

# Package: basil (via r-universe)

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**Type** Package

**Title** Survival Prediction for Severe Limb Ischaemia (BASIL Model)

**Version** 0.1.0

**Description** Predicts survival for patients with severe limb ischaemia using the prognostic model developed from the Bypass versus Angioplasty in Severe Ischaemia of the Leg (BASIL) trial (Bradbury and others (2010) <[doi:10.1016/j.jvs.2010.01.077](https://doi.org/10.1016/j.jvs.2010.01.077)>). The model is an accelerated failure time Weibull regression. The package is intended for research and audit; it is not a substitute for clinical judgement and its predictions should not be used as the sole basis for clinical decisions.

**License** MIT + file LICENSE

**Encoding** UTF-8

**URL** <https://github.com/chrislongros/basil>

**BugReports** <https://github.com/chrislongros/basil/issues>

**Suggests** tinytest

**Config/roxygen2/version** 8.0.0

**NeedsCompilation** no

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**Repository** <https://cran.r-universe.dev>

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|       |                                 |
|-------|---------------------------------|
| basil | <i>BASIL predicted survival</i> |
|-------|---------------------------------|

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Description

Predicts the probability of survival at one or more time points for a patient with severe limb ischaemia, using the BASIL trial survival prediction model (Bradbury and others, 2010). The model is an accelerated failure time Weibull regression; coefficients are those of the official BASIL prognostic spreadsheet.

Usage

```
basil(  
  age,  
  tissue_loss,  
  bmi,  
  creatinine,  
  bollinger,  
  smoking,  
  mi_angina,  
  stroke_tia,  
  ankle_pressures_n,  
  max_ankle_pressure,  
  times = c(0.5, 1, 2),  
  shrunk = TRUE  
)
```

Arguments

|             |                                                                          |
|-------------|--------------------------------------------------------------------------|
| age         | Age in years (clamped to 40-95).                                         |
| tissue_loss | Logical; tissue loss present.                                            |
| bmi         | Body mass index category: "<20", "20-25", "25-30", "30+" or "unknown".   |
| creatinine  | Serum creatinine category: "low", "medium", "high" or "missing".         |
| bollinger   | Below-knee Bollinger angiogram score category: "<5", ">=5" or "unknown". |
| smoking     | Smoking status: "non", "ex" or "current".                                |
| mi_angina   | Logical; history of myocardial infarction or angina.                     |
| stroke_tia  | Logical; history of stroke or transient ischaemic attack.                |

|                    |                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------|
| ankle_pressures_n  | Number of below-knee ankle pressures measurable (0, 1, 2 or 3).                                   |
| max_ankle_pressure | Maximum ankle pressure obtained, mmHg (clamped to 0-200).                                         |
| times              | Numeric vector of times in years at which to return survival (default 0.5, 1 and 2).              |
| shrunk             | Logical; if TRUE (default) apply the model's uniform shrinkage, as in the trial's primary output. |

## Details

Two composite variables are entered as categories rather than raw values, because their derivations are not fully specified in the spreadsheet: creatinine as "low", "medium", "high" or "missing", and bollinger (the below-knee Bollinger angiogram score) as "<5", ">=5" or "unknown". Age is clamped to 40-95 and maximum ankle pressure to 0-200, as in the deployed model.

## Value

A named numeric vector of survival probabilities at times, with the linear predictor attached as attribute "lp".

## Examples

```
# The BASIL spreadsheet's worked example
basil(age = 80, tissue_loss = TRUE, bmi = "30+", creatinine = "medium",
      bollinger = "<5", smoking = "ex", mi_angina = TRUE, stroke_tia = TRUE,
      ankle_pressures_n = 0, max_ankle_pressure = 0)
```

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basil\_creatinine\_category

*Categorise a serum creatinine value for BASIL*

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## Description

Maps a raw serum creatinine value to the category used by the creatinine argument of `basil`. The cut points are those of the BASIL model (Bradbury and others, 2010): below 88, 88-115, and above 115  $\mu\text{mol/L}$  for low, medium and high, respectively.

## Usage

```
basil_creatinine_category(x, units = c("umol", "mgdl"))
```

## Arguments

|       |                                                                                                                                                                                      |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x     | Numeric vector of serum creatinine values. NA maps to "missing".                                                                                                                     |
| units | Units of x: "umol" (micromoles per litre, the default) or "mgdl" (milligrams per decilitre, converted to $\mu\text{mol/L}$ at 1 mg/dL = 88.4 $\mu\text{mol/L}$ before categorising). |

Value

A character vector of "low", "medium", "high" or "missing", suitable for the creatinine argument of basil.

Examples

```
basil_creatinine_category(c(70, 100, 130, NA))
basil_creatinine_category(1.5, units = "mgdl") # 1.5 mg/dL -> 132.6 umol/L -> "high"
```

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|            |                                              |
|------------|----------------------------------------------|
| basil_risk | <i>BASIL predicted survival for a cohort</i> |
|------------|----------------------------------------------|

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Description

Applies basil to each row of a data frame, appending the linear predictor and the predicted survival at each of times as columns.

Usage

```
basil_risk(data, times = c(0.5, 1, 2), shrunk = TRUE)
```

Arguments

|        |                                                                                                                                                                           |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data   | A data frame with one row per patient and columns age, tissue_loss, bmi, creatinine, bollinger, smoking, mi_angina, stroke_tia, ankle_pressures_n and max_ankle_pressure. |
| times  | Numeric vector of times in years (default 0.5, 1 and 2).                                                                                                                  |
| shrunk | Logical; passed to basil.                                                                                                                                                 |

Value

data with an lp column and one surv\_t<time> column for each entry in times.

Examples

```
patients <- data.frame(
  age = c(80, 65), tissue_loss = c(TRUE, FALSE),
  bmi = c("30+", "20-25"), creatinine = c("medium", "low"),
  bollinger = c("<5", ">=5"), smoking = c("ex", "non"),
  mi_angina = c(TRUE, FALSE), stroke_tia = c(TRUE, FALSE),
  ankle_pressures_n = c(0, 2), max_ankle_pressure = c(0, 80))
basil_risk(patients)
```

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