

Package ‘epicR’

March 10, 2026

Title Evaluation Platform in Chronic Obstructive Pulmonary Disease

Version 1.0.0

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Description Evaluation Platform in Chronic Obstructive Pulmonary Disease (EPIC) is a Discrete Event Simulation (DES) model that simulates health outcomes of patients with Chronic Obstructive Pulmonary Disease (COPD) based on demographics and individual-level risk factors, based on the model published in Sadatsafavi et al. (2019) <[doi:10.1177/0272989X18824098](https://doi.org/10.1177/0272989X18824098)>.

Depends R (>= 4.1.0)

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Encoding UTF-8

Imports Rcpp (>= 1.0.0), graphics, stats, tools, ggplot2 (>= 4.0.0),
ggthemes, sqldf, jsonlite, readr, reshape2, scales, tidyr,
tibble, dplyr

LinkingTo Rcpp, RcppArmadillo

RoxygenNote 7.3.3

Suggests testthat (>= 3.0.0), openxlsx, survival, survminer, knitr,
rmarkdown

Config/testthat/edition 3

Config/build/no-staged-install TRUE

VignetteBuilder knitr, rmarkdown

NeedsCompilation yes

Repository CRAN

Date/Publication 2026-03-10 09:40:33 UTC

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epicR-package	epicR <i>package</i>
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Description

Evaluation Platform in COPD (EPIC) R Package

Details

See the README on [GitHub](#)

Author(s)

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`calc_event_stack_size` *Calculate recommended event_stack_size for a given number of agents*

Description

Calculate recommended event_stack_size for a given number of agents

Usage

```
calc_event_stack_size(n_agents, time_horizon = 20)
```

Arguments

`n_agents` number of agents to simulate
`time_horizon` simulation time horizon in years (default 20)

Value

recommended event_stack_size

`calibrate_COPD_inc` *Solves stochastically for COPD incidence rate equation.*

Description

Solves stochastically for COPD incidence rate equation.

Usage

```
calibrate_COPD_inc(  
  nIterations = 100,  
  nPatients = 1e+05,  
  time_horizon = 20,  
  output_dir = tempdir()  
)
```

Arguments

`nIterations` number of iterations for the numerical solution
`nPatients` number of simulated agents.
`time_horizon` in years
`output_dir` directory for output CSV files (default: tempdir())

Value

regression co-efficients as files

calibrate_explicit_mortality
Calibrates explicit mortality

Description

Calibrates explicit mortality

Usage

```
calibrate_explicit_mortality(n_sim = 10^8)
```

Arguments

n_sim number of agents

Value

difference in mortality rates and life table

calibrate_explicit_mortality2
Calibrates explicit mortality by Amin

Description

Calibrates explicit mortality by Amin

Usage

```
calibrate_explicit_mortality2(n_sim = 10^7)
```

Arguments

n_sim number of agents

Value

difference in mortality rates and life table

calibrate_smoking	<i>Calibrates smoking</i>
-------------------	---------------------------

Description

Calibrates smoking

Usage

calibrate_smoking()

Value

TODO

copy_configs_to_user	<i>Copy default configs to user directory</i>
----------------------	---

Description

Copy default configs to user directory

Usage

copy_configs_to_user(overwrite = FALSE)

Arguments

overwrite	Whether to overwrite existing user configs (default FALSE)
-----------	--

Value

TRUE if successful, FALSE otherwise

Description

The epicR package now supports user-customizable configuration files. When the package is loaded for the first time, configuration files are automatically copied to a user-specific directory following CRAN policy. You can modify these files to customize model parameters for your specific region or research needs.

Configuration Directory

User configuration files are stored in a platform-specific location determined by `tools::R_user_dir("epicR", "config")`. Use `get_user_config_dir()` to find the exact path on your system.

