

## Co-Management Guide

<p><b>Guidelines Referenced</b></p>	<ol style="list-style-type: none"> <li>1 Donald L Yee, MD, Donald H Mahoney Jr. MD, Carrie Armsby, MD, MPH (2019). (Approach to the child with bleeding symptoms), Up to Date.</li> <li>2 W Keith Hoots, MD, Amy D Shapiro, MD, Donald H Mahoney, Jr, MD, Lawrence LK Leung, MD, Jennifer S Tirnauer, MD.</li> <li>3 Kate Khair, Ri Liesner (2006). (Bruising and bleeding in infants and children--a practical approach), <i>Br J Haematol</i>. 2006 May;133(3):221-31.</li> <li>4 Collins PW, Hamilton M, Dunstan FD, Maguire S, Nuttall DE, Liesner R, Thomas AE, Hanley J, Chalmers E, Blanchette V, Kemp AM (2017). (Patterns of bruising in preschool children with inherited bleeding disorders: a longitudinal stud), <i>Arch Dis Child</i>. 2017;102:1110-1117</li> <li>5 A Srivasta, et. al., Treatment Guidelines Working Group on behalf of the World Federation of Hemophilia (2013). (Guidelines for the management of hemophilia), <i>Haemophilia</i> 2013,19 el-e47</li> </ol>
<p><b>Background</b></p>	<p>Bruising and bleeding symptoms are commonly seen in children and are usually from an injury or trauma.</p> <p><b>A bleeding disorder should be considered when</b></p> <ul style="list-style-type: none"> <li>- The bleeding or bruising occurs with unusual frequency</li> <li>- Bleeding or bruising is severe or prolonged</li> <li>- There is unexplained bruising</li> <li>- Bruising is not consistent with development and level of activity (i.e. bruising in pre-mobile infants)</li> <li>- Onset of bleeding/bruising occurs in infancy especially if there is a positive family history</li> </ul> <p><b>Bleeding disorder should be considered in these typical scenarios</b></p> <ul style="list-style-type: none"> <li>- Newborn bleeding from umbilical stump or non-premature newborn with intracranial hemorrhage should prompt coagulation evaluation</li> <li>- Excessive bleeding after circumcision-common presentation of hemophilia</li> <li>- An otherwise healthy appearing child presents with multiple bruises and petechiae following a viral infection is common presentation of acute immune thrombocytopenia purpura (ITP)</li> <li>- Adolescent female with menorrhagia, +/- frequent epistaxis, may have Von Willebrand disease (VWD)</li> </ul> <p><b>Other considerations</b></p> <ul style="list-style-type: none"> <li>- Non accidental trauma</li> <li>- Frequent nose bleeds from rhinitis, superficial vessels, or dry air</li> <li>- Bleeding from surgical trauma (i.e. after tonsillectomy)</li> </ul>
<p><b>Screening and Evaluation of Child with Bleeding</b></p>	<p><b>Detailed history of bleeding/bruising</b></p> <ul style="list-style-type: none"> <li>- Type, frequency, severity, and duration of bleeding</li> <li>- Medication history including non-prescription (especially aspirin, ibuprofen as they impair platelet function) and herbal medicine use – these medicines, if used within 2 weeks of evaluation, can affect results of laboratory evaluation</li> <li>- Bleeding from mucous membranes and into skin is typical for platelet disorders and their interaction with blood vessels</li> <li>- Bleeding into soft tissue, muscle, joints characteristic of abnormalities in coagulation proteins. Most common factor VIII deficiency (hemophilia A), factor IX deficiency (hemophilia B)</li> </ul>

## Co-Management Guide

### Detailed family history

- Presence of bleeding in males of the family suggest an inherited sex linked hemophilia such as Hemophilia A or B
- VWD however is an autosomal dominant so will affect both sexes.
- Factor VII or factor XI deficiency are more rare autosomal recessive disorders in which family history is often negative

### Physical exam

- Particular attention to the number of bruises, pattern and size. In a prospective longitudinal observational study, children with severe inherited bleeding disorders have more and larger bruises. They have more bruises >1cm than children without bleeding disorders.<sup>3</sup>
- Severity of bruises and presence of hematomas correlate with bleeding disorder.

### Laboratory evaluation

#### Initial screen:

- *Complete blood count (CBC)*—evaluation of smear by hematopathologist—to verify automated platelet count (i.e. in case of platelet clumping) and evaluate platelet size
- *Prothrombin time/International normalized ratio (PT/INR)* – use institutional normal
  - evaluates extrinsic pathway with factors II, VII and X (vitamin K dependent factors) and V and fibrinogen
- *Activated partial thromboplastin time (PTT)* – use institutional normal
  - evaluates intrinsic and common pathway with factors VIII, IX, XI and XII
- *Fibrinogen assay*

