# Package 'gtreg'

November 25, 2025

```
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Description Creates tables suitable for regulatory agency submission by
     leveraging the 'gtsummary' package as the back end. Tables can be exported
     to HTML, Word, PDF and more. Highly customized outputs are
     available by utilizing existing styling functions from 'gtsummary' as
     well as custom options designed for regulatory tables.
License GPL (>= 3)
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     https://shannonpileggi.github.io/gtreg/
BugReports https://github.com/shannonpileggi/gtreg/issues
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Author Shannon Pileggi [aut, cre, cph] (ORCID:
      <https://orcid.org/0000-0002-7732-4164>),
     Daniel D. Sjoberg [aut] (ORCID:
      <https://orcid.org/0000-0003-0862-2018>)
Maintainer Shannon Pileggi <shannon.pileggi@gmail.com>
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```

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2 .complete\_ae\_data

# **Contents**

.comp	olete_ae_data	Create events	a co	mple	ete a	nd e	ехра	nde	d d	lata	frai	ne f	or to	ıbula	ating	g aa	lver	se
Index																		19
	toi_reg_summary .												• •					1/
	tbl_listing tbl_reg_summary .																	
	tbl_ae_focus																	
	tbl_ae_count																	
	tbl_ae																	
	style_xxx																	
	selectors																	
	inline_text_tbl_ae .																	7
	df_patient_character	ristics																6
	df_adverse_events .																	5
	add_overall_tbl_ae																	3
	.complete_ae_data																	2

# Description

Returns a data frame that has an observation for each patient in the study, with combinations for each ID, SOC, and AE. The returned data frame includes new logical columns "..ae.." and "..soc.." indicating whether that row should be included when tabulating the AE table. When multiple AEs of the same type are observed, the AE with the largest by= value is the observation to be used in the tabulation.

# Usage

```
.complete_ae_data(
   data,
   id,
   ae,
   soc = NULL,
   by = NULL,
   strata = NULL,
   id_df = NULL,
   by_values = NULL,
   missing_text = "Unknown",
   missing_location = "first"
)
```

add\_overall\_tbl\_ae 3

# Arguments

data	Data frame				
id	String variable name of the patient ID				
ae	String variable name of the adverse event column				
soc	Optional string variable name of the system organ class column				
by	Optional string variable to split results by, e.g. report AEs by grade or attribution				
strata	Optional string variable to stratify results by, e.g. report AEs summaries by treatment group				
id_df	Optional data frame of complete id values and strata to achieve correct base n for the situation in which not all subjects experience adverse events				
by_values	Optional vector of complete by values, listed in desired order, to achieve correct table structure for the situation in which an adverse event of a certain grade is not observed for a given soc				
missing_text	String that will be shown for missing levels of by=, Default is "Unknown"				
missing_location					
	location where the column summarizing values with missing levels by= will be located in the final table. Must be one of c("first", "last", "hide). Default is "first"				

# Value

a tibble

# **Examples**

```
df_adverse_events %>%
  .complete_ae_data(
    id = "patient_id",
    ae = "adverse_event",
    soc = "system_organ_class",
    by = "grade",
    strata = "trt"
)
```

add\_overall\_tbl\_ae

Tabulate Overall Summary

# Description

**Tabulate Overall Summary** 

4 add\_overall\_tbl\_ae

### Usage

```
## S3 method for class 'tbl_ae'
add_overall(x, across = NULL, ...)

## S3 method for class 'tbl_ae_count'
add_overall(x, across = NULL, ...)

## S3 method for class 'tbl_ae_focus'
add_overall(x, across = NULL, ...)
```

### **Arguments**

x Object of class "tbl\_ae", "tbl\_ae\_focus", or "tbl\_ae\_count"
across Specify the type of overall statistics to include.

• "both" adds summaries across both the by= and strata= levels

• "by" adds summaries across the by= levels

• "strata" adds summaries across the strata= levels

• "overall-only" adds a single overall column Default is all possible overall types.

... Not used

#### Value

Summary object of same input class

#### Notes

If the spanning headers are modified prior to the call of add\_overall(), the ordering of the columns may not be correct.

### **Example Output**

df\_adverse\_events 5

