

# EARLY PHASE ECONOMIC EVALUATION OF NEW GENERATION SEQUENCE DIAGNOSTICS IN MULTIPLE MYELOMA

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## INTRODUCTION

Multiple myeloma (MM) represents approximately 10% of all hematologic malignancies (Kyle, 2005). Depending on the state of patients, autologous stem cell transplantation is often performed, followed by maintenance therapy. For this purpose, currently, lenalidomide is the only approved agent.

In multiple myeloma, new generation sequence (NGS) diagnostics has the potential to accurately detect minimal residual disease. Consequently, patients after stem cell transplantation may avoid unnecessary and costly maintenance therapy due to the fear of minimal residual disease - in case of two independent negative NGS test results.

## OBJECTIVES

Our goal was to develop a model assessing the economic value potential of a NGS diagnostics in development compared to no further diagnostics in multiple myeloma.

## METHODS

Decision tree was used to allocate patients according to diagnosis, followed by a Markov model simulating overall and progression free survival of patients using 28-day long cycles over 10-year time horizon (see Figure 1-3).

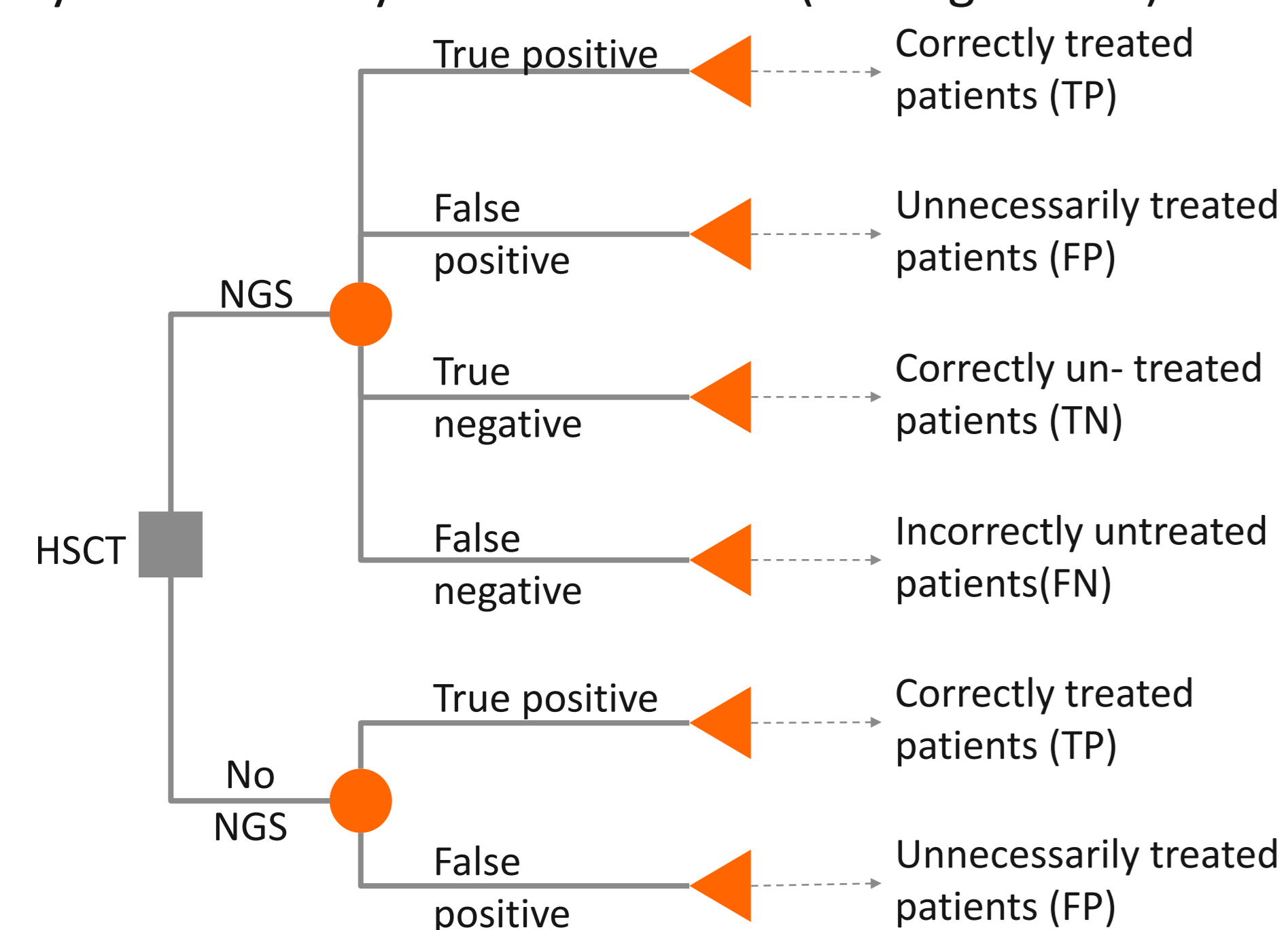


Figure 1 – Decision tree used to allocate the patients

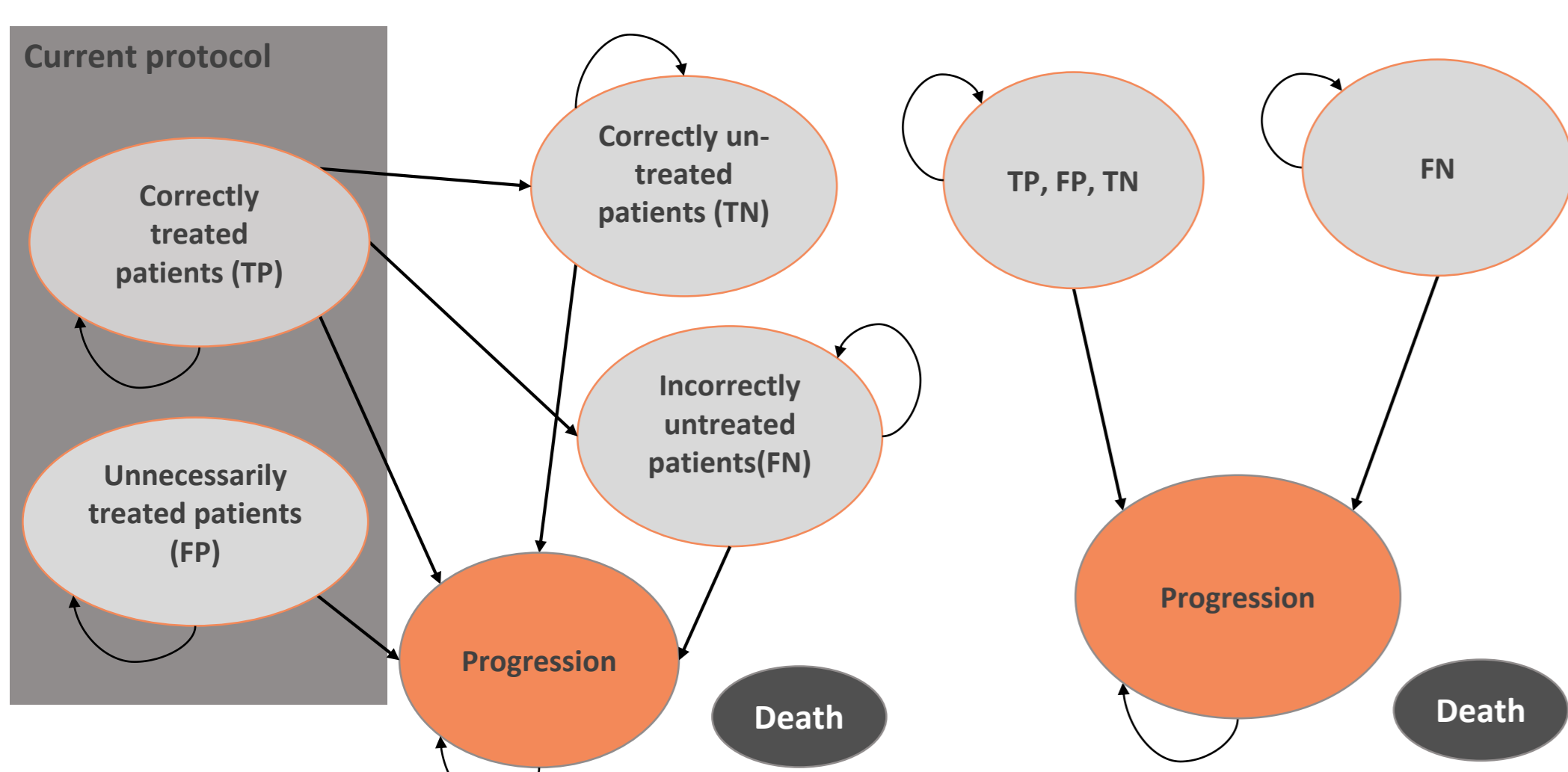


Figure 2 – Markov model for the first two years

Figure 3 – Markov model for period after the first two years

Patients with positive NGS diagnosis stayed on maintenance therapy, MRD-negatively diagnosed patients stopped treatment. It was assumed that false negative patients terminate effective therapy, which results in worse prognosis for these subjects.

## Input data

Treatment costs (including maintenance therapy, AE costs, second-line treatment) were based on published literature (Pelligra, 2017; LeBlanc, 2016; Carlson, 2018).

Utility data used in the model is based on an EQ-5D survey performed in the USA (Pelligra, 2017).

Transition probabilities were calculated based on the IFM 2005-02 clinical trial results concerning the use of lenalidomide as maintenance therapy after autologous stem-cell transplantation (Attal, 2012).

98.1% specificity and 99.5% sensitivity were assumed for the NGS diagnostics based on Jennings (2017).

Net Monetary Benefit (NMB) was calculated with a 150 thousand USD incremental cost/QALY threshold.

The proportion of patients in the true positive and true negative cohorts was based on the opinion of an expert panel in Hungary. Discount rate used for both costs and utilities was 3%.

