Package 'CompARE'

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Title Statistical functions for studies with composite endpoints

Version 0.0.0.9000

Description The package has been mainly designed for calculating the required sample size in randomized clinical trials with composite endpoints. This package also includes functions for calculating the probability of observing the composite endpoint and the expected effect on the composite endpoint.

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Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

R topics documented:

ARE_cbe   *ARE method for composite binary endpoints*

Description

This function calculates the ARE method for binary composite outcomes.

Usage

```
ARE_cbe(p0_e1, p0_e2, eff_e1, effm_e1, eff_e2, effm_e2, effm_ce = "or", rho)
```

Arguments

`p0_e1`	numeric parameter, probability of occurrence E1 in the control group
`p0_e2`	numeric parameter, probability of occurrence E2 in the control group
`eff_e1`	numeric parameter, anticipated effect for the composite component E1
`effm_e1`	Effect measure used for the event E1 (effm_e1 = "diff" for difference of proportions, effm_e1 = "rr" for risk ratio, effm_e1 = "or" for odds ratio)
`eff_e2`	numeric parameter, anticipated effect for the composite component E2
`effm_e2`	Effect measure used for the event E2 (effm_e2 = "diff" for difference of proportions, effm_e2 = "rr" for risk ratio, effm_e2 = "or" for odds ratio)
`effm_ce`	Effect measure used for the composite endpoint (effm_ce = "diff" for difference of proportions, effm_ce = "rr" for risk ratio, effm_ce = "or" for odds ratio)
`rho`	numeric parameter, Pearson's correlation between the two events E1 and E2

Details

The input parameters represent the probability of the composite components and Pearson's correlation between the two components. Note that Pearson's correlation takes values between two bounds that depend on the probabilities p0_e1 and p0_e2. To calculate the correlation bounds you can use the R functions lower_corr and upper_corr, available in this package.

Value

Returns the ARE value.

References

Bofill Roig, M., & Gomez Melis, G. (2018). Selection of composite binary endpoints in clinical trials. Biometrical Journal, 60(2), 246-261. https://doi.org/10.1002/bimj.201600229

`effectsize_cbe`	*Effect for composite binary endpoints*

Description

This function calculates different effect measures for binary composite outcomes. In particular, it allows for computing the risk difference, risk ratio and odds ratio.

Usage

```
effectsize_cbe(
  p0_e1,
  p0_e2,
  eff_e1,
  effm_e1,
  eff_e2,
  effm_e2,
  effm_ce = "diff",
  rho
)
```

Arguments

p0_e1	numeric parameter, probability of occurrence E1 in the control group
p0_e2	numeric parameter, probability of occurrence E2 in the control group
eff_e1	numeric parameter, anticipated effect for the composite component E1
effm_e1	Effect measure used for the event E1 (effm_e1 = "diff" for difference of proportions, effm_e1 = "rr" for risk ratio, effm_e1 = "or" for odds ratio)
eff_e2	numeric parameter, anticipated effect for the composite component E2
effm_e2	Effect measure used for the event E2 (effm_e2 = "diff" for difference of proportions, effm_e2 = "rr" for risk ratio, effm_e2 = "or" for odds ratio)
effm_ce	Effect measure used for the composite endpoint (effm_ce = "diff" for difference of proportions, effm_ce = "rr" for risk ratio, effm_ce = "or" for odds ratio)
rho	numeric parameter, Pearson's correlation between the two events E1 and E2

Details

The input parameters represent the probability of the composite components and Pearson's correlation between the two components. Note that Pearson's correlation takes values between two bounds that depend on the probabilities p0_e1 and p0_e2. To calculate the correlation bounds you can use the R functions lower_corr and upper_corr, available in this package.

Value

Returns the effect for the composite binary endpoint and the effects for the composite components

References

Bofill Roig, M., & Gómez Melis, G. (2019). A new approach for sizing trials with composite binary endpoints using anticipated marginal values and accounting for the correlation between components. Statistics in Medicine, 38(11), 1935–1956. https://doi.org/10.1002/sim.8092

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lower_corr	*Lower bound for Pearson's Correlation*

Description

Pearson's correlation between two binary outcomes takes values between two bounds defined according to the probabilities of the binary outcomes. This function calculates the lower bound of the correlation based on the probabilities of two binary outcomes.