```
# Example 2 -----
add_overall_ex2 <-
 df_adverse_events %>%
 tbl_ae(
  id = patient_id,
  ae = adverse_event,
  soc = system_organ_class,
  by = grade
 ) %>%
 add_overall(across = 'by') %>%
 modify_header(all_ae_cols() ~ "**Grade {by}**") %>%
 bold_labels()
# Example 3 ------
add_overall_ex3 <-
 df_adverse_events %>%
 tbl_ae_focus(
   id = patient_id,
  include = c(any_complication, grade3_complication),
  ae = adverse_event,
  strata = trt
 ) %>%
 add_overall(across = 'strata')
# Example 4 ------
add_overall_ex4 <-
 df_adverse_events %>%
 tbl_ae(
  id = patient_id,
  ae = adverse_event,
  soc = system_organ_class,
  by = grade,
   strata = trt
 ) %>%
 add_overall(across = 'overall-only') %>%
 modify_header(all_ae_cols() ~ "**Grade {by}**") %>%
 bold_labels()
```

df\_adverse\_events

Simulated Adverse Event Database

### **Description**

A data set containing reported AEs from a trial.

# Usage

```
df_adverse_events
```

# **Format**

```
A data frame with 100 rows—one row per patient per AE

patient_id Patient ID

trt Treatment Group

system_organ_class System Organ Class

adverse_event Adverse Event

grade Grade

drug_attribution Drug Attribution

any_complication Any Grade Complication
```

grade3\_complication Grade 3+ Complication

```
df\_patient\_characteristics
```

Simulated Patient Characteristics Database

# Description

Simulated Patient Characteristics Database

# Usage

```
df_patient_characteristics
```

#### **Format**

A data frame with 100 rows-one row per patient

```
patient_id Patient ID

trt Treatment Group

age Patient Age

marker Biological Marker

status Study Status

discontinued Discontinued from Study

off_trt_ae Off Treatment Adverse Event
```

inline\_text\_tbl\_ae 7

inline\_text\_tbl\_ae

Report Values from gtreg tables in-line

### **Description**

Function allows users to report formatted and styled results from gtreg tables in-line.

# Usage

```
## S3 method for class 'tbl_ae'
inline_text(x, row, column = NULL, ...)
## S3 method for class 'tbl_ae_count'
inline_text(x, row, column = NULL, ...)
## S3 method for class 'tbl_ae_focus'
inline_text(x, row, column = NULL, ...)
```

# Arguments

# Value

string

```
tbl <-
    df_adverse_events %>%
    tbl_ae(
        id = patient_id,
        ae = adverse_event,
        soc = system_organ_class,
        by = grade
    )
show_header_names(tbl)
inline_text(tbl, "Anaemia", column = stat_5)
```

8 selectors

selectors

Column Selectors

# **Description**

See the Table modifications article for examples.

- all\_ae\_cols(overall, unknown) selects all columns summarizing AE statistics. By default, unknown and overall columns are not selected.
- all\_cols\_in\_strata(strata) selects all columns from specified stratum.
- all\_overall\_cols() selects all overall columns
- all\_unknown\_cols() selects all unknown columns

# Usage

```
all_ae_cols(overall = FALSE, unknown = FALSE)
all_cols_in_strata(strata)
all_overall_cols()
all_unknown_cols()
```

### **Arguments**

overall logical indicating whether to include the overall columns. Default is FALSE
unknown logical indicating whether to include the unknown or missing columns. Default is FALSE
strata character vector of the selected stratum

# Value

selected columns

# **Example Output**

### See Also

