OBSOLETE

User manual for the Roach Formula

Version 3, July 2024, in English

Table of Contents

1. The Evidencio platform

The Evidencio platform facilitates the creation, use, validation and implementation of medical prediction models and clinical decision support tools. This User Manual specifically relates to the Roach Formula. The User Manual can also be referred to as the Instructions For Use (IFU).

Throughout this manual CE-marked content and the term medical device are used interchangeably.

2. Disclaimer

Evidencio provides information, models, calculators, equations, and algorithms (tools) intended for use by healthcare professionals. Some of these tools have been certified as CE-medical devices. For such CE-marked content the 'Official Legal Disclaimer for CE-marked content' applies. All other content and tools provided by Evidencio are explicitly only covered by the 'Official Legal Disclaimer for non-CE-marked content. Both are available on the Evidencio website: https://www.evidencio.com/disclaimer.

3. Warnings

3.1. Warnings for CE-marked content

Calculations alone should never dictate patient care, and are no substitute for professional judgement. This tool is only to be used by physicians in a clinical setting, and is not for patient use.

Always read the intended use before using this tool.

Always make sure the patient complies with the clinical indications and clinical contra-indications as stated on the Evidencio website, and in **paragraphs 6.4.1** and **6.4.2** of this user manual respectively.

Before reading the result, double check the filled in values to prevent errors.

Results that concern risk percentages, do not guarantee certain outcomes. When there is a risk present, do not expect an event to not occur at all, even if the risk is very small. Conversely, a high risk does not guarantee that an event will occur.

This model is only intended for use in settings where the usage and result of a model are never immediately needed.

Calculations alone should never dictate patient care, and are no substitute for professional judgement. See our full disclaimer on: https://www.evidencio.com/disclaimer.

No security or privacy-sensitive personal and health-related data is stored after the use of CE-certified Medical Device Software (MDSW) models provided by Evidencio. When using the online platform, any new input, the closing of the browser tab and the refreshing of the page will remove the previously provided input. Only user data regarding which devices are used when and by whom are logged.

4. Device Description Roach Formula

The Roach Formula is an online calculation tool which uses the pre-treatment Prostate Specific Antigen (PSA) and the Gleason score to provide an estimate on the risk of pelvic lymph node dissection in prostate cancer patients.

5. Electronic Label

The electronic label of this device contains the following information:

Name of the device	Roach Formula
Manufacture information	Evidencio B.V., Irenesingel 19, 7481 GJ Haaksbergen, The Netherlands
LOT number	V-1.6-761.24.07.29
UDI-PI number	08720938015069

The electronic label can be found on the Evidencio website, see also section **G** and **Figure *5***.

The electronic label on the website further contains the option to download the **User Manual** and **Declaration of conformity** (DoC).

5.1. LOT number

The LOT number indicated the model version, the model identifier, and the model publication date. Publication date is indicated as YY.MM.DD.

5.2. UDI-PI number

Stands for Unique Device Identifier Production Identifier (UDI-PI) number is an international tool that helps users identify and find information on products. Evidencio's UDI-PIs have the following format:

(01)[UDI-DI number](8012)[versionnumber](4326)[releasedate](240)[identificationnumber]

The UDI-DI (Device Identifier) number is a unique numeric code. For each medical device of Evidencio, a unique UDI-DI is ascribed. This UDI-DI is used as an "access key" for information stored in a unique device identification database (UDID). Information on Evidencio's medical devices can be found by searching for the UDI-DI number in the following data base: https://gepir.gs1.org/index.php/search-by-gtin.

6. Intended Purpose

6.1. Intended Medical Use

The Roach Formula is intended to be used by professional users who are capable of operating the device and interpreting its results.

The Roach Formula combines pre-treatment prostate specific antigen (PSA) and the Gleason Score to provide an estimate on the risk of pelvic lymph node dissection in prostate cancer patients.

The device is intended to be used for patients with clinically localized prostate cancer. The result of the Roach Formula is intended to be reviewed and interpreted by qualified medical specialists only. The device is not intended for use by patients on their own.

The Roach Formula is not intended to replace clinical decision-making, it can only provide information to the user on the probability of pelvic lymph node involvement. The user can use this information to support clinical decision-making regarding optimal treatment options for the patient. In practice, this typically entails the decision to perform an extended pelvic lymph node dissection.

6.2. Input variables

To perform the calculations successfully, the Roach Formula requires the input variables as listed in **Table 1.**

Table 1. Variables used as input for the Roach Formula.

Name	Description	Type	Range (step size)	Units
PSA	Pre-treatment Prostate Specific Antigen	Continuous	1-100 (0.1)	*ng/mL*
Gleason score	Gleason grading system	Categorical	2, 3, 4, 5, 6, 7, 8, 9, 10	[-]

6.3. Clinical benefit

Correct functioning of the Roach Formula can result in these clinical benefits:

- The Roach formula can assist in risk stratification for patients
- Risk stratification can reduce the burden of (invasive and intensive) medical procedures in patients with low risks, reducing, shortening or avoiding adverse events caused by the procedures.
- Risk stratification can reduce the unnecessary consumption of (scarce) medical resources, decreasing costs and increasing their availability for high-risk patients.
- Digital implementation of the algorithm underlying the Roach Formula as a medical device can improve the speed and reliability of calculation. This would further increase the accuracy of the prognosis and by extent increase the chance for the above-mentioned benefits.

6.4. Indented target population and exclusion

The Roach Formula should be used for patients with clinically localized prostate cancer. The Roach Formula is intended to be used only for a specific group of patients, corresponding to the below indications and contra-indications.

