**Preoperative atelectasis in patients with obesity undergoing bariatric surgery: a cross-sectional study**

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**R packages**

All the packages used, and their versions are listed below, except for epiR v.2.0.60 which was used in a prior separate session to estimate the required sample size.

attached base packages:

## [1] splines stats4 stats graphics grDevices utils datasets

## [8] methods base

##

## other attached packages:

## [1] gratia\_0.8.1 gtsummary\_1.7.2 gt\_0.10.0

## [4] VGAM\_1.1-9 ordinal\_2022.11-16 sandwich\_3.0-2

## [7] broom\_1.0.5 lavaan\_0.6-16 dagitty\_0.3-1

## [10] car\_3.1-2 carData\_3.0-5 ggmosaic\_0.3.3

## [13] mgcv\_1.9-0 nlme\_3.1-163 officer\_0.6.3

## [16] flextable\_0.9.4 table1\_1.4.3 plotly\_4.10.3

## [19] sf\_1.0-14 rnaturalearth\_0.3.4 overviewR\_0.0.13

## [22] gridExtra\_2.3 RColorBrewer\_1.1-3 lubridate\_1.9.3

## [25] forcats\_1.0.0 stringr\_1.5.0 dplyr\_1.1.3

## [28] purrr\_1.0.2 readr\_2.1.4 tidyr\_1.3.0

## [31] tibble\_3.2.1 ggplot2\_3.4.4 tidyverse\_2.0.0

## [34] pacman\_0.5.1

A general description of the purposes for which packages were used is as follows (the order reflects the sequence of use during the workflow of analyses and does not reflect the order of importance for this study in any way):