```
gtsummary::all_stat_cols()
```

style\_xxx 9

### **Examples**

```
selectors_ex1 <-
    df_adverse_events %>%
    dplyr::mutate(grade = ifelse(dplyr::row_number() == 1L, NA, grade)) %>%
    tbl_ae(
        id = patient_id,
        ae = adverse_event,
        soc = system_organ_class,
        by = grade
) %>%
    add_overall(across = 'by') %>%
    modify_header(
        all_ae_cols() ~ "**Grade {by}**",
        all_overall_cols() ~ "**Total**",
        all_unknown_cols() ~ "**Unknown Grade**"
)
```

style\_xxx

Style numbers as x's

# **Description**

The purpose of style\_xxx() is to convert numeric values in summary tables to x's of consistent length for mock tables. See the Table shells vignette for detailed examples.

### Usage

```
style_xxx(x, width = digits + 2, digits = 0)
```

# Arguments

a numeric or character vector
 the width of output field of x's, including the decimal place
 the number of digits displayed after the decimal place

# Value

a character vector

```
style_xxx(7:10, digits = 0)
style_xxx(7:10, digits = 1)
style_xxx(7:10, width = 2, digits = 0)
style_xxx(7:10, width = 5, digits = 2)
```

tbl\_ae

tbl\_ae Tabulate Adverse Events

# Description

The function tabulates adverse events. One AE per ID will be counted in the resulting table. If a by= variable is passed and a patient experienced more than one of the same AE, the AE associated with the highest by= level will be included. For example, if a patient has two of the same AE and by = grade, the AE with the highest grade will be included. Similarly, if tabulations within system organ class are requested, the AE within SOC associated with the highest grade will be tabulated.

# Usage

```
tbl_ae(
  data,
  id,
  ae,
  soc = NULL,
  by = NULL,
  strata = NULL,
  id_df = NULL,
  statistic = "{n} ({p})",
  by_values = NULL,
  digits = NULL,
  sort = NULL,
  sort = NULL,
  rero_symbol = "\U2014",
  missing_location = c("first", "last", "hide")
)
```

data	Data frame
id	Variable name of the patient ID
ae	Variable name of the adverse event column
soc	Variable name of the system organ class column
by	Variable to split results by, e.g. report AEs by grade
strata	Variable to stratify results by, e.g. report AEs summaries by treatment group
id_df	Optional data frame of complete id values and strata to achieve correct base n for the situation in which not all subjects experience adverse events. See df_patient_characteristics for an example id_df that pairs with df_adverse_events.
statistic	String indicating the statistics that will be reported. The default is "{n} ({p})"
by_values	Optional vector of complete by values, listed in desired order, to achieve correct table structure for the situation in which an adverse event of a certain grade is not observed for a given soc

tbl\_ae 11

digits

Specifies the number of decimal places to round the summary statistics. By default integers are shown to zero decimal places, and percentages are formatted with  $style\_percent()$ . If you would like to modify either of these, pass a vector of integers indicating the number of decimal places to round the statistics. For example, if the statistic being calculated is "{n} ({p}%)" and you want the percent rounded to 2 decimal places use digits = c(0, 2). User may also pass a styling function: digits =  $style\_sigfig$ 

sort

Controls order of AEs and SOCs in output table. The default is NULL, where AEs and SOCs are sorted alphanumerically (and factors sorted according to their factor level). Use sort = "ae" to sort AEs in decreasing frequency order, sort = "soc" to sort SOCs in decreasing order, and sort = c("ae", "soc") to sort both. AEs are sorted within SOC.

zero\_symbol

String used to represent cells with zero counts. Default is the em-dash ("\U2014"). Using zero\_symbol = NULL will print the zero count statistics, e.g. "0 (0)"

missing\_location

location where the column summarizing values with missing levels by= will be located in the final table. Must be one of c("first", "last", "hide). Default is "first"

#### Value

```
a 'tbl_ae' object
```

### **Example Output**

```
# Example 1 ------
tbl_ae_ex1 <-
 df_adverse_events %>%
 tbl_ae(
  id = patient_id,
  ae = adverse_event,
  soc = system_organ_class,
  by = grade,
  strata = trt
 modify_header(all_ae_cols() ~ "**Grade {by}**")
# Example 2 ------
tbl_ae_ex2 <-
 df_adverse_events %>%
 tbl_ae(
  id = patient_id,
  ae = adverse_event,
  by = grade
 ) %>%
 modify_header(all_ae_cols() ~ "**Grade {by}**")
```

tbl\_ae\_count

tbl\_ae\_count

Tabulate Raw AE Counts

# Description

Create a table counting all AEs.

# Usage