6.4.1. Clinical indications

The Roach Formula should be used for patients with clinically localized prostate cancer, eligible for radical prostatectomy.

6.4.2. Clinical contra-indications

The Roach Formula should not be used for patients with missing PSA or Gleason score data.

6.5. Lifetime, residual risks and side effects

The Roach Formula is software, and does not expire. The lifetime is initially set at 5 years from certification, if the state of the art does not change in such a way as to negatively affect the benefit-risk of the device, the lifetime can be extended.

Evidencio has identified a series of risks associated with the use of this model.

The Roach Formula is a low-risk device, there are no noticeable risks involved outside of possible mis-estimation of patient risk for lymph node involvement, and all residual risks are accepted.

Most risks can be defined into two main groups, depending on their outcome.

a) The risk calculation was wrong or;
b) The MDSW prediction model is inaccessible.

A wrong risk calculation can be the result of erroneous input values or an error in the mathematical calculation. Technical risks, including the erroneous calculations or the inaccessibly due to a technical error, have been mitigated when possible. These measures focussed on reducing the risks' probability and severity. Concluding that the risks could not be mitigated further, the residual risks were classified as *low-level and acceptable.* It should be noted that the use of Evidencio's Medical Device Software is itself a risk mitigation measure, as Evidencio's certified Quality Management System ensures and monitors the reliability of the calculations performed with its certified medical devices.

The Roach Formula does not have any direct side effects.

6.6. User profile

The Roach Formula is intended to be used by Healthcare Professionals or automatically calculated through Evidencio's API. Results shall always be reviewed and interpreted by qualified medical specialists only, in the context of the patient's clinical history and other diagnostic test results. Healthcare professionals do not require additional training prior to the use of the medical device. The device is not intended for use by patients on their own.

6.7. Intended use environment

The MDSW can be used as made available on the Evidencio platform in any actively supported web-browser on personal computers, mobile devices, or tablet PCs, and on the mobile app provided by Evidencio. The MDSW can also be used through Evidencio's iFrame representation as an embedded view, provided that the specific Evidencio guidelines for iFrame implementations of this MDSW are adhered to. Automated calculation of the device is enabled through Evidencio's API. The device is only intended for use in healthcare settings where the immediate application and outcomes of the device are not required.

6.8. Physical interaction

The MDSW is stand-alone software and does not come into contact with any bodily or other material of the patient, user or otherwise.

6.9. Versions of the MDSW

The version of the Roach Formula concerns the initial version of MDSW of which Evidencio is the manufacturer.

6.10. Functioning, physical principle

The MDSW's underlying mathematical formula to calculate the probability of lymph node involvement (N+) is: $N_+ = \frac{2}{3}(PSA) + (Gleason\ score - 6) \times 10$. The acquisition and processing of the data, the analyses to assemble the relevant criteria for the MDSW as well as the setup and refinement of the Roach Formula are provided in the instructions for use. Entering the details for an individual in the MDSW initiates the estimation of the probability for pelvic lymph node involvement.

7. Result interpretation

The primary output of this device is given as a risk percentage for the estimated lymph node involvement.

Conditional information

In the original paper by Roach *et al.* (1994) a cohort of 212 male patients of whom the pre-operative prostate specific antigen values and Gleason scores were available, was used to derive the Roach Formula. They identified 145 patients with a calculated risk of positive nodes of <15%, classified as low risk, and 67 patients with a calculated risk ≥15%.

The observed incidence of positive nodes was 6% and 40% among the low and high-risk groups respectively ($p < 0.001$).

Calculations alone should never dictate patient care, and are no substitute for professional judgement. See the Evidencio website for the full disclaimer; https://www.evidencio.com/disclaimer.

8. Additional information

8.1. Details

Model author:	T. A. Heuting
Model ID	761
Version	1.6
Revision date	29 July 2024
Speciality	Oncology, Urology
Model type	Costum model (conditional)
MeSH terms	• Prostate Cancer • Lymphadenectomy • Gleason Score • Prostate Specific Antigen

Formula

The formula for the Roach Formula is: $\left(\frac{2}{3}\right) \times PSA + (Gleason\ score - 6) \times 10$

If the Roach Formula < 0 the outcome is 0%. If the roach Formula ≥ 0; the outcome is the output of the formula.

For the value for PSA is limited to 50 ng/mL, meaning that if e.g. 60 ng/mL is given as an input value, 50 ng/mL will be used in the calculation. Similarly, the value of 4 is used when Gleason scores input is 2, 3, and 4 and the maximum Gleason score is set at 8 for the Gleason score inputs of 8, 9, and 10. These maximums result in a calculation of the maximum estimated risk at 53%.

8.2. Study characteristics

The derivation study used data from 212 male patients. For potential variables the clinical stage, pre-treatment PSA, and the pre-treatment Gleason score were considered, resulting in a formula incorporating the pre-treatment PSA level and Gleason score. In this study the maximum PSA value of 40 ng/mL was used, and the Gleason scores of 2 to 4 were set to a value of 4 while 8 to 10 were set to a value of 8.

The implementation of the Roach Formula implements a slight change, where the maximum PSA value is increased to 50 ng/mL increasing the maximum estimated risk from 47% to 53%.

8.3. Supporting publication & Related files

Evidencio has conducted a broad clinical evaluation whereby a peer-reviewed publications validating the performance of the Roach Formula have been gathered and evaluated. The Roach Formula was assessed in a total of 15725 patients. In terms of discrimination, the model performed acceptable with a C-statistic of 0.69 (95% CL0.63 – 0.74). This is below the Briganti Nomogram, which is considered the other state of the art model, with a C-statistic between 0.76 and 0.80. However, the Roach Formula is relatively substantially easier to use and apply.

