Review article

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BLEEDING ASSESSMENT TOOLS

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Bleeding Assessment Tools (BATs) are bleeding scoring systems used for screening and quantitative assessment of mild bleeding disorders. They consist of a standardized questionnaire and a scoring system that is used for the summation of the final score. In this review article, we have presented BATs that are applied in the area of hematology.

The earlier BATs were designed to distinguish patients with von Willebrand disease (VWD) from healthy individuals. Later modifications of the original Vicenza-BAT were developed in order to improve its specificity, precision, and flexibility, as well as to shorten the administration time. The most significant of these modifications is the International Society on Thrombosis and Hemostasis Bleeding Assessment Tool (ISTH-BAT), which is also validated for use in patients affected by hemophilia and inherited platelet disorders. ISTH-BAT score of ≥ 6 in adult females, ≥ 4 in adult males, and ≥ 3 in children is considered abnormal.

The WHO developed the first BAT for immune thrombocytopenia (ITP). However, more recently, the ITP International Working Group (IWG) designed the ITP-BAT. The IWG defines a severe or clinically relevant bleeding manifestation as an ITP-BAT SMOG index of S > 2 and/or M > 1 and/or O > 1. In 2016, a group of Chinese experts created a simple modification of the ITP-BAT, the ITP-2016. The values of the ITP-2016 Bleeding Score ≥ 5 indicate severe immune thrombocytopenia.

In the primary healthcare setting BATs serve as a valuable screening tool for discovering patients with bleeding disorders, who require further hematologic investigation.

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Key words: *scoring, von Willebrand disease, platelet disorders, hemophilia, immune thrombocytopenia*

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Introduction

Spontaneous termination of bleeding is realized through multiple interactions between vascular elements, thrombocytes, and coagulation factors (1).

If any of the aforementioned components is impaired, this might result in clinical manifestations of a bleeding disorder (2). While being utterly heterogeneous, both hereditary and acquired bleeding disorders share similar clinical manifestations, such as spontaneous bleeding events in various tissues and organs (2). Although generally rare in the overall population, unless a timely diagnosis is made, these disorders can greatly reduce the quality of life in affected patients (2).

Therefore, bleeding assessment tools (BATs) were designed in order to attain structured anamnestic data, and optimize the accuracy of a bleeding disorder diagnosis, as well as to predict the risk of bleeding events in the future (3).

BATs are bleeding scoring systems used for screening and quantitative assessment of mild bleeding disorders (2, 3). BATs are clinical tools consisting of a standardized questionnaire (based on structured bleeding symptomatology, which is quantified according to severity, and sometimes frequency), and a scoring system, that is used for the summation of the final score, and its interpretation (4).

BATs should be used primarily in the primary healthcare setting by trained medical professionals (general practitioners, pediatricians, trained nurses, and technicians), who are first to meet patients with a possible bleeding disorder (5). The final BAT score may help primary

healthcare providers decide whether the patient is in need of an examination by a hematology specialist and further laboratory testing, which can be expensive, time-consuming, and sometimes problematic for interpretation (3, 5).

An optimal BAT should be objective, highly specific and highly sensitive, validated on a real-life population, as well as accessible, available, short, and simple (6).

Even though no single BAT meets all of the aforementioned standards, the latest BATs tend to meet most of them (5).

When designing BATs and interpreting BAT scores it is important that medical profes-sionalsavoid mistaking trivial bleeding (defined as a bleeding which "causes no emotional distress, does not impair social life and activities, and does not require medical treatment") for significant bleeding symptoms (4, 6).

In this review article, we have presented a short review of BATs which are used in assessing bleeding disorders.

BATs used for von Willebrand disease type 1

Von Willebrand disease (VWD) is a bleeding disorder caused by either the dysfunction or deficiency of von Willebrand factor, a protein that enables the adhesion of platelets onto the subendothelial matrix and acts as the protector of FVIII (7).

VWD typically manifests itself through mucocutaneous bleeding events, especially during hemostatic challenges (surgery, tooth extraction, and postpartum bleeding) (7, 8).

