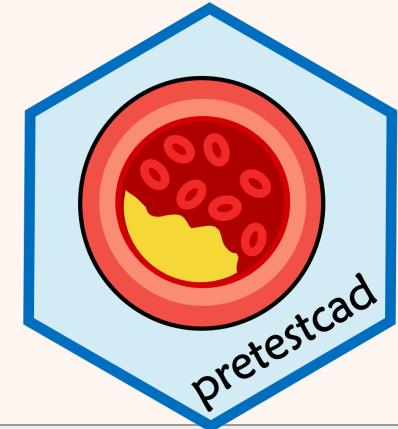


pretestcad

An R package for Pretest Probability
for Coronary Artery Disease



Jeremy Selva 

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<https://jeremy-selva.netlify.app> 

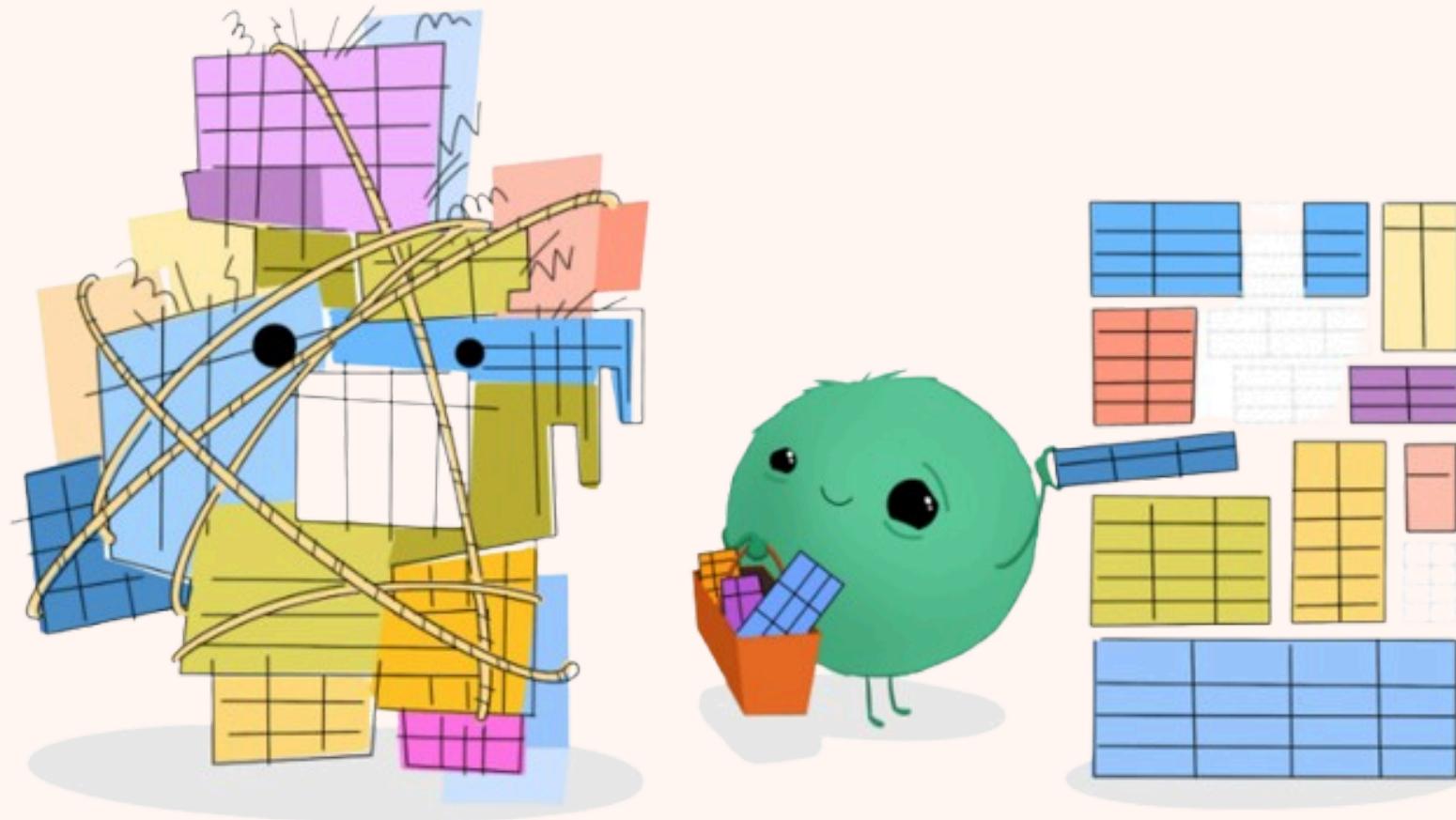
For [R/Medicine 2025](#) 

