User manual

For the

HAS-BLED Score for Major

Bleeding Risk Calculator

Version 1, 27th of July, 20 22, in English

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 the HAS-BLED Score for Major Bleeding risk Calculator. 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 here: https://www.evidencio.com/disclaimer

3. Warnings

⚠ **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.

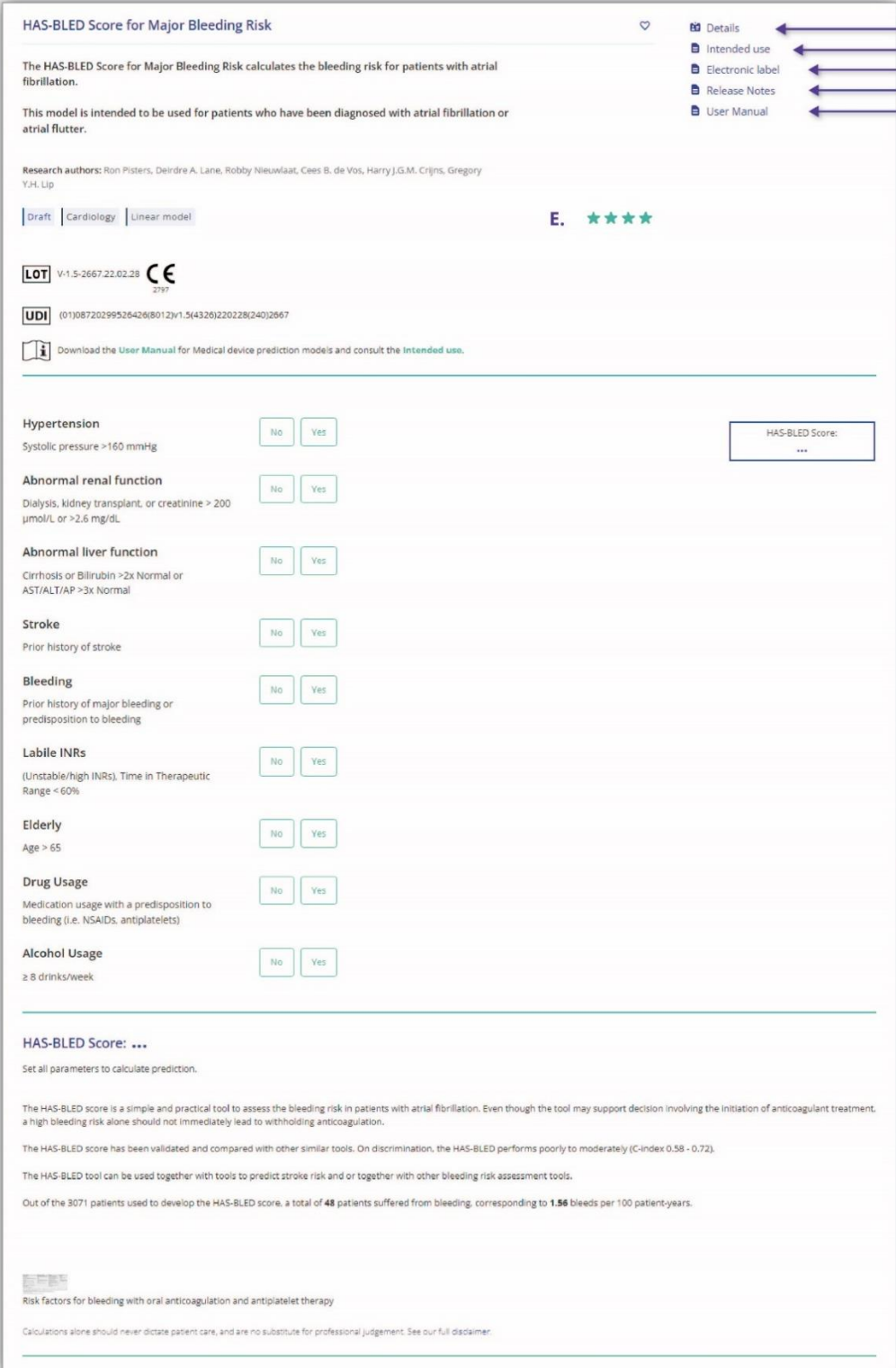Always read the intended use before using this tool.

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.