8.4. Release notes

The release notes for each publicly available version of the device can be found on the Evidencio website page for the Roach Formula: https://www.evidencio.com/models/show/761, selecting the correct device, and clicking on Release Notes. It is recommended to read these notes after a version update to see if these changes are relevant to you. Please make sure the correct model version is selected.

9. Implementation of the model through an API

The Roach Formula can be used through Evidencio's API to allow for (automated) calculation of the estimated risk of lymph node. In the case of use of the MDSW through the API, the user should take into account the different inputs for the model, in order to properly interpret the results. Furthermore, the information contained within this user manual, specifically chapters 3-8, should be read and understood by the user.

Instruction on how to implement the API within a system are included in a separate document that is made available to the party performing the technical implementation.

When using the MDSW through the API, the warnings and descriptions given in this document all apply, as does the additional information. The information for use included in this document regards both use through the website as well as use through the API, as long as the API is properly implemented. The API is only intended for authorized users.

10. Using the model on the Evidencio website

Using the tool on the Evidencio website, requires a stable internet connection. The tool was tested on the following browsers and will run on these versions and higher;

- Personal computers or laptops using the following browsers:
  - Safari (version 17.5 and higher)
  - Chrome (version 126.0.6478.127 and higher)
  - Firefox (version 128.0 and higher)
  - Edge (version 126.0.2592.102 and higher)
- Tablets or smartphones running on the next operating systems:
  - IOS (version 17.5.1 and higher)
  - Android (version 13 and higher)

Correct functioning of the tool with earlier versions of these browsers cannot be guaranteed.

The medical device cannot be used in combination with Internet Explorer. The personal computers, laptops, tablets or smartphones used should at least be able to have an internet connection and use the browsers mentioned above. The minimal screen resolution should be 800x600.

Furthermore, the model may be used through the Evidencio iFrame representation of the calculator, as an embedded view, provided that the specific Evidencio guidelines for iFrame implementations of that model are adhered to.

The Evidencio MDSW models can be used with any browser settings that don't distort the regular display of websites, with a 50% to 500% zoom rate, and at a display resolution starting from 800x600. However, factory recommended browser settings, 100% zoom rate and regular display resolution are recommended.

The MDSW is intended for authorised users only, and should not be used by unauthorised personnel.

This model is only intended for use in settings where the usage and result of a model are never immediately needed.

10.1. General modelling landing page

The medical device model on the Evidencio platform is shown in **Figure 1**. The model landing page contains the following sections, that are indicated in **Figure 1**.