13 June 2025



whoami

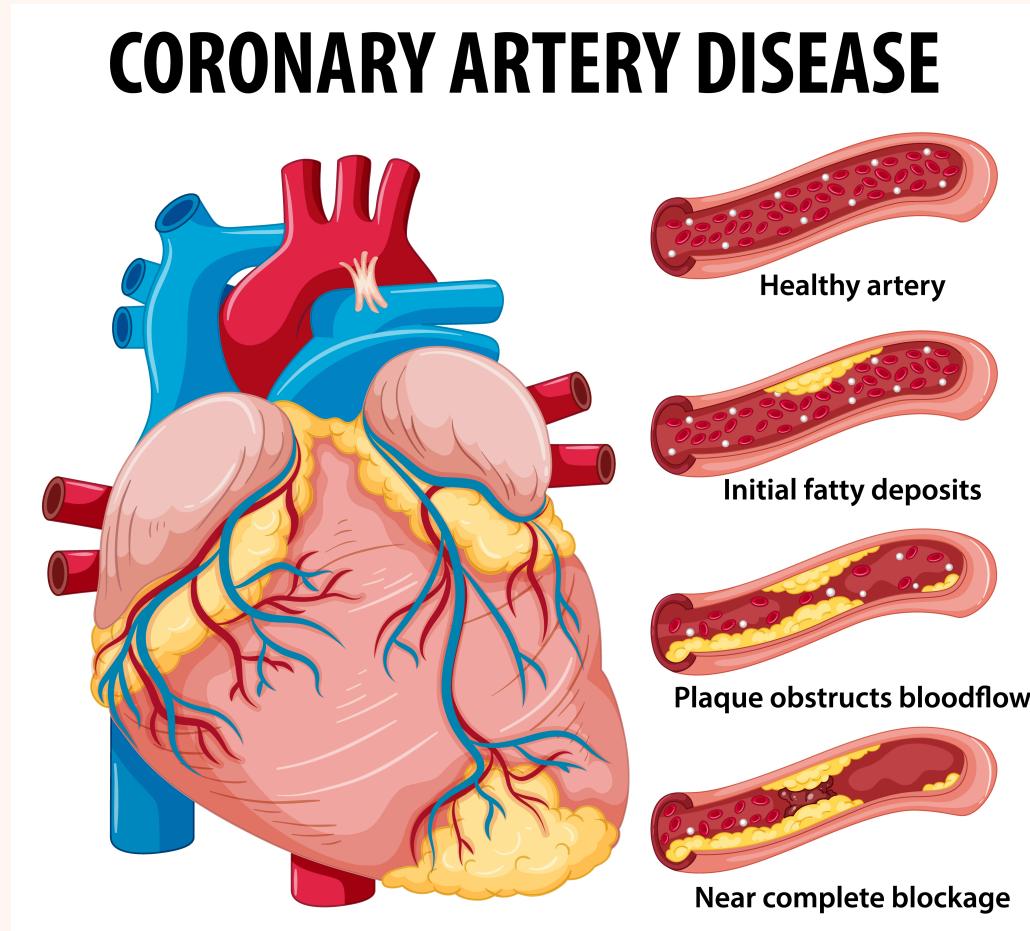
Research Officer from [National Heart Centre Singapore](#) who collects, cleans and harmonises clinical data.



Taming the Data Beast from “[Cleaning Medical Data with R](#)” workshop by Shannon Pileggi, Crystal Lewis and Peter Higgins presented at R/Medicine 2023. Illustrated by [Allison Horst](#).

What is Coronary Artery Disease (CAD) ?

Coronary Artery Disease (CAD) happens when the coronary arteries from the heart become narrow or blocked by fatty deposits called plaque. This can lead to chest pain, shortness of breath or even heart attack.

