Women with high breast density could benefit from 3D mammography as a primary modality in preventive BC screening

Cost-Effectiveness of Digital Breast Tomosynthesis in Mammography Screening in Women with High Breast Density From a Czech Perspective

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INTRO

Women with high breast density have a higher risk of breast cancer and a lower likelihood of detecting a lesion with standard mammography screening. Digital breast tomosynthesis (3D mammography) offers superior diagnostic performance compared with 2D mammography in women with high breast density.

OBJECTIVE

The study objective was to evaluate the cost-effectiveness of digital breast tomosynthesis in mammography screening in women with high breast density from Czech payers' perspective.

METHODS

Mammography screening and following cancer treatment was modelled using semi-Markov model for a cohort of women 45 years over a lifetime. The model consisted of four health states: healthy (no malignant lesion present), undiagnosed malignant neoplasm (false negative screening result), after treatment state, and death. The analysis was performed from the Czech payer's perspective. The current course of mammographic screening with 2D mammography and other complementary examinations was chosen as a comparator. The screening cost data entering the model were quantified based on retrospective data collection at the mammography center (n = 547). Other costs and outcome data was sourced from published sources. All future costs and benefits were discounted by 3% annually. Cost-effectiveness was defined as below 1 200 000 CZK/QALY gained.
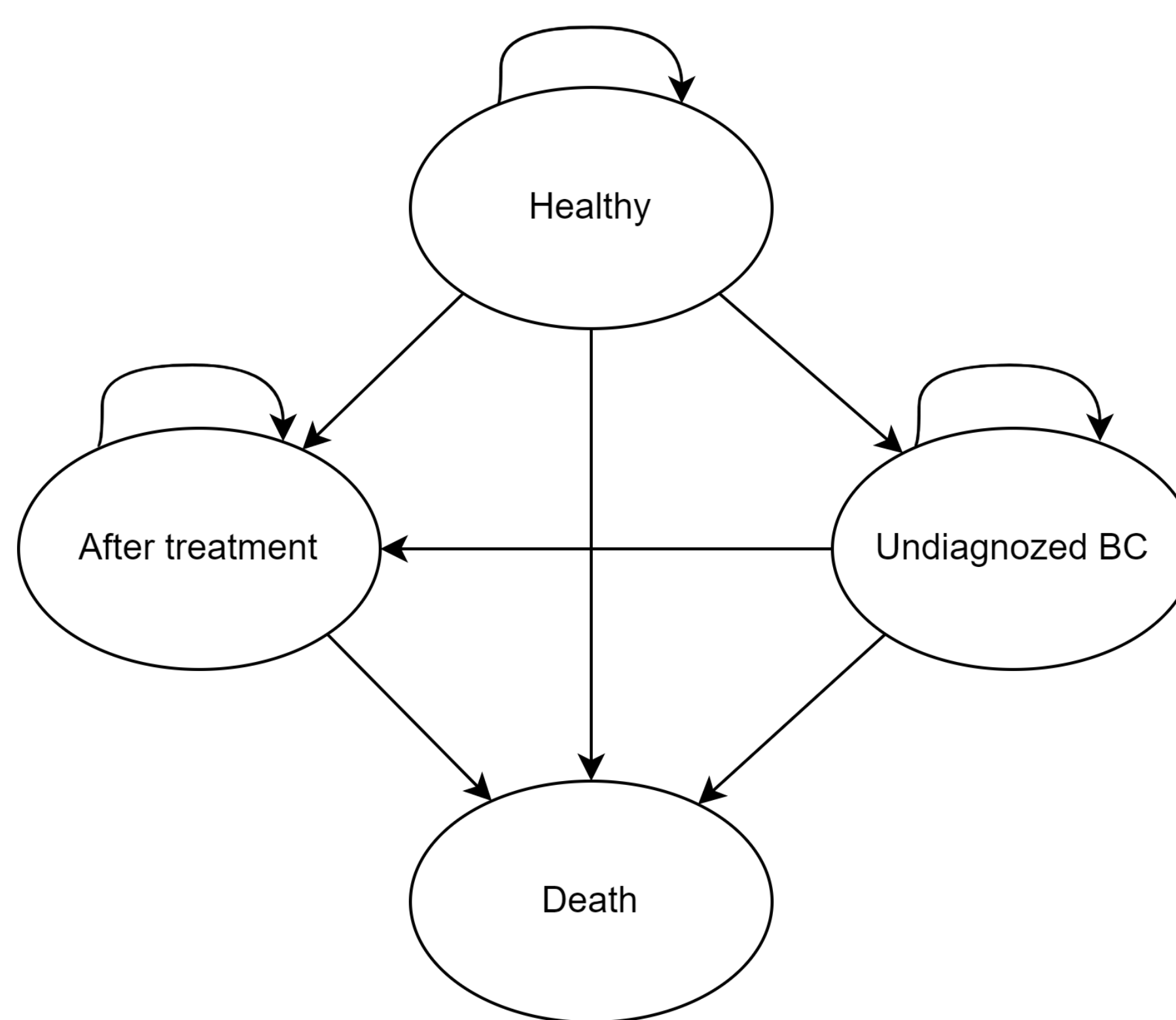
CONCLUSION

