Costs of Newly Funded Proton Therapy Using Time-Driven Activity-Based Costing in The Netherlands

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Object & Aim

Proton beam therapy (PBT) may deliver more precise treatment compared with conventional radiotherapy for patients with cancer. While this innovation entails investment costs, the information about the treatment costs per patient, especially during the start-up phase, is limited.

This study aims to calculate the costs for PBT at a single center during the start-up phase in the Netherlands
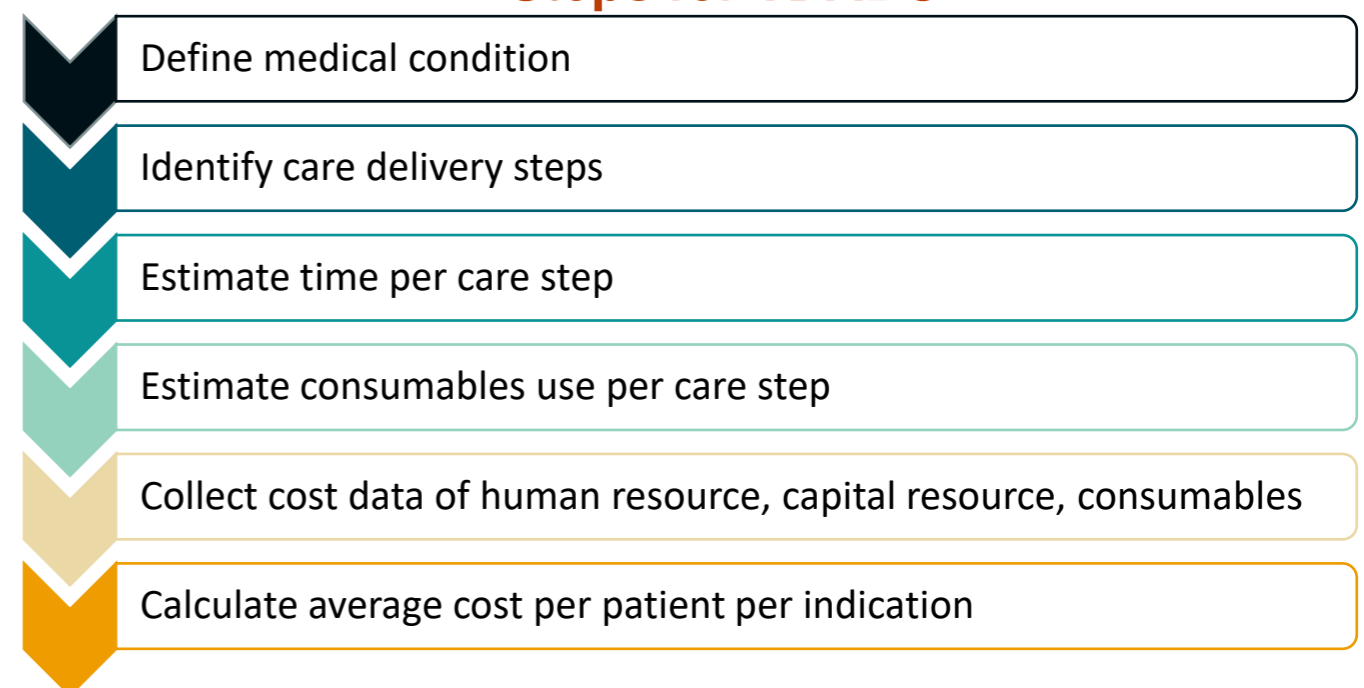
Method

The cost of PBT per patient was estimated for the treatment indications head and neck cancer, breast cancer, brain cancer, thorax cancer, chordoma and eye melanoma.

A time-driven activity-based costing analysis (TDABC) was conducted in a newly established proton center in the Netherlands.