Available Functions

- `get_user_config_dir`: Get the path to user config directory
- `user_config_exists`: Check if a user config exists
- `copy_configs_to_user`: Copy default configs to user directory
- `reset_user_configs`: Reset configs to package defaults
- `list_available_jurisdictions`: List available config jurisdictions
- `validate_config`: Validate a configuration file

Usage

The package automatically uses user configs if they exist. When you call `get_input()`, it will:

1. First check for user config files in the user config directory
2. If found, use the user's customized configuration
3. If not found, fall back to package default configurations

Customizing Configurations

To customize configurations for your region:

1. The config files are automatically copied on first package load
2. Edit the JSON files (e.g., `'config_canada.json'`, `'config_us.json'`)
3. Save your changes
4. The next time you use `get_input()`, your changes will be used

Adding New Jurisdictions

To add a new jurisdiction:

1. Copy an existing config file (e.g., 'config_canada.json')
2. Rename it to 'config_yourcountry.json'
3. Update the "jurisdiction" field in the JSON to match
4. Modify all parameters as needed for your region
5. Use with: `get_input(jurisdiction = "yourcountry")`

Resetting to Defaults

If you need to reset your configurations:

- Reset all configs: `reset_user_configs()`
- Reset specific jurisdiction: `reset_user_configs("canada")`

Examples

```
# Check where user configs are stored
get_user_config_dir()

# List available jurisdictions
list_available_jurisdictions()

# Validate your custom config
validate_config("canada", user = TRUE)

# Reset to package defaults if needed
reset_user_configs("canada")

# Use your custom config
input <- get_input(jurisdiction = "canada")
```

```
estimate_memory_required
```

Estimate memory required for simulation

Description

Estimate memory required for simulation

Usage

```
estimate_memory_required(n_agents, record_mode = 0, time_horizon = 20)
```

Arguments

n_agents	number of agents
record_mode	recording mode (0=none, 1=agent, 2=event, 3=some_event)
time_horizon	simulation time horizon in years

Value

estimated memory in bytes

export_figures	<i>Runs the model and exports an excel file with all output data</i>
----------------	--

Description

Runs the model and exports an excel file with all output data

Usage

```
export_figures(nPatients = 10000)
```

Arguments

nPatients	number of agents
-----------	------------------

Value

an excel file with all output

express_matrix	<i>Express matrix.</i>
----------------	------------------------

Description

Takes a named matrix and writes the R code to populate it; useful for generating input expressions from calibration results.

Usage

```
express_matrix(mtx)
```

Arguments

mtx	a matrix
-----	----------

Value

Invisibly returns the generated R code as a character string, also outputs via message().

<code>get_agent_events</code>	<i>Returns all events of an agent.</i>
-------------------------------	--

Description

- Returns all events of an agent.
- Returns events specific to an agent.

Usage

```
get_agent_events(id)

get_agent_events(id)
```

Arguments

- | | |
|-----------------|--------------|
| <code>id</code> | Agent number |
|-----------------|--------------|

Value

- all events of agent `id`
- dataframe consisting all events specific to agent `id`

<code>get_agent_size_bytes</code>	<i>Returns the size of agent struct in bytes</i>
-----------------------------------	--

Description

- Returns the size of agent struct in bytes
- Get size of agent struct in bytes (from C code)

Usage

```
get_agent_size_bytes()

get_agent_size_bytes()
```

Value

- size of agent struct in bytes
- size in bytes

get_all_events	Returns all events.
----------------	---------------------

Description

Returns all events.

Returns all events.

Usage

```
get_all_events()
```

```
get_all_events()
```

Value

all events

dataframe consisting all events.

get_all_events_matrix	Returns a matrix containing all events
-----------------------	--

Description

Returns a matrix containing all events

Usage

```
get_all_events_matrix()
```

Value

a matrix containing all events

get_available_memory	<i>Get available system memory (platform-specific)</i>
Description	
Get available system memory (platform-specific)	
Usage	
get_available_memory()	
Value	
available memory in bytes	
get_default_settings	<i>Exports default settings</i>
Description	
Exports default settings	
Usage	
get_default_settings()	
Value	
default settings	
get_errors	<i>Returns errors</i>
Description	
Returns errors	
Usage	
get_errors()	
Value	
a text with description of error messages	

get_event	Returns the events stack.
-----------	---------------------------

Description

Returns the events stack.

Usage

get_event(i)

Arguments

i number of event

Value

events

get_events_by_type	Returns all events of a certain type.
--------------------	---------------------------------------

Description

Returns all events of a certain type.