Although there are basically three hereditary types of this disease (out of which type 2 is further divided into subtypes: 2A, 2B, 2M, 2N), VWD may rarely occur as an acquired condition, which is known as the acquired von Willebrand syndrome (7).

According to epidemiologic studies, the prevalence of VWD ranges between 1:100 and 1:10.000 individuals, making it the most frequent bleeding disorder (7, 9, 10).

VWD type 1, which results from a partial quantitative deficiency of VWF, accounts for 75% of individuals affected by von Willebrand syndrome (7).

Given its high prevalence as well as the pitfalls of the existing laboratory tests in cases of mild disease forms, a group of Italian investigators developed the Vicenza-BAT, the first BAT designed and validated for the screening of (mild forms of) VWD type 1 (5, 8). According to the severity of an individual bleeding symptom, each symptom included in the Vicenza-BAT was scored between 0 and 3 (11). The values of Vicenza-BAT bleeding score greater than 3 in adult males, as well as values greater than 5 in adult females, were associated with the phenotype of VWD (with specificity of 98%, and sensitivity of 69%) (6, 8, 11).

Since the main limitation of Vicenza-BAT was its relatively low sensitivity (as bleeding episodes that required higher intensity therapy were awarded higher scores), the next tool developed in order to improve sensitivity was the European Molecular and Clinical Markers for the Diagnosis and Management of Type 1 VWD (MCMDM-1 VWD BAT) (5). Although MCMDM-1 VWD BAT improved sensitivity (100%), it was too complex and time-consuming (requiring approximately 40 minutes for administration) (5, 8, 11).

The Condensed MCMDM-1 VWD BAT was the later modification of the MCMDM-1 VWD BAT, which was significantly shorter, requiring only 10 minutes for administration (5, 8, 11). A normal range of the Condensed MCMDM-1 VWD BAT bleeding score ranges between -3 and +3, while abnormal values of the Condensed MCMDM-1 VWD BAT bleeding score are above 3 in both sexes (11).

In 2010, the International Society on Thrombosis and Hemostasis/Scientific and Standardization Committee (ISTH/SSC) Joint Working Group designed the ISTH-BAT (Tables 1 and 2) through the merging of the previously developed BATs, in order to improve the ease of use, precision, and flexibility (3, 4, 11). The ISTH-BAT was developed for the screening of mild bleeding disorders such as VWD, but it was later validated for the screening of mild hemophilia and inherited platelet disorders (3, 5). While previous BATs relied exclusively on the severity of bleeding symptoms, the ISTH-BAT also included quantitative elements regarding their frequency (11). Normal values of the ISTH-BAT Bleeding Score for adult females and adult males range between 0–5 and 0–3, respectively (11). This sex-related normal range difference is due to the inclusion of gender-specific bleeding symptoms (menorrhagia and postpartum bleeding) (6, 11). In the pediatric population (aged < 18 years), normal values of the ISTH-BAT bleeding score range between 0–2, regardless of sex (6, 11). In adult females the value of ISTH-BAT bleeding score ≥ 6 is considered "abnormal", whereas in adult males the value of ISTH-BAT bleeding score ≥ 4 is considered "abnormal", deserving further laboratory investigation (6, 11). In the pediatric population, ISTH-BAT bleeding score ≥ 3 is considered "abnormal", regardless of sex (6, 11). In the context of VWD, current guidelines of relevant medical organizations (ISTH, WFH, ASH, NHF) encourage the use of ISTH-BAT in a primary healthcare setting, while ISTH-BAT testing is considered unnecessary in a tertiary healthcare setting, as well as for patients with an existing family history of VWD (9, 12).

Self-BAT is a more recent self-testing version of ISTH-BAT, which can be filled out online (8, 9). Self-BAT has lesser specificity (23%) and greater sensitivity (78%) compared to the original ISTH-BAT (8).

