

# Comparative Effectiveness of Two Pharmaceutical Therapies

Ching-Lung Hsu

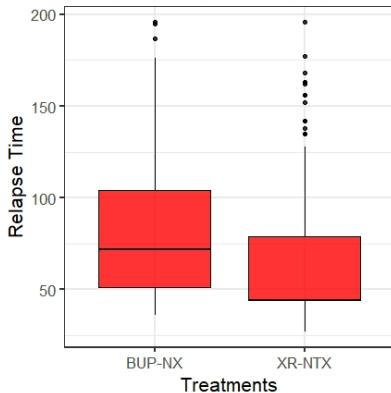
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# Key Questions

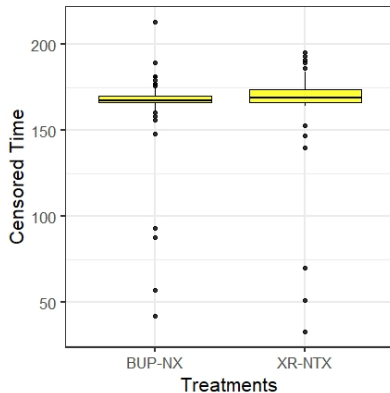
- Is there any patient-level covariates predictive of time to relapse? Determine their association with time to relapse across treatments.
- Is there a difference in the proportion of patients successfully inducted into treatment with BUP-NX vs XR-NTX? Any covariates are predictive this successful rate?
- Is there a difference in the safety profiles of the two treatments for any adverse events?

## EDA

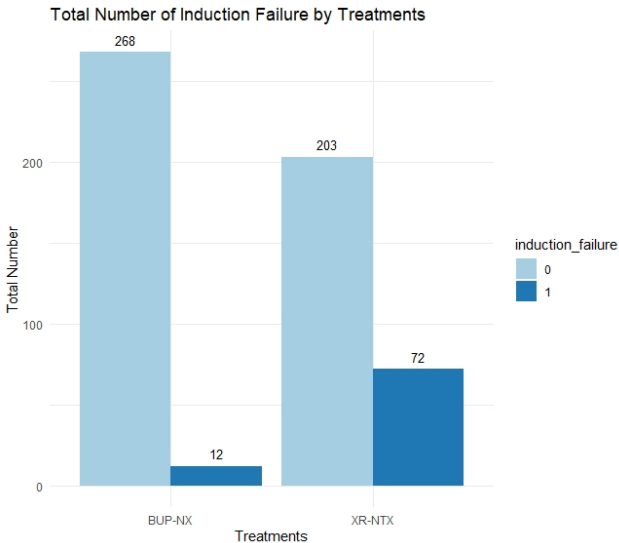
Relapse Time by Treatments



Censored Time by Treatments



## EDA



# Cox Proportional Hazards Model

The Cox model is expressed by the hazard function  $h(t)$ :

$$h(t) = h_0(t) \times \exp(\beta_1 x_1 + \cdots + \beta_n x_n),$$

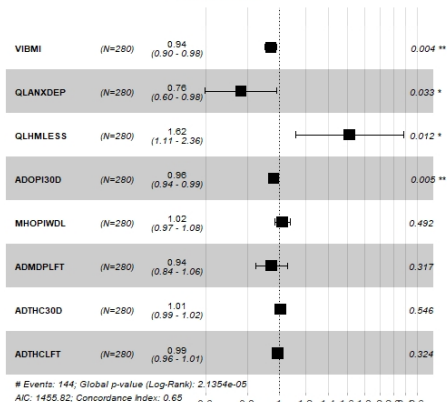
where  $t$  represent survival time and  $X = (x_1, \cdots, x_n)$  represent covariates. The hazard ratio for two covariates  $X$  and  $X'$  is defined as

$$\frac{h_X(t)}{h_{X'}(t)} = \exp\left(\sum_{i=1}^n \beta_i x_i\right).$$

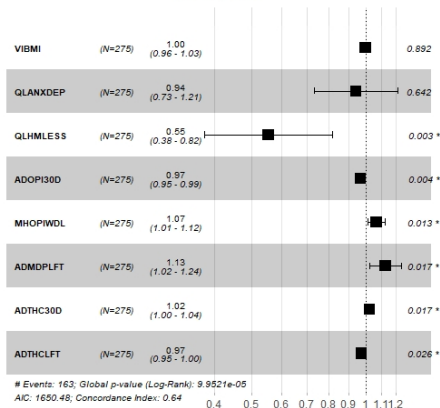
In this model, we focus on the estimation of hazard ratio for each covariate.

# Model Results

Hazard ratio



Hazard ratio



# Model Assumptions for Cox Proportion

- Non-informative Censoring: Relapse or not does not affect censoring .
- Survival Times are Independent: The survival time for each sample does not depend on each other.
- Baseline hazard is unspecified

# Logistic Regression Model

To answer whether there are difference patient-level covariates to affect the successful induction rate among these two drugs, here I use logistic regression for both of them and compare the result.

Variables	Estimate	Std. Error	z value	Pr(> z )	Estimate	Std. Error	z value	Pr(> z )
Opiates use 30 days	-0.059644	0.022087	-2.700	0.00692 **	-0.06670	0.02515	-2.652	0.00801 **
Opiate withdrawal scale	0.062691	0.039589	1.584	0.11330	0.16414	0.05079	3.232	0.00123 **
Blood pressure	-0.010715	0.008117	-1.320	0.18681	-0.02312	0.01004	-2.304	0.02125 *
Homeless	-0.510336	0.302781	-1.685	0.09189	-0.93731	0.37699	-2.486	0.01291 *



# Conclusion/Future Directions

- ① Most significant covariates: Homeless, Opiates use in 30 days!
- ② Future Directions:
  - Addressing the difference of adverse event
  - Implement Bayesian model on the first two questions
  - Try accelerate failure time model

Thank you for listening.