Pharmacological Interventions for Alcohol Abuse

SHUANG CHEN, SONIA GILL, REBECCA NOURSE & ANNE PAUMGARTEN

PH121: DECISION AND COST-EFFECTIVENESS ANALYSIS

THE DARTMOUTH INSTITUTE FOR HEALTH POLICY &CLINICAL PRACTICE

Background

- Alcohol use disorders affect over 17 million adults in the United States as of 2012[1]
- Only a third of the population seeks treatment and less than ten percent receives medication for alcohol abuse[2]
- The purpose of this decision analysis is to determine which drug out of naltrexone, disulfiram, acamprosate and topiramate is most effective at increasing the number of non-drinking days among those who have received a score of 15 or higher on the Alcohol Use Disorders Identification Tool (AUDIT) screening

Primary Project Objective

- Use decision tree Markov modeling to determine which pharmacological intervention for alcohol abuse has the highest payoff in number of sober months per 12-month period
- Primary care providers can then utilize this tool to decide which pharmacologic therapy should be prescribed

Decision Tree Structure

- Markov Model
  - Relapse common and recurring
- Primary Outcome: Months of Sobriety
- 12 Month Timeframe
- Incremental Rewards: Four 3-Month Payoff Cycles
  - Abstinence (3 months)
  - Partial Abstinence (1.5 months)
  - Any Drinking (0 months)
  - Death (0 months)

Probabilities for Alcohol States

Alcohol States Selected for Inclusion:

- Abstinence vs. Continued Drinking
- Drug Discontinuation due to Adverse Effects vs. Continuation
- Assumption: Continued drinking is at an unhealthy abusive level (studies did not provide heavy drinking vs. any drinking across all included drugs)

A meta-analysis was used to obtain probabilities for the no treatment, naltrexone, acamprosate arms of our decision tree[3]

RCT studies were used to collect probabilities for disulfiram and topiramate[4,5]

Assumption: Studies used to derive probabilities are methodologically rigorous and accurate

