Beyond the Numbers: Measuring the Real–Life Impact of Medical Treatments via Patient–Level Modeling

Authors

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Background

- Informed consent is essential to ethical medical care but often overlooks patient impact beyond the treatment and short–term clinical outcomes
- Recent initiatives—such as 2021 US price transparency regulations[1]—promote informed patient decisions and have prompted healthcare systems to create tools estimating out–of–pocket treatment expenses[2,3]
- No published models focus on resources, costs, and health outcomes from the patient perspective with outputs relevant to an individual patient
- We developed a holistic patient impact model methodology to enhance informed consent and guide patient–centered decision–making

Methodology

- Inspired by the Academy Health framework,[4] we created a novel modeling methodology to estimate patient and caregiver resources, clinical outcomes, and "financial toxicity" for treatment choices, in addition to insurer costs (Fig. 1)
- Inputs were derived from published studies, grey sources, and expert opinion, with patient advocates reviewing key assumptions
- We followed ISPOR modeling standards and conducted case study validation with oncology treatments (poster focus is model methodology)

Results

- A customizable, patient–level model methodology was created in Excel to simulate patient/caregiver financial burden, resource use, outcomes, and insurer costs over 5 years (Fig. 2)
- Inputs include costs, medical resources, missed work, and clinical factors (Table 1)
- Outputs convey per–patient/caregiver costs, resource use, and health outcomes by treatment and insurance plan at 1 and 5 years, along with 1– and 5–year insurer costs by treatment and plan
- Outputs were simplified based on expert feedback to support provider and patient understanding

Conclusions

- This first–known patient impact model offers a novel approach to projecting treatment outcomes and costs relevant to patients and caregivers
- Patient impact models can enhance informed consent by facilitating treatment transparency and patient–centered healthcare decision–making

References

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4. Introducing a Framework to Understand Economic Impacts on Patients and Caregivers | AcademyHealth. Academyhealth.org. Published October 30, 2023. Accessed December 15, 2024. https://academyhealth.org/blog/2023-10/introducing-framework-understand-economic-impacts-patients-and-caregivers

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This **first-known** patient impact model methodology offers a novel approach to projecting comprehensive treatment outcomes and costs relevant to patients and caregivers.