Usage

```
lower_corr(p_e1, p_e2)
```

Arguments

p_e1	numeric parameter, probability of the event E1
p_e2	numeric parameter, probability of the event E2

Details

lower_corr returns a numeric value between -1 and 0.

Value

Returns the minimum value that the correlation between the two outcomes can take.

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prob_cbe   *Probability of composite binary endpoints*

Description

This function calculates the probability of the composite of two events E1 and E2 (i.e., the union of the events E1 and E2). This probability is calculated by means of the probabilities of each event and the correlation between them.

Usage

```
prob_cbe(p_e1, p_e2, rho)
```

Arguments

p_e1   numeric parameter, probability of the event E1

p_e2   numeric parameter, probability of the event E2

rho   numeric parameter, Pearson's correlation between E1 and E2

Details

The input parameters represent the probability of the composite components and Pearson's correlation between the two components. Note that Pearson's correlation takes values between two bounds that depend on the probabilities p0_e1 and p0_e2. To calculate the correlation bounds you can use the R functions lower_corr and upper_corr, available in this package.

@references Bofill Roig, M., & Gómez Melis, G. (2019). A new approach for sizing trials with composite binary endpoints using anticipated marginal values and accounting for the correlation between components. Statistics in Medicine, 38(11), 1935–1956. https://doi.org/10.1002/sim.8092

Value

Returns the probability of the composite endpoint (E1 or E2).

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samplesize_cbe   *Sample size for composite binary endpoints*

Description

This function calculates the required sample size for trials with a composite binary endpoint as primary endpoint. The primary endpoint is assumed to be a composite binary endpoint formed by a combination of two events (E1 and E2). The sample size is computed for evaluating differences between two groups in terms of the risk difference, risk ratio or odds ratio. The sample size is calculated on the basis of anticipated information of the composite components and the correlation between them.

Usage

```
samplesize_cbe(
  p0_e1,
  p0_e2,
  eff_e1,
  effm_e1,
  eff_e2,
  effm_e2,
  effm_ce = "diff",
  rho,
  alpha = 0.05,
  beta = 0.2,
  unpooled = TRUE
)
```

Arguments

p0_e1	numeric parameter, probability of occurrence E1 in the control group
p0_e2	numeric parameter, probability of occurrence E2 in the control group
eff_e1	numeric parameter, anticipated effect for the composite component E1
effm_e1	Effect measure used for the event E1 (effm_e1 = "diff" for difference of proportions, effm_e1 = "rr" for risk ratio, effm_e1 = "or" for odds ratio)
eff_e2	numeric parameter, anticipated effect for the composite component E2
effm_e2	Effect measure used for the event E2 (effm_e2 = "diff" for difference of proportions, effm_e2 = "rr" for risk ratio, effm_e2 = "or" for odds ratio)
effm_ce	Effect measure used for the composite endpoint (effm_ce = "diff" for difference of proportions, effm_ce = "rr" for risk ratio, effm_ce = "or" for odds ratio)
rho	numeric parameter, Pearson's correlation between the two events E1 and E2
alpha	Type I error
beta	Type II error
unpooled	Variance estimate used for the sample size calculation ("TRUE" for unpooled variance estimate, and "FALSE" for pooled variance estimate).

Details

The input parameters represent the probability of the composite components and Pearson's correlation between the two components. Note that Pearson's correlation takes values between two bounds that depend on the probabilities p0_e1 and p0_e2. To calculate the correlation bounds you can use the R functions lower_corr and upper_corr, available in this package.

@references Bofill Roig, M., & Gomez Melis, G. (2019). A new approach for sizing trials with composite binary endpoints using anticipated marginal values and accounting for the correlation between components. Statistics in Medicine, 38(11), 1935-1956. https://doi.org/10.1002/sim.8092

Value

Return the sample size for composite binary endpoints based on the anticipated values of the composite components and the association between them in terms of Pearson's correlation.

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upper_corr   *Upper bound for Pearson's Correlation*

Description

Pearson's correlation between two binary outcomes takes values between two bounds defined according to the probabilities of the binary outcomes. This function calculates the upper bound of the correlation based on the probabilities of two binary outcomes.

Usage

```
upper_corr(p_e1, p_e2)
```

Arguments

p_e1	numeric parameter, probability of the event E1
p_e2	numeric parameter, probability of the event E2

Details

upper_corr returns a numeric value between 0 and 1.

Value

Returns the maximum value that the correlation between the two outcomes can take.

Index