

Pre-operative coagulation test results do not correlate with Self-bleeding assessment tool (Self-BAT) scores

Grace H. Tang¹, Rosane Nisenbaum², Rachel Martin³, Pauline Manuel¹, Rebecca Sampat¹, Jerry Teitel¹, Paula D. James⁴, Michelle Sholzberg^{1,5}

1. Division of Hematology/Oncology, Department of Medicine, St. Michael's Hospital, Toronto, Canada; 2. Li Ka Shing Knowledge Institute, Applied Health Research Centre, Centre for Urban Health Solutions, St. Michael's Hospital, Toronto, Canada; 3. Department of Anesthesia, St. Joseph's Health Centre, Toronto, Canada; 4. Department of Medicine, Queen's University, Kingston, ON, Canada; 5. Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, ON, Canada

INTRODUCTION

- Elective surgical procedures are planned hemostatic challenges and laboratory coagulation testing is often the approach used for pre-operative hemostatic assessments.
- This is unfortunate as the prothrombin time [PT] and activated partial thromboplastin time [aPTT] have poor predictive value for surgical bleeding and are of limited screening value for inherited bleeding disorders.¹⁻⁴
- To the contrary, personal and family history of bleeding are important predictors of inherited bleeding disorders, and thus also likely predictive of perioperative bleeding risk.**
- Quantitative bleeding assessment tools (BATs) have been developed to standardize the patient bleeding history, and a patient self-administered BAT (Self-BAT) has been validated for the diagnosis of type 1 von Willebrand disease.^{5,6}
- As part of a large, multicentre prospective cohort study to assess the accuracy of the Self-BAT in predicting peri-operative bleeding, we aimed to determine the correlation between results of pre-operative coagulation assays and the Self-BAT score in patients undergoing elective surgery.

RESULTS

- A total of 368 were enrolled in the study, the mean age was 59 years old (standard deviation: 14.4) and 64.3% were women (Table 1)
- The median Self-BAT score for women was 2 (interquartile range [IQR]: 1-4.3) and 1 (IQR: 0-2) for men.**

Table 1. Patient Characteristics at Pre-Operative Visit

Characteristic, n (%)	Patients (n=368)
Female	236 (64.3)
Age at enrollment (mean (SD))	59 (14.4)
Hemoglobin at enrollment (g/L) (mean (SD))	
Female	124.2 (40.9)
Male	142.8 (33.1)
Ethnicity	
White	286 (78.8)
Asian	29 (8.0)
Black	23 (6.3)
Other	12 (3.3)
Hispanic	10 (2.8)
Native American	3 (0.8)
Family History of Bleeding Disorder	12 (3.3)
Family History of Bleeding	7 (1.9)
Type of Planned Surgery	
Orthopedic	224 (61.0)
Neurosurgery	53 (14.4)
General Surgery	30 (8.2)
Gynecology Surgery	28 (7.6)
Otolaryngology Surgery	17 (4.6)
Urology Surgery	15 (4.1)

- Of the 236 women and 132 men, 42 (17.8%, 95%CI: 12.9-22.7%) and 17 (13%, 95%CI: 7.2-18.7%) had abnormal Self-bat score, defined as ≥ 6 for women and ≥ 4 for men**
- We found no significant correlations between the aPTT, PT, Factor VIII, VWF panel nor PFA-100 and the Self-BAT score (Table 2, Figure 1).**
- There was also no correlation found for sex stratified analyses.**
- Correlation tests for abnormal Self-BATs and abnormal lab parameters were not analyzed due to small sample size.

