Abstract

Relations that are true at all time and all places such as the laws of motion are postulated by reasoning and verified using data generated thru experiments. When the laws relate to non-living things as in physics and chemistry and when errors in observations are random, repeating experiments and deriving laws based on more information will lead to more accurate results. Hence, the larger the sample the better the results.

An interesting question is: Will more information always help to derive more accurate relations when objects studied are living organisms as in biology and social sciences? For example, does repeating a diagnostic test or performing a confirmatory test help to increase diagnostic accuracy?

Using data for 4,435 persons from the National Health and Nutrition Examination Survey in the U.S., we show how repeated tests can decrease diagnostic accuracy. Statistical designs and methods used to discover relations in physical sciences cannot be used without appropriate modifications or extensions in social sciences.

Prof. V.K. Chetty
Professor of Family Medicine
Boston University
Tel: 617-414-6221, Fax:617-414-3345
emails: chettyvk@gmail.com,vchetty@bu.edu
Screening for Diabetes using A1C and Glucose Tolerance Tests

(Use only NHanes 3 to estimate and NH 2005-6 to validate)

- Rule: FPG. Predicted = Reg.Wtd. Average of ogtt & A1c > = 126

- DM = 53 (n = 2,245)

- $\rho_{A1c,OGTT} = 0.3$ for Non DM
  - $0.7$ for DM

- Sens = 83% spec = 97% for either
- Sens = 66% spec = 99% for reg.wtd.avg

- FN = 9
- FN = 9

- Neither + ve
Screening for Undiagnosed Diabetes

Fasting Plasma Glucose
Linear Model

Relative Risk ($r/ r^m$)
Logistic

$n = 2,702$ (yrs. 2005,06)
Sens = 82%
Spec = 76%

$r^m = \text{mean risk of persons without diabetes}$
Sens = 79%
Spec = 82%
Screening for Undiagnosed Diabetes

Fasting Plasma Glucose

Relative Risk

FPG.Observed

FPG.Predicted

Relative Risk

Screening for Undiagnosed Diabetes
Screening for Undiagnosed Diabetes-Non-DM

Fasting Plasma Glucose

False Positives 629 (24%)

Relative Risk

False Positives 477 (18%)