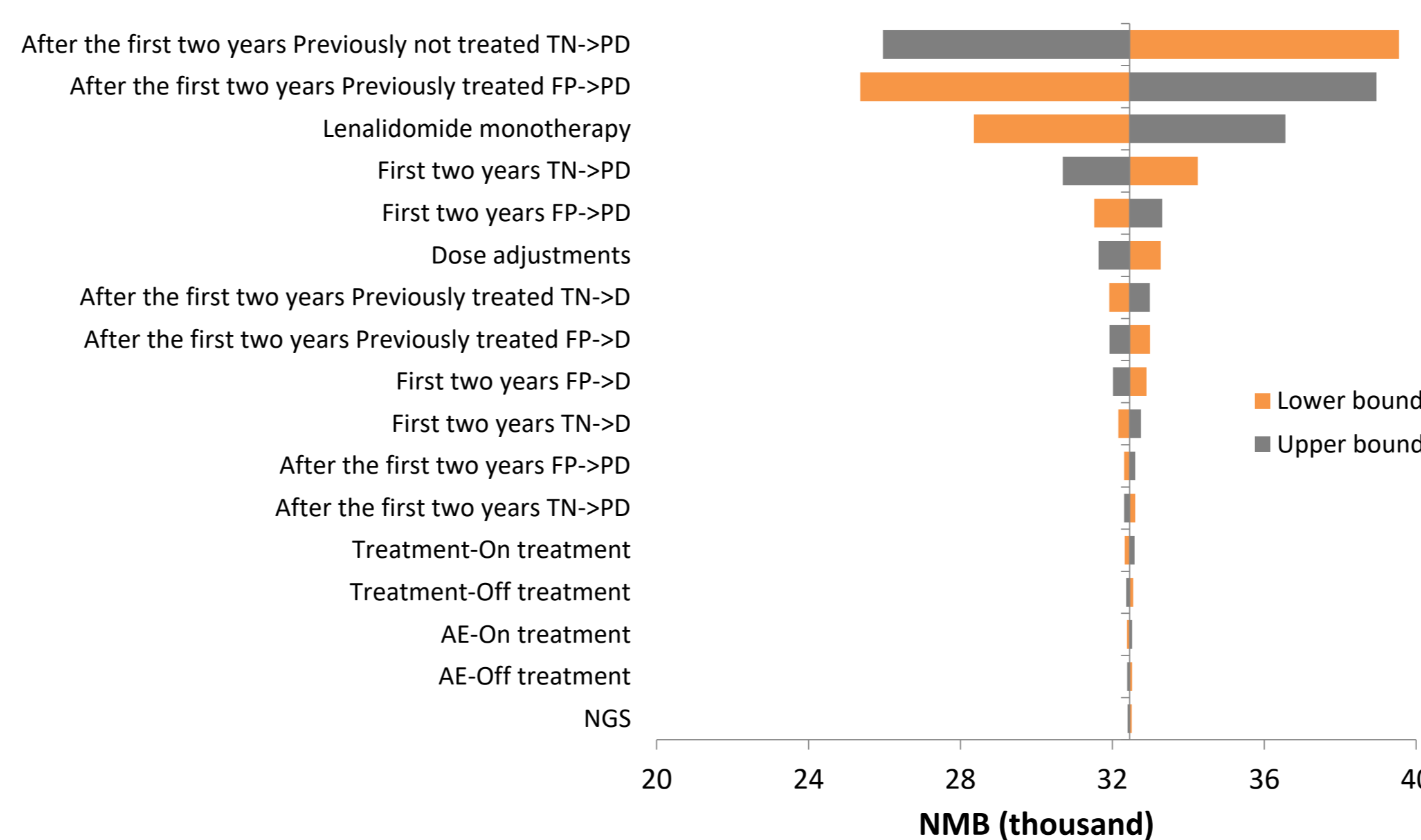


Figure 5 – Tornado diagram for the effect of input data changed by 10% on NMB



Figure 4 – Discounted healthcare costs per cycle per arm

## REFERENCES

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Pelligra CG, Parikh K, Guo S, Chandler C, Mouro J, Abouzaid S, et al. Cost-effectiveness of Pomalidomide, Carfilzomib, and Daratumumab for the Treatment of Patients with Heavily Pretreated Relapsed-refractory Multiple Myeloma in the United States. Clinical therapeutics. 2017;39(10):1986-2005.e5.  
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## RESULTS

Due to NGS diagnostics, 58.9% of patients were predicted to stop therapy as being true negative and 0.2% as being false negative. On the comparator arm, all patients stayed on maintenance therapy according to the current treatment practice. At zero price, inclusion of NGS into the diagnostic protocol would accumulate 32.8 thousand USD NMB. The model was highly sensitive to the prevalence of positive patients in the population, the diagnostic accuracy of NGS and the compliance of physicians with test results.

Results over a 10-year time horizon	Comparator	NGS
Total cost	\$502 025	\$469 553
Total QALY	3.8548	3.8539
Incremental costs		-\$32 472
Incremental QALYs		-0.0008
Net Monetary Benefit		\$32 455