A scenario analysis was conducted for short-term, middle-term and long-term projections of patient numbers in the PBT center.
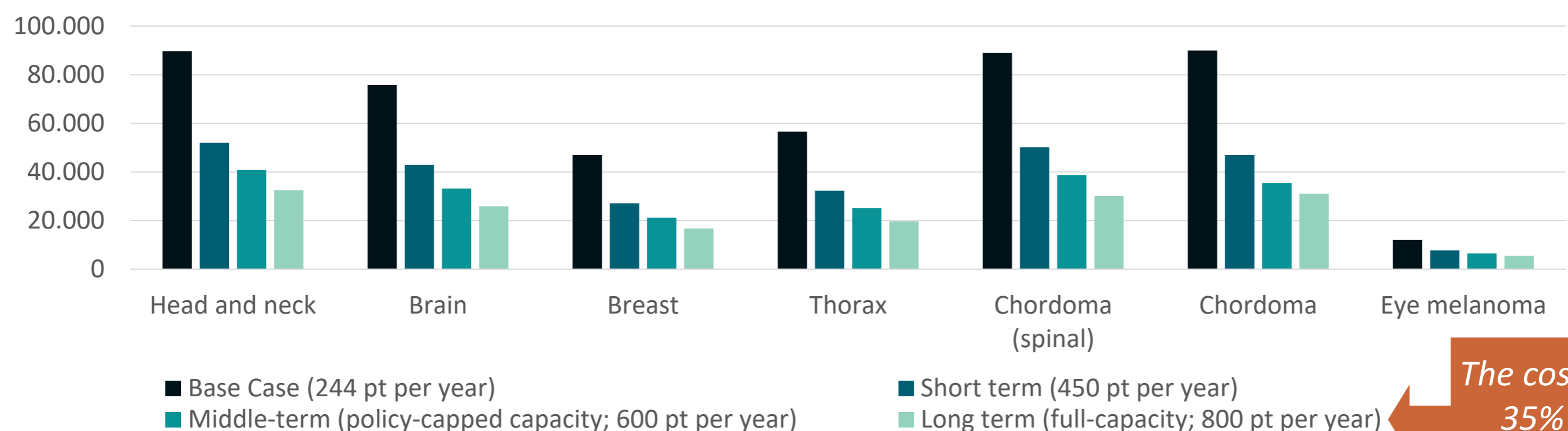
■ Steps for TDABC

- Define medical condition
- Identify care delivery steps
- Estimate time per care step
- Estimate consumables use per care step
- Collect cost data of human resource, capital resource, consumables
- Calculate average cost per patient per indication

■ Average total costs of PBT per treatment indication

	Head and Neck	Brain	Breast	Thorax	Chordoma (spinal)	Chordoma (skull base)	Eye Melanoma
Direct human resource cost	6,013	3,267	2,856	2,931	3,616	4,660	1,919
Other patient-related costs	1343	737	615	682	607	607	730
Uncaptured direct HR cost	14,993	13,066	7,925	9,639	15,422	15,422	1,714
Depreciation costs	10,008	8,721	5,290	6,434	10,294	10,294	1,144
Total direct costs	32,357	25,791	16,686	19,685	29,938	30,982	5,506
Indirect human resource costs	8,551	7,452	4,520	5,497	8,795	8,795	977
Fixed depreciation costs	2,776	2,419	1,467	1,785	2,855	2,855	317
Operating costs	46,032	40,113	24,331	29,592	47,347	47,347	5,261
Total indirect costs	57,359	49,984	30,318	36,873	58,998	58,998	6,555
Cost per course	89,716	75,775	47,004	56,559	88,936	85,786	12,062
Cost per fraction	2,563	2,484	2,541	2,514	2,470	2,499	3,015

Indirect costs were the largest cost component

■ Scenario analysis: short-term, middle-term and long-term projections

- Base Case (244 pt per year)
- Short term (450 pt per year)
- Middle-term (policy-capped capacity; 600 pt per year)
- Long term (full-capacity; 800 pt per year)

The cost reduced to 35% when full capacity is achieved

Conclusion:

To have an estimation that reflects the matured cost of proton therapy which could be used in cost-effectiveness analysis, a follow-up study assessing the full-fledged situation is recommended.

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