```
tbl_ae_count(
  data,
  ae,
  soc = NULL,
  by = NULL,
  strata = NULL,
  by_values = NULL,
  digits = NULL,
  sort = NULL,
  zero_symbol = "\U2014",
  missing_location = c("first", "last", "hide")
)
```

data	Data frame
ae	Variable name of the adverse event column
soc	Variable name of the system organ class column
by	Variable to split results by, e.g. report AEs by grade
strata	Variable to stratify results by, e.g. report AEs summaries by treatment group
by_values	Optional vector of complete by values, listed in desired order, to achieve correct table structure for the situation in which an adverse event of a certain grade is not observed for a given soc
digits	Specifies the number of decimal places to round the summary statistics. By default integers are shown to zero decimal places, and percentages are formatted with $style_percent()$ . If you would like to modify either of these, pass a vector of integers indicating the number of decimal places to round the statistics. For example, if the statistic being calculated is "{n} ({p}%)" and you want the percent rounded to 2 decimal places use digits = $c(0, 2)$ . User may also pass a styling function: digits = $style_sigfig$
sort	Controls order of AEs and SOCs in output table. The default is NULL, where AEs and SOCs are sorted alphanumerically (and factors sorted according to their factor level). Use sort = "ae" to sort AEs in decreasing frequency order, sort = "soc" to sort SOCs in decreasing order, and sort = c("ae", "soc") to sort both. AEs are sorted within SOC.

tbl\_ae\_focus 13

zero\_symbol

String used to represent cells with zero counts. Default is the em-dash ("\U2014"). Using zero\_symbol = NULL will print the zero count statistics, e.g. "0 (0)"

missing\_location

location where the column summarizing values with missing levels by= will be located in the final table. Must be one of c("first", "last", "hide). Default is "first"

### **Details**

tbl\_ae\_count counts all AEs (whereas tbl\_ae counts by maximum grade). Thus, tbl\_ae\_count does not provide percentages as multiple AEs can be counted per subject.

#### Value

```
a 'tbl_ae_count' object
```

### **Example Output**

### See Also

tbl\_ae

### **Examples**

```
# Example 1 ------
tbl_ae_count_ex1 <-
  tbl_ae_count(
   data = df_adverse_events,
   ae = adverse_event,
   soc = system_organ_class,
   strata = trt,
   by = grade
) %>%
modify_header(all_ae_cols() ~ "**Grade {by}**")
```

tbl\_ae\_focus

Tabulate AE Focused (Dichotomous) Summaries

# Description

Summarize dichotomous AE data. For example, report the rate of patients that have an AE of Grade 3 or higher.

tbl\_ae\_focus

# Usage

```
tbl_ae_focus(
  data,
  include,
  id,
  ae,
  soc = NULL,
  strata = NULL,
  label = NULL,
  id_df = NULL,
  statistic = "{n} ({p})",
  digits = NULL,
  sort = NULL,
  zero_symbol = "\U2014"
)
```

data	Data frame
include	Vector of column names to summarize. Column names may be quoted or unquoted. All columns must be class 'logical'.
id	Variable name of the patient ID
ae	Variable name of the adverse event column
SOC	Variable name of the system organ class column
strata	Variable to stratify results by, e.g. report AEs summaries by treatment group
label	A named list of labels that will be applied in the resulting table. Names must be those passed in include=. Default is NULL, and either the label attribute or the column name will be used.
id_df	Optional data frame of complete id values and strata to achieve correct base n for the situation in which not all subjects experience adverse events. See df_patient_characteristics for an example id_df that pairs with df_adverse_events.
statistic	String indicating the statistics that will be reported. The default is "{n} ({p})"
digits	Specifies the number of decimal places to round the summary statistics. By default integers are shown to zero decimal places, and percentages are formatted with $style_percent()$ . If you would like to modify either of these, pass a vector of integers indicating the number of decimal places to round the statistics. For example, if the statistic being calculated is "{n} ({p}%)" and you want the percent rounded to 2 decimal places use digits = $c(0, 2)$ . User may also pass a styling function: digits = $style_sigfig$
sort	Controls order of AEs and SOCs in output table. The default is NULL, where AEs and SOCs are sorted alphanumerically (and factors sorted according to their factor level). Use sort = "ae" to sort AEs in decreasing frequency order, sort = "soc" to sort SOCs in decreasing order, and sort = c("ae", "soc") to sort both. AEs are sorted within SOC.
zero_symbol	String used to represent cells with zero counts. Default is the em-dash ("\U2014"). Using zero_symbol = NULL will print the zero count statistics, e.g. "0 (0)"

tbl\_listing 15

### Value