Table 1. ISTH/SSC* definitions of bleeding symptoms included in the ISTH-BAT**

Bleeding symptom:	International Society on Thrombosis and Hemostasis/Scientific and Standardization Committee definition:
Significant epistaxis	lasting > 10 min; > 5 episodes/year; is not seasonal; not associated with an identifiable cause
Significant bruises:	≥ 5 bruises > 1 cm in exposed areas; petechiae; spontaneous hematomas
Significant minor cutaneous wound:	> 1 bleeding episode caused by superficial cuts lasting > 10 min requiring frequent bandage changes
Hematuria:	red to pale-pink coloration of urine that cannot be explained by the presence of a urologic disease
Hematemesis, melena, hematochezia:	gastrointestinal bleeding that cannot be explained by the presence of a specific disease
Significant oral cavity bleeding:	> 1 bleeding episode lasting > 10 min originating from the gums, bitten lips, cheeks, or tongue, causing swelling and frankly bloody sputum
Significant bleeding after tooth extraction:	any bleeding occurring after leaving the dentist's office, requiring a new, unscheduled visit or prolonged bleeding at the dentist's office causing a delay in the procedure or discharge
Significant surgical bleeding:	any bleeding judged by the surgeon to be abnormally prolonged, that causes a delay in discharge or requires supportive treatment
Menorrhagia:	criteria for significant menorrhagia may include any of the following: changing pads more frequently than every 2 h; menstrual bleeding lasting 7 or more days; and the presence of clots > 1 cm combined with a history of flooding. If a patient has previously made a record of her menstrual loss using a pictorial blood loss assessment chart (PBAC), a PBAC score > 100 also qualifies for a score of 1
Postpartum bleeding:	vaginal bleeding or uterine discharge (lochia) lasting > 6 weeks. Any bleeding lasting < 6 weeks that is judged by the obstetrician as abnormally heavy or prolonged, that causes a delay in discharge, requires supportive treatment, changing pads or tampons more frequently than every 2 h, or causes progressive anemia
Muscle hematomas/ hemarthrosis:	Any spontaneous joint/muscle bleeding (not related to traumatic injuries)
CNS bleeding:	subdural or intracerebral hemorrhage requiring diagnostic or therapeutic intervention is scored 3 or 4, respectively
Other bleeding symptoms:	when these bleeding symptoms occur during infancy, they are scored ≥ 1. Their presence when reported by either the patient or a family member should always prompt detailed laboratory investigation.

* The International Society on Thrombosis and Hemostasis/Scientific and Standardization Committee

** The International Society on Thrombosis and Hemostasis Bleeding Assessment Tool

Modified from Rodeghiero F, et al (4).

Table 2. The International Society on Thrombosis and Hemostasis Bleeding Assessment Tool Bleeding Score

Symptoms (up to the time of diagnosis)	POINTS				
	0*	1*	2	3	4
Epistaxis	No/trivial	> 5/year or > 10 min	Consultation only**	Packing/ cauterization/ antifibrinolytic	Transfusion or replacement therapy (use of hemostatic blood components and rFVIIa) or desmopressin
Cutaneous bleeding	No/trivial	For bruises 5 or more (> 1 cm) in exposed areas	Consultation only**	Extensive	Spontaneous hematoma requiring transfusion
Bleeding from minor wounds	No/trivial	> 5/year or > 10 min	Consultation only**	Surgical hemostasis	Transfusion, replacement therapy/desmo-pressin
Oral cavity	No/trivial	Present	Consultation only**	Surgical hemostasis/ antifibrinolyitic	Transfusion, replacement therapy/desmo-pressin
Gastro-intestinal bleeding	No/trivial	Present (not associated with ulcer, portal hypertension, hemorrhoids, angiodysplasia)	Consultation only**	Surgical hemostasis/ antifibrinolyitic	Transfusion, replacement therapy/desmo-pressin
Hematuria	No/trivial	Present (macroscopic)	Consultation only**	Surgical hemostasis, iron therapy	Transfusion, replacement therapy/desmo-pressin
Tooth extraction	No/trivial or none done	Reported in ≤ 25% of all procedures, no intervention***	Reported in > 25% of all procedures, no intervention***	Resuturing/ packing	Transfusion, replacement therapy/desmo-pressin
Surgery	No/trivial or none done	Reported in ≤ 5% of all procedures, no intervention***	Reported in > 25% of all procedures, no intervention***	Surgical hemostasis/ antifibrinolytic	Transfusion, replacement therapy/desmo-pressin
Menorrhagia	No/trivial	Consultation only**/ changing pads more frequently than every 2 h /clot and flooding/ PBAC score > 100#	Time off work/school > 2 per year/ requiring antifibrinolytics/ hormonal/iron therapy	Requiring combined treatment with antifibrinolytics and hormonal therapy/ present since menarche and > 12 months	Acute menorrhagia requiring hospital admission and emergency treatment/ requiring transfusion, replacement therapy, desmopressin/ requiring dilatation and curettage or endometrial ablation or hysterectomy
Postpartum hemorrhage	No/trivial or no deliveries	Consultation only**/Use of syntocin /Lochia > 6 weeks	Iron therapy/ antifibrinolytic	Requiring transfusion, replacement therapy, desmopressin	Any procedure requiring critical care or surgical intervention (e.g. hysterectomy,