Mortality Rates for Alcohol States

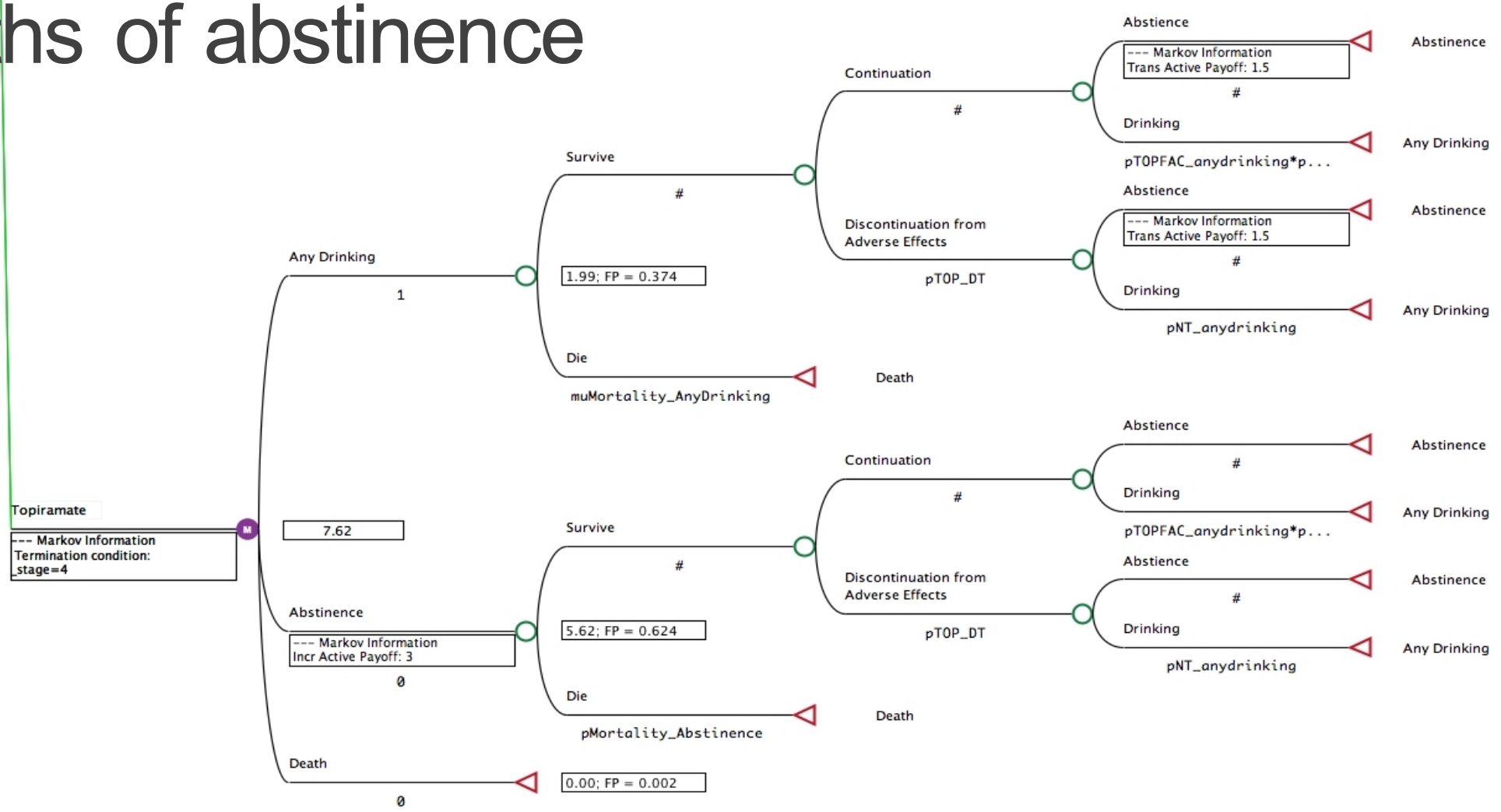
All-cause mortality probabilities for the abstinence group by age

- Assumption: All-cause mortality is being used as proxy for recovery after abstinence assuming no serious complications such as cirrhosis have occurred

Alcohol-attributable mortality probabilities by age

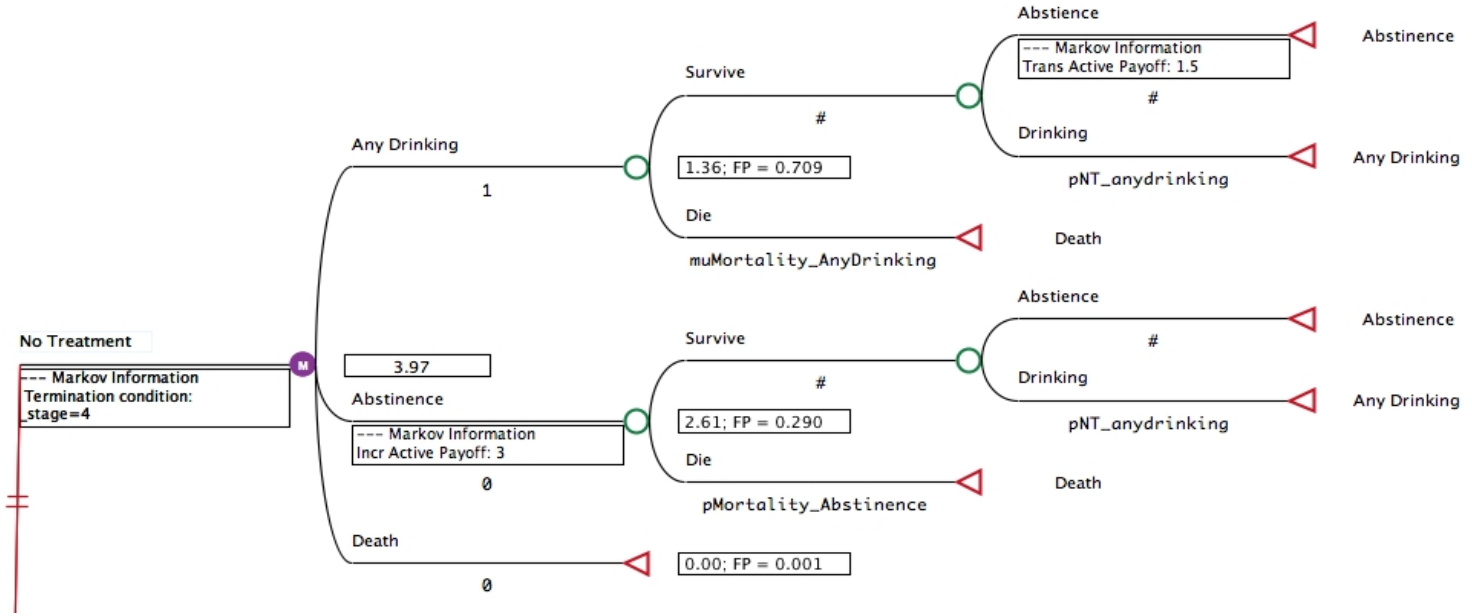
- CDC alcohol-attributable deaths for the numerator
- 2010 Census data for denominator
- Conversation from rate to probabilities