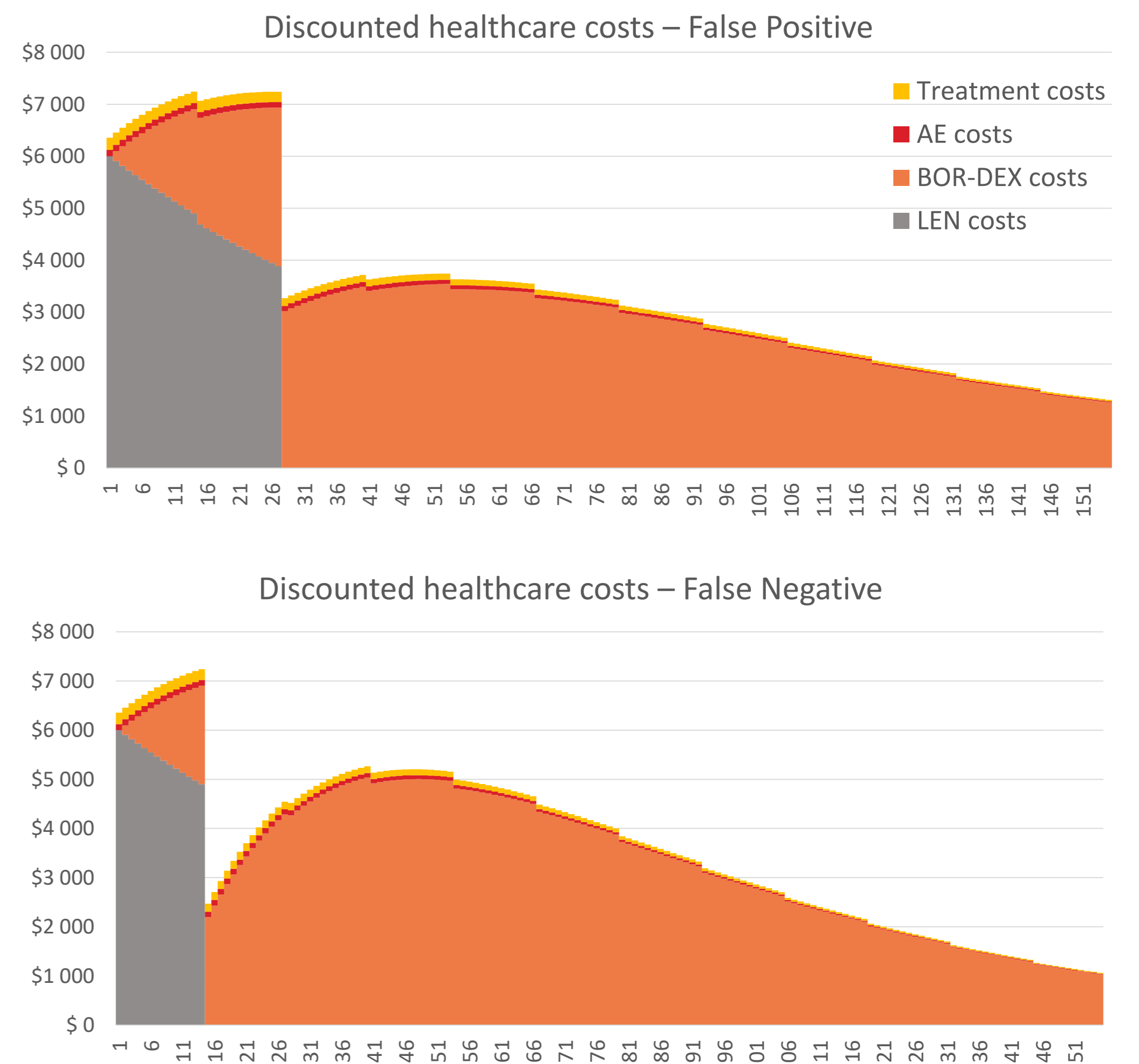
Table 1 – Base case result for comparator and NGS arm

## CONCLUSIONS

The model demonstrated that NGS may generate significant cost-savings in multiple myeloma by confirming the appropriateness of therapy discontinuation for patients in sustained MRD-negative remission. Scenario analyses could explore the economic value of other diagnostic protocols with special focus on time difference between the two negative test results.

Scenarios	Net Monetary Benefit
Base case	\$32 455
2-year time horizon	\$32 617
Proportion of TP = 50%	\$26 928
Proportion of positive = 70%	\$15 872
Proportion of positive = 90%	\$4 817

Table 2 – Cost saving per patient and NMB



Carlson JJ, Guzauskas GF, Chapman RH, et al. Cost-effectiveness of Drugs to Treat Relapsed/Refractory Multiple Myeloma in the United States. J Manag Care Spec Pharm. 2018;24:29-38  
Attal M, Lauwers-Cances V, Marit G, et al. Lenalidomide maintenance after stem-cell transplantation for multiple myeloma. N Engl J Med. 2012; 366: 1782-1791  
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