

**Homework #5:**

**Submit to [outcomesresearch2009@gmail.com](mailto:outcomesresearch2009@gmail.com) prior to class on 5/6/09**

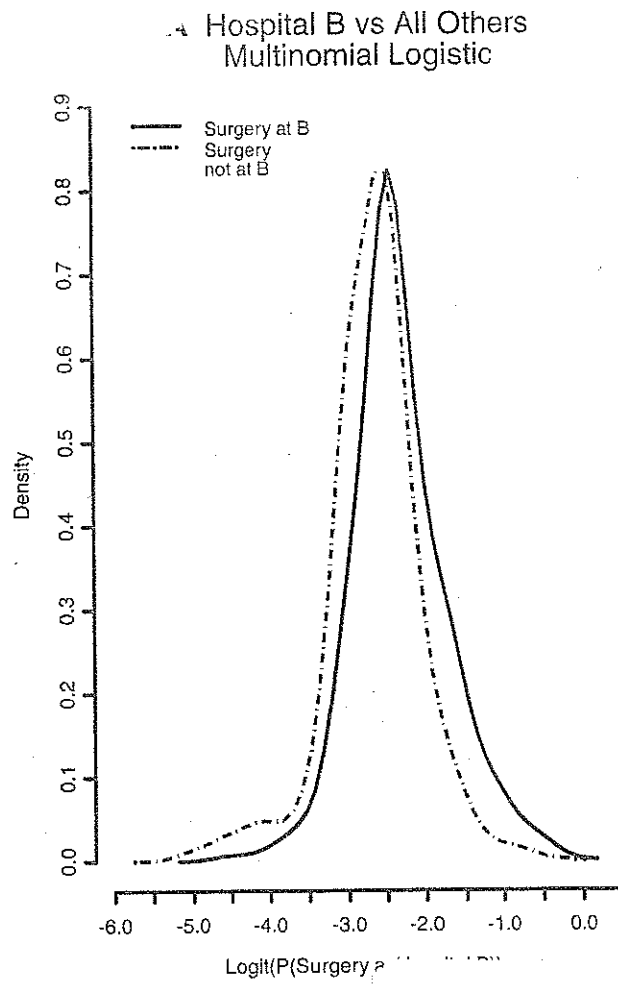
1. You are asked to characterize the performance of hospitals based on the mortality rates for CABG surgery in your state. You notice that the University Hospital (B) has the highest observed mortality rate for the procedure. The University Hospital has the highest percentage of patients undergoing the procedure who are either salvage cases or who have a low ejection fraction but a relatively low percentage who had a prior CABG. Using the data elements in the table below, contrast how you would determine with risk adjustment versus propensity scores whether the University hospital operated on sicker patients than the other hospitals. What would be the dependent variable of the models in each case?

Variable	Hospital, %														All, %
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
Female	31.0	27.0	24.0	29.0	29.0	21.0	25.0	25.0	26.0	23.0	30.0	20.0	30.0	18.0	26.5
Renal failure	3.8	13.0	6.6	6.2	9.7	1.8	7.2	3.4	3.1	8.3	8.4	11.0	6.9	4.5	6.9
Hx of PVD	14.0	20.0	19.0	23.0	16.0	20.0	17.0	13.0	17.0	19.0	14.0	26.0	12.0	27.0	17.4
Prior CABG	3.0	2.1	4.7	4.9	1.8	0	4.2	1.4	3.1	4.5	2.2	1.8	1.1	0	3.1
EF <30%	12.0	15.0	8.7	13.0	9.1	1.8	2.9	9.3	7.3	8.1	11.0	11.0	13.0	6.8	12.6
MI <6 h	0.9	0.9	0.3	0.5	0.5	0.9	0.9	2.0	0.5	0.5	1.1	0	4.0	0	0.96
Emergent or salvage	3.8	7.2	3.1	4.0	2.7	0.9	3.4	2.5	2.1	1.1	1.8	0.9	4.0	0	3.0
Cardiogenic shock	3.0	2.1	1.6	0.8	1.5	0.9	1.9	1.7	2.1	0.6	1.1	1.8	2.3	0	1.6
Preop IABP	10.0	13.0	17.0	6.7	8.6	29.0	12.0	8.8	15.0	14.0	9.9	14.0	5.2	2.3	11.7

Hx of PVD indicates history of peripheral vascular disease; EF, ejection fraction; MI, myocardial infarction; and preop IABP, preoperative intraaortic balloon pump.

2. The University Hospital CEO suggests that he doesn't think it is reasonable to include the University Hospital in your comparisons. You point out that while it is true that the patients are sickest at the University Hospital, the Hosmer-Lemeshow test of the observed and expected CABG outcomes in the state is non significant overall and for each stratum of risk. Is there any additional role for using propensity scores to determine whether or not it is valid to include the University Hospital in your assessments?

3. How similar or different would you expect the hospital results you obtained for CABG outcomes using risk adjusted mortality to compare to results obtained from a propensity score based analysis given the distribution of propensity scores shown in the figure below:



4. The graph below depicts the distribution of propensity scores of patients undergoing CABG surgery at hospitals B and F. Assuming you've developed a risk adjustment model with a good c statistic and a non significant Hosmer Lemeshaw test, is it legitimate to make comparisons of the outcomes of these two hospitals? How might you use risk adjustment and propensity scores to ensure a valid comparison?