Clinicians and patient advocates can use patient impact models to facilitate more transparent treatment discussions and inform decision–making.
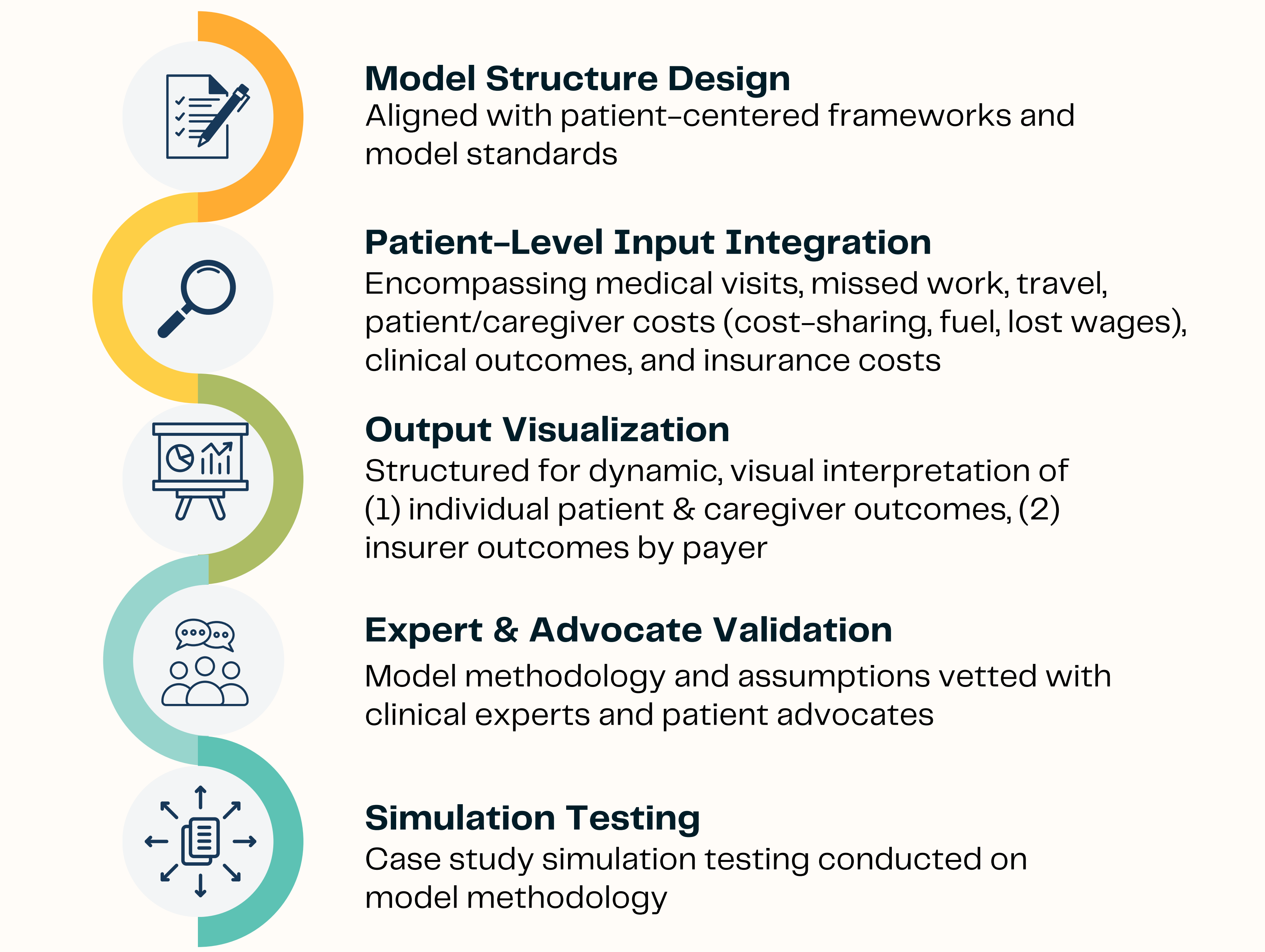
Figure 1: Patient Impact Model Development