Results: Topiramate is preferred arm with 7.62 months of abstinence

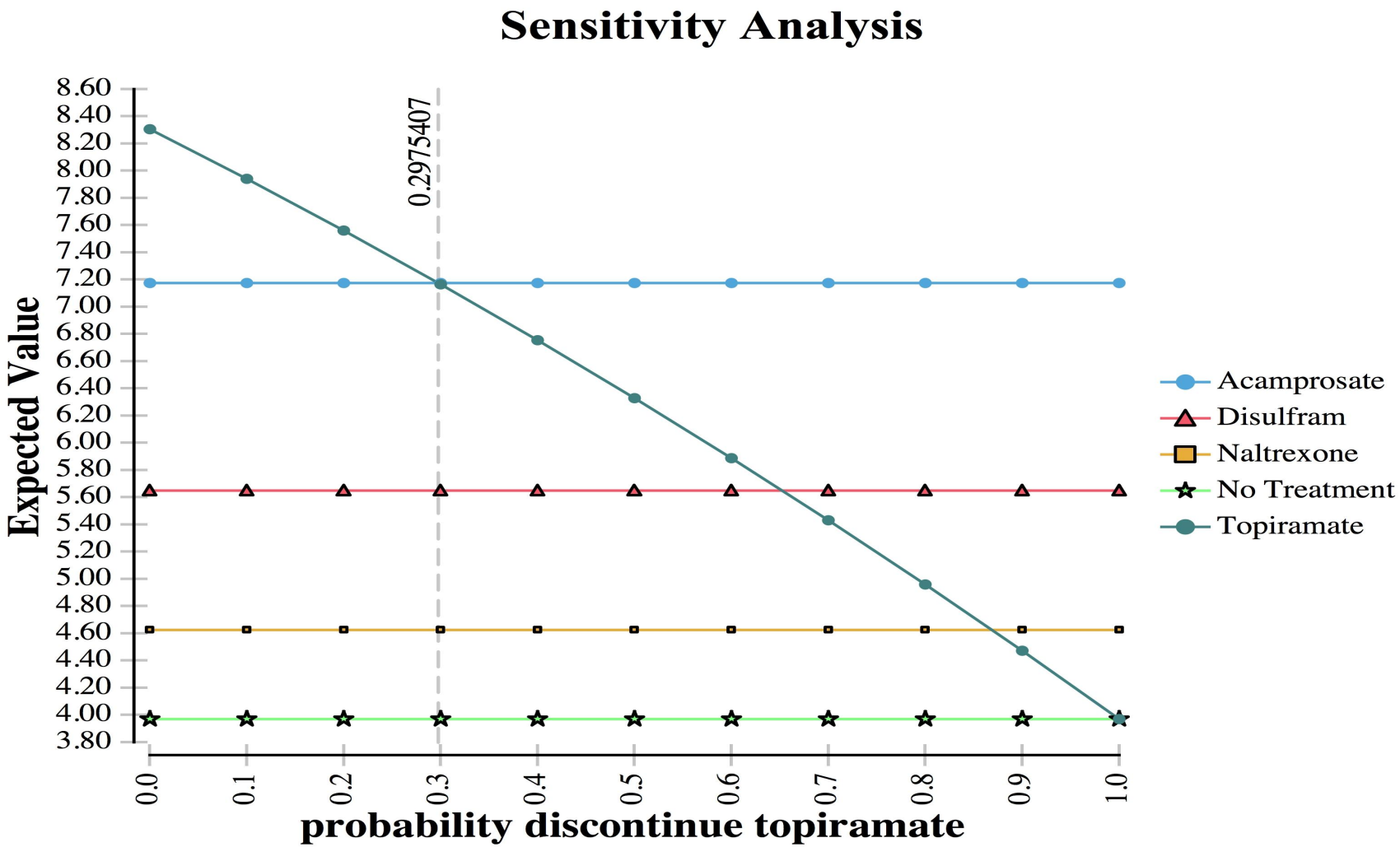


Results

