus transdermal nicotine patch for smoking cessation: results from a randomised open-label trial. *Thorax*. 2008 Aug; 63(8): 717-24. Epub 2008 Feb 8.
- Gonzales D, Rennard SJ, Nides M. Varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation: a randomized controlled trial. *JAMA*. 2006 Jul 5;296(1):47-55.
- Jorenby DE, Hays JT, Rigotti NA. Efficacy of varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs placebo or sustained-release bupropion for smoking cessation: a randomized controlled trial. *JAMA*. 2006 Jul 5;296(1):56-63.
- Nakamura M, Oshima A, Fujimoto Y. Efficacy and tolerability of varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, in a 12-week, randomized, placebo-controlled, dose-response study with 40-week follow-up for smoking cessation in Japanese smokers. *Clin Ther*. 2007 Jun; 29(6): 1040-56.
- Niaura R, Hays JT, Jorenby DE. The efficacy and safety of varenicline for smoking cessation using a flexible dosing strategy in adult smokers: a randomized controlled trial. *Curr Med Res Opin*. 2008 Jul;24(7):1931-41. Epub 2008 May 29.
- Oncken C, Gonzales D, Nides M. Efficacy and safety of the novel selective nicotinic acetylcholine receptor partial agonist, varenicline, for smoking cessation. *Arch Intern Med*. 2006 Aug 14;28(16):1571-7.
- Fiscella K, Franks P. Cost-effectiveness of the transdermal nicotine patch as an adjunct to physicians' smoking cessation counseling. *JAMA*. 1996 Apr 24;275(16):1247-51.

**Clinical effectiveness:** The measure of clinical effectiveness was continuous abstinence rates to 52 weeks. Treatment effects for analysis come from identified RCTs assessing the effects of considered smoking cessation strategies [4-9].

Intervention	Percent of patients achieving continuous abstinence rates to 52 weeks
Varenicline	25.3%
Bupropion	17.3%
NRT	19.6%
Unaided cessation	5.0%
Placebo	10.2%

**Cost analysis:** In the analysis, following direct medical costs were considered using Polish cost data:

- Costs of varenicline therapy;
- Costs of bupropion therapy;
- Costs of nicotine replacement therapy (NRT);
- Costs of smoking-related morbidities treatment.

Parameter	Cost (PLN)
Varenicline therapy (12 weeks)	932.95
Bupropion therapy (7 weeks)	562.98
Nicotine replacement therapy (NRT) (10-12 weeks)	710.76

1€ = 4.11 PLN; 24.08.2009

Disease	Annual cost of treatment (PLN)
COPD	3 027.59
Lung cancer	20 085.00
CHD (first year)	47 606.71
CHD (subsequent year)	1 021.00
Stroke (first year)	10 534.00
Stroke (subsequent year)	253.00
Asthma exacerbation	4 322.93

1€ = 4.11 PLN; 24.08.2009

**Utilities:** Baseline utilities for patients with no smoking-related morbidity by sex and age band were derived from Fiscella 1996

Age	Baseline utility weight	
	Men	Women
18-34	0.93	0.91
35-64	0.88	0.85
65+	0.80	0.77

The utilities for the considered smoking related diseases were sourced from the published literature.

Disease	Utility weight
COPD	0.76
Lung cancer (first year)	0.61
Lung cancer (subsequent year)	0.50
CHD	0.76
Stroke (first event)	0.74
Stroke (subsequent event)	0.15
Asthma exacerbation	0.52

