

# Package ‘ewhorm’

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**Title** Statistical Considerations for Designing e-WHORM Adaptive Trial

**Version** 0.1

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**Description** Data simulation and analysis for the design of e-WHORM trial

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**Encoding** UTF-8

**Imports** mvtnorm,  
stats,  
multcomp,  
gMCP,  
gtools

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.2.1

**Suggests** knitr,  
rmarkdown

**VignetteBuilder** knitr

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get_hyp_mat	<i>Function to compute the hypotheses to test (closed test)</i>
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**Description**

Function to compute the hypotheses to test (closed test)

**Usage**

```
get_hyp_mat(n_hypothesis = 3, selected_hypothesis = 1)
```

**Arguments**

n_hypothesis	num elementary hypotheses
selected_hypothesis	selected hypothesis for closed test

**Details**

eWHORM simulations

**Value**

maximum value in a row

**Author(s)**

Marta Bofill Roig

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get_max_col_index	<i>Function to get the column index of the maximum value in a row</i>
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**Description**

Function to get the column index of the maximum value in a row

**Usage**

```
get_max_col_index(row)
```

**Arguments**

row	selected row
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**Details**

eWHORM simulations

**Value**

maximum value in a row

**Author(s)**

Marta Bofill Roig

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sim\_data

*Simulate data from a multi-arm trial with shared control*

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**Description**

Function to simulate trial data (1-stage, multiple arms)

**Usage**

```
sim_data(n_arms, N, mu_6m, mu_12m, sigma, rmonth)
```

**Arguments**

n_arms	number of arms (including control)
N	total sample size
mu_6m	6-month mean response per arm (vector of length n_arm)
mu_12m	12-month mean response per arm (vector of length n_arm)
sigma	covariance matrix between 6- and 12-month responses assumed equal across arms (matrix of dim 2x2)
rmonth	recruitment per month (recruitment speed assumed constant over time)

**Details**

eWHORM simulations

**Value**

simulated data consisting of the responses at 6 and 12 months, treatment arm, and recruitment time for each subject.

**Author(s)**

Marta Bofill Roig

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sim_trial	<i>Simulate data from a multi-arm multi-stage trial with shared control and dose selection</i>
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## Description

Function to simulate trial data (2-stages, with dose selection). Analysis using Dunnett test in stage 1 and closed test for the selected dose, and the Inverse normal combination test for combining pvalues of stages 1 and 2.

## Usage

```
sim_trial(
  n_arms = 4,
  N1 = 30 * 4,
  N2 = 30 * 2,
  mu_6m,
  mu_12m,
  sigma,
  rmonth,
  alpha1 = 0.5,
  alpha = 0.05,
  p_safety = c(0.9, 0.8, 0.7),
  safety = T,
  promising = F
)
```

## Arguments

n_arms	number of arms (including control)
N1	sample size stage 1
N2	sample size stage 2
mu_6m	6-month mean response per arm (vector of length n_arm)
mu_12m	12-month mean response per arm (vector of length n_arm)
sigma	covariance matrix between 6- and 12-month responses assumed equal across arms (matrix of dim 2x2)
rmonth	recruitment per month (recruitment speed assumed constant over time)
alpha1	significance level for dose selection
alpha	significance level for selected dose vs control comparison
p_safety	probability of each dose to be safe
safety	indicator - if true, it simulates safety according to p_safety
promising	select the most promising dose at the interim analysis

## Details

eWHORM simulations

**Value**

Combined p-value, selected dose and safety for each dose (if argument safety=TRUE)

**Author(s)**

Marta Bofill Roig

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sim_trial_pce	<i>Simulate data from a multi-arm multi-stage trial with shared control and two initial doses, where an additional dose could be added after the interim analysis</i>
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**Description**

Function to simulate trial data (2-stages, with dose selection). The analyses are performed using partial conditional error.

**Usage**

```
sim_trial_pce(
  n_arms = 4,
  N1 = 30 * 4,
  N2 = 30 * 2,
  mu_6m,
  mu_12m,
  sigma,
  rmonth,
  alpha1 = 0.1,
  alpha = 0.05,
  sim_out = F
)
```

**Arguments**

n_arms	number of arms (including control)
N1	sample size stage 1
N2	sample size stage 2
mu_6m	6-month mean response per arm (vector of length n_arm)
mu_12m	12-month mean response per arm (vector of length n_arm)
sigma	covariance matrix between 6- and 12-month responses assumed equal across arms (matrix of dim 2x2)
rmonth	recruitment per month (recruitment speed assumed constant over time)
alpha1	significance level for dose selection
alpha	significance level for selected dose vs control comparison
sim_out	Option for simplified output for simulations (if sim_out=TRUE simplified version, the value is FALSE by default)

**Details**

eWHORM simulations

**Value**

A list consisting of pvalues at stage 1, pvalues at stage 2, the decision at stages 1 and 2, the selected dose at stage 1, and the time at which the last patient was recruited in stage 1 and 2.

**Author(s)**

Marta Bofill Roig

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