				or requiring examination under anesthesia and/or the use of uterine balloon/package to tamponade the uterus	internal iliac artery ligation, uterine brace sutures, uterine artery embolization)
Muscle hematomas	Never	Post-trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or transfusion
Hemarthrosis	Never	Post-trauma, no therapy	Spontaneous, no therapy	Spontaneous or traumatic, requiring desmopressin or replacement therapy	Spontaneous or traumatic, requiring surgical intervention or transfusion
CNS bleeding	Never	/	/	subdural, any intervention	Intrace−rebral, any intervention
Other bleedings##	No/trivial	Present	Consultation only**	Surgical hemostasis, antifibrinolytics	Transfusion/replacement therapy/ desmopressin

*Distinction between 0 and 1 is of critical importance. Score 1 means that the symptom is judged as present in the patient's history by the interviewer but does not qualify for a score 2 or more
**Consultation only: the patient sought medical evaluation and was either referred to a specialist or offered detailed laboratory investigation
***Example: 1 extraction/surgery resulting in bleeding (100%): the score to be assigned is 2; 2 extractions /surgeries, 1 resulting in bleeding (50%): the score to be assigned is 2; 3 extractions/surgeries, 1 resulting in bleeding (33%): the score to be assigned is 2; 4 extractions/surgeries, 1 resulting in bleeding (25%): the score to be assigned is 1
#If already available at the time of collection
##Include umbilical stump bleeding, cephalohematoma, cheek hematoma caused by sucking during breast/bottle feeding, conjunctival hemorrhage or excessive bleeding following circumcision or venipuncture. Their presence in infancy requires detailed investigation independently from the overall score.

ISTH-BAT Bleeding Score interpretation:
Normal values of ISTH-BAT Bleeding Score for adult males range between 0 and 3.
In adult males ISTH-BAT Bleeding Score ≥ 4 is considered "abnormal".
Normal values of ISTH-BAT Bleeding Score for adult females range between 0 and 5.
In adult females ISTH-BAT Bleeding Score ≥ 6 is considered "abnormal".
Normal values of ISTH-BAT Bleeding Score in the pediatric population (of both sexes aged < 18 years) range between 0 and 2.
In the pediatric population ISTH-BAT Bleeding Score ≥ 3 is considered "abnormal".

Modified from Rodeghiero F, et al (4).

BATs used for hemophilia

Hemophilia represents a group of bleeding disorders that are characterized by the deficiency of an intrinsic pathway coagulation factor (FVIII in hemophilia A, FIX in hemophilia B, and FXI in hemophilia C) (13, 14).

Although it is usually hereditary, hemophilia can rarely occur as an acquired autoimmune disease resulting from the development of anti-FVIII antibodies (inhibitors) (15).

The most common forms of hemophilia are X-linked recessive FVIII deficiency (hemophilia A) and FIX deficiency (hemophilia B) (13).

Both hemophilia A and B have identical clinical manifestations (typically hemarthroses, prolonged bleeding after tooth extraction), whereas depending on the degree of the coagulation factor deficiency, hemophilia can be mild, moderate, or severe (13).

