Editorials

Assessing Bleeding Risk With the HAS-BLED Score: Balancing Simplicity, Practicality, and Predictive Value in Bleeding-Risk Assessment

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In clinical practice, we know that bleeding risk can be associated with a number of common clinical factors.[1] Nonetheless, clinicians have been poor at estimating bleeding risk, with a tendency to overestimate risks in particular patients.[2] Some of clinical factors have been used to derive bleeding-risk stratification schemes, which have been generally derived and validated in general anticoagulated populations, often with a diverse range of reasons for anticoagulation.[1]

However, the uptake of older bleeding-risk scores has been limited given the relative lack of simplicity and practicality, especially because some schemes were based on weighted, complex multivariate formulae, which limited their quick use in busy clinics or wards.

Bleeding-risk assessment is commonly needed most in patients with atrial fibrillation (AF), especially because we are dealing with an elderly patient population with multiple comorbidities, where some balance is needed against stroke prevention, especially with the use of antithrombotic drugs.[1] Of the various bleeding-risk stratification schemes, only 3 thus far have been derived from and subsequently validated in AF populations: HEMORR$_2$HAGES, HAS-BLED, and the ATRIA score.

The HAS-BLED score was first proposed in 2010,[3] based on data from the EuroHeart survey, and subsequently validated in multiple independent cohorts derived from trial and nontrial populations. Subsequently, the HAS-BLED score has been validated in a venous thromboembolism population, as well as in non-AF cohorts, where it has been shown to be predictive of bleeding following bridging,[4] and in the setting of acute coronary syndrome with percutaneous coronary intervention/stenting.[5] The HAS-BLED score is also predictive of intracranial hemorrhage,[6] the most devastating complication related to anticoagulation use.

Because stroke and bleeding risk track each other, HAS-BLED has also been compared against stroke risk scores (CHADS$_2$ or CHA$_2$DS$_2$-VASc) in predicting bleeding risk, and unsurprisingly, HAS-BLED has better prediction value for bleeding compared to CHADS$_2$ or CHA$_2$DS$_2$-VASc.[7,8] Thus, stroke risk should be assessed with a stroke risk-stratification score, whereas bleeding risk should be assessed with a specific bleeding-risk score, such as HAS-BLED.

How does the HAS-BLED score compare against other bleeding-risk scores? Various studies have compared HAS-BLED against other bleeding-risk scores, and it performs as good as or even better than some of the more complicated risk scores.[9–11] Care has to be taken where derivation or validation studies have used highly selected cohorts (eg, those based on a healthcare plan) or trial datasets (which may have only included high–stroke-risk patients or where those with prior severe bleeds or severe renal impairment have been excluded from the trial).

In the present issue of *Clinical Cardiology,* Zhu et al. report a systematic review and meta-analysis that compare the diagnostic accuracy of the HAS-BLED score and any of the HEMORR$_2$HAGES, ATRIA, CHADS$_2$, or CHA$_2$DS$_2$-VASc scores in anticoagulated patients with AF.[12] In this study, discrimination analysis demonstrated that the HAS-BLED score had similar C statistic differences for bleeding-risk prediction compared with ATRIA or HEMORR$_2$HAGES, but the significant positive net reclassification improvement and integrated discrimination improvement values show that the HAS-BLED score was superior to HEMORR$_2$HAGES, ATRIA, CHADS$_2$, or CHA$_2$DS$_2$-VASc scores. The authors conclude that the HAS-BLED score should be the optimal choice to assess major bleeding risk in everyday clinical practice.

How should the HAS-BLED score be used? This simple score is recommended in various management guidelines for AF,[13,14] but it should be emphasized that a high HAS-BLED score is not an excuse to withhold oral anticoagulation, as the net clinical benefit balancing ischemic stroke reduction against serious bleeding is even greater at a high HAS-BLED score.[15] Instead, a high HAS-BLED score is to "flag up" the patients potentially at risk of bleeding for more careful review and follow-up, and to address the potentially correctable bleeding-risk factors, such as uncontrolled hypertension (the H in HAS-BLED), labile international normalized ratio (INR) (the L criterion, which is only applicable to those using a vitamin K antagonist [VKA] such as warfarin), concomitant use of aspirin or nonsteroidal anti-inflammatory drugs in an anticoagulated patient, or alcohol excess.

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HAS-BLED has also been validated in AF populations who are anticoagulated with non-VKA anticoagulants[10]; thus, this score works with anticoagulants other than VKAs. However, if the latter are used, the HAS-BLED score is one of the few scores that actually takes the quality of anticoagulation into consideration (labile INRs), given that the time in therapeutic range (TTR) is a strong predictor of bleeding (and thromboembolism) in a patient taking a VKA.[16–18]

However, clinicians have to balance simplicity, practicality, and predictive utility for use in everyday clinical practice. Some may consider trying to "simplify" HAS-BLED even more by excluding (say) uncontrolled hypertension, concomitant alcohol excess, or labile INRs on the grounds (or excuse?) of trying to further simplify a risk score. This is despite uncontrolled hypertension,[19] alcohol excess,[11] and labile INRs[17] being good predictors of bleeding risk.

Thus, a 60-year-old AF patient with poorly controlled hypertension, excessive alcohol intake, and a TTR of 55% (ie, poor anticoagulation control) would have a HAS-BLED score of 3 (ie, high risk of bleeding), and the responsible physician would address that patient's risk factors by controlling blood pressure, reducing alcohol intake, and direct better efforts to improve TTR or to switch the patient to a non-VKA oral anticoagulant. Simplified scores that do not consider these (reversible) bleeding-risk factors would misclassify such a patient as low risk, and thus expose the patient to potentially serious bleeding risks.

Ultimately, most risk scores, whether for bleeding or stroke-risk prediction, that are based on clinical features have modest predictive value for high-risk patients who sustain events. One can certainly add in biomarkers or imaging techniques (eg, small vessel disease or microbleeds on cerebral imaging), but introduce additional complexity and costs of additional tests, with only a marginal improvement in predictive value, which may well be statistically significant; the clinical significance could be open to debate.[20] However, would such an approach of adding additional tests help clinical application and practicality, or would oversimplification (by reducing the number of clinical parameters) really help the patient by misclassifying the patient as low risk? A balance would be needed between simplicity and practicality—as well as predictive value, and as Zhu et al. show, the HAS-BLED score offers this.

Appendix

HADS2 (1 point each for congestive heart failure, hypertension, age ≥75, and diabetes, and 2 points for previous stroke or thromboembolism);

CHA2DS2-VASc (1 point for congestive heart failure, hypertension, diabetes, vascular disease, age 65-74, and female gender, and 2 points for previous stroke or thromboembolism and age ≥75);

HAS-BLED (Hypertension, Abnormal renal and/or liver function, Stroke, Bleeding history or predisposition, Labile International Normalized Ratio (INR), Elderly (>65 years)

HEMORR2HAGES=Hepatic or renal disease Ethanol abuse Malignancy Older (aged ≥75 years) Reduced platelet count or function Rebleeding risk Hypertension (uncontrolled) Anaemia Genetic factors (CYP2C9 single nucleotide polymorphism) Excessive fall risk Stroke ATRIA (Anticoagulation and Risk Factors in Atrial Fibrillation) study

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