PUMP Manuscript: Reverse Outline

Overview

1. Multiple outcomes and MTPs
2. MTPs change power
3. Other definitions of power exist
4. Outline other definitions of power
5. No one else has done this
6. PUMP package
7. RCT designs

Review of the multiple testing problem in a frequentist framework

1. Frequentist framework is prevailing framework.
2. Hypotheses, test statistic, p-value.
3. Type I error for single test
4. Type I error inflation for multiplte tests
5. MTPs reduce individual power
6. MTP effects on other power

Using MTPs to protect against spurious impact findings

1. FWER
2. FDR
3. Calculation of FWER and FDR
4. Difference in objective
5. Strong control and weak control

Estimating power, MDES and sample size in studies with multiple outcomes

Power estimation strategy

1. Introduce why we need simulation approach
2. Details of simulation approach
3. Side note about complete power
4. Simplification of simulation approach, and summary
5. How to sample test statistics
6. How to sample test statistics continued
7. MDES and SS
8. WY detail
9. WY detail continued
10. Source of idea of simulated power

Randomized Control Trial Designs and Models

1. Choices: design and model

2. Design and model details
3. Notation

Understanding design parameters

1. Detail on ICC, omega, R2

Estimating MDES and sample size

1. We need a search algorithm
2. Search algorithm bounds
3. More detail of search algorithm
4. Power estimation from results

Validation

1. Validation approach
2. See appendix for details