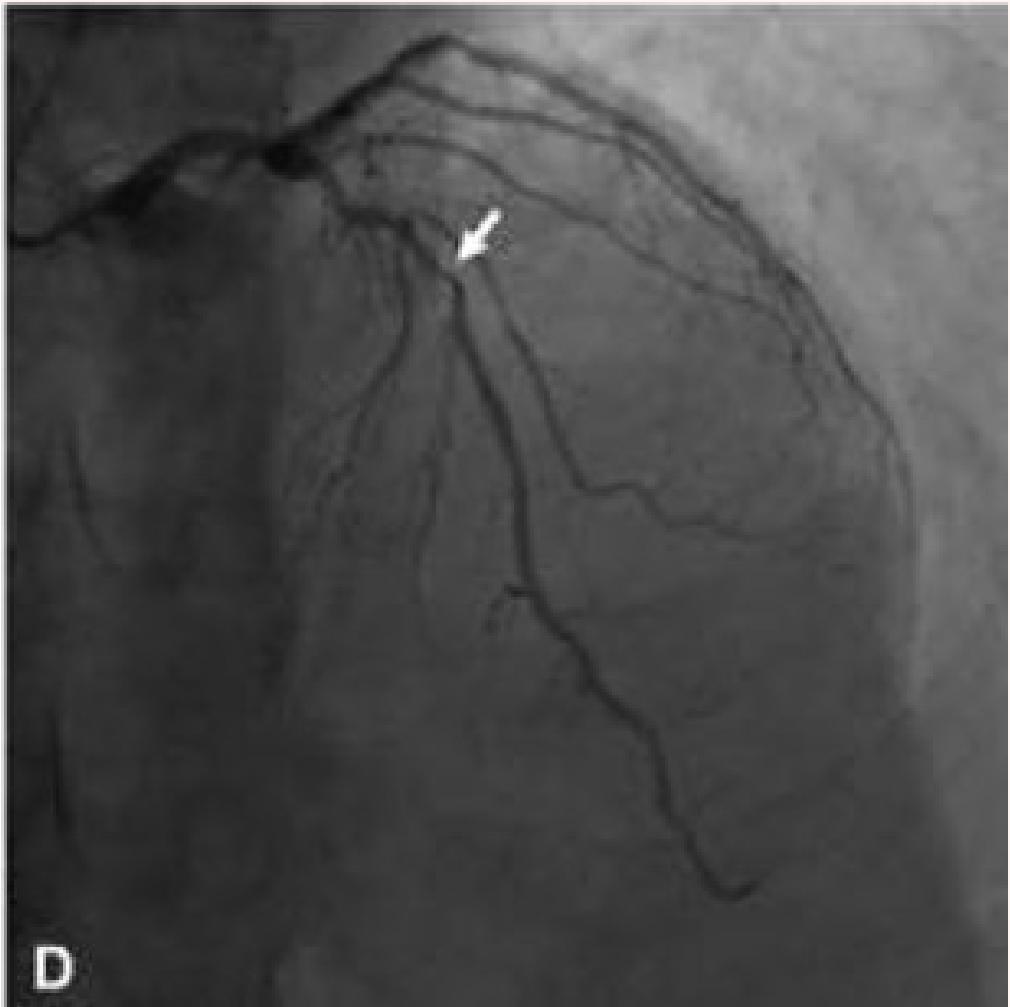


Coronary Artery Disease for health education Infographic designed by [brgfx](#) from [Freepik](#).

What is Coronary Artery Disease (CAD) ?

Diagnosis of CAD includes invasive coronary angiography (right), or computerized tomography coronary angiogram (left).

Early detection and treatment of CAD can help improve the patient's outcome.

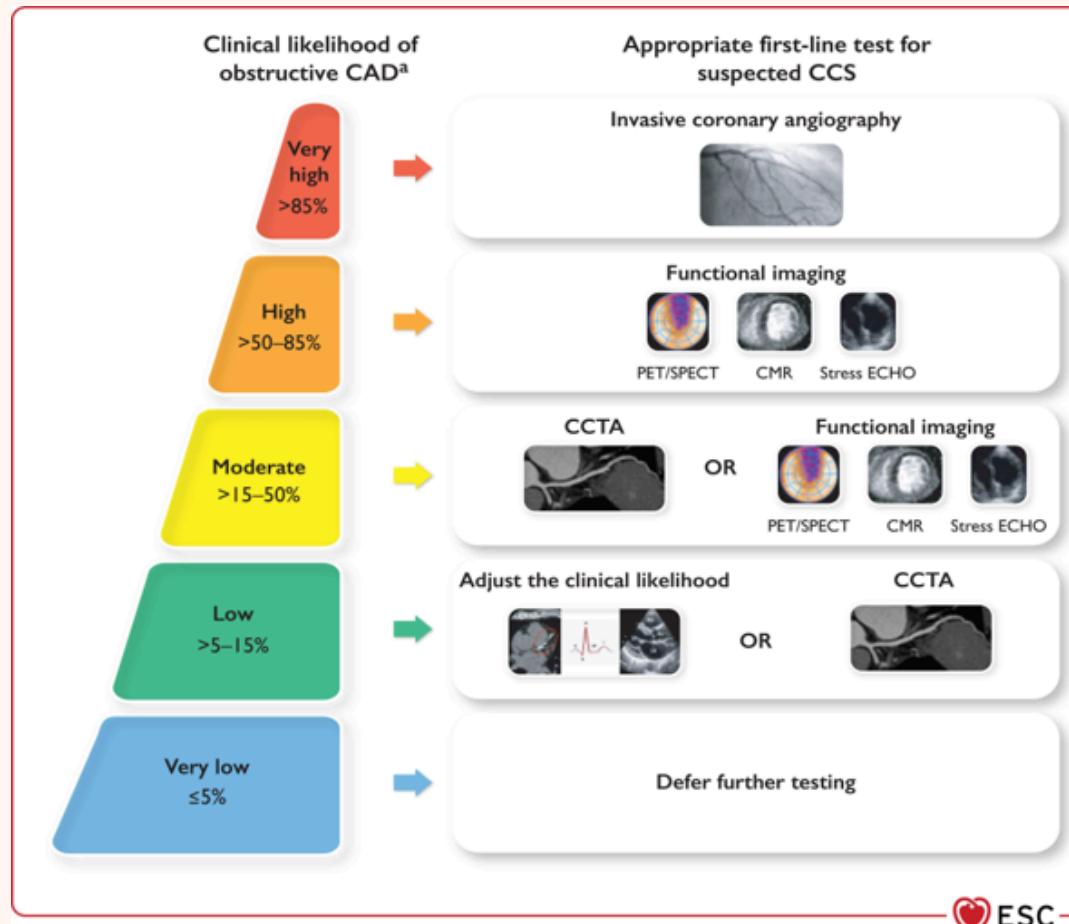


Images from Latina et al. *Radiology: Cardiothoracic Imaging* 2021; 3(4):e210053 doi: [10.1148/ryct.2021210053](https://doi.org/10.1148/ryct.2021210053).

