

# Cost model assessing flat and weight-based dosing of nivolumab immunotherapy

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## Background

Nivolumab immunotherapy has a wide therapeutic index and its pharmacokinetics are not significantly affected by body weight.<sup>1,2,3</sup> Flat dosing of nivolumab has been approved as an alternative to conventional weight-based dosing and may improve medication safety as well as compounding efficiency, but its costs is not well understood.<sup>4</sup>

## Aim

To identify and evaluate the costs of nivolumab flat dosing relative to weight-based dosing.

## Methods

A retrospective analysis of patients who received nivolumab between January and December 2018 at a metropolitan teaching hospital was performed. Based on this data, a cost model was developed to simulate three scenarios: weight-based dosing (3-mg/kg every 2 weeks regimen (Q2W)), flat dosing (240-mg Q2W), and combination dosing (patients <80kg received 3-mg/kg Q2W while patients ≥80kg received 240-mg Q2W) (Figure 1). The respective costs of these scenarios were then assessed. Patients who received flat dosing or 1-mg/kg dosing were excluded from the data used to generate models.

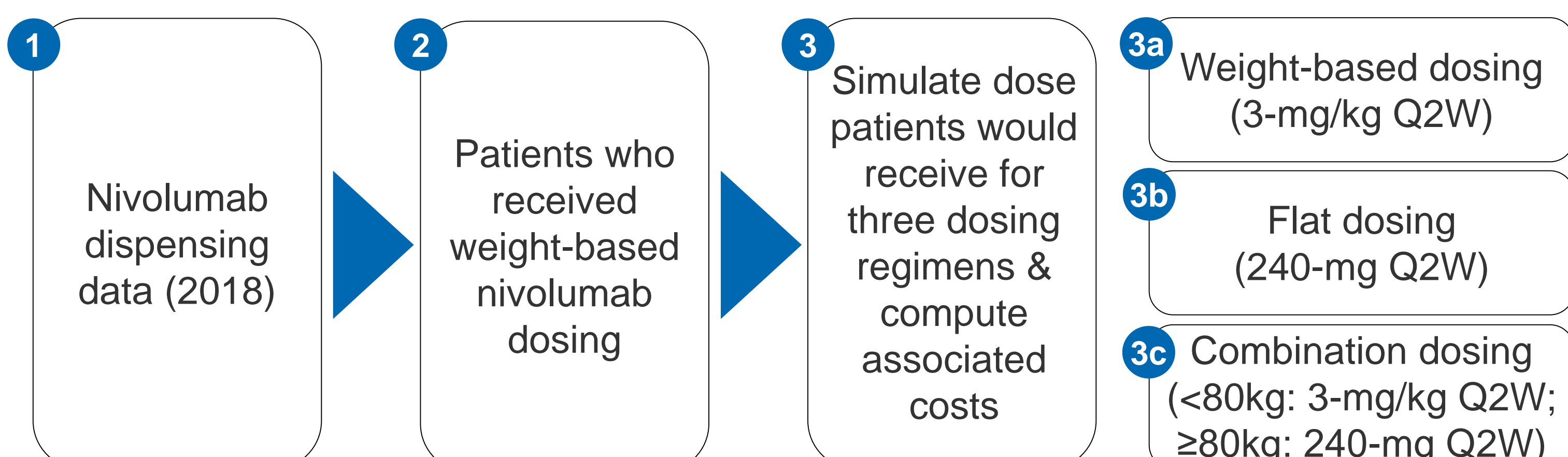


Figure 1: Development of cost models to identify and evaluate costs of nivolumab flat dosing relative to weight-based dosing.

## Results

### Dispensing Count and Indication

Nivolumab was dispensed 803 times in 2018, with non-small cell lung cancer the major indication accounting for 76.6% of dispensings.

### Dosing Regimen and Patient Population

Conventional 3-mg/kg Q2W was the predominant regimen with 97.4% (782/803) of dispensings and patients who received this weighed between 43 and 110kg (median weight 70kg), age ranging from 45 to 94 years.

### Cost Model

Modelling of these patients who received weight-based dosing (rounded to the nearest vial content) demonstrated therapy costs to total \$3.6 million. Compared to flat dosing model, patients modelled with weight-based dosing and combination dosing demonstrated reduction in overall net costs by 7.6% and 11.5% respectively.

Analyses of cost drivers identified reduction in costs for patients <80kg modelled with weight-based and combination dosing relative to flat dosing. Conversely, increase in costs was identified for patients ≥80kg modelled with weight-based dosing while costs remain unchanged for these patients when modelled with combination dosing (Figure 2).