In a study conducted by James et al., ISTH-BAT was evaluated in the context of recognizing hemophilia carriers (16). The results of this prospective study showed that the mean ISTH-

BAT score values achieved by hemophilia carriers were below those registered for females with VWD1, and above those achieved by VWD3 patients (16).

A multicenter Chinese study performed by Li et al., also confirmed the utility of the ISTH-BAT (as well as the Chinese-BAT, C-BAT) in discriminating hemophilia carriers from healthy females, since carriers achieved higher median bleeding scores (17). However, median scores from neither of the BATs showed a significant correlation with the levels of plasma coagulation factors (17).

According to the results of a recent study performed by Borhany et al., ISTH-BAT has proven itself to be useful in discriminating hemophilia (18). In the aforementioned study, ISTH-BAT was used for the assessment of a population of newly diagnosed, as well as already diagnosed patients with hemophilia A (78 patients) and B (37 patients), in order to establish the role of ISTH-BAT in the diagnostics and severity assessment, as well as to investigate the correlation between the ISTH-BAT score and plasma levels of the deficient coagulation factors in children and adults (18). By using ISTH-BAT, Borhany and colleagues were successful in discriminating hemophilia patients from healthy controls, since the bleeding score was significantly higher in hemophilia patients (18). Regarding the achieved ISTH-BAT score values, no significant difference was found in the hemophilia A and B patient subgroups, nor between the newly diagnosed and known hemophilia patients (18). This study also found that the ISTH-BAT score was higher in patients with severe hemophilia A compared to those with the mild form of this disease, as well as that children had a lower score compared to the adult patients (18).

BATs used for inherited platelet disorders

Inherited platelet disorders (IPDs) represent a heterogeneous spectrum of bleeding disorders that include defects of platelet functions and/or a decrease in platelet counts (3).

Gresele et al. performed a large multinational study in order to establish the diagnostic utility of ISTH-BAT in discriminating IPDs from healthy controls (3).

Additional aims of the aforementioned study were to distinguish VWD1 from inherited platelet function disorders (IPFDs) as well as various IPFDs by using ISTH-BAT (3).

The results from Gresele et al. proved that the values of the ISTH-BAT bleeding score above 6 in patients with a mucocutaneous bleeding diathesis, in whom VWD1 and coagulation disorders were excluded by using preliminary laboratory screening tests, indicate a diagnosis of IPFD with a 99% chance (3).

The ISTH-BAT bleeding score was significantly higher in IPFD patients (median bleeding score of 9) in comparison to VWD1 patients (median bleeding score of 5) (3).

The percentage of patients with an ISTH-BAT score > 2 (patients with clinically relevant bleeding symptoms) was significantly higher in IPFD patients in comparison to other study groups (3). This study also demonstrated that the median number of bleeding symptoms was lowest for healthy individuals (0) and those with inherited thrombocytopenias (1), and the highest in IPFD patients (4), while the median numbers of bleeding symptoms in individuals with VWD1 were in between (3).

The highest scores were recorded in the subpopulation of IPFDs (consisting mostly of Glanzmann thrombasthenia and CalDAG-GEFI-linked disorder cases), as well as in the subpopulation of inherited thrombocytopenias (consisting mostly of X-linked thrombocytopenia and TAR syndrome cases) (3).

It is important to note that the frequent association between inherited thrombocytopenias and platelet function defects causes the ISTH-BAT score values to be as high as in the case of IPFDs with a regular platelet count (3). In this case, the ISTH-BAT score would not support the diagnosis of an inherited thrombocytopenia given the severe bleeding tendency (3).

In order not to establish an incorrect diagnosis of an acquired thrombocytopenia, a high ISTH-BAT score in the presence of thrombocytopenia requires assessment of the medical history as well as a hematocytological analysis (19).

It was also recorded that certain bleeding events were more frequently recorded in certain bleeding disorders. Thus, VWD1 was associated with menorrhagia, and inherited thrombocytopenias were associated with cutaneous bleeding,
whereas IPFDs were associated more often with epistaxis (3).