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

4. Model 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. An example of a model landing page.

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. Model rating

Evidencio can award up to 5 stars to each model, these stars are awarded when:

1. All model details are provided;
2. A TRIPOD form is added to the supporting publications;
3. An internal review is added to the supporting publications;
4. An external review is added to the supporting publications; and
5. A peer review is added to the supporting publications.

Under the "Details button", indicated by H, details are given to which of these stars are awarded for which reason. the HAS-BLED Score for Major Bleeding risk Calculator has 5 stars.

F. 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.

G. UDI number

The UDI number is an international tool that helps users identify and find information on products. UDI stands for Unique Device Identifier. Evidencio's UDIs have the following format:

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

The UDI-DI 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

H. 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.

Additional information on the rating of a model can be found by hovering over the 'i' icon, next to the stars.

Details			
Model author	T. A. Hueting	Rating	★★★★ ⓘ
Model ID	162	Status	Private
Version	3.15	Share	
Revision date	2021-06-28		
Specialty	Cardiology		
Model type	Linear model (Calculation)		
MeSH terms	• Bleeding • Anticoagulants • Atrial Fibrillation		

Figure 2. The model details.

Study characteristics

Below the 'Details section' the section labeled '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 models.

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 3.

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.

These tags are considered important, because the availability of particular information covered by the above mentioned tasks provide insight into the quality of the model development process and the model itself. As a completeness of information and quality indicator a model receives a certain number of stars when these labels can be assigned to relevant files or references.

Supporting Publications

Title or description	Tags
A novel user-friendly score (HAS-BLED) to assess 1-year risk of major bleeding in patients with atrial fibrillation: the Euro Heart Survey DOI: 10.1378/chest.10-0134	Internal validation Peer review Paper
External Validation of the ORBIT Bleeding Score and the HAS-BLED Score in Nonvalvular Atrial Fibrillation Patients Using Direct Oral Anticoagulants (Asian Data from the DIRECT Registry) DOI: 10.1016/j.amjcard.2019.07.005	Peer review External validation Paper
ESC Clinical Practice Guidelines (2020 Guidelines for Management of Atrial Fibrillation) NICE guideline [NG196] (Atrial fibrillation: diagnosis and management)	

Related files

Preview	Name	Tags
	Bleeding risk factors.png 338.73 kB	Figure (results-page)

Figure 3. Supporting publications & related files. Below the list of supporting publications, a related file is added. In this case; a table with bleeding risk factors.

I.   Intended use button

The intended use and (medical) purpose of the model can be found under the button: 'Intended use'. Among other things, the intended use indicates the inclusion criteria of the medical device. Furthermore, the intended use comments on the appropriate use of the model regarding the intended use environment, intended users, and intended patient population (inclusion criteria). For the HAS-BLED Score for Major Bleeding Risk Calculator the following intended use is described:

Intended use
The HAS-BLED Score for major bleeding risk calculator is intended to support clinical decision making by informing clinical management on the estimated risk that an individual patient diagnosed with atrial fibrillation or atrial flutter may suffer a major bleeding.

The calculator combines patient data (age, alcohol usage) with clinical data (prior stroke, prior bleeding, hypertension, renal and liver functions, labile INRs, and medication usage) to calculate the estimated risks.

The calculator is intended to be used by physicians in a clinical setting, in combination with other information related to the patient (such as clinical history, appearance, comorbidities, other scores, patient preferences, etc.) used in the context of the physician's decision to prescribe anticoagulant medication or to change an existing prescription. A high risk of bleeding should not lead to the conclusion of stopping anticoagulant treatment as the reduction of stroke risk outweighs the consequences of higher bleeding risk. The calculator can be used repeatedly at patient follow-ups to assess the risk over time.

Clinical Benefit
The HAS-BLED score indicates whether additional measures should be provided to reduce the risk of bleeding as far as possible. The reduction of bleeding risk mainly aims at modifiable risk factors. When non-modifiable risk factors are present, physicians should decide to review the patient's risk factors more often for high bleeding risk patients. HAS-BLED is recommended by the ESC guideline for the stratification between low and high-risk patients. The use of the HAS-BLED score to identify bleeding risk of patients results in significant population benefit.

Inclusion criteria
The calculator is intended to be used for patients who have been diagnosed with atrial fibrillation or atrial flutter.

User Profile
The calculator should not be used by patients.
The calculator may be used by physicians and qualified medical specialists in a clinical setting.