Model Structure Design
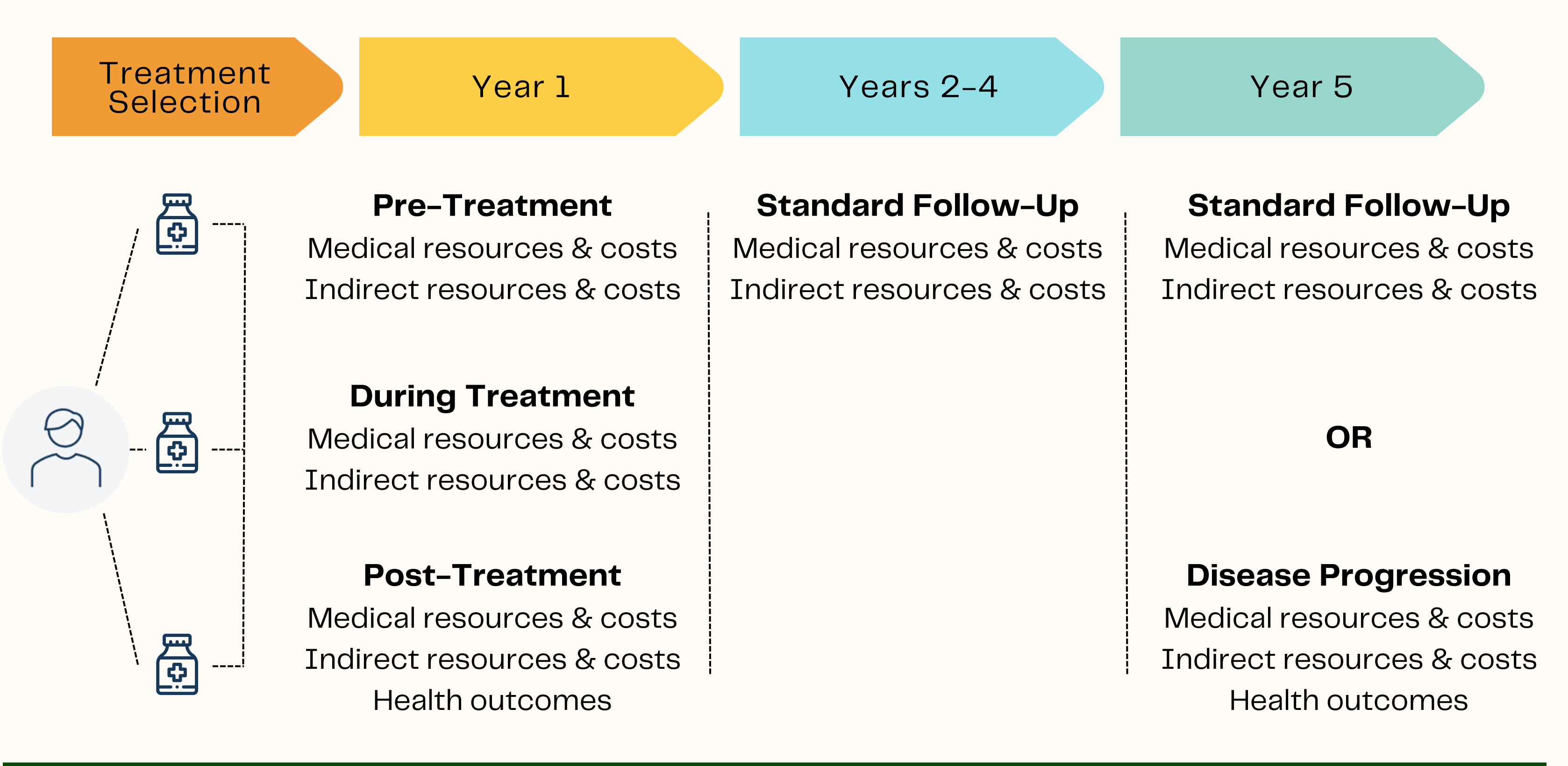Aligned with patient–centered frameworks and model standards

Patient–Level Input Integration
Encompassing medical visits, missed work, travel, patient/caregiver costs (cost-sharing, fuel, lost wages), clinical outcomes, and insurance costs

Output Visualization
Structured for dynamic, visual interpretation of (1) individual patient & caregiver outcomes, (2) insurer outcomes by payer

Expert & Advocate Validation
Model methodology and assumptions vetted with clinical experts and patient advocates

Simulation Testing
Case study simulation testing conducted on model methodology

Figure 2: Patient Impact Model Schematic

Treatment Selection → Year 1 → Years 2–4 → Year 5

Pre-Treatment
Medical resources & costs
Indirect resources & costs

During Treatment
Medical resources & costs
Indirect resources & costs

Post-Treatment
Medical resources & costs
Indirect resources & costs
Health outcomes

Standard Follow–Up (Year 1)
Medical resources & costs
Indirect resources & costs

Standard Follow–Up (Year 5)
Medical resources & costs
Indirect resources & costs

OR

Disease Progression
Medical resources & costs
Indirect resources & costs
Health outcomes

Table 1: Patient Impact Model Specifications

Model Specifications					
Perspective	**Time Horizon**	**Population**	**Region**	**Treatment Options**	**Currency**
(1) Patient/Caregiver (2) US Payer (Medicare, Medicare Advantage, Commercial)	5 years	Adult Patients	United States	3 Discrete Treatments	2024 US Dollars
Inputs					

Inputs

- Medical Resources (office, emergency department, outpatient surgery, hospital & home care visits, length of stay, labs/imaging, medication use)
- Indirect Resources (patient & caregiver missed work, travel distance & time)
- Medical Costs (patient cost-sharing, insurance payment rates)
- Indirect Costs (patient & caregiver missed wages, fuel)
- Health Outcomes (complications, disease recurrence, disease progression, progression-free survival)

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