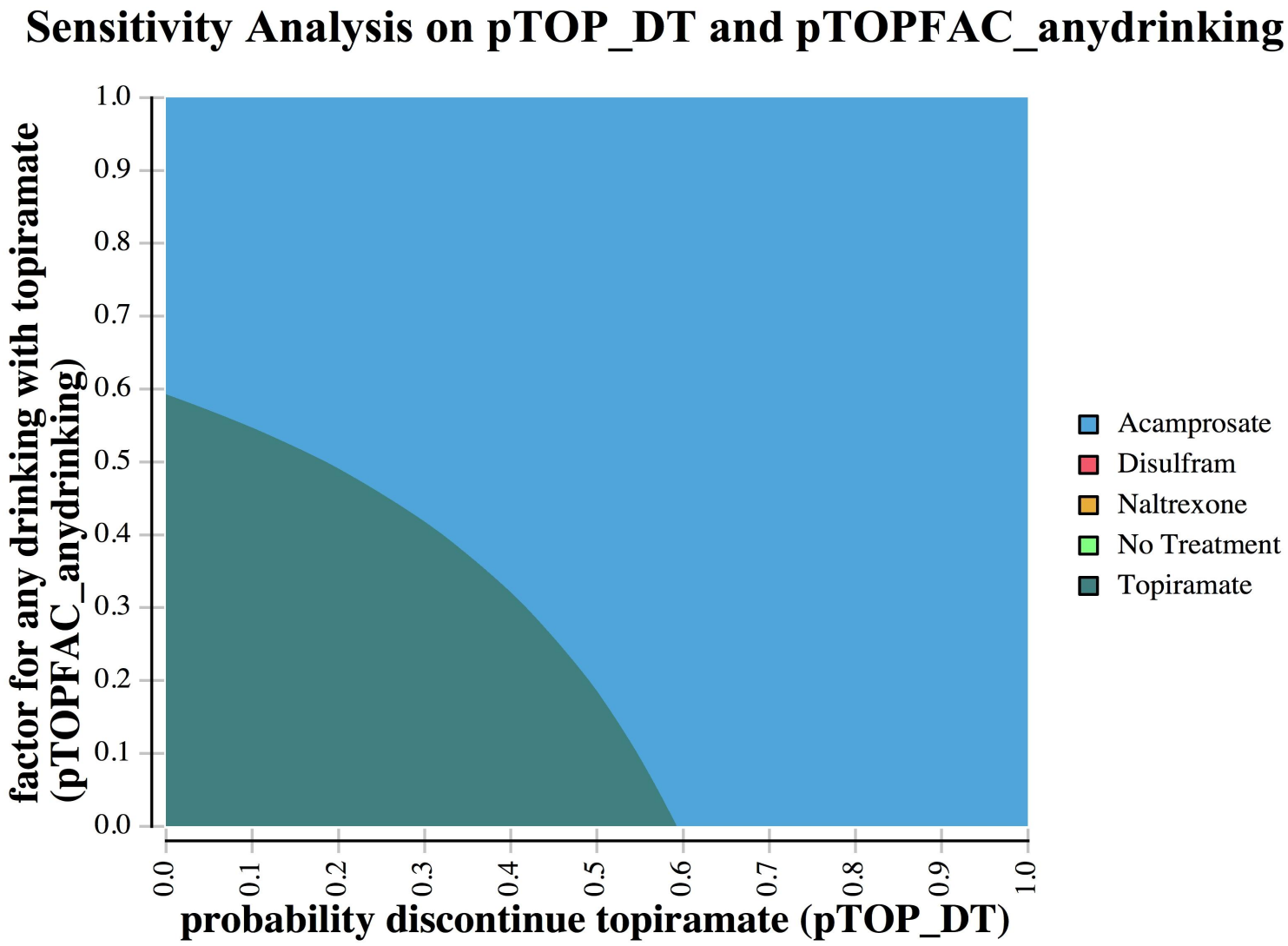
Intervention	No Treatment	Naltrexone	Acamprosate	Disulfiram	Topiramate
Abstinence months	3.97	4.63	7.17	5.65	7.62



