Treatment Selection Example

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# Multiarm, Binary Outcome - Treatment Selection Example

This example demonstrates how to add new treatment selection functionality into East using an R function.

For all of these examples, we assume all trails designs consist of control and three experimental treatments. There is one Interim Analysis, IA, and a Final Analysis, FA. At the IA, experimental treatment(s) are selected and continue to the 2nd stage of the study. If the trial is not stopped for efficacy or futility, then control and any selected treatments continue to the next stage of the trial.

The examples include here are to provide different approaches for selecting treatments for stage 2.

**East Workbook**: TreatmentSelection.cywx

**R Studio Project File**: TreatmentSelection.Rproj.

In the RCode directory of this example you will find the following R files:

1. TreatmentSelectionTemplate.R - This file provides a template that may be used as a starting point for developing new treatment selection functions in R.
2. TreatmentSelectionExample1.R - Contains a function named PerformTreatmentSelection to demonstrate the R code necessary for Example 1 as described below.
3. TreatmentSelectionExample2.R - Contains a function named PerformTreatmentSelection to demonstrate the R code necessary for Example 2 as described below.
4. TreatmentSelectionExample3.R - Contains a function named PerformTreatmentSelection to demonstrate the R code necessary for Example 3 as described below.
5. TreatmentSelectionExample4.R - Contains a function named PerformTreatmentSelection to demonstrate the R code necessary for Example 4 as described below.

In addition, if you would like to experiment with these examples to and would like some code to help you get started we have provided fill-in-the-blank type code files in the FillInTheBlankRCode directory.

## Example 1 - Treatment Selection Rules

At the interim analysis, select any treatment with a response rate that is higher than control for stage 2.

If none of the treatments have a higher response rate than control, select the treatment with the largest probability of response.

In the second stage, the randomization ratio will be 1:1 (experimental:control)

## Example 2 - Treatment Selection Rule

At the interim analysis, compare treatment and each experimental to control using a chi-squared test and any treatment with p-value less than 0.2 ( p-value < 0.2) is selected for stage 2 .

If none of the treatments have a p-value less than 0.2, (p-value < 0.2), select the treatment with the smallest p-value

In the second stage, the randomization ratio will be 1:1 (experimental:control)

## Example 3 - Treatment Selection Rule

At the interim analysis, select the two treatments with the highest number of responses. In the second stage, the randomization ratio is updated to the following:

| Treatment | Randomization Ratio |
| --- | --- |
| Control | 1 |
| Treatment with largest number of responses | 2 |
| Treatment with 2nd largest number of responses | 1 |

The R Function to accomplish this in in RCode/TreatmentSelectionExample1.R. The resulting simulations are labeled Example 1 in the East workbook.

## Example 4 - Treatment Selection Rule

At the interim analysis, we use the following Bayesian model and selection rule and selection rule

Denote the probability of response on experimental treatment by pj , for j = 1, 2, 3.

Prior:

pj ~ Beta( 0.2, 0.8 )

Select any treatment that has at least a 20% probability of being greater than historical response rate of 10%. Specifically, if Pr( pj > 0.1 | data ) > 0.2 then experimental treatment j is selected for stage 2. If none of the treatments meet the criteria for selection, then select the treatment with the largest Pr( pj > 0.1 | data ).

After the IA, we use a randomization ratio of 2:1 (experimental:control) for all experimental treatments that are selected for stage 2.