What is Pretest Probability ?

Pretest probability is the estimated probability, given a set of risk factors, that a patient has a specific disease or condition before any diagnostic tests are performed.

It helps clinicians and doctors makes informed decision on which patients go for diagnostic tests, especially if the diagnostic test is expensive, invasive or time consuming to the patient.



Pretest Probability Calculation

Pretest probability of CAD may be presented in the form of a table or an online calculator where we calculate the probability for each patients.

Age	Chest pain						Dyspnea	
	Typical		Atypical		Non-anginal		Men	Women
	Men	Women	Men	Women	Men	Women		
30-39	3 %	5 %	4 %	3 %	1 %	1 %	0 %	3 %
40-49	22 %	10 %	10 %	6 %	3 %	2 %	12 %	3 %
50-59	32 %	13 %	17 %	6 %	11 %	3 %	20 %	9 %
60-69	44 %	16 %	26 %	11 %	22 %	6 %	27 %	14 %
70+	52 %	27 %	34 %	19 %	24 %	10 %	32 %	12 %

Table from Knuuti et al. *Herz* 2020; 45:409-420 doi:

[10.1007/s00059-020-04935-x](https://doi.org/10.1007/s00059-020-04935-x).

The screenshot shows the Calculate by QxMD interface. The top navigation bar includes a logo, the word "Calculate" followed by "by QxMD", and a menu icon. Below the header, there's a blue navigation bar with "All Calculators" and a back arrow icon. The main content area has tabs for "Calculator" (which is active), "About", and "References". A section titled "Pre-test probability of CAD (CAD consortium)" features a star icon, a share icon, and a brief description: "Determine pre-test probability of coronary artery disease in patients with chest pain."

Online [calculator](#) from CAD Consortium.

Motivation

Tables are getting more complicated as more risk factors are used to calculate.

ESC 2019 Guidelines

Age	Chest pain				Dyspnea	
	Typical		Atypical		Non-anginal	
	Men	Women	Men	Women	Men	Women
30-39	3 %	5 %	4 %	3 %	1 %	1 %
40-49	22 %	10 %	10 %	6 %	3 %	2 %
50-59	32 %	13 %	17 %	6 %	11 %	3 %
60-69	44 %	16 %	26 %	11 %	22 %	6 %
70+	52 %	27 %	34 %	19 %	24 %	10 %

ESC 2024 Guidelines

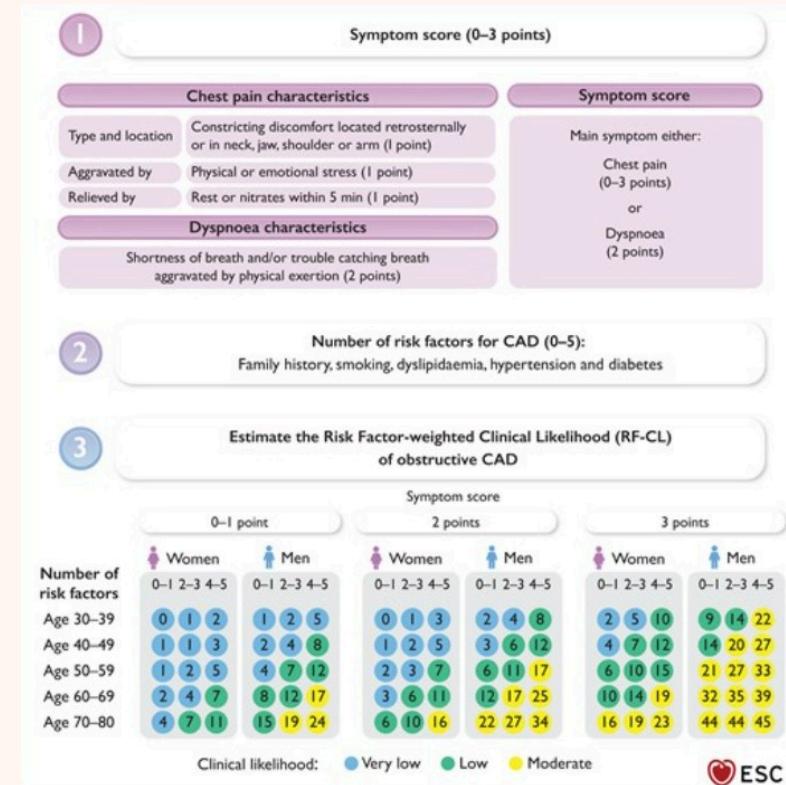


Table from Knuuti et al. *Herz* 2020; 45:409–420 doi: [10.1007/s00059-020-04935-x](https://doi.org/10.1007/s00059-020-04935-x).