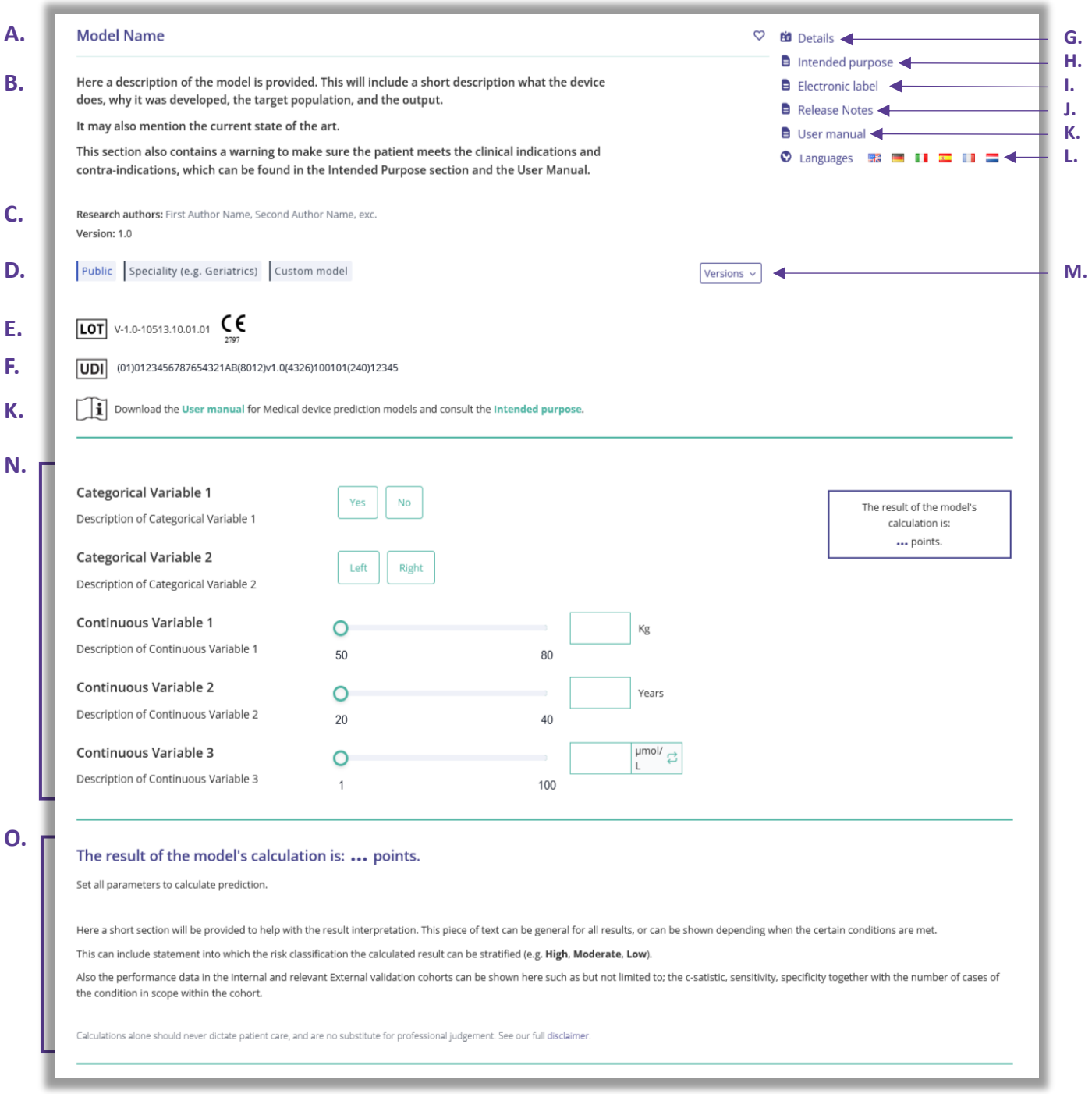


Figure 1. Example of a model landing page on the Evidencio website.

A. Model title

This is the title and name of the model

B. Model description

This is a short description of the model.

C. Research Authors

These are the research authors of the paper that originally published the model.

D. Model tags

These are the tags that are assigned to the model. Evidencio has the following status tags: “Draft”, “Public”, “Private”, “Under review”. Evidencio has the following model type tags: “Composite model”, “Sequential model”, “API model”. Evidencio has the following calculation method tags: “Linear model”, “Logistic regression”, “Cox regression”, “RScript” and “Custom model”. Next to this, there are tags that indicate the specialty e.g. “Cardiology”.

E. LOT number

The LOT number indicated the model version, the model identifier, and the model publication date. Publication date is indicated as YY.MM.DD.

(Additionally, the CE mark is displayed next to the LOT number. This way, medical devices can be easily recognized.)

F. Details button

On the top right of the model page, several clickable buttons are displayed that show a pop-up when clicked. The first button opens a pop-up concerning additional information about the model. This pop-up has three sections: Details, Study characteristics and Supporting publications & related files.

Details

The first part of the additional information concerns the details of the model as shown in **Figure 2**. This section may show the calculation if it is built as a mathematical formula and, if applicable, shows the conditions at which certain formulas are used.

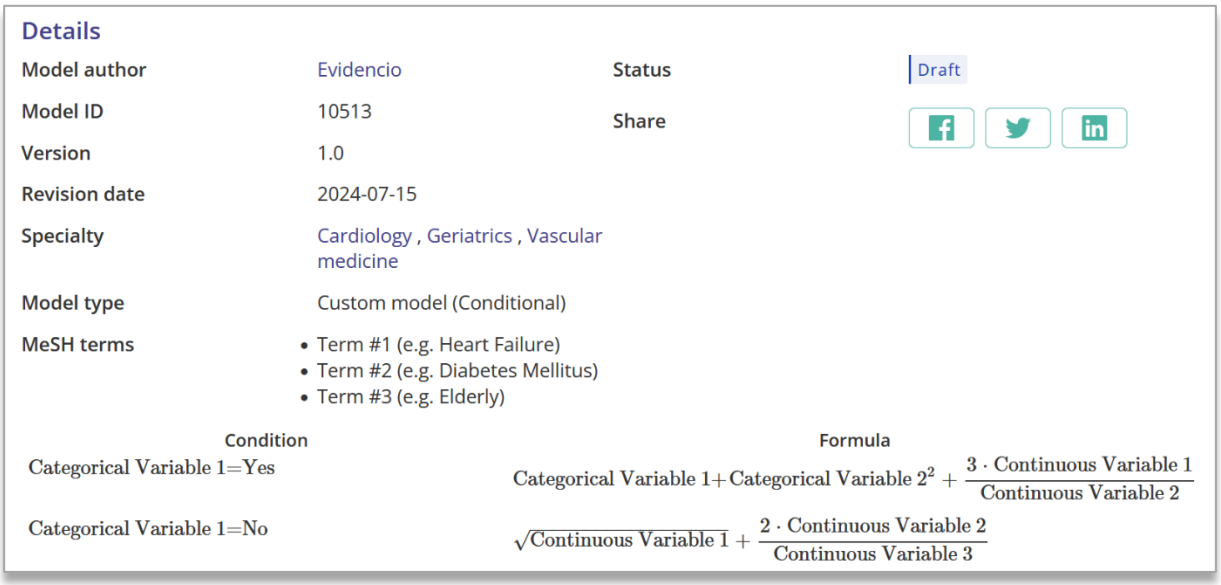
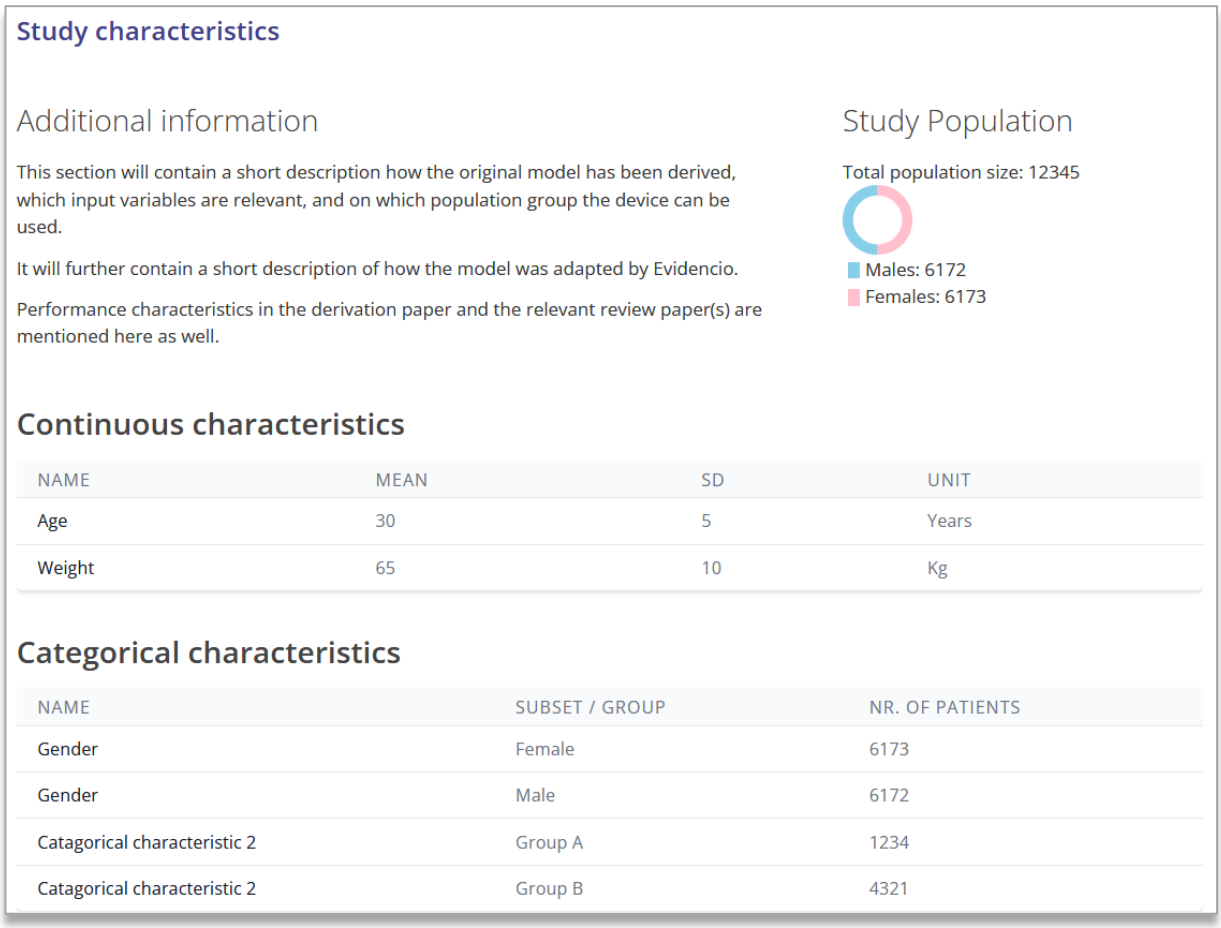