Returns certain events by type

Usage

get_events_by_type(event_type)

get_events_by_type(event_type)

Arguments

event_type event_type number

Value

all events of the type event_type

dataframe consisting all events of the type event_type

get_input	Returns a list of default model input values
-----------	--

Description

Returns a list of default model input values

Usage

```
get_input(  
    age0 = 40,  
    time_horizon = 20,  
    discount_cost = 0,  
    discount_qaly = 0.03,  
    closed_cohort = 0,  
    jurisdiction = "canada"  
)
```

Arguments

age0	Starting age in the model
time_horizon	Model time horizon
discount_cost	Discounting for cost outcomes
discount_qaly	Discounting for QALY outcomes
closed_cohort	Whether the model should run as closed_cohort, open-population by default.
jurisdiction	Jurisdiction for model parameters ("canada" or "us")

Value

A list with four components:

values A nested list of model input parameter values

help A nested list of help text descriptions for each parameter

ref A nested list of reference information for each parameter

config The raw configuration object loaded from the JSON file

get_inputs	<i>Returns inputs</i>
------------	-----------------------

Description

Returns inputs

Usage

```
get_inputs()
```

Value

all inputs

get_list_elements	<i>Get list elements</i>
-------------------	--------------------------

Description

Recursively extracts element names from a nested list structure.

Usage

```
get_list_elements(ls, running_name = "")
```

Arguments

ls	A list to extract element names from
running_name	Internal parameter for recursion (default: "")

Value

A character vector of element names, with nested elements separated by "\$" (e.g., "parent\$child\$grandchild").

get_n_events	Returns total number of events.
--------------	---------------------------------

Description

Returns total number of events.

Usage

get_n_events()

Value

number of events

get_output	Main outputs of the current run.
------------	----------------------------------

Description

Main outputs of the current run.

Usage

get_output()

Value

number of agents, cumulative time, number of deaths, number of COPD cases, as well as exacerbation statistics and QALYs.

get_output_ex	Extra outputs from the model
---------------	------------------------------

Description

Extra outputs from the model

Usage

get_output_ex()

Value

Extra outputs from the model.

get_progress	Returns current simulation progress.
--------------	--------------------------------------

Description

Returns current simulation progress.

Usage

```
get_progress()
```

Value

Number of agents processed so far (last_id).

get_runtime_stats	Returns run time stats.
-------------------	-------------------------

Description

Returns run time stats.

Usage

```
get_runtime_stats()
```

Value

agent size as well as memory and random variable fill stats.

get_sample_output	Returns a sample output for a given year and gender.
-------------------	--

Description

Returns a sample output for a given year and gender.

Usage

```
get_sample_output(year, sex)
```

Arguments

year	a number
sex	a number, 0 for male and 1 for female

Value

that specific output

<code>get_settings</code>	<i>Returns current settings.</i>
---------------------------	----------------------------------

Description

Returns current settings.

Usage

`get_settings()`

Value

current settings.

<code>get_smith</code>	<i>Returns agent Smith.</i>
------------------------	-----------------------------

Description

Returns agent Smith.

Usage

`get_smith()`

Value

agent smith.

<code>get_user_config_dir</code>	<i>Get user config directory path</i>
----------------------------------	---------------------------------------

Description

Returns the path to the user configuration directory following CRAN policy using `tools::R_user_dir()`.

Usage

`get_user_config_dir()`

Value

Path to user config directory

init_session	<i>Initializes a model. Allocates memory to the C engine.</i>
--------------	---

Description

Initializes a model. Allocates memory to the C engine.

Usage

```
init_session(settings = get_default_settings(), jurisdiction = "canada")
```

Arguments

settings	customized settings.
jurisdiction	The jurisdiction for which to load input parameters (default: "canada").

Value

0 if successful.

list_available_jurisdictions	<i>List available config jurisdictions</i>
------------------------------	--

Description

List available config jurisdictions

Usage

```
list_available_jurisdictions()
```

Value

Character vector of available jurisdictions

mvrnormArma

Samples from a multivariate normal

Description

Samples from a multivariate normal

Usage

```
mvrnormArma(n, mu, sigma)
```

Arguments

n	number of samples to be taken
mu	the mean
sigma	the covariance matrix

Value

the multivariate normal sample

report_COPD_by_ctime *Reports COPD related stats.*

Description

Reports COPD related stats.

Usage

```
report_COPD_by_ctime(n_sim = 10^6)
```

Arguments

n_sim	number of simulated agents.
-------	-----------------------------

Value

COPD-related stats

report_exacerbation_by_time	<i>Reports exacerbation-related stats.</i>
-----------------------------	--

Description

Reports exacerbation-related stats.