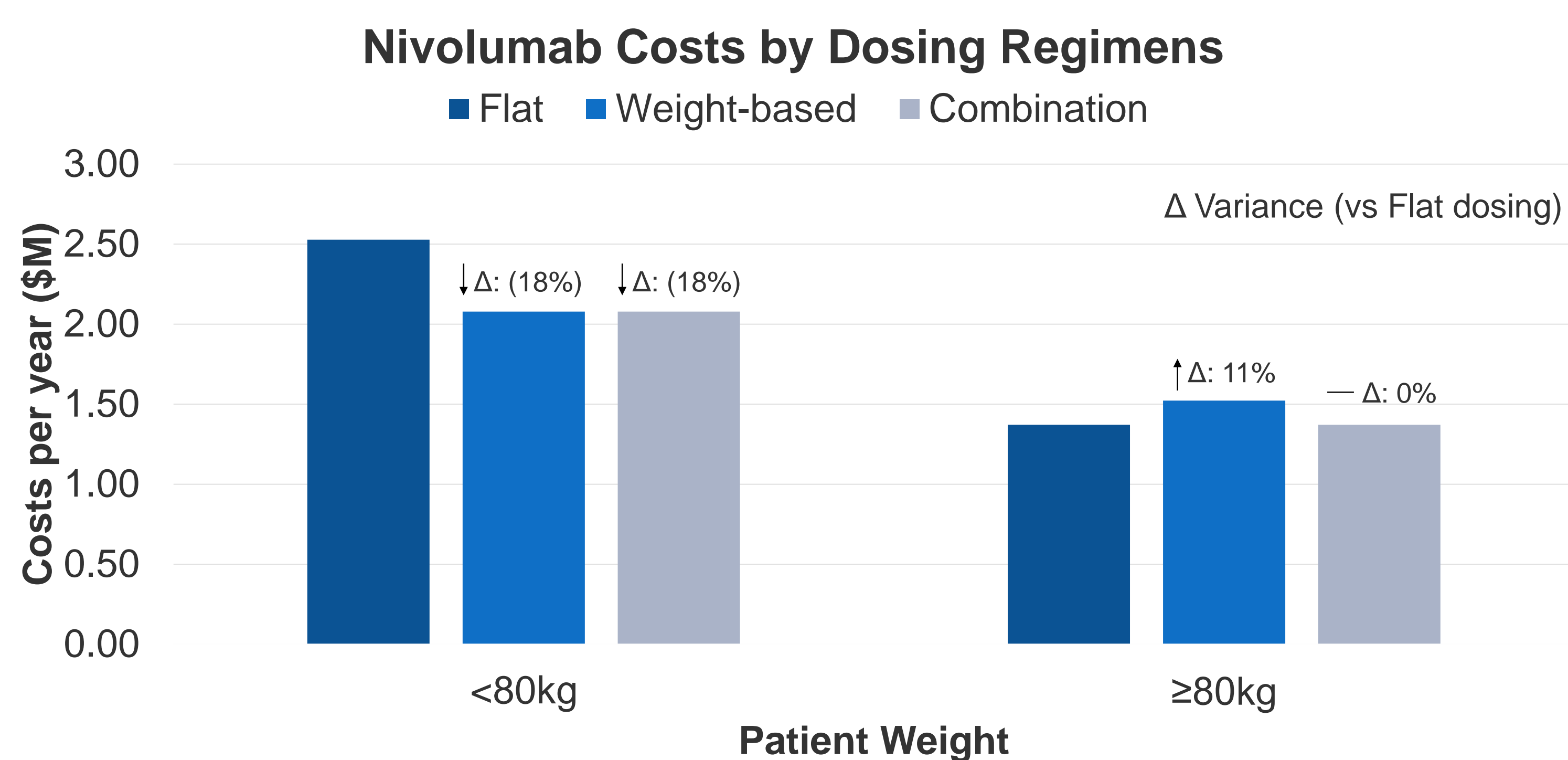


Figure 2: Based on patients weighing <80kg in 2018, flat dosing regimen of nivolumab would cost \$2.5M, that could be reduced by 18% using weight-based and combination regimens. For patients weighing ≥80kg, the flat dosing regimen would cost \$1.4M, that could be increased by 11% using the weight-based regimen but remain unchanged using the combination regimen.

## Discussion

- Cost models indicate that cost is optimised under the 240-mg Q2W dosing regimen for patients ≥80kg. This result is consistent with the recent listing amendment of nivolumab on the Pharmaceutical Benefits Scheme (PBS) to restrict dosing to a maximum of 240-mg Q2W or 480-mg Q4W under a weight-based or flat dosing regimen.<sup>5</sup>
- Given this recent amendment, the majority of patients prescribed nivolumab could start receiving the 480-mg Q4W dosing regimen.

## Conclusions

Cost models indicate the overall cost per year for flat dosing of nivolumab is more costly than conventional weight-based dosing. A combination approach consisting of weight-based dosing for patients <80kg and flat dosing for patients ≥80kg could potentially reduce costs. Further work to optimise the high costs of nivolumab and patient care should be explored, with pharmacists uniquely positioned to lead clinical and compounding initiatives.

## References

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