Workflow from Vrints et al. *European Heart journal* 2024; 45(36):3415–3537 doi: [10.1093/eurheartj/ehae177](https://doi.org/10.1093/eurheartj/ehae177).

Motivation

As pretest models changes with time, it becomes tedious to calculate and update pretest probability one patient at a time.



Burntout girl by [Freepik](#).

Crowd of people wearing face masks designed by [Freepik](#).

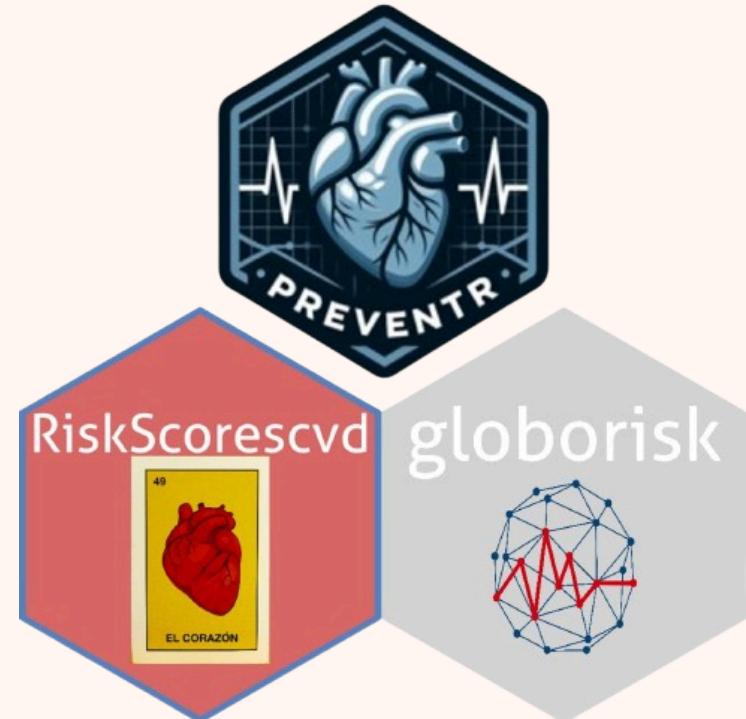
Motivation

There are many R packages for calculating risk for cardiovascular disease (CVD).

Why not create one for CAD ?



Motivated guy ready to start work by [Fleepik](#).



R packages [preventr](#), [RiskScorecvd](#) and [globorisk](#) to calculate risk of CVD.

pretestcad

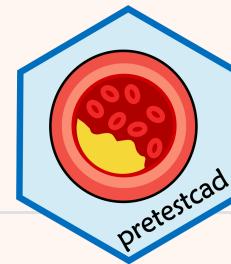
<https://jauntyjjs.github.io/pretestcad/>

pretestcad 1.0.2 Reference Changelog

Search for



pretestcad



R package used to calculate different **PreTest Probability** (PTP) scores for obstructive **Coronary Artery Disease** (CAD).

As diagnosis of CAD involves a costly and invasive coronary angiography procedure for patients, having a reliable PTP for CAD helps doctors to make better decisions during patient management. This ensures high risk patients can be diagnosed and treated early for CAD while avoiding unnecessary testing for low-risk patients.

Table of Content

- [Installation](#)
- [Currently available pretest probability scores](#)

Links

[View on CRAN](#)

[Browse source code](#)

[Report a bug](#)

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Citation

[Citing pretestcad](#)