Table 2. Relationship between Laboratory Testing and Self-BAT Scores at the Pre-Operative Visit

Laboratory Test	R	P value
Routine Testing		
Prothrombin time	-0.055	0.31
Activated partial thromboplastin time	-0.042	0.44
Specialized Hemostatic Testing		
von Willebrand Factor Antigen	-0.05	0.37
von Willebrand factor GP1b (ristocetin calibrated) Activity	-0.057	0.30
Factor VIII activity	0.0026	0.96
Platelet Function Assay-100		
Collagen/Adenosine Diphosphate	-0.00062	0.99
Collagen/Epinephrine	0.084	0.14

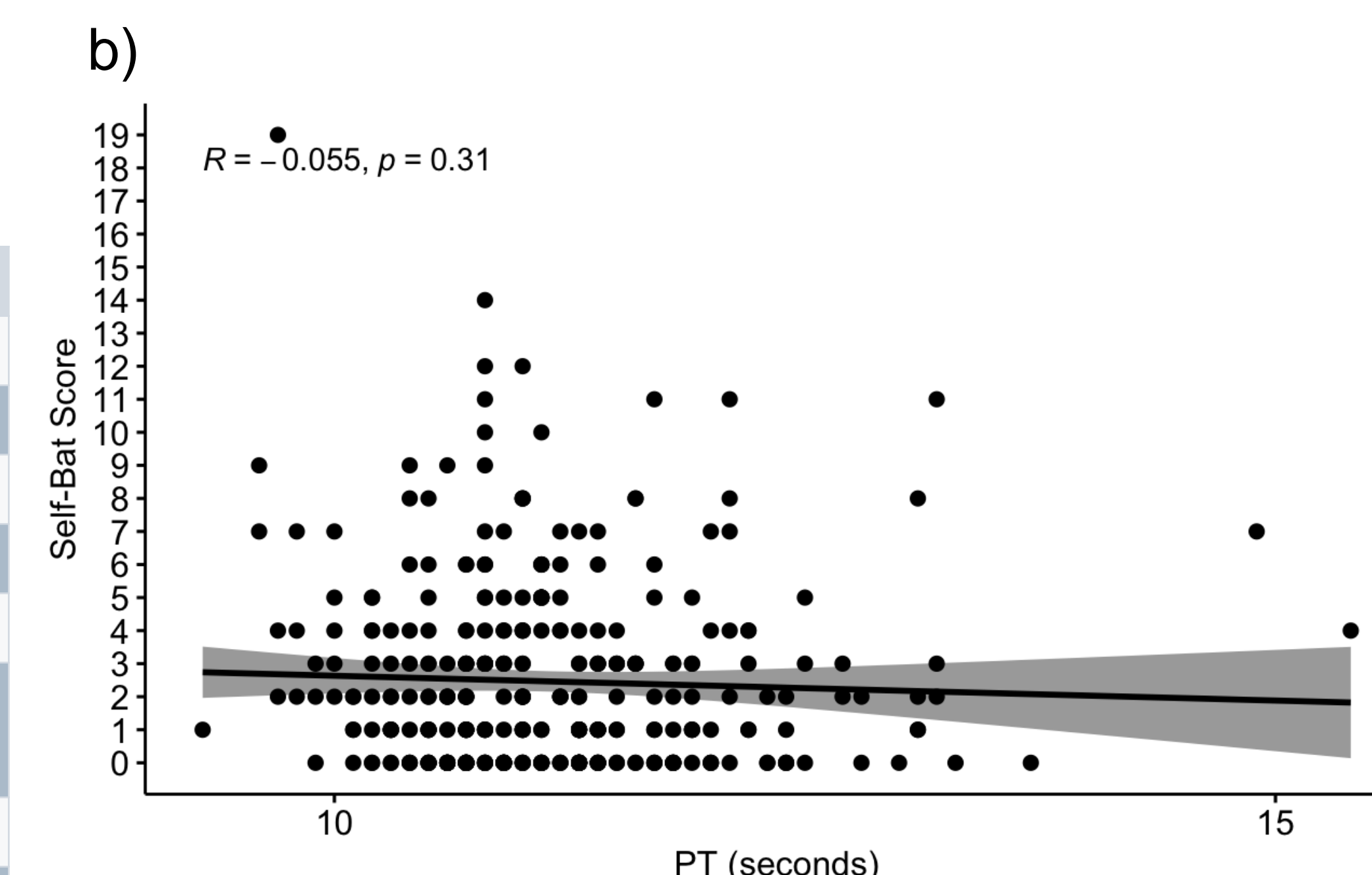
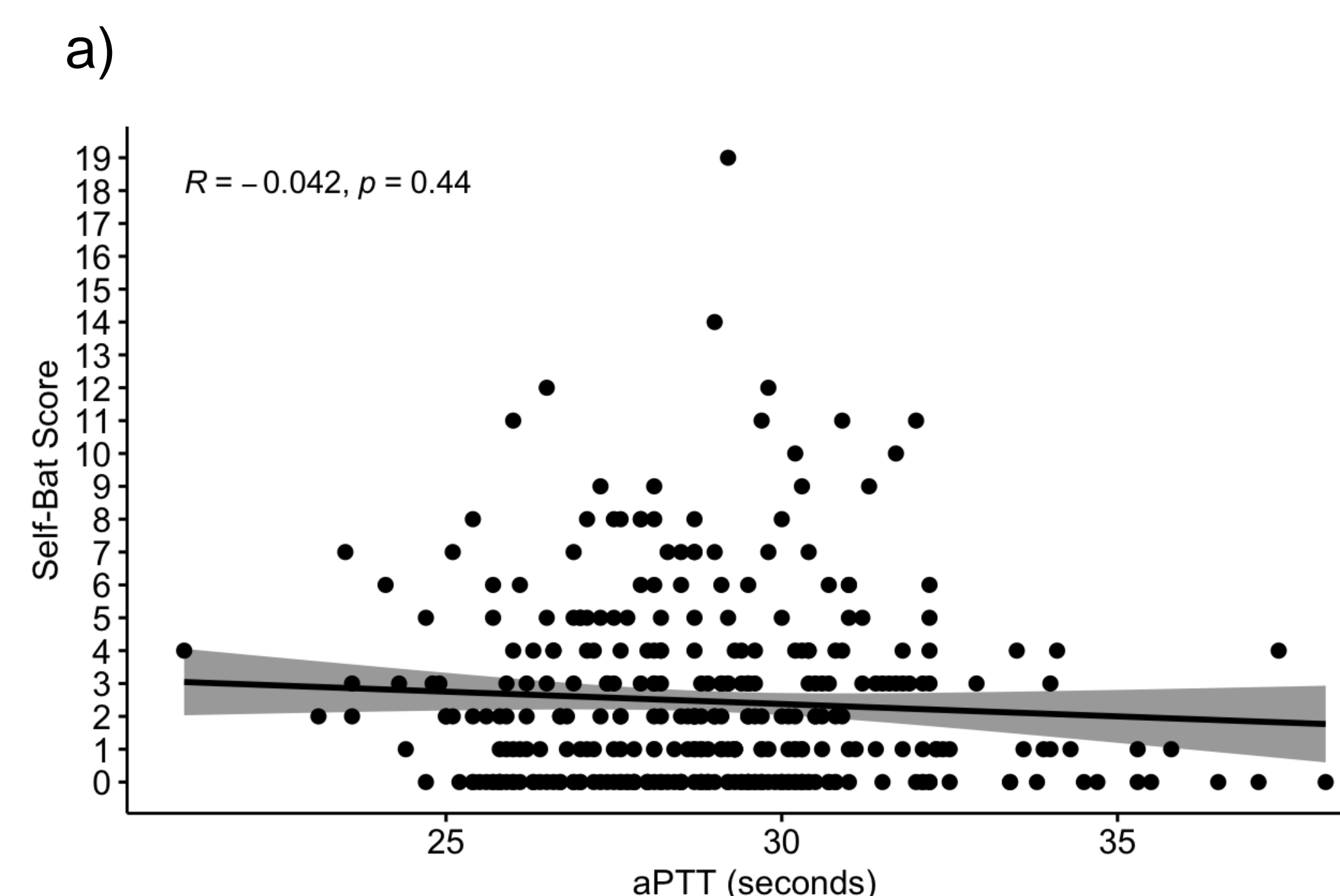