Digital breast tomosynthesis is a cost-effective primary modality for preventive mammography screening for women with high breast density from a Czech payer's perspective.
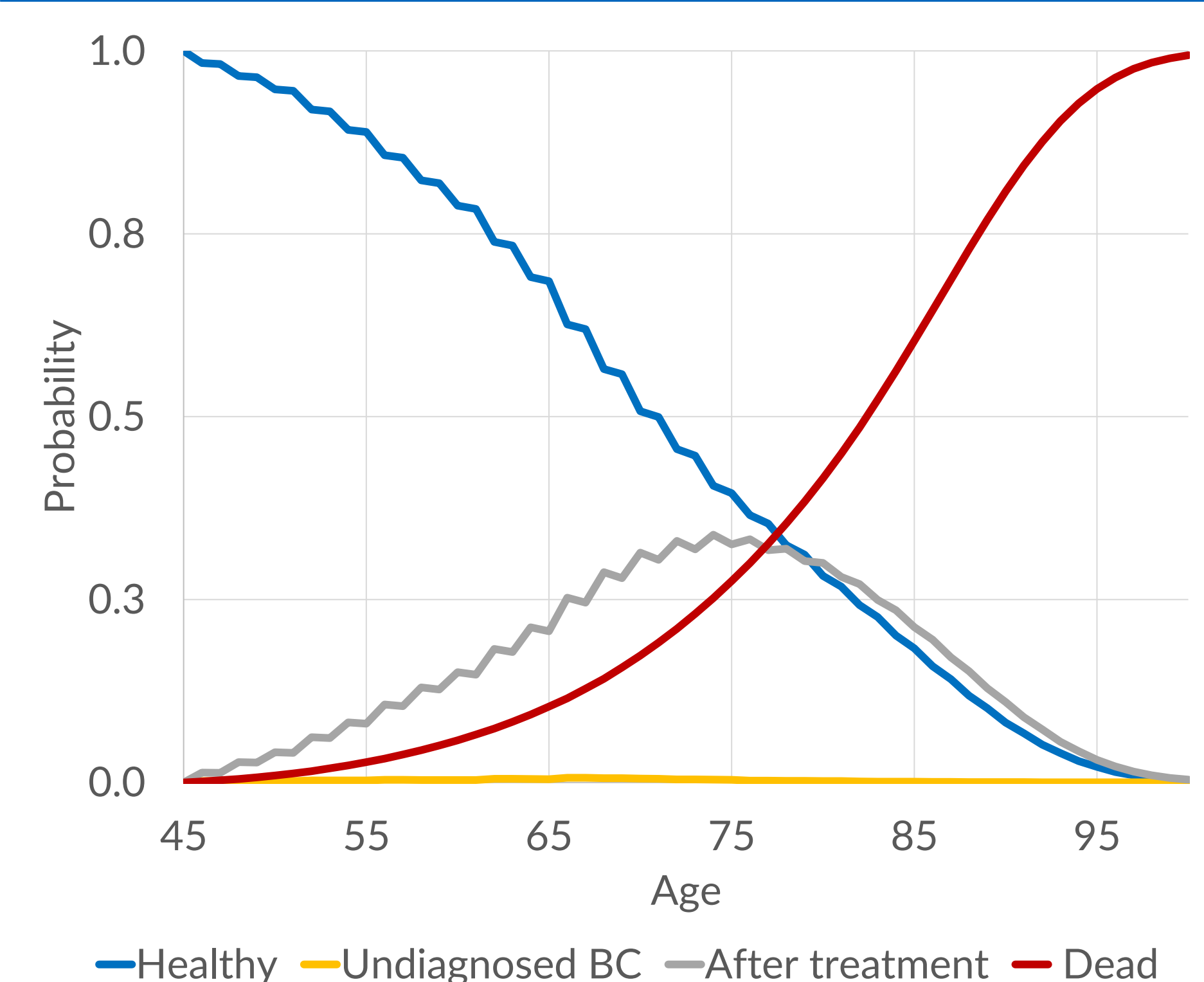
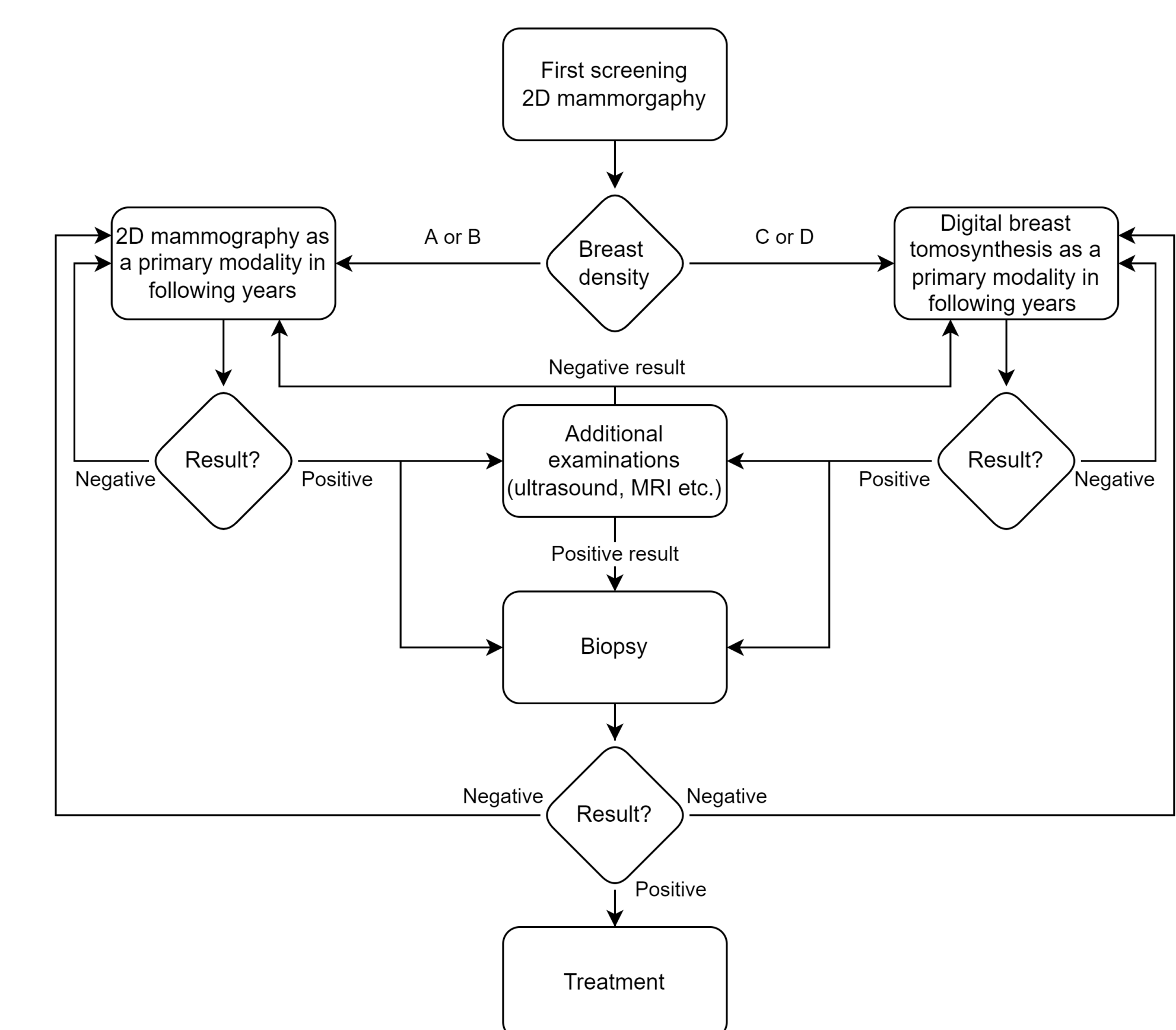## Additional exams after 2D mammography screening