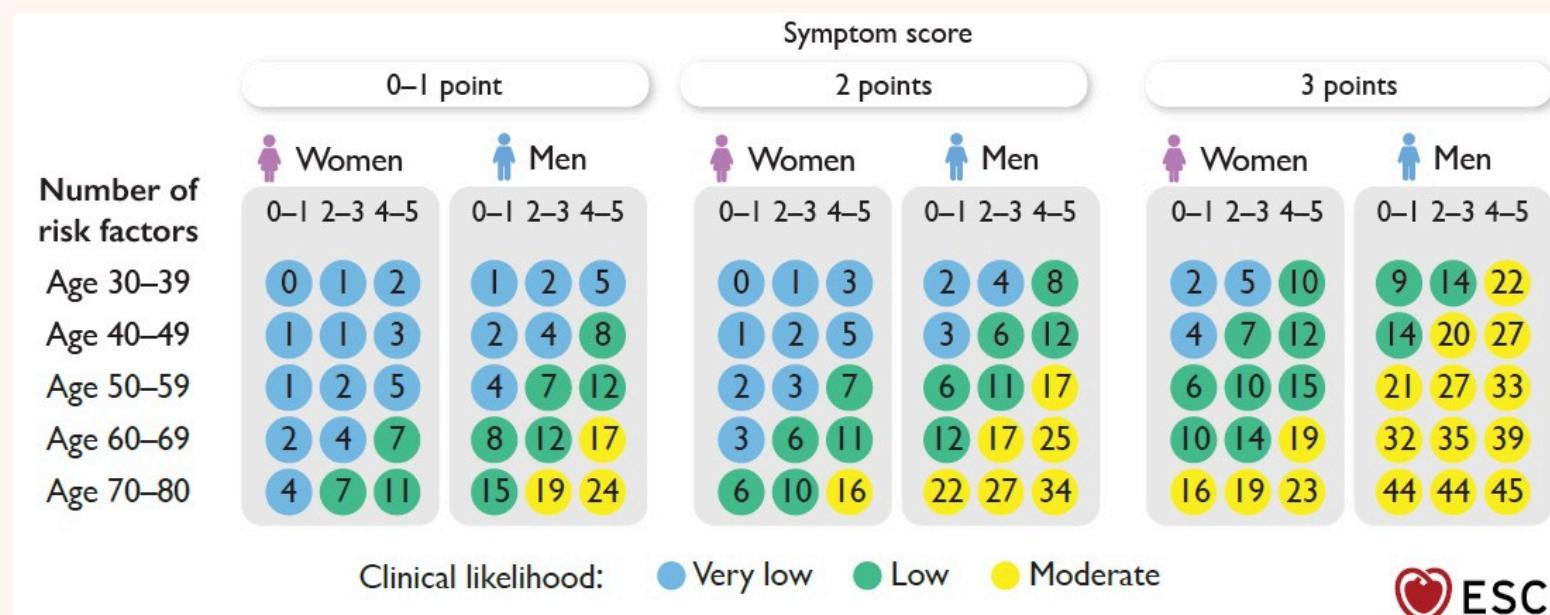
Developers

Jeromy Salvo

Features of pretestcad

```
1 # 30 female with symptom score of 3 and 0 risk factors
2 calculate_esc_2024_fig_4_ptp(
3   age = 30,
4   sex = "female",
5   chest_pain_type = "typical",
6   have_dyspnoea = "no",
7   have_family_history = "no",
8   have_smoking_history = "no",
9   have_dyslipidemia = "no",
10  have_hypertension = "no",
11  have_diabetes = "no",
12  output = "percentage"
13 )
```

```
[1] "2%"
```



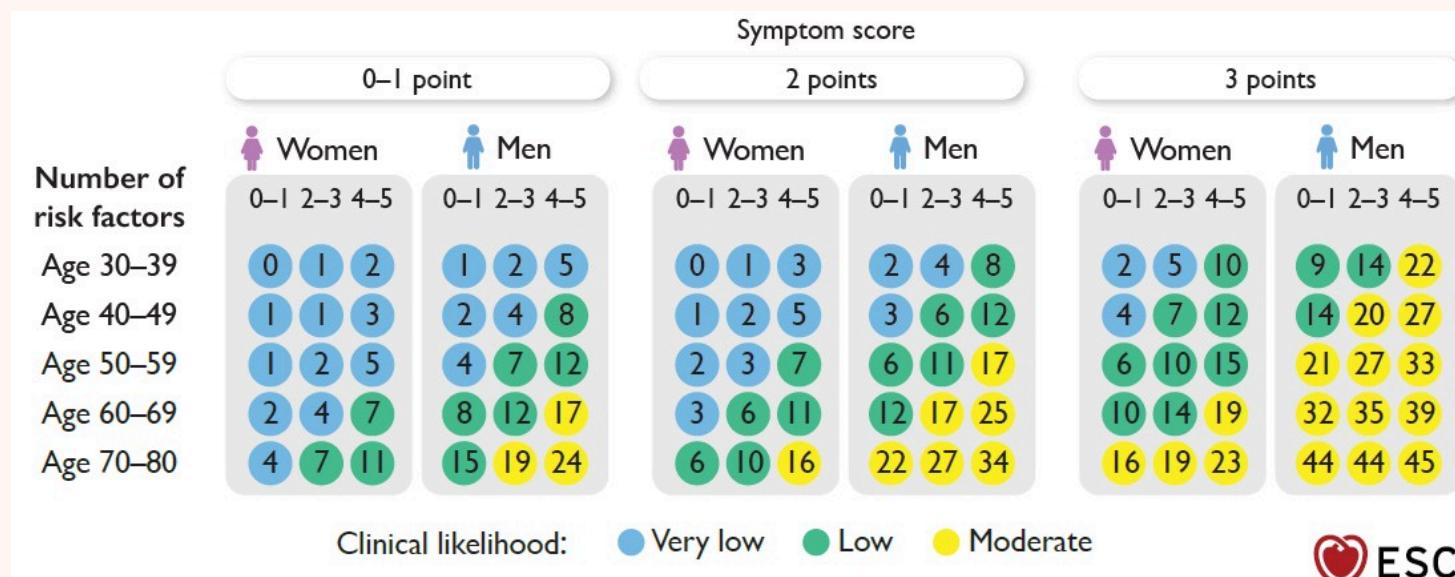
ESC 2024 guidelines from Vrints et al. *European Heart journal* 2024; 45(36):3415–3537 doi: [10.1093/eurheartj/ehae177](https://doi.org/10.1093/eurheartj/ehae177).