Figure 2. Example of first part of detail section.

Study Characteristics

Below the 'Details section' the section labelled 'Study characteristics' provides information on the characteristics of the patient data used to derive and validate the model. Additional information is provided on the methods used to develop and/or validate the model. An example of the Study characteristics section can be seen in **Figure 3**.



Study characteristics

Additional information

This section will contain a short description how the original model has been derived, which input variables are relevant, and on which population group the device can be used.

It will further contain a short description of how the model was adapted by Evidencio.

Performance characteristics in the derivation paper and the relevant review paper(s) are mentioned here as well.

Study Population

Total population size: 12345

Males: 6172
Females: 6173

Continuous characteristics

NAME	MEAN	SD	UNIT
Age	30	5	Years
Weight	65	10	Kg

Categorical characteristics

NAME	SUBSET / GROUP	NR. OF PATIENTS
Gender	Female	6173
Gender	Male	6172
Catagorical characteristic 2	Group A	1234
Catagorical characteristic 2	Group B	4321

Figure 3. Example of the study characteristics section under the Details tab.

Supporting publications & Related files

An important part of the Study characteristics is the information on Supporting publications and related files. These sections can be found at the bottom of the Details-pop-up as shown in **Figure 4**. Tags are attached to the different files to identify their link with the model. Examples of relevant tags are a.o.; "Peer review", "Internal validation", "External validation", and "TRIPOD". Publications that have the tags: "Internal validation" or "External validation", contain the performance characteristics of the device. Figures and tables which help to interpreted the results may also be provided here.