Overall, ISTH-BAT is a useful tool capable of discriminating IPFD patients from healthy individuals (3). However, it is less reliable for distinguishing VWD1 from IPFDs, and between inherited thrombocytopenia and IPFDs (3). By using ISTH-BAT, it is impossible to distinguish patients affected by inherited thrombocytopenia from healthy individuals (3).

Although ISTH-BAT is not yet sufficiently validated in IPFDs, current IPFD guidelines suggest using ISTH-BAT for the sake of assessing the severity of bleeding symptoms and identifying patients who deserve further laboratory investigations (20).

BATs used for immune thrombocytopenia

Immune thrombocytopenia (ITP) is an acquired autoimmune disease that is characterized by the formation of antibodies against thrombocytic antigens (glycoproteins—gp IIb/IIIa, gp Ib/IX etc.), resulting in the excess destruction

of opsonized platelets by spleen macrophages and Kupffer cells and a decrease in platelet counts below 100 x 109/l (21).

Depending on the clinical course, ITP can be newly diagnosed (with a resolution within the next 3 months), persistent (with a resolution within a period of 3–12 months), or chronic (lasting longer than 12 months) (21, 22).

Although several specific BATs were developed in the past, the only one adopted for practical assessment of ITP in the context of clinical trials used to be a scale that was developed in 1981 on the initiative of the World Health Organization (23).

Since none of the previous BATs could meet the standards (simplicity, reproducibility, and clinical applicability) required for use in clinical practice, there was a need to design a new BAT that would be more clinically relevant (24).

In 2013, the International Working Group (IWG) on Immune Thrombocytopenia developed the Immune Thrombocytopenia Bleeding Assessment Tool (ITP-BAT, version 1.0), a clinically meaningful scoring system based on expert consensus (24). The IWG provided precise definitions for each of the ITP bleeding symptoms and grouped these symptoms into three domains: S—bleeding into the skin (which are the least dangerous), M—bleeding in the visible mucosae, and O—bleeding in organs and internal mucosae (which may be potentially life-threatening) (24).

Every bleeding symptom in each of the domains is further graded depending on its severity (24). Bleeding in the organ domain (except intracranial and ocular bleeding, which are graded from 0 and 2 to 4) and epistaxis have been graded between 0 (none) and 4 (24).

Other bleeding sites in mucosal and skin domains were graded into four grades (0–3), whereas any fatal bleeding was assigned a grade 5 (24).

Instead of obtaining a total sum ITP-BAT score, the IWG recommends reporting the 3 domains (S, M, and O) separately, thus generating the SMOG index, whereas intracranial bleeding should be reported separately (e.g., S2M2O3 (intracranial 3) stands for grade 2 for the skin domain, grade 2 for the visible mucosal domain, grade 3 for the organ and internal mucosal domain, and grade 3 for intracranial bleeding) (24).

The IWG defines a severe/clinically relevant bleeding manifestation as the ITP-BAT SMOG index of S > 2 and/or M > 1 and/or O > 1 (24).

The ITP-BAT version 1.0 was intended for describing bleeding manifestations in a form suitable for statistical analysis, in order to aid the investigations regarding ITP course, such as investigating the correlation between platelet counts and ITP manifestations (24).

Further prospective studies are still required in order to validate ITP-BAT for therapeutic decision-making (determining the effectiveness of the existing and innovative ITP treatments), as well as ITP prognosis (24).

Table 3. ITP-2016 (2016 Version of the Immune Thrombocytopenia Bleeding Grading System)

Points		1	2	3	5	8
Age	≥ 65 years	+				
	≥ 75 years		+			
Subcutaneous hemorrhage (petechiae/ecchymosis /hematoma)	head and face		+			
	other	+				
Mucosal hemorrhage (nasal cavity/gums/ oral mucosa/bloody bulla/conjunctive)	sporadic, automatic cease		+			
	frequent, hard to cease			+		
	with anemia				+	
Visceral (internal organs) hemorrhage (lung, gastrointestinal tract, urogenital system)	without anemia			+		
	with anemia				+	
	life threatening					+
	central nervous system					+

ITP-2016 Bleeding Score is calculated by summation of the age score and the bleeding manifestation score, which is the highest score among all achieved scores.