Usage

```
report_exacerbation_by_time(n_sim = 10^5)
```

Arguments

n_sim	number of simulated agents.
-------	-----------------------------

Value

exacerbation-related stats

reset_model_input	<i>Reset the cached model input</i>
-------------------	-------------------------------------

Description

Forces the default model_input to be reloaded on next access. Useful after modifying config files.

Usage

```
reset_model_input()
```

Value

No return value, called for side effects (clears the model input cache).

reset_user_configs	<i>Reset user configs to package defaults</i>
--------------------	---

Description

Reset user configs to package defaults

Usage

```
reset_user_configs(jurisdiction = NULL)
```

Arguments

jurisdiction Specific jurisdiction to reset, or NULL for all (default NULL)

Value

TRUE if successful, FALSE otherwise

resume	<i>Resumes running of model.</i>
--------	----------------------------------

Description

Resumes running of model.

Usage

```
resume(max_n_agents = NULL)
```

Arguments

max_n_agents maximum number of agents

Value

0 if successful.

sanity_check	<i>Basic tests of model functionality. Serious issues if the test does not pass.</i>
--------------	--

Description

Basic tests of model functionality. Serious issues if the test does not pass.

Usage

```
sanity_check()
```

Value

tests results

sanity_COPD	<i>Basic COPD test.</i>
-------------	-------------------------

Description

Basic COPD test.

Usage

```
sanity_COPD()
```

Value

validation test results

set_input_var	<i>Sets input variables.</i>
---------------	------------------------------

Description

Sets input variables.

Usage

```
set_input_var(name, value)
```

Arguments

name	a string
value	a number

Value

0 if successful

set_settings_var	<i>Sets model settings.</i>
------------------	-----------------------------

Description

Sets model settings.

Usage

```
set_settings_var(name, value)
```

Arguments

name	a name
value	a value

Value

0 if successful.

simulate	<i>Convenience function: run simulation and return results</i>
----------	--

Description

This is a simplified interface that handles session management automatically and returns the results directly. Ideal for most users. Progress information is displayed including: configuration summary, a real-time progress bar showing percentage completion (10

Usage

```
simulate(
  input = NULL,
  settings = NULL,
  jurisdiction = "canada",
  time_horizon = NULL,
  n_agents = NULL,
  extended_results = TRUE,
  return_events = FALSE,
  seed = NULL
)
```

Arguments

input	customized input criteria (optional)
settings	customized settings (optional)
jurisdiction	Jurisdiction for model parameters ("canada" or "us")
time_horizon	Model time horizon in years (default: uses config file value)
n_agents	Number of agents to simulate (default: 60,000)
extended_results	whether to return extended results in addition to basic (default: TRUE)
return_events	whether to return event matrix (default: FALSE). If TRUE, automatically sets record_mode=2
seed	Random seed for reproducibility (optional). If provided, ensures identical results across runs

Value

list with simulation results (always includes 'basic', includes 'extended' by default, optionally 'events')

Examples

```
# Simplest usage - includes both basic and extended results
results <- simulate()
print(results$basic)
print(results$extended)

# With custom parameters
results <- simulate(jurisdiction = "us", time_horizon = 10, n_agents = 100000)

# Quick test with fewer agents
results <- simulate(n_agents = 10000)

# Basic output only (faster, less memory)
results <- simulate(extended_results = FALSE)
print(results$basic)
```

```
# With event history
results <- simulate(return_events = TRUE)
print(results$events) # Event matrix

# With reproducible results
results1 <- simulate(seed = 123)
results2 <- simulate(seed = 123)
# results1 and results2 will be identical
```

terminate_session	<i>Terminates a session and releases allocated memory.</i>
-------------------	--

Description

Terminates a session and releases allocated memory.