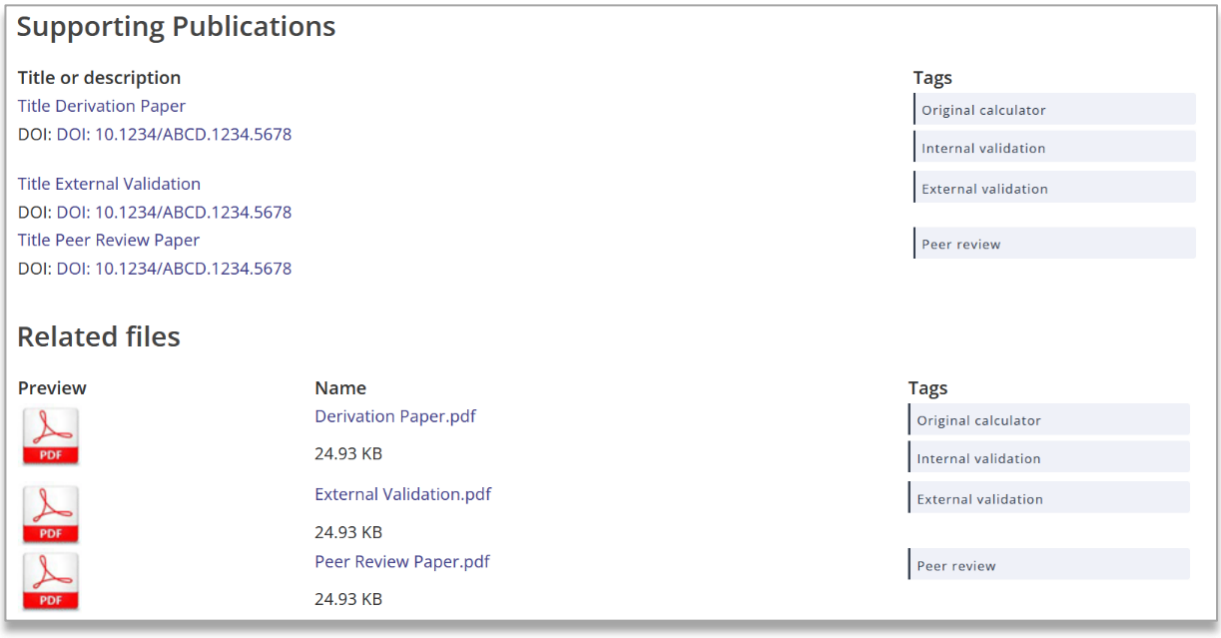


Figure 4. Example of the Supporting publication & Related files section under the Details tab.

G. Electronic label

The electronic label button opens a pop-up with the location and address of Evidencio, the LOT number, the UDI number, the CE-mark, the medical device logo and a download link for the declaration of conformity of the medical device. The example of the electronic label is shown in **Figure 5**.

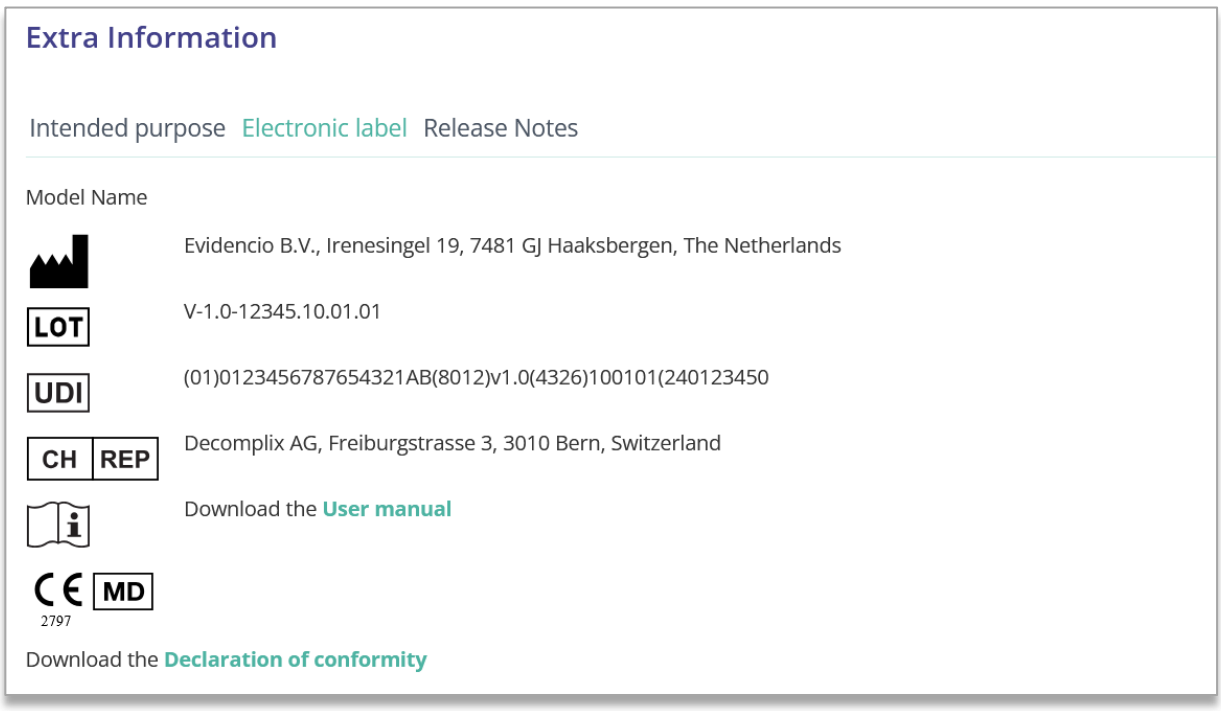


Figure 5. Example of an electronic label under the Electronic Label tab.

H. Intended purpose

Under this tab, the intended purpose can be found, containing a lot of information regarding the model, its user, target population, clinical benefit, etc. This information is also provided in this manual and can be found in **Chapter 6** on **page 4**.

I. Release notes

Under this tab the most recent release notes can be found, noting the most significant changes between the versions of the model found on the Evidencio website.

The 'Release Notes' button opens a pop-up with the latest release notes of the model. Here you can find a list of the most significant changes over the different versions of the model. Additionally, if there are any known residual anomalies the user should be aware of, they are listed here. It is recommended to read these notes after a version update to see if these changes are relevant to you.

J. User manual

This user manual can be found in three places: 1) under the short description of the model on the Evidencio model page, 2) on the right of the model page, and 3) as a tab in the electronic label screen. Additionally, all versions of the user manual can be found in the general page for all user manuals for medical devices. The page can be found under the 'About' drop-down menu button as shown in **Figure 6**. The user manual page is shown in **Figure 7**.