Features of pretestcad

```
1 # 55 male with symptom score of 3 and 3 risk factors and 2 NA
2 calculate_esc_2024_fig_4_ptp(
3   age = 55,
4   sex = "male",
5   chest_pain_type = "typical",
6   have_dyspnoea = "no",
7   have_family_history = NA,
8   have_smoking_history = NA,
9   have_dyslipidemia = "yes",
10  have_hypertension = "yes",
11  have_diabetes = "yes",
12  max_na_num_of_rf = 2,
13  output = "percentage"
14 )
```

```
[1] "27%"
```



Features of pretestcad

```
1 patient_data <- tibble::tribble(
2   ~unique_id,
3   ~age,      ~sex,
4   ~chest_pain_type, ~have_dyspnoea,
5   ~have_family_history, ~have_smoking_history, ~have_dyslipidemia, ~have_hypertension, ~have_diabetes,
6   "45 year old male with typical chest pain, no dyspnoea, hypertension and diabetes",
7   45, "male",
8   "typical", "no",
9   "no", "no", "no", "yes", "yes",
10  "70 year old female with no chest pain, dyspnoea, have smoking history (past or current smoker) and dyslipidemia",
11  70, "female",
12  "no chest pain", "yes",
13  "no", "yes", "yes", "no", "no"
14 )
15
16 risk_data <- patient_data |>
17   dplyr::mutate(
18     esc_2024_ptp_percent = purrr::pmap_chr(
19       .l = list(
20         age = .data[["age"]],
21         sex = .data[["sex"]],
22         chest_pain_type = .data[["chest_pain_type"]],
23         have_dyspnoea = .data[["have_dyspnoea"]],
24         have_family_history = .data[["have_family_history"]]
```

A tibble: 2 × 2
 unique_id esc_2024_ptp_percent
 <chr> <chr>
1 45 year old male with typical chest pain, no dyspnoea, h... 20%
2 70 year old female with no chest pain, dyspnoea, have sm... 10%

Features of pretestcad

Applied this talk from useR! 2024 to write better error messages.

Making Better Error Messages with Rlang and Cli - ...



```
1 calculate_esc_2024_fig_4_ptp(  
2   age = 0,  
3   sex = "male",  
4   chest_pain_type = "typical",  
5   have_dyspnoea = "no",  
6   have_family_history = "no",  
7   have_smoking_history = "no",  
8   have_dyslipidemia = "yes",  
9   have_hypertension = "yes",  
10  have_diabetes = "yes",  
11  output = "percentage"  
12 )
```

Error in `calculate_esc_2024_fig_4_ptp_simplfied()`:
! `age` must be positive, not 0

```
1 calculate_esc_2024_fig_4_ptp(  
2   age = 50,  
3   sex = "ale",  
4   chest_pain_type = "typical",  
5   have_dyspnoea = "no",  
6   have_family_history = "no",  
7   have_smoking_history = "no",  
8   have_dyslipidemia = "yes",  
9   have_hypertension = "yes",  
10  have_diabetes = "yes",  
11  output = "percentage"  
12 )
```

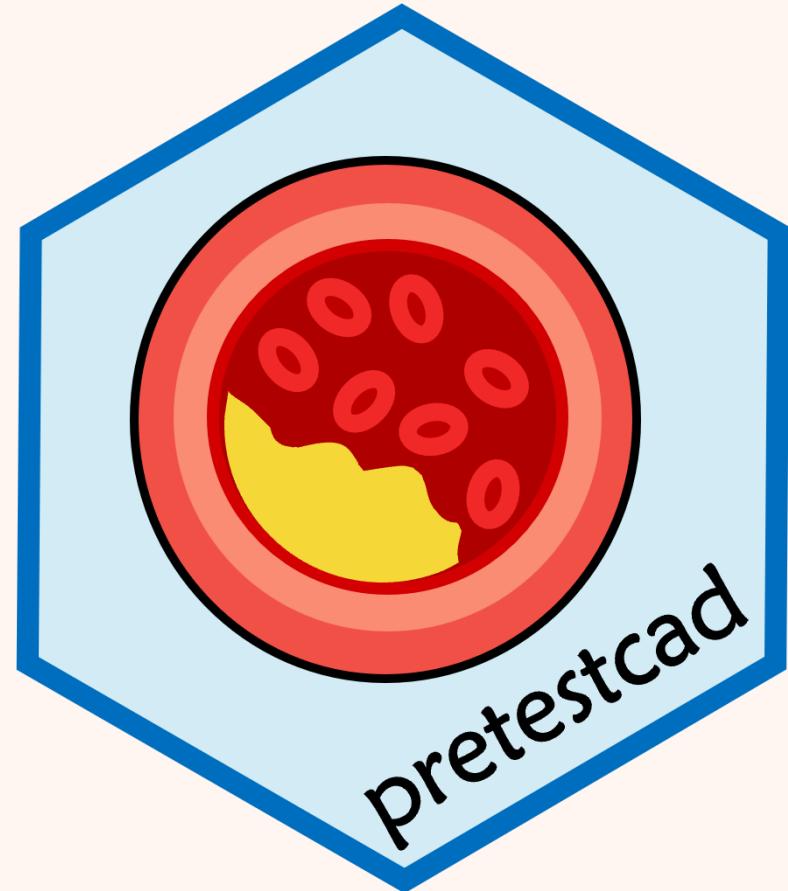
Error in `calculate_esc_2024_fig_4_ptp_simplfied()`:
! `sex` must be one of "female" or "male", not "ale".
i Did you mean "male"?