```
a 'tbl_ae_focus' object
```

### **Example Output**

# **Examples**

 $tbl_listing$ 

Data Listing Table

# Description

Function creates a gtsummary-class listing of data. Column labels are used as column headers, when present. The listing prints observations in the order of the input data.

# Usage

```
tbl_listing(data, group_by = NULL, bold_headers = TRUE)
```

# **Arguments**

data a data frame

group\_by Single variable name indicating a grouping variable. Default is NULL for no

grouping variable. When specified, a grouping row will be added to the first

column. See details below.

bold\_headers logical indicating whether to bold column headers. Default is TRUE

### Value

gtsummary data listing

16 tbl\_listing

#### group\_by

The grouping column and the first column in the table will be combined and the type/class may be converted to common type/class for both columns. However, if either the group\_by= column or the first column are factors, the factor column(s) will first be converted to character.

The groups are ordered according to the grouping variable's type (i.e., character, numeric, or factor).

#### **Details**

The purpose of tbl\_listing() is to add support for printing data frames, while taking advantage of the {gtsummary} defaults, e.g. ability to print to most output formats, using print themes to have a common style to all tables in a document, etc.

While the output of tbl\_listing() is class 'gtsummary', these tables are not meant to be merged with other 'gtsummary' tables with tbl\_merge(), or reporting table contents with inline\_text(). The reason is that a proper 'gtsummary' contains additional, hidden structure not present in the result of tbl\_listing(). If you do need to report the results of tbl\_listing() in-line, it's recommended to convert the table to a data frame, then extract the needed cell, e.g.

```
tbl_listing() |>
  as_tibble(col_names = FALSE) |>
  dplyr::slice(1) |>
  dplyr::pull(colname)`
```

### **Example Output**

```
library(dplyr, warn.conflicts = FALSE)

tbl_listing_ex1 <-
    head(df_adverse_events, n = 10) %>%
    select(system_organ_class, adverse_event, grade, drug_attribution, patient_id) %>%
    arrange(adverse_event, desc(grade)) %>%
    tbl_listing(group_by = system_organ_class) %>%
    bold_labels()

set.seed(11234)
tbl_listing_ex2 <-
df_patient_characteristics %>%
    dplyr::slice_sample(n = 10) %>%
    select(patient_id, status, discontinued, off_trt_ae) %>%
    tbl_listing() %>%
    as_gt() %>%
    gt::opt_row_striping()
```

tbl\_reg\_summary 17

tbl\_reg\_summary

Data Summary Table

# Description

Function wraps gtsummary::tbl\_summary() to create a data summary table often seen in regulatory submissions. Continuous variable summaries are shown on multiple lines with additional summary statistics and percentages are shown for categorical variables; precision levels estimated based on values observed.

### Usage