This version of the manual can be printed if required. If necessary, a paper version of the manual can be requested to be sent to you by mail. Evidencio's contact details are listed in **Chapter 11** of this user manual.

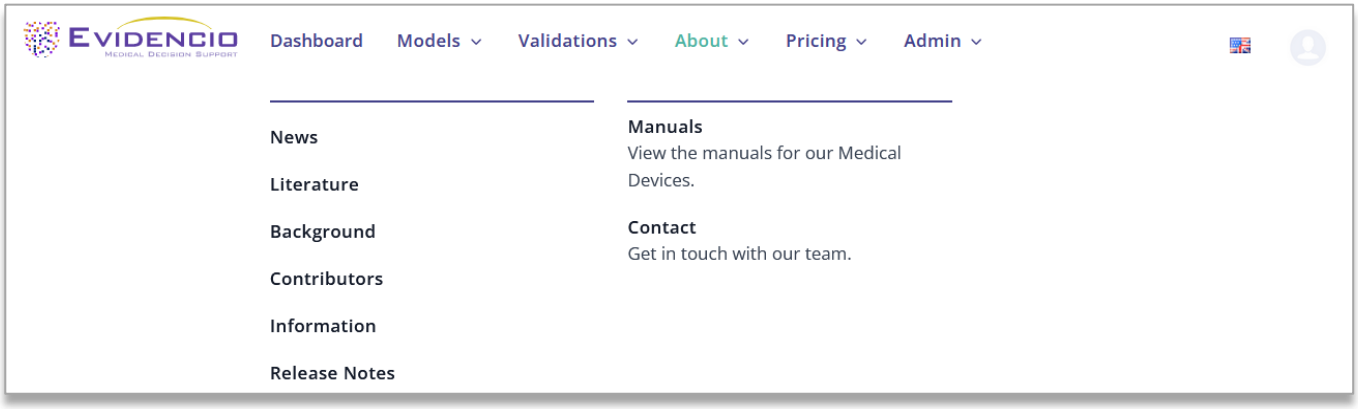


Figure 6. The drop-down menu where the user manual page can be found.

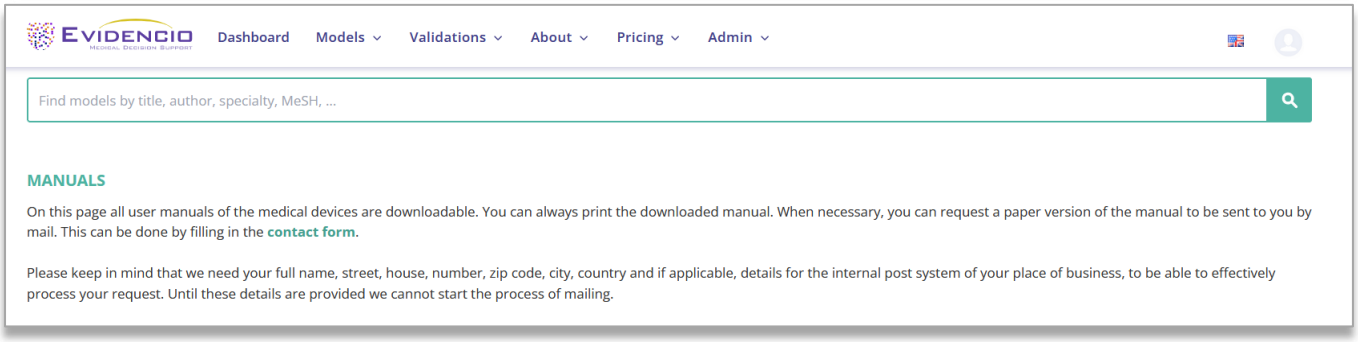


Figure 7. The user manual page for all user manuals.

K. Languages

The standard language on the Evidencio website is English. When other languages are available, these can be selected here. The list of languages may be different between models and may change when in time more languages will become available. Currently the Roach Formula and its user manual are available in German, French, Spanish, Italian, Dutch, and English.

Please note that, if a language is selected, only the user interface of the specific model will be translated, other general features and information on the site might still be set to one of our primary languages English, German, and Dutch.

When you find mistranslations, irregularities, or confusing or ambiguous use of language in English or any other language on the Evidencio website or in one of our manuals, please do not hesitate to contact us using the contact information provided at the end of this manual.

L. Input section

The Evidencio platform allows two separate input variables; categorical variables and continuous variables.

Categorical variables

In the example shown in shown in **Figure 8** and **Figure 9**, the example **Categorical Variable 1** concerns a categorical variable. The input that is wished to be used can be entered by clicking on either button. The selected button changes to green, as seen in **Figure 9**.

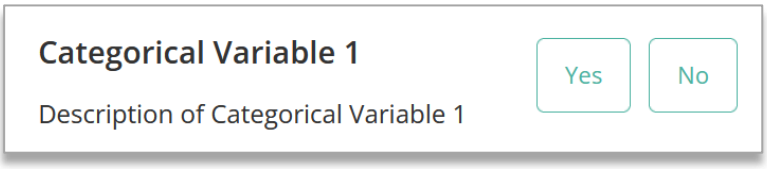


Figure 8. Example of a categorical variable, no button has been clicked and thus no input has been provided by the user.

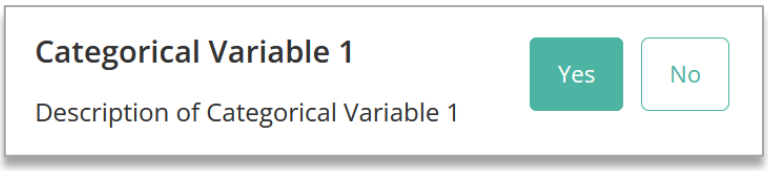


Figure 9. Example of a categorical variable, where the "Yes" button has been clicked.

