Cost-effectiveness analysis of pregabalin in the treatment of central neuropathic pain

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Objectives

The aim of the pharmaco-economic evaluation was to assess costs and benefits of treatment of central neuropathic pain (CNP) with pregabalin compared to placebo as there were no data proving efficacy of other treatments of CNP available and also no treatment is paid by healthcare payers in the Czech Republic.

The pharmaco-economic evaluation was performed from the perspective of the public healthcare payer and only the costs that affect the utilization of public health insurance resources were included.

Methods

Health-economic model

A de novo micro-simulation model was developed in MS Excel 2013 comparing pregabalin treatment of CNP versus placebo. The pharmaco-economic evaluation was performed as cost-utility analysis (CUA).

The improvement of patients' pain intensity expressed as the decrease in VAS (Visual Analog Scale 0 - 100 mm) score was modelled using one week cycle over the 24 week time horizon.

Population

Baseline characteristics of the whole population (pregabalin and placebo) were modelled individually for each patient according to the data from randomized multicenter 12-weekplacebo-controlled clinical trial (1) using normal distribution. Baseline mean age and VAS score was 50.55 (standard deviation (SD): 14.25) and 71.15 (SD: 14.20) respectively. Proportion of men according to the clinical trial (1) was 82.71 %. Baseline characteristic and efficacy was analyzed for patients with at least one visit after screening (n = 133).

Efficacy

The percentage changes of VAS score were estimated for each intervention using a regression function of time and the baseline patients' characteristic (age, sex and the baseline VAS score). Regression functions were estimated using patient level data (PLD) from clinical trial (1).

The model simulated 500 patients with fixed parameters of efficacy, utilities and costs. Only variable parameters are baseline characteristics of individual patients which are assigned to a patient according to their probability distributions estimated from the PLD data from clinical trial (1).

The regression function of decrease of VAS score for each patient was estimated as follows:

$$1 - \frac{VAS_t}{BASELINE} = Intercept + \beta \ \ ln\,(t),$$

where t is time (weeks), VAS_t is VAS score in time t, $BASELINE$ is baseline VAS score of the patient, $Intercept$ and β are parameters of regression function.

Treatment arm	Parameter	Mean	Std.Error
Pregabalin	Intercept	0,1972785	0,03513889
	β	0,0344411	0,00845979
Placebo	Intercept	0,07246228	0,0313454
	β	0	0

Table 1: Parameters of regression function of VAS change

The graph on Figure 1 shows percentage decrease of VAS score from baseline VAS score following time. The vertical line stands for time horizon in the trial (1) – 12 weeks.

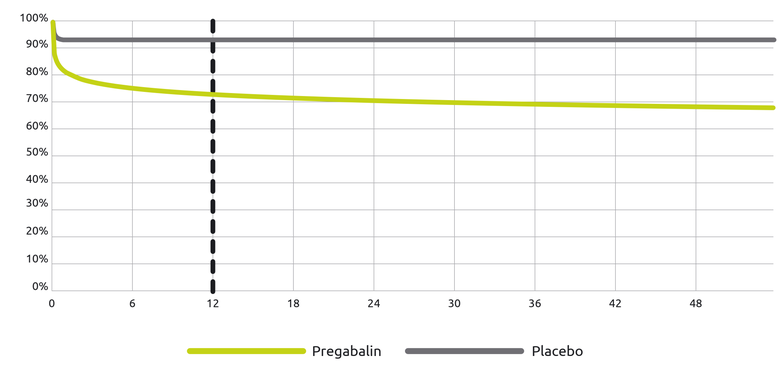

Figure 1: Percentage decrease of VAS from BASELINE

Quality of life

A systematic literature review was performed to include information on quality of life (QoL) for patients with CNP which was not measured in Sidall, et al. 2006 (1). The trial Vranken, et al. 2008 compared pregabalin to placebo using a similar pain VAS scale and measured QoL using the EQ-5D (2). Based on these data, a regression equation describing dependence of utility values on actual VAS score was estimated as follows:

$$Utility = 1 - 0{,}0101 \cdot VAS$$

Costs

From the payer's perspective drug cost, administration, monitoring, concomitant medication and costs of treatment of adverse events were considered. The cost analysis was based on the current list of reimbursed drugs (3) and medical examinations (4) in the Czech Republic.

When calculating drug costs, costs of average daily drug dosage (387.6 mg/day) were calculated according to the clinical trial (1), as well as the proportion of patients suffering of adverse events (AE). Patients experienced AE (somnolence, dizziness, edema, asthenia… (1)) in both treatment arms.

Based on expert feedback and real world prescribing, (5) concomitant medications (opioids, tricyclic antidepressants, NSAIDs) were assumed to be co-prescribed with pregabalin and with placebo according the clinical trial (1) and cost in the Czech Republic.

	Pregabalin	Placebo	Source
Daily drug cost	2.64 €	-	External price references 07/2014
Administration costs	12.94 €	-	(4; 5)
Management costs (average weekly costs)	0.83 €	0.41 €	(4; 5)
Adverse events (average costs)	2.13 €	0,73 €	(1; 4; 5)
Concomitant medication	0.81 €	1.34 €	(1; 3; 5)

Table 2: Costs

Results

The base case result is shown in the table below. Incremental cost-effectiveness ratio (ICER) per QALY gained reached 8,335.22 € which is situated far below the willingness to pay threshold (WTP = 39,876.74 €).

	Total QALY	Total Costs	ICER/QALY
Pregabalin	0.2275	617.45 €	
Placebo	0.1605	59.49 €	8,335.22 €

Table 3: Base case results

To eliminate uncertainty probabilistic sensitivity analysis (PSA) was made as 1,000 simulations of 500 patients. Pegabalin is cost-effective in 100 % of simulations.

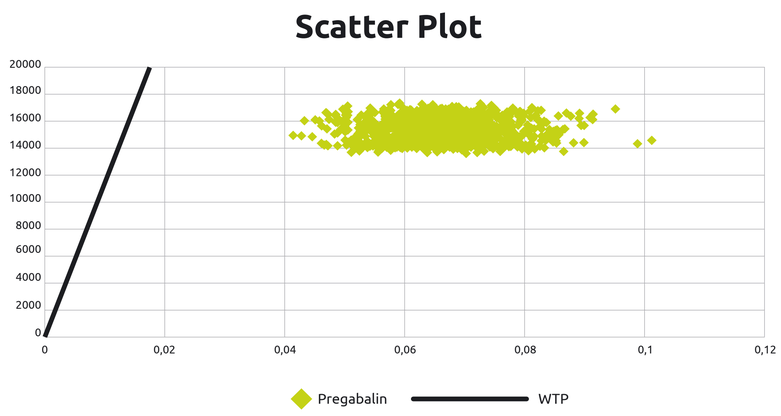

Figure 2: Scatter plot

Conclusion

Pregabalin is the only option of CNP treatment in the Czech Republic and brings significant pain relief for patients. Treatment with pregabalin also results in low ICER and can be considered a cost-effective treatment of central neuropathic pain in the Czech Republic.

References

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