PUBLIC HEALTH 252D: FINAL GROUP PROJECT PROPOSAL
by Eric Kim, David Proudman, James Duncan, Denys Dukhovnov

Target population: A Medicare Advantage population with diabetes, where original reason for Medicare eligibility was Age > 65.

Causal question in words: What is the causal average treatment effect of vaccination on subsequent admission to hospital next year?

A = Vaccination in 2015
Y = Hospital admission in 2016

Target causal parameter:
$E_{U,X}(Y_1) - E_{U,X}(Y_0) =$
$\quad = \Sigma_w(E_0(Y \mid A = 1, W = w) \, P_0(W = w)) -$
$\quad - \Sigma_w(E_0(Y \mid A = 0, W = w) \, P_0(W = w))$

Covariates and structural equations:
W1 = Income, above/below federal poverty line
W2 = Education, college educated or above/less than college
[ ] = Age, over/under 85
W4 = Medical risk score
W5 = Sex

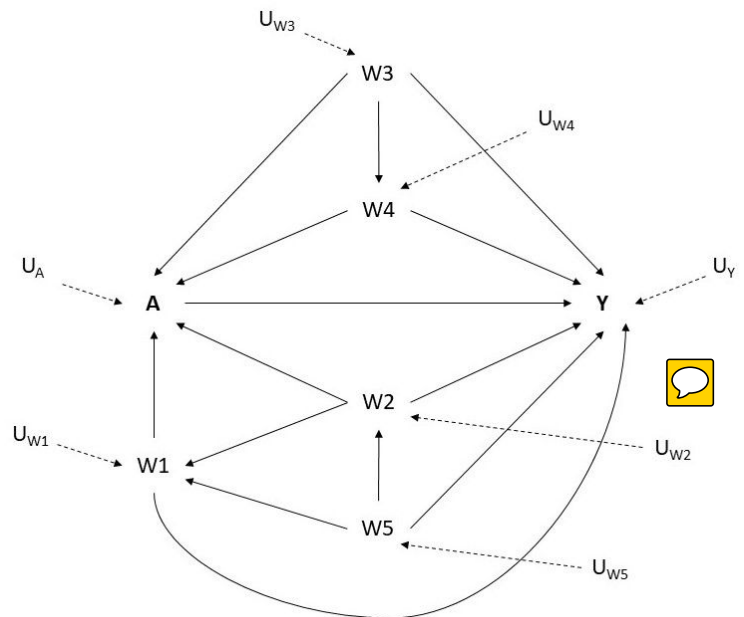$W1 = f_{W1}(W2, W5, U_{W1})$
$W2 = f_{W2}(W5, U_{W2})$
$W3 = f_{W3}(U_{W3})$
$W4 = f_{W4}(W3, U_{W4})$
$W5 = f_{W5}(U_{W5})$

$A = f_A(W1, W2, W3, W4, U_A)$
$Y = f_Y(W1, W2, W3, W4, W5, U_Y)$
$U = (U_{W1}, U_{W2}, U_{W3}, U_{W4}, U_{W5}, U_A, U_Y) \sim P_U$

Feasibility:
- Sample size: 29,943
- Marginal distribution of exposure variable: 21.5% vaccinated in 2015
- Marginal distribution of outcome: 17.8% admitted to hospital in 2016

	Y = 0	Y = 1
A = 0	19,199	4,291
A = 1	5,420	1,033

Any anticipated challenges and how you will address them:
- Whether to adjust for comorbidities. Cons[ ] CMS risk adjustment score.
- Vaccination may include various types of [ ]inations.
- Introduce further break/cut off points for continuous variables like age.
- No data on reason for admission. Are there potential Z variables?
- Can we assume SES doesn't affect whether they got th[ ]come? Account for SES via education+income.
- No race/ethnicity identification in the data.