Sensitivity Analysis



Sensitivity Analysis



Discussion

The major determinants in what drug is most effective for promoting abstinence in heavy drinkers are:

- Rate of any drinking
- Rate of discontinuation of the drug

The metric of mortality rate does not significantly alter results as it is applied evenly to all drugs

Discussion

- Topiramate has the highest efficacy of any drug available and a moderate discontinuation rate, making it the preferred drug
- While less effective, acamprosate and naltrexone have much lower discontinuation rates
- Acamprosate becomes the preferred drug if topiramate's discontinuation rate goes above ~0.30 for its current rate of drinking
- If topiramate's discontinuation rate goes above ~0.65 even disulfiram will become favored over topiramate but not acamprosate

Conclusions

- Heavy drinkers wishing to abstain from drinking should begin treatment with topiramate
- Topiramate is found to be most effective as it has the lowest rate of returning to drinking in combination with a moderate drop out rate

Future Directions

- More longitudinal studies are needed with timeframes longer than 3-6 months to further validate our claims
- All drugs should be studied using an universal outcome of reduced drinking days
- Topiramate should be considered for FDA approval to treat alcohol abuse

References

1. Alcohol Facts and Statistics. National Institute on Alcohol Abuse and Alcoholism. https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/alcohol-facts-and-statistics. Accessed May 20, 2017.
2. Jonas DE, Amick HR, Feltner C, et al. Pharmacotherapy for adults with alcohol use disorders in outpatient settings: A systematic review and meta-analysis. *JAMA.* 2014;311(18):1889-1900.
3. Donoghue K, Elzerbi C, Saunders R, Whittington C, Pilling S, Drummond C. The efficacy of acamprosate and naltrexone in the treatment of alcohol dependence, Europe versus the rest of the world: a meta-analysis. Addiction. 2015;110(6):920-930.
4. Johnson BA, Rosenthal N, Capece JA, et al. Topiramate for treating alcohol dependence: A randomized controlled trial. JAMA. 2007;298(14):1641-1651.
5. Ulrichsen, J, Nielsen, MK, Ulrichsen, M. Disulfiram in severe alcoholism – an open controlled study. Nordic Journal of Psychiatry, 64, 356-362.