

Cost-Analysis for Toxicity Management in Advanced Squamous Non-Small Cell Lung Cancer (NSCLC): nivolumab vs docetaxel

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Introduction

- Lung cancer is the type of cancer that causes more deaths worldwide, with 1,825 million patients diagnosed and 1.59 million deaths in 2012¹. A total of approximately 21,689 annual deaths occur because of lung cancer in Spain (20.2% of deaths from cancer), being the annual mortality rate significantly higher in men (26.7%) than women (9.9%)². Non-small-cell lung cancer (NSCLC) accounts for 85%–90% of all lung cancers (being subtype squamous cell 25–30%)^{3,4}.
- The corresponding cost to lung cancer in Spain increased to 1,258 million in 2009, of which 7 million euros correspond to adverse events (AEs)⁵.
- According to international guidelines, treatment for advanced NSCLC chemotherapy and targeted therapy is recommended⁴.
- It has been shown that the toxicity associated with chemotherapy in patients with NSCLC resulted in an increase in hospitalizations or additional visits to hospital more than three quarters of cycles administered⁶.

Objective

To estimate the management cost for treatment-related AEs (grade 3-4), in patient with advanced (stages IIIb/IV) squamous NSCLC undergoing a second line (2L) therapy with nivolumab or docetaxel (standard of care), from the Spanish National Health System perspective.

Methods

- Grade 3-4 treatment-related AEs suffered in ≥5% of patients treated with nivolumab or docetaxel (Table 1) were selected from CheckMate-017⁷.
- Resource consumption for each AE management was provided by an oncologists panel. The healthcare resources included: medical visits, hospitalizations, procedures, diagnostic and/or laboratory test and surgeries.
- Unitary costs (€,2016) were obtained from a national database⁸.
- Individual cost for AEs management was calculated applying AE frequency to corresponding unit cost (Table 1).
- To calculate total toxicity costs with nivolumab and docetaxel treatment, eligible population for the next three years (2017, 2018 and 2019) was estimated. An epidemiological algorithm (Figure 1), considering incidence, prevalence and mortality for NSCLC reported by Globocan⁹, and also taken into account published data related to proportion of patients with advanced NSCLC and patients treated within a clinical trial, was used.

Table 1. Treatment-related adverse events reported in at least 5% of patients

	CheckMate-017 ⁷		Event cost (€, 2016)	Nivolumab cost	Docetaxel cost	Nivolumab vs docetaxel cost difference
	Nivolumab (N=131)	Docetaxel (N=129)				
Alopecia	0.00%	0.78%	€96.52	–	€0.75	€0.75
Anemia	0.00%	3.10%	€606.60	–	€18.81	€18.81
Asthenia	0.00%	3.88%	€164.25	–	€6.37	€6.37
Diarrhea	0.00%	2.33%	€3,216.97	–	€74.81	€74.81
Fatigue	0.76%	7.75%	€365.08	€2.79	€28.30	€25.51
Nausea	0.00%	1.55%	€673.71	–	€10.45	€10.45
Neutropenia	0.00%	29.46%	€501.86	–	€147.83	€147.83
Febrile neutropenia	0.00%	10.08%	€3,318.53	–	€334.43	€334.43
Pyrexia	0.00%	0.78%	€1,208.68	–	€9.37	€9.37
Rash	0.00%	1.55%	€2,771.74	–	€42.97	€42.97
Decreased appetite	0.76%	0.78%	€1,596.77	€12.19	€12.38	€0.19
Leukopenia	76.34%	3.88%	€140.42	€107.19	€5.44	€101.75
Peripheral neuropathy	0.00%	2.33%	€2.17	–	€0.05	€0.05
Total cost				€122.17	€691.96	€-569.79

Results

- Costs related to toxicity management were lower with nivolumab (€122.17 per patient) than in the docetaxel group (€691.61). (Table 1).
- The target patient population obtained through epidemiological algorithm (Figure 1) was: 2,090, 2,119 and 2,148 patients, for the next three years.
- Incremental cost-savings considering the target population resulted in €1,190,860.83 in the first year, €1,207,384.74 in the second year and €1,223,908.65 in the third year. (Table 2).

Figure 1: Target population: epidemiological algorithm

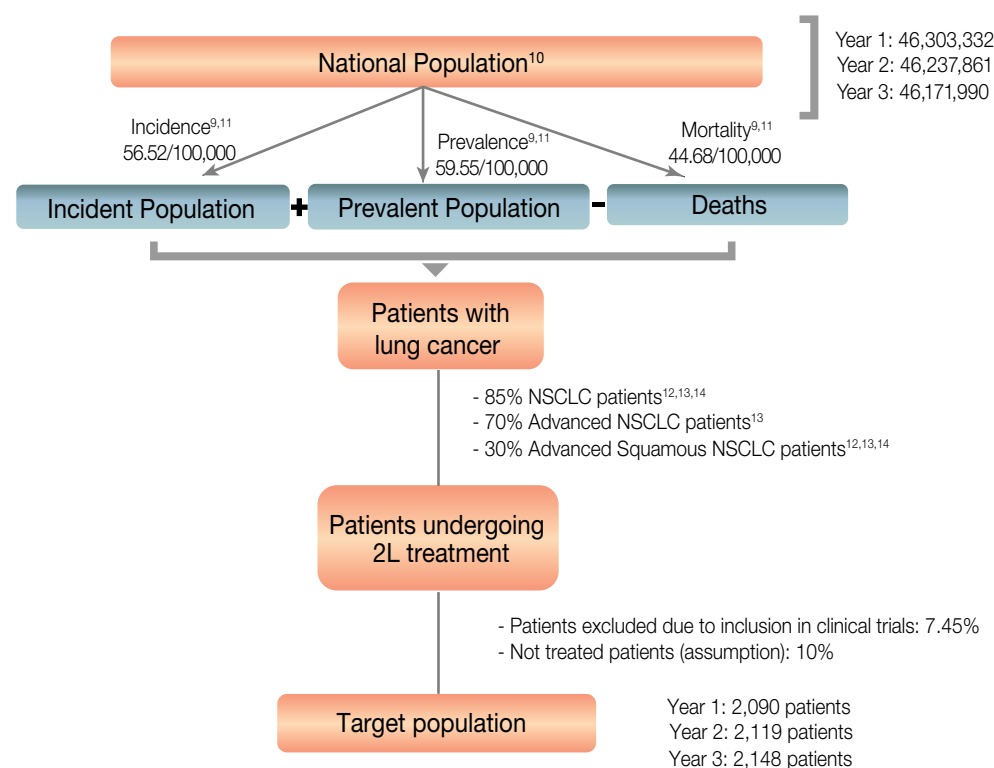


Table 2. Results

Population	2017	2018	2019
Target population NSCLC 2L	2,090	2,119	2,148
Costs	2017	2018	2019
Nivolumab	€255,328.60	€258,871.44	€262,414.27
Docetaxel	€1,446,189.43	€1,466,256.18	€1,486,322.92
Nivolumab vs docetaxel cost-savings	€-1,190,860.83	€-1,207,384.74	€-1,223,908.65

Conclusions

Nivolumab could be considered a cost-saving strategy compared to docetaxel, for 2L advanced squamous NSCLC, in terms of the associated toxicity management costs.

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