Usage

```
terminate_session()
```

Value

0 if successful.

test_case_detection	<i>Returns results of Case Detection strategies</i>
---------------------	---

Description

Returns results of Case Detection strategies

Usage

```
test_case_detection(
  n_sim = 10000,
  p_of_CD = 0.1,
  min_age = 40,
  min_pack_years = 0,
  only_smokers = 0,
  CD_method = "CDQ195"
)
```

Arguments

n_sim	number of agents
p_of_CD	probability of receiving case detection given that an agent meets the selection criteria
min_age	minimum age that can receive case detection
min_pack_years	minimum pack years that can receive case detection
only_smokers	set to 1 if only smokers should receive case detection
CD_method	Choose one case detection method: CDQ195", "CDQ165", "FlowMeter", "FlowMeter_CDQ"

Value

results of case detection strategy compared to no case detection

user_config_exists	<i>Check if user config exists</i>
--------------------	------------------------------------

Description

Check if user config exists

Usage

```
user_config_exists(jurisdiction = "canada")
```

Arguments

jurisdiction	Jurisdiction name (e.g., "canada", "us")
--------------	--

Value

TRUE if user config exists, FALSE otherwise

validate_config	<i>Validate a config file</i>
-----------------	-------------------------------

Description

Validate a config file

Usage

```
validate_config(jurisdiction = "canada", user = TRUE)
```

Arguments

jurisdiction	Jurisdiction to validate
user	Whether to validate user config (TRUE) or package config (FALSE)

Value

TRUE if valid, FALSE otherwise (with warnings about issues)

validate_COPD	<i>Returns results of validation tests for COPD</i>
---------------	---

Description

This function runs validation tests for COPD model outputs. It estimates the baseline prevalence and incidence of COPD, along with sex-specific baseline COPD prevalence. Additionally, it calculates the baseline prevalence of COPD by age groups and smoking pack-years. It also estimates the coefficients for the relationships between age, pack-years, smoking status, and the prevalence of COPD.

Usage

```
validate_COPD(incident_COPD_k = 1, return_CI = FALSE, jurisdiction = "canada")
```

Arguments

incident_COPD_k	a number (default=1) by which the incidence rate of COPD will be multiplied.
return_CI	if TRUE, returns 95 percent confidence intervals for the "Year" coefficient
jurisdiction	character string specifying the jurisdiction for validation ("canada" or "us"). Default is "canada".

Value

For Canada: list with validation test results. For US: data frame with COPD prevalence by age group over time.

validate_diagnosis	Returns results of validation tests for diagnosis
--------------------	---

Description

This function returns a table showing the proportion of COPD patients diagnosed over the model's runtime. It also provides a second table that breaks down the proportion of diagnosed patients by COPD severity. Additionally, the function generates a plot to visualize the distribution of diagnoses over time.

Usage

```
validate_diagnosis(n_sim = 10000, jurisdiction = "canada")
```

Arguments

n_sim	number of agents
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

validate_exacerbation	Returns results of validation tests for exacerbation rates
-----------------------	--

Description

This function runs validation tests for COPD exacerbation rates by GOLD stage and compares them with reference values from studies such as CanCOLD, CIHI, and Hoogendoorn. It simulates exacerbation events, and returns key metrics, including overall exacerbation rates, rates by GOLD stage, and rates in diagnosed vs. undiagnosed patients.

Usage

```
validate_exacerbation(  
  base_agents = 10000,  
  input = NULL,  
  jurisdiction = "canada"  
)
```

Arguments

base_agents	Number of agents in the simulation. Default is 1e4.
input	EPIC inputs
jurisdiction	character string specifying the jurisdiction for validation ("canada" or "us"). Default is "canada".

Value

For Canada: validation test results (invisible). For US: invisible NULL (results displayed via messages and plots).

validate_gpvisits	<i>Returns results of validation tests for GP visits</i>
-------------------	--

Description

This function returns Average number of GP visits by sex, COPD severity and COPD diagnosis status along with their plots.

Usage

```
validate_gpvisits(n_sim = 10000, jurisdiction = "canada")
```

Arguments

n_sim	number of agents
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

validate_lung_function	<i>Returns results of validation tests for lung function</i>
------------------------	--

Description

This function evaluates FEV1 (Forced Expiratory Volume in 1 second) values and GOLD stage distributions to assess lung function in simulated patients.

Usage

```
validate_lung_function(jurisdiction = "canada")
```

Arguments

jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"
--------------	--

Value

validation test results

validate_medication	Returns results of validation tests for medication module.
---------------------	--

Description

This function returns plots showing medication usage over time

Usage

```
validate_medication(n_sim = 50000, jurisdiction = "canada")
```

Arguments

n_sim	number of agents
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results for medication

validate_mortality	Returns results of validation tests for mortality rate
--------------------	--

Description

This function returns a table and a plot of the difference between simulated and expected (life table) mortality, by sex and age.