(Rretrospetive data, n = 547)
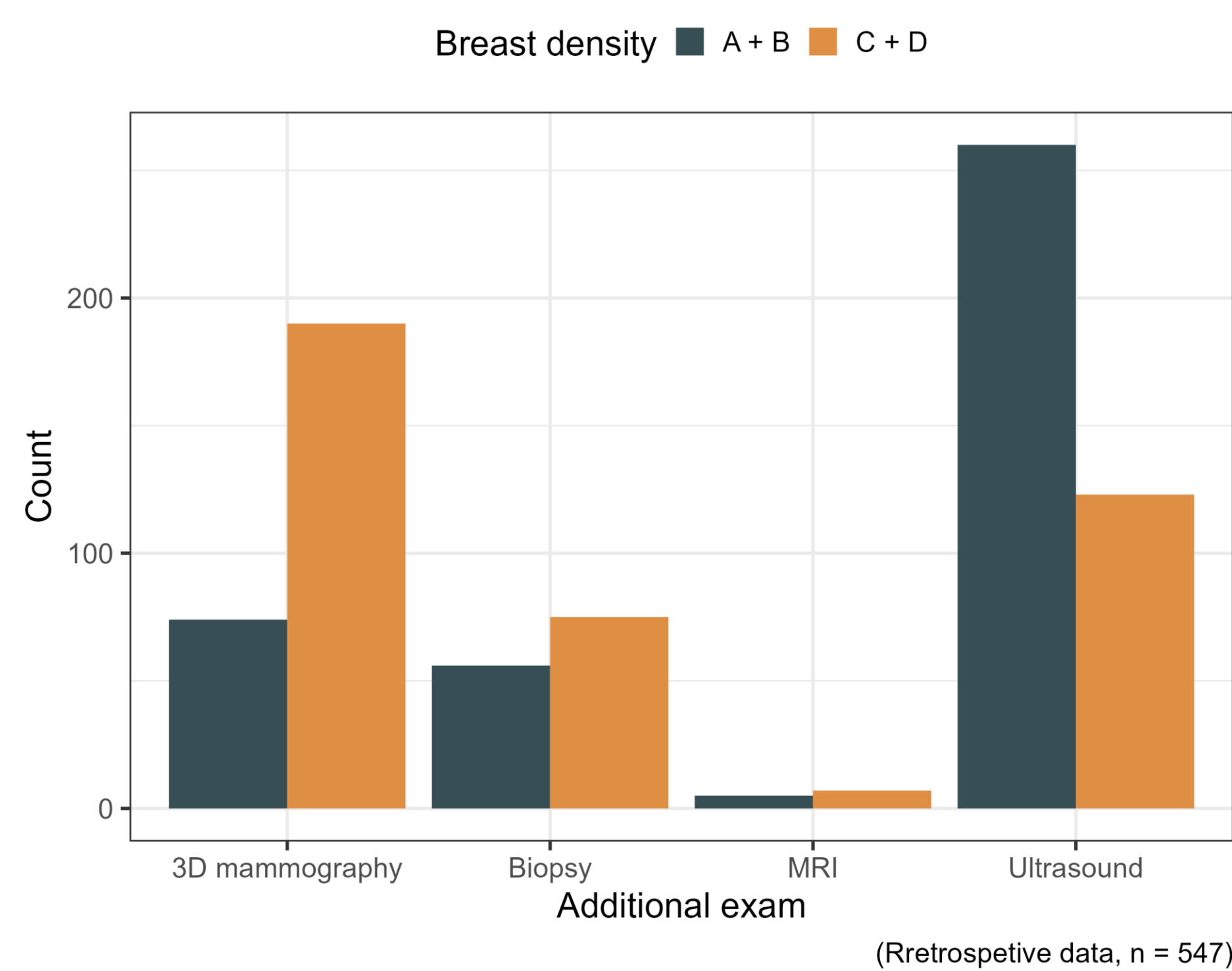
Markov model structure

