Summary Measures (Probability Models)

Common Probability Models

Characterization of a Probability Distribution and Summary Measure

- Type of random variable
  - continuous, discrete, censored
- Summary measure used for outcome
  - mean, geometric mean, proportion, odds, hazard
- Measure used for comparison of groups
  - difference, ratio
- Quantification of statistical information

Common Probability Models

Comparing means (e.g., Normal probability model of mean response)

- Continuously distributed outcome:
  - e.g., blood pressure
- Outcome summarized by mean response
- Compare groups by difference in means
- Information measured by within group variance

Common Probability Models

Comparing geometric means (e.g., Lognormal probability model-- log outcome is normal)

- Continuously distributed, skewed outcome:
  - e.g., serum cholesterol, PSA
- Outcome summarized by (log) geometric mean (median) response
- Compare groups by (log) ratio of geometric means (medians)
- Information measured by within group variance of log transformed response

Common Probability Models

Comparing binomial proportions

Binary (dichotomous) outcome:

- e.g., tumor response, 30 day mortality

Outcome summarized by probability of event

Compare groups by difference in proportions

Information from mean variance relationship under null or alternative

Common Probability Models

Comparing binomial odds

Binary (dichotomous) outcome:

- e.g., tumor response, 30 day mortality

Outcome summarized by (log) odds of event

Compare groups by (log) ratio of odds

Information from mean variance relationship under null or alternative

Common Probability Models

Comparing rates (Poisson probability model)

Outcome counts events:

- e.g., number of lesions, number of infections

Outcome summarized by (log) event rate

Compare groups by (log) ratio of event rates

Information from mean variance relationship under null or alternative

Common Probability Models

Hazard ratios (Proportional hazards survival model)

Right censored time to event:

- e.g., time to death

Outcome summarized by hazard (semi-parametric)

Compare groups by (log) ratio of hazards

Information proportional to number of events