Figure 1. Relationship between Self-BAT Scores and Routine Testing

METHODS

- We enrolled adult patients with no previously identified bleeding disorder who were undergoing general elective surgery between 2017 to 2018 at a large academic hospital in Toronto, Canada.
- We excluded patients with any prior history of therapeutic dose antithrombotic use, and those undergoing cardiac, vascular, emergency, ophthalmologic, or dental surgeries.
- Bloodwork was drawn at the pre-operative visit, and included aPTT, PT, von Willebrand factor (VWF) antigen, VWF GP1b (ristocetin calibrated) activity, factor VIII activity, platelet function assay (PFA)-100 closure times.
- The pre-operative Self-BAT and all laboratory tests were analyzed at the same site.
- An abnormal Self-BAT score was defined as ≥ 6 for women and ≥ 4 for men.
- We used Spearman's correlation coefficient to determine the relationship between results of laboratory testing and the Self-BAT scores.
- R v4.3.1 was used to perform the analysis.

Sample Self-BAT Questions:

Have you ever had bleeding from the mouth? (i.e. bleeding after tooth brushing or flossing, or injury to the mouth). (This does NOT include tooth extraction at the dentist). Select one:

- No
- Yes, but very little bleeding
- Yes, but did not need medical treatment
- Spoke to doctor or dentist about bleeding from the mouth but did not need medical treatment
- Needed surgery or oral medication
- Had blood transfusion or I.V. medication as a result of bleeding from the mouth

Have you ever had heavy menstrual periods? (please choose all that apply)

- No
- Spoke to doctor about heavy periods
- Bleeding lasted for more than 7 days
- Passed clots and had flooding
- Needed to change pads/tampons more often than every 2 hours
- Needed to stay home from work/school more than twice a year because of heavy periods
- Was given the birth control pill or other oral medication to make my periods lighter or shorter
- Needed to take iron because of heavy periods
- Given the birth control pill AND other oral medication to make my periods lighter or shorter
- Periods were heavy from the get-go and for longer than 1 year
- Had emergency treatment or was admitted to hospital, or had blood transfusion or I.V. medication or needed surgery

For more information on the Self-BAT:



CONCLUSIONS

- Our findings confirm that unselected 'routine' and specialized coagulation test results do not correlate with an individual's bleeding history.
- Thus, indiscriminate testing should not be used as surrogate screening tests for bleeding disorders in the pre-operative setting.
- Specialized coagulation testing should be reserved for when a hemostatic defect is suspected based on a positive personal or family bleeding history.**

Future Directions:

- We look forward to the results of the primary objective of the larger cohort study; enrollment is more than half completed to determine if the Self-BAT score itself is an accurate predictor of peri-operative bleeding.

FUNDING

This study has received a 2017 Mentored Research Award from the Hemostasis and Thrombosis Research Society (HTRS), which was supported by an educational grant from Takeda, the Canadian Hemophilia Society Care Until Cure Grant and the Association of Hemophilia Clinic Directors of Canada.

REFERENCES

- Chee YL, Crawford JC, Watson HG, Greaves M. Guidelines on the assessment of bleeding risk prior to surgery or invasive procedures. British Committee for Standards in Haematology. Br J Haematol. 2008 Mar;140(5):496-504.
- Burk CD, Miller L, Handler SD, Cohen AR. Preoperative history and coagulation screening in children undergoing tonsillectomy. Pediatrics. 1992 Apr;89(4 Pt 2):691-5.
- Kitchens CS. To bleed or not to bleed? Is that the question for the PTT? J Thromb Haemost. 2005 Dec;3(12):2607-11.
- Levy JH, Szlam F, Wolberg AS, Winkler A. Clinical use of the activated partial thromboplastin time and prothrombin time for screening: a review of the literature and current guidelines for testing. Clin Lab Med. 2014 Sep;34(3):453-77.
- Deforest M, Grabell J, Albert S, Young J, Tuttle A, Hopman WM, et al. Generation and optimization of the self-administered bleeding assessment tool and its validation as a screening test for von Willebrand disease. Haemophilia. 2015 Sep;21(5):e384-388.
- Kalot MA, Husainat N, Tayiem S, El Alayli A, Dimassi AB, Diab O, Abughanim O, Madoukh B, Qureini A, Ameer B, Di Paola J. Bleeding assessment tools in the diagnosis of VWD in adults and children: a systematic review and meta-analysis of test accuracy. Blood Advances. 2021 Dec 14;5(23):5023-31.

CONTACT

Grace Tang, PhD
Email: grace.tang@unityhealth.to