|  |  |
| --- | --- |
| **Package** | **General description of use and reference** |
| epiR | Used to calculate the sample size.   * Stevenson M, Sergeant E, Firestone S (2023). \_epiR: Tools for the Analysis of Epidemiological Data\_. R package version 2.0.60, <https://CRAN.R-project.org/package=epiR>. |
| pacman | R package manager.   * Rinker, T. W. & Kurkiewicz, D. (2017). pacman: Package Management for R. version 0.5.0. Buffalo, New York. http://github.com/trinker/pacman |
| tidyverse | Used for basic data handling and visualization.   * Wickham H, Averick M, Bryan J, Chang W, McGowan LD, François R, Grolemund G, Hayes A, Henry L, Hester J, Kuhn M, Pedersen TL, Miller E, Bache SM, Müller K, Ooms J, Robinson D, Seidel DP, Spinu V, Takahashi K, Vaughan D, Wilke C, Woo K, Yutani H (2019). “Welcome to the tidyverse.” \_Journal of Open Source Software\_, \*4\*(43), 1686. doi:10.21105/joss.01686 <https://doi.org/10.21105/joss.01686>. |
| RColorBrewer | Color palettes for data visualization.   * Neuwirth E (2022). \_RColorBrewer: ColorBrewer Palettes\_. R package version 1.1-3, <https://CRAN.R-project.org/package=RColorBrewer>. |
| gridExtra | Used to arrange multiple ggplots in a grid.   * Auguie B (2017). \_gridExtra: Miscellaneous Functions for "Grid" Graphics\_. R package version 2.3, <https://CRAN.R-project.org/package=gridExtra> |
| overviewR | Used to assess missing data.   * Meyer C, Hammerschmidt D (2023). \_overviewR: Easily Extracting Information About Your Data\_. R package version 0.0.13, <https://CRAN.R-project.org/package=overviewR>. |
| rnaturalearth | Used to extract geographical data to create maps.   * Massicotte P, South A (2023). \_rnaturalearth: World Map Data from Natural Earth\_. R package version 0.3.4, <https://CRAN.R-project.org/package=rnaturalearth>. |
| sf | Used together with the prior package to create map.   * Pebesma, E., & Bivand, R. (2023). Spatial Data Science: With Applications in R. Chapman and Hall/CRC. <https://doi.org/10.1201/9780429459016> * Pebesma, E., 2018. Simple Features for R: Standardized Support for Spatial Vector Data. The R Journal 10 (1), 439-446, https://doi.org/10.32614/RJ-2018-009 |
| plotly | Used together with prior two packages to create map.   * C. Sievert. Interactive Web-Based Data Visualization with R, plotly, and shiny. Chapman and Hall/CRC Florida, 2020. |
| table1 | Used to add labels to variables and to create table of descriptive characteristics of patients.   * Rich B (2023). \_table1: Tables of Descriptive Statistics in HTML\_. R package version 1.4.3, <https://CRAN.R-project.org/package=table1>. |
| flextable | Used to create and export tables.   * Gohel D, Skintzos P (2023). \_flextable: Functions for Tabular Reporting\_. R package version 0.9.4, <https://CRAN.R-project.org/package=flextable>. |
| officer | Used to create and export tables.   * Gohel D (2023). \_officer: Manipulation of Microsoft Word and PowerPoint Documents\_. R package version 0.6.3, <https://CRAN.R-project.org/package=officer>. |
| dagitty | Used in conjunction with https://www.dagitty.net/ to create directed acyclic graph to inform statistical modelling.   * Johannes Textor, Benito van der Zander, Mark K. Gilthorpe, Maciej Liskiewicz, George T.H. Ellison (2016). Robust causal inference using directed acyclic graphs: the R package 'dagitty'. International Journal of Epidemiology 45(6):1887-1894. |
| mgcv | Used to model non-linear relationships with a general additive model.   * Wood, S.N. (2011) Fast stable restricted maximum likelihood and marginal likelihood estimation of semiparametric generalized linear models. Journal of the Royal Statistical Society (B) 73(1):3-36 * Wood S.N., N. Pya and B. Saefken (2016) Smoothing parameter and model selection for general smooth models (with discussion). Journal of the American Statistical Association 111:1548-1575. |
| ggmosaic | Used to create mosaic plots.   * Jeppson H, Hofmann H, Cook D (2021). \_ggmosaic: Mosaic Plots in the 'ggplot2' Framework\_. R package version 0.3.3, <https://CRAN.R-project.org/package=ggmosaic>. |
| car | Used to visualize distribution of continuous variables (stacked Q-Q plots).   * Fox J, Weisberg S (2019). \_An R Companion to Applied Regression\_, Third edition. Sage, Thousand Oaks CA. <https://socialsciences.mcmaster.ca/jfox/Books/Companion/>. |
| simpleboot | Used to calculate mean atelectasis coverage and confidence intervals through bootstrapping.   * Peng RD (2019). \_simpleboot: Simple Bootstrap Routines\_. R package version 1.1-7, <https://CRAN.R-project.org/package=simpleboot>. |
| boot | Used to calculate mean atelectasis coverage and confidence intervals through bootstrapping.   * Angelo Canty and Brian Ripley (2022). boot: Bootstrap R (S-Plus) Functions. R package version 1.3-28.1. * Davison, A. C. & Hinkley, D. V. (1997) Bootstrap Methods and Their Applications. Cambridge University Press, Cambridge. ISBN 0-521-57391-2 |
| lavaan | Used to create correlation matrix to assess conditional independencies.   * Yves Rosseel (2012). lavaan: An R Package for Structural Equation Modeling. Journal of Statistical Software, 48(2), 1-36. https://doi.org/10.18637/jss.v048.i02 |
| broom | Used to exponentiate coefficients of regression models.   * Robinson D, Hayes A, Couch S (2023). \_broom: Convert Statistical Objects into Tidy Tibbles\_. R package version 1.0.5, <https://CRAN.R-project.org/package=broom>. |
| sandwich | Used to calculate robust standard errors for prevalence ratios.   * Zeileis A, Köll S, Graham N (2020). “Various Versatile Variances: An Object-Oriented Implementation of Clustered Covariances in R.” \_Journal of Statistical Software\_, \*95\*(1),1-36. doi:10.18637/jss.v095.i01 <https://doi.org/10.18637/jss.v095.i01>. |
| ordinal | Used to model ordinal outcome (atelectasis percent) and to test proportional odds assumptions.   * Christensen, R. H. B. (2022). ordinal - Regression Models for Ordinal Data. R package version 2022.11-16. <https://CRAN.R-project.org/package=ordinal>. |
| VGAM | Used to model partial proportional odds model.   * Thomas W. Yee (2023). VGAM: Vector Generalized Linear and Additive Models. R package version 1.1-9. URL <https://CRAN.R-project.org/package=VGAM> * Thomas W. Yee and C. J. Wild (1996). Vector Generalized Additive Models. Journal of Royal Statistical Society, Series B, 58(3), 481-493. |
| gt | Used to present a summary of the results of regression models.   * Iannone R, Cheng J, Schloerke B, Hughes E, Lauer A, Seo J (2023). \_gt: Easily Create Presentation-Ready Display Tables\_. R package version 0.10.0, <https://CRAN.R-project.org/package=gt>. |
| gtsummary | Used to create table to summarize regression models.   * Sjoberg DD, Whiting K, Curry M, Lavery JA, Larmarange J. Reproducible summary tables with the gtsummary package. The R Journal 2021;13:570–80. <https://doi.org/10.32614/RJ-2021-053>. |
| gratia | Used together with gglopt2 to create smooth partial effects plot from gam models.   * Simpson G (2023). \_gratia: Graceful ggplot-Based Graphics and Other Functions for GAMs Fitted using mgcv\_. R package version 0.8.1, <https://gavinsimpson.github.io/gratia/>. |