State prob. chart - 3D mammography

CEA results

Intervention	Cost (CZK)	Incremental cost (CZK)	QALYs	Inc. QALYs	ICER (CZK/QALY)
2D mammography	32 648		17.76		
3D mammography	34 247	1 599	17.78	0.02	74 945

Proposed breast cancer screening strategy

Model input parameters

Parameter	Value	Source
After treatment annual screening cost. max 10 years	945 CZK	Czech claims data
2D screening cost	1 998 CZK	Retrospective data on 547 pts
3D screening cost	2 174 CZK	Retrospective data on 547 pts
Treatment cost	29 170 CZK	Czech claims data
Background mortality	Age dependent	Czech mortality tables
Cancer mortality	Time dependent	Chiu 2010
Cancer mortality increment for undiagnosed BC	0.1	Estimated based on Cortesi 2010, Jensen 2009, and Yassin 2003
Reccurence probability	Time dependent	Cil 2009
Sensitivity for 2D mammography	0.78	Chae 2016
Sensitivity for 3D mammography	0.88	Chae 2016
Specificity for 2D mammography	0.94	Chae 2016
Specificity for 3D mammography	0.93	Chae 2016
Background utility	Age dependent	Ara 2017
Disutility - after treatment	0.0155	Roine 2021
Disutility - after treatment multiplier for undiagnosed BC	0.9	Estimated based on Johnston 1998 and Gerard 1999

Sensitivity analysis

Parameter	LB	UB	ICER LB	ICER UB
Disutility - after treatment multiplier for undiagnosed BC	0.05	0.13	54 389	202 501
Sensitivity for 2D mammography	0.72	0.83	49 860	141 837
Sensitivity for 3D mammography	0.84	0.92	55 833	119 540
Cancer mortality increment for undiagnosed BC	0.05	0.13	69 413	81 549
Utility - undiagnosed BC	0.9	1	60 867	74 945
Treatment cost	13 000 CZK	100 000 CZK	71 066	91 936
After treatment annual screening cost	661 CZK	1 228 CZK	74 628	75 261
Disutility - after treatment	0.0124	0.0186	73 971	75 944