Intended Use Environment
The calculator 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 in Evidencio's mobile App. Furthermore, the calculator can be used through the Evidencio iFrame representation of the calculator, as an embedded view, provided that the specific Evidencio guidelines for iFrame implementations of this model are adhered to. The model is only intended for use in settings where the usage and result of a model are never urgently needed.

Functioning, physical principle
The calculator's underlying mathematical formula is a logistic regression model that has been transformed to an easy to use risk score model. The specifications and equations of the model are described in the paper published by Pisters et al.

J. Electronic label button

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 4.
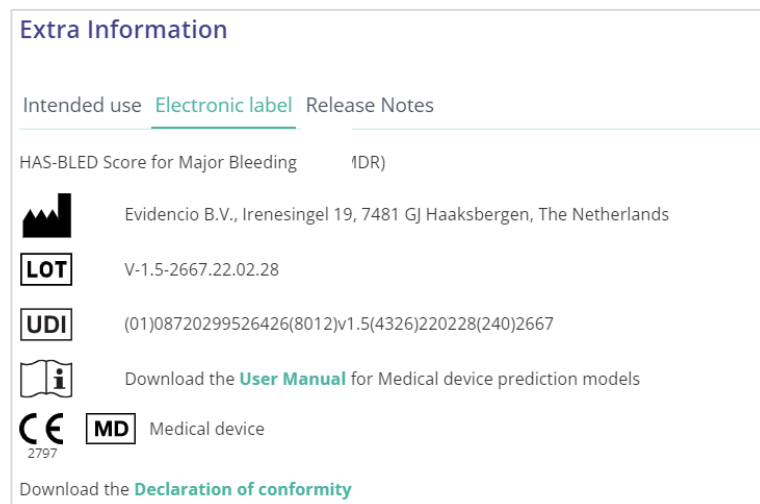

Extra Information

Intended use   Electronic label   Release Notes

HAS-BLED Score for Major Bleeding   (MDR)

🏭   Evidencio B.V., Irenesingel 19, 7481 GJ Haaksbergen, The Netherlands

LOT   V-1.5-2667.22.02.28

UDI   (01)08720299526426(8012)v1.5(4326)220228(240)2667

📋   Download the **User Manual** for Medical device prediction models

CE MD   Medical device
2797

Download the **Declaration of conformity**

Figure 4. Example of the electronic label

K. Release notes

The 'Release Notes' button opens a pop-up with the latest release notes of the model. Here you can find what has changed over the last versions of the model. Additionally, if there are any known residual anomalies the user should be aware of, they are listed here.

L. User Manual

This user manual can be found in three places: 1) under the short description, 2) on the right of the model page, and 3) in the electronic label. 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 5. The user manual page is shown in Figure 6.
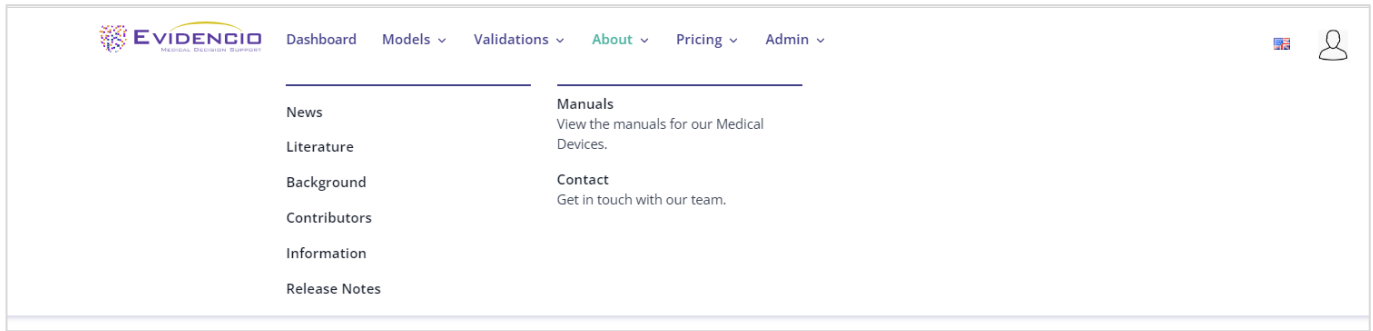
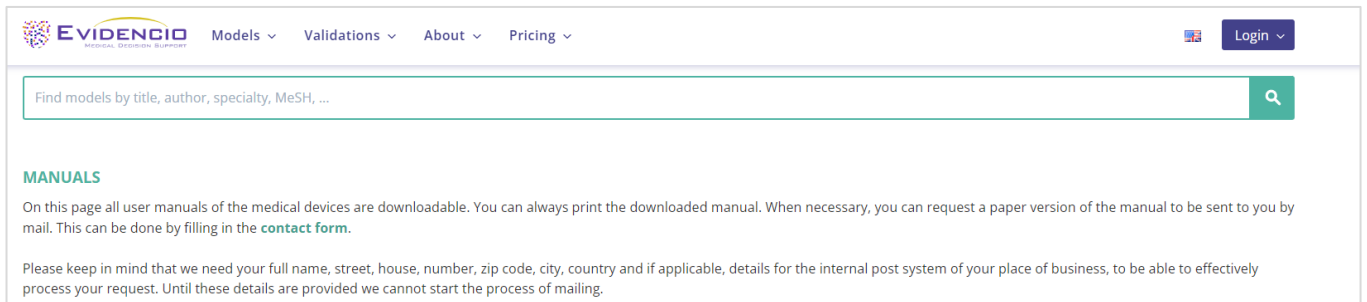*Figure 5. The drop-down menu where the user manual page can be found.*

