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Cognitive Behavioral Therapy for Insomnia (CBT-I) Compared to Z-Drugs for the Treatment of Insomnia in the Elderly: A Cost-Effectiveness Analysis

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OBJECTIVE

Insomnia is a prevalent and costly condition in the United States, responsible for over USD$100 billion in annual spending. Recent guideline changes have established cognitive behavioral therapy for insomnia (CBT-I) as first-line treatment for insomnia. Despite this, the most prevalent treatment for insomnia remains pharmacological agents known as Z-drugs. The objective of this economic evaluation is to compare the cost-effectiveness of CBT-I with Z-drugs and no treatment to inform payers, policymakers, providers and patients about the value provided by these treatments.

METHOD

- **Model Type:** Markov model
- **Comparators**: CBT-I vs. Z-drugs and no treatment
- **Target population:** Adults ages 65 and older in the United States
- **Model Structure:** 5 mutually exclusive health states: Insomnia, Insomnia with fall-related hospitalization (FRH), Remission, Remission with FRH, Death
- **Time Horizon:** 15 years
- **Cycle Length:** 6 weeks
- **Perspective:** US Medicare
- **WTP Threshold:** $100,000/QALY

Costs (2024 USD):

- Initial clinician visit (treatment initiation)
- Direct cost of treatment
- Utilization from fall-related hospitalizations
- Discounted at 3% annually

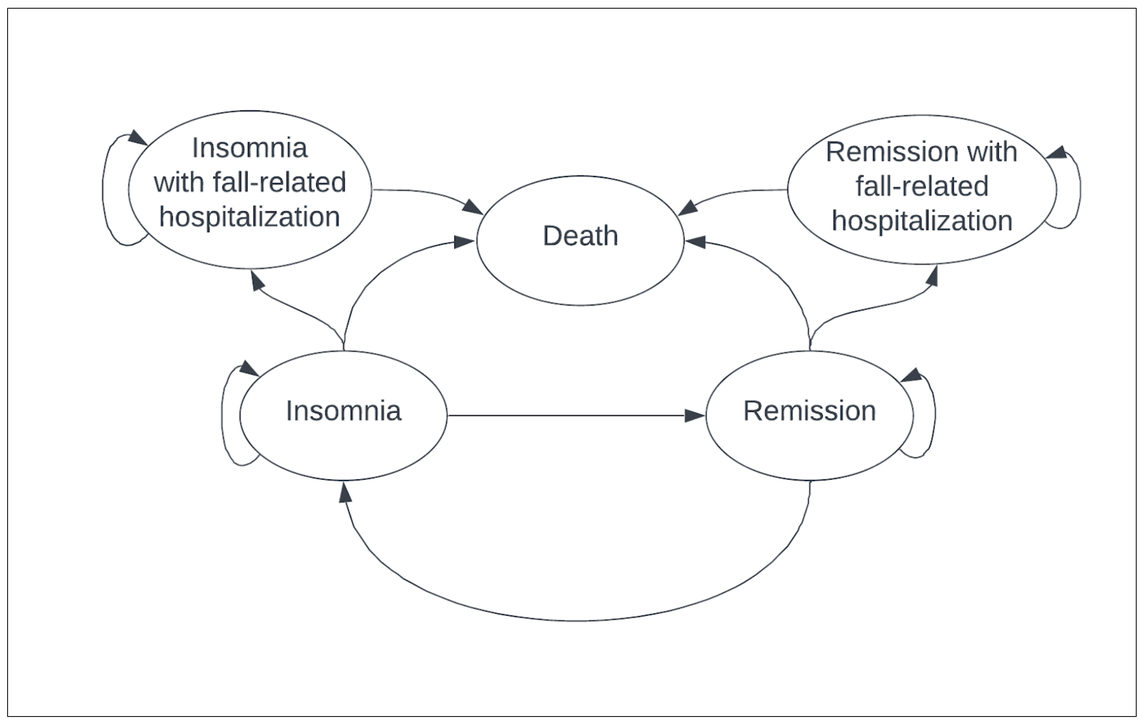
Outcomes:

- Quality-adjusted life years (QALYs) for treated insomnia, untreated insomnia, and remission
- Discounted at 1.5% annually

Uncertainty Analyses:

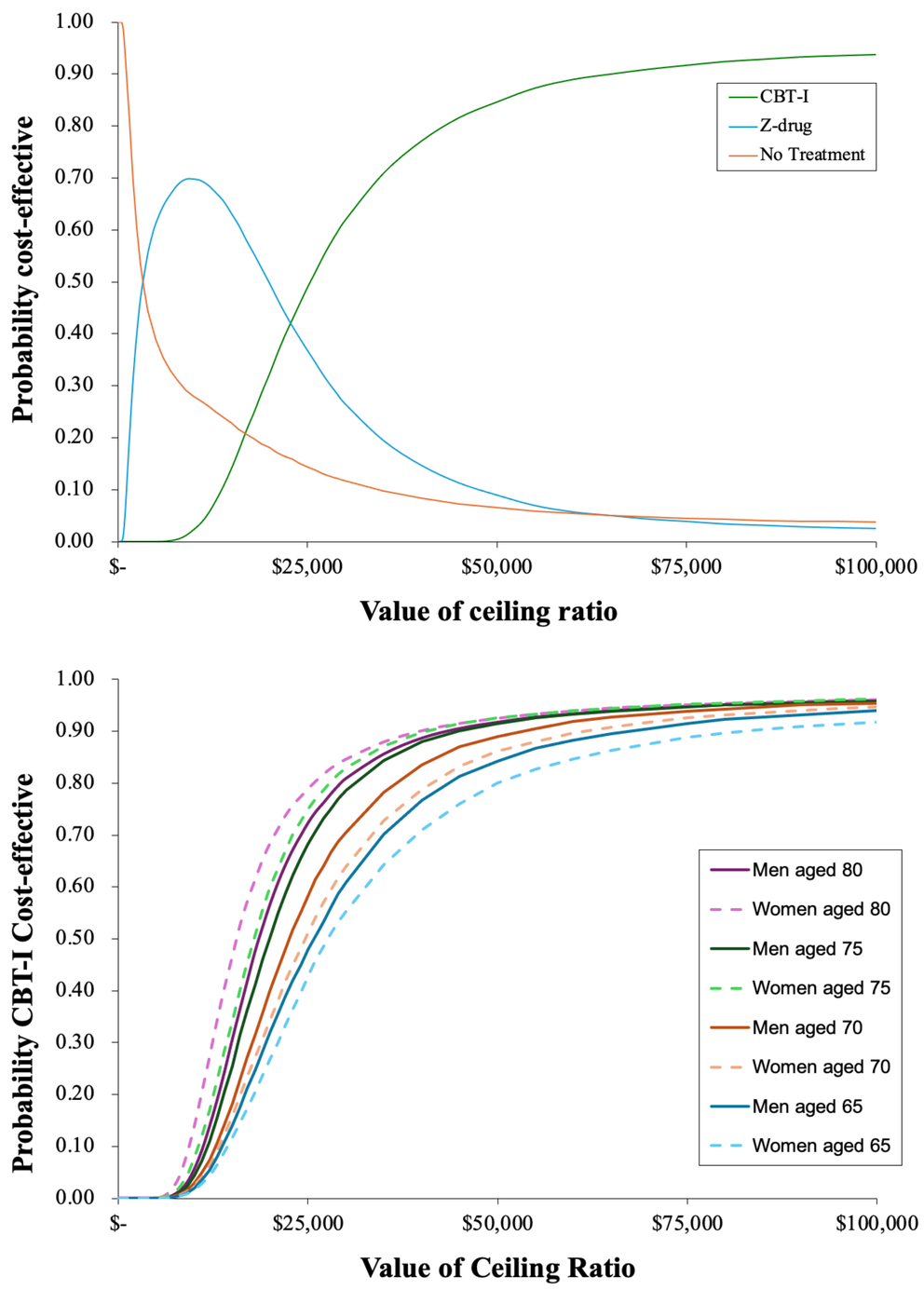
- Probabilistic and deterministic sensitivity analysis conducted to test model assumptions and robustness

MODEL OVERVIEW



Base Case: 65-y/o male	Discounted Costs	Life Years	Discounted QALYs	ICER vs untreated	INMB vs untreated	ICER vs Z-drugs	INMB vs Z-drugs
Untreated	$614	7.07	2.16	-	-	-	-
Z-drugs	$935	6.81	2.26	$3,233/QALY	$9,625	-	-
CBT-I	$3,601	7.07	2.38	$13,651/QALY	$18,282	$22,333/QALY	$9,270

Probabilistic Sensitivity Analysis	Discounted Costs	Life Years	Discounted QALYs	ICER vs untreated	INMB vs untreated	ICER vs Z-drugs	INMB vs Z-drugs
Untreated	$612	3.93	2.15	-	-	-	-
Z-drugs	$937	3.77	2.25	$3,241/QALY	$9,701	-	-
CBT-I	$3,603	3.86	2.37	$13,422/QALY	$18,682	$21,750/QALY	$9,593



MODEL INPUTS

Variable	Base-Case Value
Transition parameters	
Insomnia Remission (untreated)	1.2%
Insomnia Remission (treated with Z-drugs)	7.2%
Insomnia Remission (treated with CBT-I)	38.7%
Insomnia Recurrence	1.9%
Fall-related hospitalization (FRH)	Age and sex-dependent
Odds ratio of FRH if untreated	1
Odds ratio of FRH with Z-drugs	1.24
Odds ratio of FRH with CBT-I	1
Readmission rate after FRH	23.4%
Morality after FRH	3.3%
Mortality rate (MR)	Age and sex-dependent
Odds ratio of MR if untreated	1
Odds ratio of MR if with Z-drugs	1.59
Odds ratio of MR if with CBT-I	1
Cost Inputs	
Fall-related hospitalization	$29,114.76
Generic Z-drug / cycle (42 tablets)	$1.20
Z-drug dispensing fee	$12.45
CBT-I / cycle	$723.00
Initial clinician visit (primary care)	$90.88
Health Utility Inputs	
Remission	0.72
Insomnia receiving treatment	0.66
Insomnia left untreated	0.63
Disutility from fall-related hospitalization	-0.20

RESULTS

- CBT-I and Z-drugs are both more cost-effective than no treatment above low WTP thresholds
- CBT-I is more cost-effective than Z-drugs above a WTP threshold of ~$25,000
- The cost-effectiveness of CBT-I increases with age and is higher for women than men at older age (likely due to increased FRH risk in women)

LIMITATIONS

- Simplifying assumptions include comparator-independent recurrence rates and continued CBT-I utilization among non-responders
- Patients are often treated with Z-drugs and CBT-I simultaneously. Evaluating the cost-effectiveness of combined treatment would be informative
- In addition, there are substantial non-medical costs resulting from insomnia that are not incorporated into this model
- Model extensions incorporating simultaneous treatment options and a societal perspective framework may be warranted

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