Usage

```
validate_mortality(  
  n_sim = 5e+05,  
  bgd = 1,  
  bgd_h = 1,  
  manual = 1,  
  exacerbation = 1,  
  jurisdiction = "canada"  
)
```

Arguments

n_sim	number of simulated agents
bgd	a number
bgd_h	a number
manual	a number
exacerbation	a number
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

validate_overdiagnosis

Returns results of validation tests for overdiagnosis

Description

This function returns the proportion of non-COPD subjects overdiagnosed over model time.

Usage

```
validate_overdiagnosis(n_sim = 10000, jurisdiction = "canada")
```

Arguments

n_sim	number of agents
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

validate_payoffs

Returns results of validation tests for payoffs, costs and QALYs

Description

Returns results of validation tests for payoffs, costs and QALYs

Usage

```
validate_payoffs(
  nPatient = 1e+06,
  disableDiscounting = TRUE,
  disableExacMortality = TRUE,
  jurisdiction = "canada"
)
```

Arguments

nPatient	number of simulated patients. Default is 1e6.
disableDiscounting	if TRUE, discounting will be disabled for cost and QALY calculations. Default: TRUE
disableExacMortality	if TRUE, mortality due to exacerbations will be disabled for cost and QALY calculations. Default: TRUE
jurisdiction	character string specifying the jurisdiction for validation ("canada" or "us"). Default is "canada". Currently only "canada" is implemented.

Value

validation test results

validate_population	<i>Returns simulated vs. predicted population table and a plot</i>
---------------------	--

Description

Returns simulated vs. predicted population table and a plot

Usage

```
validate_population(
  remove_COPD = 0,
  incidence_k = 1,
  savePlots = 0,
  jurisdiction = "canada"
)
```

Arguments

remove_COPD	0 or 1, indicating whether COPD-caused mortality should be removed
incidence_k	a number (default=1) by which the incidence rate of population will be multiplied.
savePlots	0 or 1, exports 300 DPI population growth and pyramid plots comparing simulated vs. predicted population
jurisdiction	character string specifying the jurisdiction for validation ("canada" or "us"). Default is "canada".

Value

For Canada: returns a table showing predicted (StatsCan) and simulated population values. For US: returns a data frame with population comparisons by age group and year.

validate_smoking	<i>Returns results of validation tests for smoking module.</i>
------------------	--

Description

It compares simulated smoking prevalence and trends against observed data to assess the model's accuracy.

Usage

```
validate_smoking(remove_COPD = 1, intercept_k = NULL, jurisdiction = "canada")
```

Arguments

remove_COPD	0 or 1. whether to remove COPD-related mortality.
intercept_k	a number
jurisdiction	character string specifying the jurisdiction for validation ("canada" or "us"). Default is "canada".

Value

For Canada: validation test results (invisible). For US: data frame with smoking status rates by year.

validate_survival	<i>Returns the Kaplan Meier curve comparing COPD and non-COPD</i>
-------------------	---

Description

Returns the Kaplan Meier curve comparing COPD and non-COPD

Usage

```
validate_survival(
  savePlots = FALSE,
  base_agents = 10000,
  jurisdiction = "canada"
)
```

Arguments

savePlots	TRUE or FALSE (default), exports 300 DPI population growth and pyramid plots comparing simulated vs. predicted population
base_agents	Number of agents in the simulation. Default is 1e4.
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

validate_symptoms	<i>Returns results of validation tests for Symptoms</i>
-------------------	---

Description

This function plots the prevalence of cough, dyspnea, phlegm and wheeze over time and by GOLD stage.

Usage

```
validate_symptoms(n_sim = 10000, jurisdiction = "canada")
```

Arguments

n_sim	number of agents
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

validate_treatment	<i>Returns results of validation tests for Treatment</i>
--------------------	--

Description

This function runs validation tests to examine how treatment initiated at diagnosis influences exacerbation rates in COPD patients. It compares exacerbation rates between diagnosed and undiagnosed patients and assesses the impact of treatment.

Usage

```
validate_treatment(n_sim = 10000, jurisdiction = "canada")
```

Arguments

n_sim	number of agents
jurisdiction	character string specifying the jurisdiction ("canada" or "us"). Default is "canada"

Value

validation test results

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