**UCLA Stress Echocardiography Data**

**The following description comes from the UCLA Statistics Web Site. The original dataset may be found here.**

Keywords for Dataset: Medical, Biology, Physiology

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**General Explanation of the Study**

This data is from a study that was trying to determine if a drug called "dobutamine" could be used effectively in a test for measuring a patient's risk of having a heart attack, or "cardiac event." For younger patients, a typical test of this risk is called "Stress Echocardiography." It involves raising the patient's heart rate by exercise--often by having the patient run on a treadmill--and then taking various measurements, such as heart rate and blood pressure, as well as more complicated measurements of the heart. The problem with this test is that it often cannot be used on older patients whose bodies can't take the stress of hard exercise. The key to assessing risk, however, is putting stress on the heart before taking the relevant measurements. While exercise can't be used to create this stress for older patients, the drug dobutamine can. This study, then, was partly an attempt to see if the stress echocardiography test was still effective in predicting cardiac events when the stress on the heart was produced by dobutamine instead of exercise. More specifically, though, the study sought to pinpoint which measurements taken during the stress echocardiography test were most helpful in predicting whether or not a patient suffered a cardiac event over the next year. The complete citation for the journal in which the results of the study were published is as follows:

Garfinkel, Alan, et. al. "Prognostic Value of Dobutamine Stress Echocardiography in Predicting Cardiac Events in Patients With Known or Suspected Coronary Artery Disease." Journal of the American College of Cardiology 33.3 (1999) 708-16.

**Brief Description of the Data**

The accompanying data file contains the complete data for the final study population, which included 220 men and 338 women. The data collected on each subject is explained below.

**Variables**

For the purposes of the study, the "cardiac events" that the "Dobutamine Stress Echocardiography" was attempting to predict were broken down into four categories:

myocardial infarction (MI)

revascularization by percutaneous transluminal coronary angioplasty (PTCA)

coronary artery bypass grafting surgery (CABG)

cardiac death

If you're not familiar with medical jargon, you can simply think of these as four things that can go wrong with your heart, and that the test was trying to predict. In the datafile you can see whether or not a patient suffered one of these cardiac events in the year following the patient's test by looking in the columns marked "newMI", "newPTCA", "newCABG", and "death". Note that, contrary to statistical convention, a "1" means that the patient DID NOT suffer the corresponding cardiac event, and a "0" means that he DID. The other variables are explained below.

Explanation of Data Measurement Abbreviations in the Data File

bhr basal heart rate

basebp basal blood pressure

basedp basal double product (= bhr x basebp)

pkhr peak heart rate

sbp systolic blood pressure

dp double product (= pkhr x sbp)

dose dose of dobutamine given

maxhr maximum heart rate

%mphr(b) % of maximum predicted heart rate achieved

mbp maximum blood pressure

dpmaxdo double product on maximum dobutamine dose

dobdose dobutamine dose at which maximum double product occured

age age

gender gender (male = 0)

baseef baseline cardiac ejection fraction (a measure of the heart's pumping efficiency)

dobef ejection fraction on dobutamine

chestpain 0 means experienced chest pain

posecg signs of heart attack on ecg (0 = yes)

equivecg ecg is equivocal (0 = yes)

restwma cardiologist sees wall motion anamoly on echocardiogram (0 = yes)

posse stress echocardiogram was positive (0 = yes)

newmi new myocardial infarction, or heart attack (0 = yes)

newptca recent angioplasty (0 = yes)

newcabg recent bypass surgery (0 = yes)

death died (0 = yes)

hxofht history of hypertension (0 = yes)

hxofdm history of diabetes (0 = yes)

hxofcig history of smoking (0 = yes)

hxofmi history of heart attack (0 = yes)

hxofptca history of angioplasty (0 = yes)

hxofcabg history of bypass surgery (0 = yes)

any event Outcome variable, defined as "death or newmi or newptca or newcabg". if any of these variables is positive (= 0) then "any event" is also postive (= 0).

The following remaining variables are the researcher's technical calculations and they may be ignored

phat

event(#)

mics

deltaef

newpkmphr

gdpkmphr

gdmaxmphr

gddpeakdp

gdmaxdp

hardness

**Statistical Tests and Analyses Used in the Study**

Two-sample z-test (or p-test) for difference in mean

Chi-square test for independence

Logistic regression analysis

Hosmer/Lemeshow "goodness of fit" test

CART analysis (Classification and regression tree analysis)