The values of ITP-2016 Bleeding Score ≥ 5 points indicate severe immune thrombocytopenia.

Modified from Thrombosis and Hemostasis Group (26).

The aim of a prospective study by Xiao et al. was to compare ITP-BAT to a new ITP bleeding scale—version 2016 (ITP-2016) (Table 3), which was developed by the Society of Hematology, Chinese Medical Association experts (25, 26).

A retrospective study conducted by Huang et al. compared the two BATs (ITP-BAT vs. ITP-2016) in assessing the population of Chinese pregnant ITP patients (27).

According to the results of this study, ITP-2016 appears to be more adequate for pregnant ITP patients of Chinese ethnicity (27).

The results of the aforementioned studies stated that, in comparison to ITP-BAT, ITP-2016 took less time to complete, while both BATs showed strong assessment consistency and adequate responsiveness (25, 27).

Both studies have demonstrated a negative correlation between platelet counts and the bleeding grade (25, 27).

These studies suggest that ITP-2016 represents a valid tool for the assessment of clinical manifestations and disease risk, as well as for the evaluation of (high-dose dexamethasone) treatment efficacy (25, 27).

The values of the ITP-2016 Bleeding Score ≥ 5 points indicate severe immune thrombocytopenia (26).

Conclusion

In light of possible issues with the interpretation of existing laboratory tests in diagnosing mild bleeding disorders, BATs remain useful tools for the clinical assessment of patients with potential bleeding disorders primarily in the primary healthcare setting, providing a standardized and structured approach for physicians who are less experienced in hematologic disorders.

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ALATI ZA PROCENU KRVARENJA

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Alati za procenu krvarenja (engl. *blood assessment tool* – BATs) predstavljaju sisteme bodovanja za krvarenja koji se koriste za skrining i kvantitativnu procenu blagih poremećaja krvarenja. Sastoje se od standardizovanog upitnika i sistema bodovanja koji se upotrebljava za računanje konačnog zbira bodova. U ovom preglednom članku predstavljeni su alati za procenu krvarenja koji se koriste u oblasti hematologije.

Prvi alati bili su dizajnirani radi razlikovanja bolesnika sa Fon Vilebrandovom bolešću od zdravih osoba. Kasnije modifikacije originalnog Vičenza alata razvijene su kako bi se poboljšale njegova specifičnost, preciznost i fleksibilnost i kako bi se skratilo vreme potrebno za popunjavanje upitnika. Najznačajnija od ovih modifikacija jeste alat Internacionalnog društva za trombozu i hemostazu (ISTH-BAT), takođe validiran za upotrebu kod hemofilije i urođenih bolesti trombocita. ISTH-BAT zbir ≥ 6 kod odraslih žena, ≥ 4 kod odraslih muškaraca i ≥ 3 kod dece smatra se abnomalnim nalazom.

Prvi alat za imunološku trombocitopeniju (engl. *immune thrombocytopenia*– ITP) razvila je Svetska zdravstvena organizacija (SZO). Međutim, nedavno je Internacionalna radna grupa (engl. *International Working Group*–IWG) za ITP razvila ITP-BAT. Radna grupa definiše teško / klinički relevantno krvarenje kao ITP-BAT SMOG index: S > 2 i/ili M > 1 i/ili O > 1. Modifikovanjem ITP-BAT tokom 2016. godine grupa kineskih eksperata razvila je ITP-2016. Vrednosti ITP-2016 zbira ≥ 5 odgovaraju teškoj imunološkoj trombocitopeniji.

Na nivou primarne zdravstvene zaštite alati za procenu krvarenja predstavljaju korisne skrining alate za otkrivanje bolesnika sa patološkim krvarenjima, koji zahtevaju sprovođenje dopunskih hematoloških pretraga.

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***Ključne reči**: bodovanje, Fan Vilebrova bolest, bolesti trombocita, hemofilija, imunološka trombocitopenija*

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