Continuous variables

In the example shown in **Figure 10**, the **Continuous Variable 3**, exemplifies a continuous variable. The plausible ranges for which the model is tested and deemed valid are used.

The details for a patient can be entered by sliding the button to the correct value, or by entering the correct value in the box on the right-hand side (i.e., where the 10.2 mg/dL is entered for the **Continuous Variable 3**).

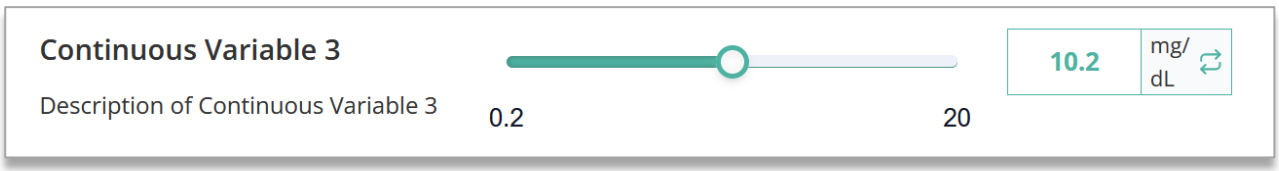


Figure 10. Example of a continuous variable, where "10.2 mg/dL" has been entered.

Unit conversion

Sometimes it is possible to use a unit conversion, by clicking on the unit when the green arrows are present. See **Figure 11** below where the unit has been clicked and switched.

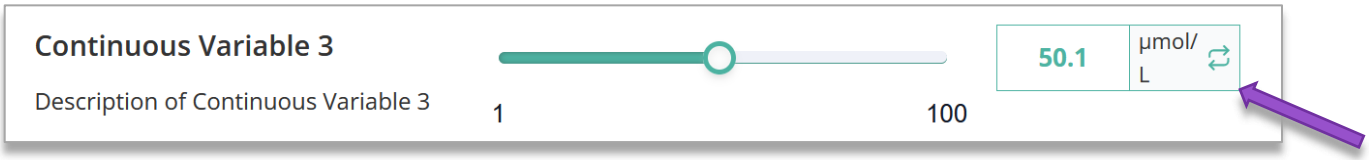


Figure 11. Example of a continuous variable where "50.1 $\mu mol/L$" has been entered.

Details on variable measurements

Directly underneath the name for each variable, additional details can be provided on the methods required to enter the correct value for each variable. Details may include but are not limited to; more detailed explanation of the variable, the ranges of the variables (for healthy individuals), or a description when a continuous variable should be true or false.

M. Result section

At the bottom of the page, the results of the model are shown.

Calculations alone should never dictate patient care, and are no substitute for professional judgement. See our full disclaimer on: https://www.evidencio.com/disclaimer.

Result calculation

When all variables are filled in, a result will be calculated. No risk is displayed until all variables are filled in and the result section will indicate; *"Set all parameters to calculate prediction."*

Result interpretation

In the result interpretation, a risk stratification is provided based on the risk score. Additional information about this stratification and the classification as found in the derivation and important validation cohorts may also be provided. An example of the information is shown in **Figure 12**.

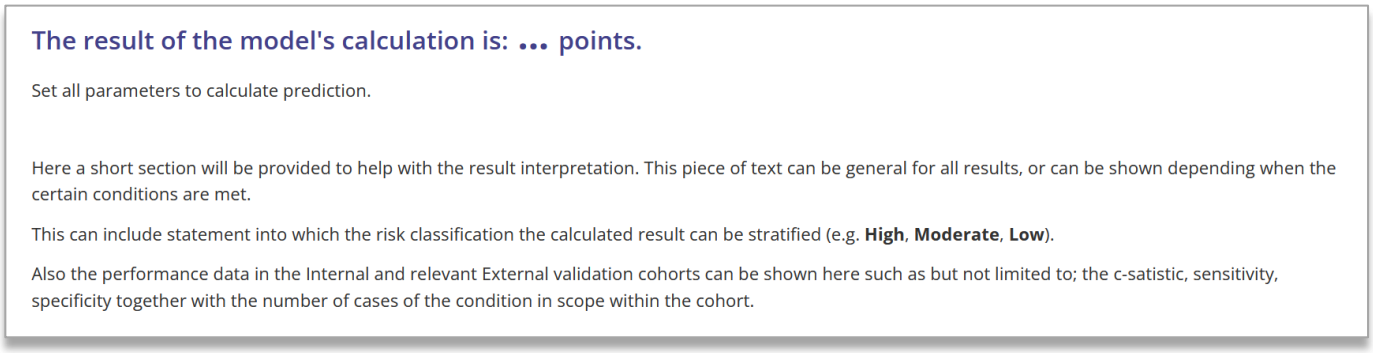


Figure 12. Example of the result display and information section.

11. Manufacturer details

Any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the country in which you, the reader, are established. A competent authority is the institute that governs all issues related to medical devices in a country.

Please contact Evidencio when you suspect any malfunction or changes in the performance of a medical device. Do not use the device, until Evidencio replies to your message that it is safe to start using it again.

Contact details of Evidencio:

Evidencio B.V., Irenesingel 19, 7481 GJ Haaksbergen, The Netherlands
www.evidencio.com
tel: +31 53 85195 08
e-mail: info@evidencio.com