Conclusion

Pretest probability for CAD is useful in patient management to ensure high-risk patients are diagnosed and treated early.

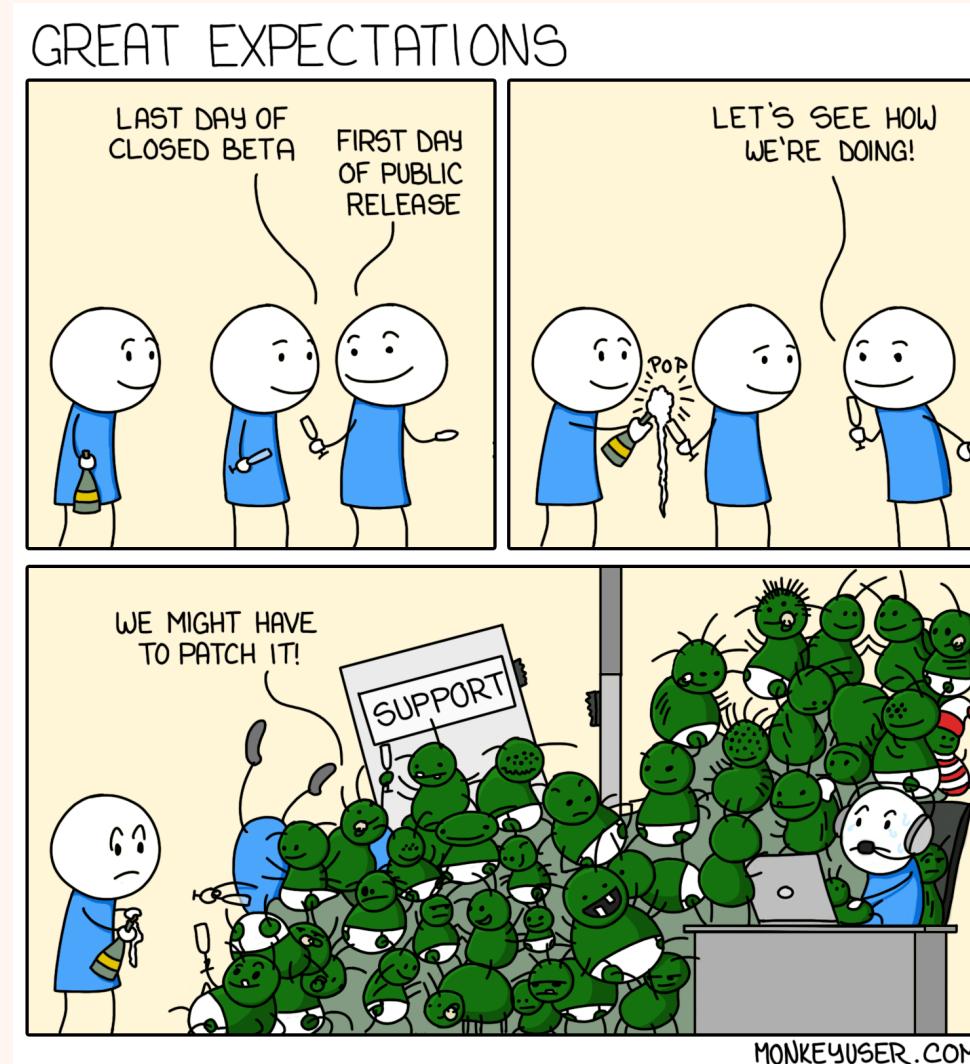
While there are many R packages developed to calculate risk of cardiovascular disease, there is currently no R package dedicated for calculating pretest probability for CAD.

R package [pretestcad](#) helps to ensure that these values can be calculated efficiently as number of patient increase and pretest probability models evolved over time.



Thank you

Available on [CRAN](#), [RUniverse](#) and [Github](#).



[Great Expectations](#) from [MonkeyUser.com](#)