```
tbl_reg_summary(
          data,
          by = NULL,
          label = NULL,
          to statistic = list(all\_continuous() \sim c("{N\_nonmiss}", "{mean} ({sd})", "{mean} ({sd})",
                       "{median} ({p25}, {p75})", "{min}, {max}", "{N_miss}"), all_categorical() ~
                      "{n} ({p}%)"),
          digits = NULL,
          type = NULL,
          value = NULL,
         missing = c("no", "yes", "ifany"),
         missing_text = "Unknown",
         missing_stat = "{N_miss}";
          sort = all_categorical(FALSE) ~ "alphanumeric",
          percent = c("column", "row", "cell"),
           include = everything()
)
```

data	(data.frame) A data frame.
by	A column name (quoted or unquoted) in data. Summary statistics will be calculated separately for each level of the by variable (e.g. by = trt). If NULL, summary statistics are calculated using all observations.
label	(formula-list-selector) Used to override default labels in summary table, e.g. list(age = "Age, years"). The default for each variable is the column label attribute, attr(., 'label'). If no label has been set, the column name is used.
statistic	List of formulas specifying types of summary statistics to display for each variable.
digits	(formula-list-selector) Specifies how summary statistics are rounded. Values may be either integer(s) or function(s). If not specified, default formatting is assigned via assign_summary_digits(). See below for details.

18 tbl\_reg\_summary

type List of formulas specifying variable types. Accepted values are c ("continuous",

"continuous2", "categorical", "dichotomous"), e.g. type = list(age ~ "continuous", female ~ "dichotomous"). If type not specified for a variable,

the function will default to an appropriate summary type.

value List of formulas specifying the value to display for dichotomous variables. gt-

 $summary\ selectors,\ e.g.\ all\_dichotomous(),\ cannot\ be\ used\ with\ this\ argu-$ 

ment.

missing, missing\_text, missing\_stat

Arguments dictating how and if missing values are presented:

- missing: must be one of c("ifany", "no", "always").
- missing\_text: string indicating text shown on missing row. Default is "Unknown".
- missing\_stat: statistic to show on missing row. Default is "{N\_miss}". Possible values are N\_miss, N\_obs, N\_nonmiss, p\_miss, p\_nonmiss.

sort (formula-list-selector)

Specifies sorting to perform for categorical variables. Values must be one of c("alphanumeric", "frequency"). Default is all\_categorical(FALSE)  $\sim$ 

"alphanumeric".

percent (string)

Indicates the type of percentage to return. Must be one of c("column", "row",

"cell"). Default is "column".

In rarer cases, you may need to define/override the typical denominators. In

these cases, pass an integer or a data frame. Refer to the ?cards::ard\_tabulate(denominator)

help file for details.

include (tidy-select)

Variables to include in the summary table. Default is everything().

### Value

```
a 'tbl_reg_summary' object
```

# **Example Output**

# See Also

```
See gtsummary::tbl_summary() help file
See vignette for detailed tutorial
```

```
tbl_reg_summary_ex1 <-
  df_patient_characteristics %>%
  tbl_reg_summary(by = trt, include = c(marker, status))
```

# **Index**

```
* datasets
    {\tt df\_adverse\_events}, {\tt 5}
    df_patient_characteristics, 6
.complete_ae_data, 2
?cards::ard_tabulate(denominator), 18
add_overall.tbl_ae
        (add_overall_tbl_ae), 3
add_overall.tbl_ae_count
        (add_overall_tbl_ae), 3
add_overall.tbl_ae_focus
        (add_overall_tbl_ae), 3
add_overall_tbl_ae, 3
all_ae_cols (selectors), 8
all_cols_in_strata(selectors), 8
all_overall_cols(selectors), 8
all_unknown_cols(selectors), 8
df_adverse_events, 5, 10, 14
df_patient_characteristics, 6, 10, 14
inline_text.tbl_ae
        (inline_text_tbl_ae), 7
inline_text.tbl_ae_count
        (inline_text_tbl_ae), 7
in line\_text.tbl\_ae\_focus
        (inline_text_tbl_ae), 7
inline_text_tbl_ae, 7
selectors, 8
style_xxx, 9
tbl_ae, 10, 13
tbl_ae_count, 12
tbl_ae_focus, 13
tbl_listing, 15
tbl_reg_summary, 17
```