Figure 6. The user manual page for all user manuals.

You (The user) can always print this downloaded manual. When necessary, you can request a paper version of the manual to be sent to you by mail. Evidencio's contact details are listed in Chapter 6 of this user manual.

M.   Input section

The Evidencio platform allows two separate input variables; categorical, and continuous variables. For the HAS-BLED Score for Major Bleeding Risk Calculator only the categorical variables are used.

Categorical variables

In the example shown in Figure 7 and 8, the **Hypertension** variable concerns a categorical variable. The patient status can be entered by clicking on either button. The selected button changes to green, as seen in Figure 7.

Figure 7. The variable for Hypertension, where no button has been clicked, and thus no input has been provided by the user.

Figure 8. The variable for Hypertension, where the "Yes" button has been clicked.

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. In Figure 9, the details below **Elderly** explain how elderly is defined for this model.

Figure 9. An example on how additional information can be provided for a variable.

N. Result section

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

Result calculation

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

Result interpretation

In the result interpretation, a risk stratification is given based on the risk score. The patient is classified as high risk, medium risk or low risk. Furthermore, some explanation about the model is given including the c-index of the external validation. For each score it is described how often this score was present in the validation of the model and how many patients suffered from bleeding. An example of the information is shown in Figure 10.

Conditional information

Warning: Always check if the patient falls within the inclusion criteria.

The HAS-BLED score has identified this patient as **Low Risk.**

Anticoagulation can be safely administered.

Assess bleeding risk repeatedly over time as the risk factors may also change over time.

Out of the 3071 patients used to develop the HAS-BLED score, **798** patients had a HAS-BLED score of **0**. A total of **9** patients suffered from bleeding, corresponding to **1.13** bleeds per 100 patient-years.

The HAS-BLED score is a simple and practical tool to assess the bleeding risk in patients with atrial fibrillation. Even though the tool may support decision involving the initiation of anticoagulant treatment, a high bleeding risk alone should not immediately lead to withholding anticoagulation.

The HAS-BLED score has been validated and compared with other similar tools. On discrimination, the HAS-BLED performs poorly to moderately (C-index 0.58 - 0.72).

The HAS-BLED tool can be used together with tools to predict stroke risk and or together with other bleeding risk assessment tools.

Out of the 3071 patients used to develop the HAS-BLED score, a total of **48** patients suffered from bleeding, corresponding to **1.56** bleeds per 100 patient-years.

Figure 10. The result information.

Relevant information for correct use of the model

At the bottom of the page, there is a link to Evidencio's terms and conditions of use, the privacy policy, and the disclaimer.

5. Use of Medical devices

To use the tool, Evidencio requires a stable internet connection and runs on the following devices:
- Personal computers or laptops using the following browsers:
  - Safari (the latest three versions)
  - Chrome (the latest three versions)
  - Firefox (the latest three versions)
  - Edge (the latest three versions)
- Tablets or smartphones running on the next operating systems:
  - IOS (the latest three versions)
  - Android (the latest three versions)

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 SaMD 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.

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

6. 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.

Contact details of your competent authority can be found here: https://www.ema.europa.eu/en/partners-networks/eu-partners/eu-member-states/national-competent-authorities-human

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:

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