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## Pediatric Venous Thromboembolism (VTE) Risk Assessment Tool

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# Pediatric Venous Thromboembolism (VTE) Risk Assessment Tool

Andrea Prentiss, MSN, PNP-BC, PCNS-BC



## Purpose:

Early and accurate assessment of risk factors present in the pediatric patient would minimize morbidity and mortality from venous thromboembolism. The purpose of this research was to evaluate the reliability and validity of a pediatric venous thromboembolism (VTE) risk assessment tool.

## Methods:

A pediatric venous VTE risk assessment tool was developed following an exhaustive literature review. Random, retrospective chart reviews were completed on 1,001 pediatric patients admitted to the pediatric inpatient area of Baptist Children's Hospital who had the risk assessment tool completed between November 2008 and November 2009. The tool was compared to the patient's medical record to determine the risk for development of VTE. The form was approved by the Department of Pediatrics for implementation, and education for the nurses and physicians ensured its proper use. Institutional Review Board approval was obtained for a study to determine the reliability and validity of the pediatric VTE risk assessment tool.

## Prentiss Pediatric VTE Risk Assessment Risk Factors

Risk Score: 1 point each Risk	Score: 2 points each Risk	Score: 3 points each
<ul style="list-style-type: none"> <li>Central venous catheter</li> <li>Multiple trauma</li> <li>Orthopedic surgery</li> <li>Cancer</li> <li>Nephrotic syndrome</li> <li>Sepsis and other acute states with disseminated intravascular coagulation</li> </ul>	<ul style="list-style-type: none"> <li>Immobility</li> <li>Obesity (<math>\geq 20\%</math> over IBW)</li> <li>Use of oral contraceptives</li> <li>Family history of coagulopathy</li> </ul>	<ul style="list-style-type: none"> <li>Hereditary or acquired abnormalities of anticoagulant factors</li> <li>History of DVT (VTE) or pulmonary embolism in the past</li> </ul>
Total=	Total =	Total =
<b>Total Score:</b>		
VTE Risk Assessment: <ul style="list-style-type: none"> <li>No Risk Factors</li> <li>+1 point = Potential Risk</li> <li>+2 points = Medium Risk</li> <li>+3 points = High Risk</li> </ul>		
<ul style="list-style-type: none"> <li>See VTE prophylaxis order sheet if Medium Risk (2 points) or High Risk (<math>\geq 3</math> points)</li> </ul>		

## Outcomes:

A total of 1,001 patients were assessed on admission for risk of VTE. Results showed 581 of the assessed patients (58 percent) were male, and 420 (42 percent) of the patients assessed were female, with more than 50 percent of the patients assessed being younger than 5 years of age. The mean age of the patient assessed was 6.91 ( $\pm 0.39$ ) years, and the mean age by gender distribution was 7.29 ( $\pm 0.61$ ) years for female patients and 6.64 years ( $\pm 0.5$ ) for male patients.

## Demographics of Patients Assessed

Characteristics	Frequency (%) or Mean $\pm$ SD
<b>Gender</b>	
Male	581 (58%)
Female	420 (42%)
<b>Age</b>	6.91 (6.261)
<b>Age by Gender</b>	
Male	6.63 $\pm$ 6.14
Female	7.29 $\pm$ 6.4
<b>Age by Categories</b>	
0-5	525 (52.5%)
6-11	171 (17.1%)
12-20	305 (30.5%)

Of the 1,001 patients assessed, 981 (98 percent) did not have a VTE diagnosis, and 20 (2 percent) patients presented with VTE. Of the 2 percent with VTE, 14 — or 70 percent — were female, indicating a relationship between female gender and VTE.

## Association between VTE and Gender

Gender	Did a Venous Thromboembolism Occur?		TOTAL
	No (0)	Yes (1)	
Female	406 (96.7%)	14 (3.3%)	420
Male	575 (99%)	6 (1%)	581
Total	981	20	1,001

Yates' Correction for Continuity  $p=0.019$

The model was statistically significant,  $p < .001$ , indicating the ability to distinguish between those patients who would be positive for VTE versus negative utilizing the assessment tool. The strongest predictor for the

development of VTE was that of female gender, recording an odds ratio of 7.047. This indicates the odds of developing a VTE for females are seven times greater than males.

## Logistic Regression Predicting VTE Utilizing the Pediatric VTE Risk Assessment Tool in 1,001 Inpatient Chart Reviews

Variables in the Equation

Predictor	B	S.E.	Wald	df	Sig.	Exp (B) Odds Ratio
Step 1 <sup>a</sup>						
Risk Score 1	1.487	0.435	11.656	1	0.001	4.422
Risk Score 2	1.034	0.218	22.589	1	0.000	2.813
Risk Score 3	1.575	0.292	29.014	1	0.000	4.832
Sex (1)						
Male: 0 Female:1	1.953	0.738	6.998	1	0.008	7.047
Age	0.100	0.065	2.402	1	0.121	1.105
Constant	-7.938	1.081	53.958	1	0.000	0.000
a. Variable(s) entered on step 1: Risk Score 1, Risk Score 2, Risk Score 3, Sex, Age						
Test	X <sup>2</sup>	df			Sig.	
Overall Model	100.557	5			<.001	

Results showed that the majority of the patients at risk for VTE were between 13 and 17 years of age, with females having more than seven times greater the risk than males. Data also suggests the higher the identified risk score, the greater the risk of VTE demonstrating a significant relationship between the risk score and incidence of VTE.

## Recommendations:

These preliminary results demonstrate that broad use of this risk assessment tool is useful in patients with clinical criteria that may suggest a potential risk of VTE as it gives us the probability that the patient may develop VTE. Future research recommendations include:

- Prospective risk assessment tool analysis.
- Multi-site studies.
- Implementation of a risk assessment tool on all pediatric patients in order to determine risk and initiate treatment.

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