\*Perform as indicated based on history/family history and presentation

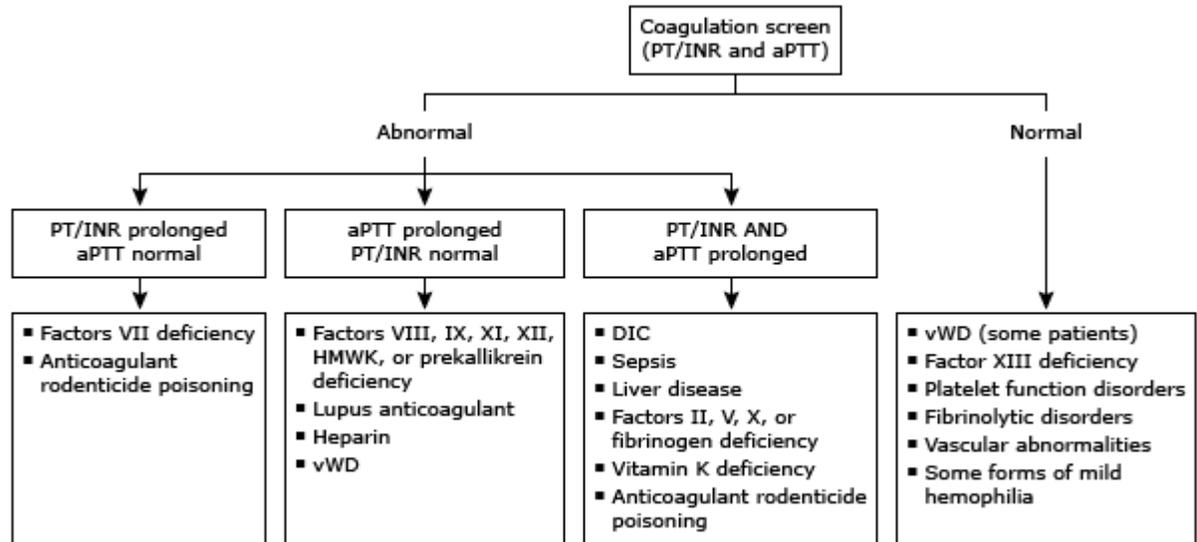
#### Following initial screen:

- If all the screening studies are normal however clinical concerns of bleeding remain— call to discuss with hematologist.
- If above studies are abnormal and there is clinical concerns of bleeding or significant family history of bleeding disorder – call to discuss with hematologist.
- The hematologist and provider can then determine the urgency of referral, labs for further evaluation prior to consultation with hematologist and if immediate action is needed for bleeding.
- For patients with bleeding and known diagnosis of hemophilia; first, they should be given factor replacement and then call hematologist. See below for treatment guidelines for hemophilia A and B.

## Co-Management Guide

UpToDate, Inc. algorithms are useful when interpreting coagulation studies

### Algorithm for identifying causes of bleeding symptoms in children based on results of coagulation screen



© 2019 UpToDate, Inc. and/or its affiliates. All Rights Reserved

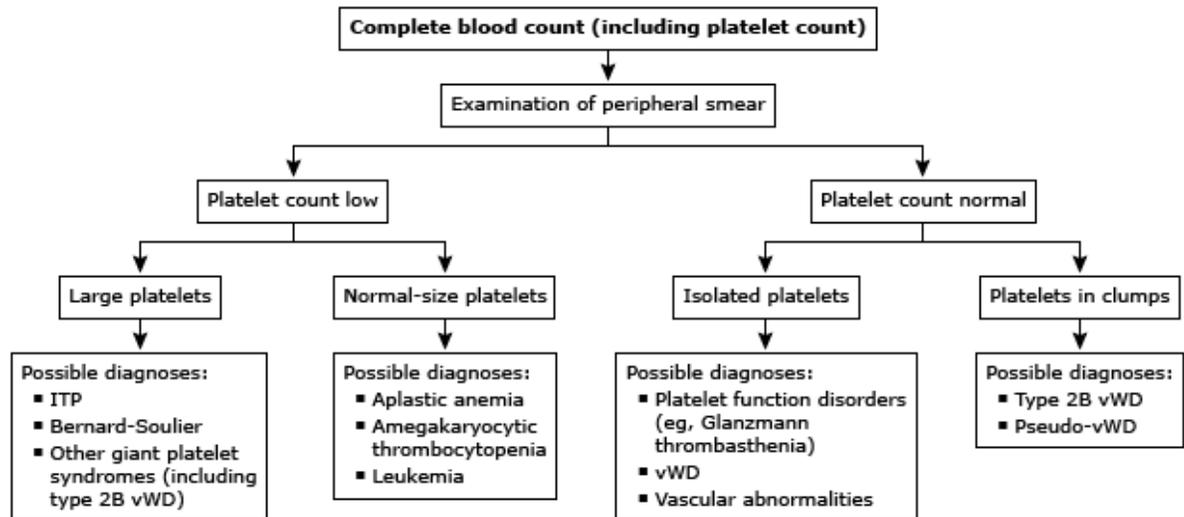
Graphic 60745 Version 11.0

Refer to UpToDate topic on the evaluation of bleeding symptoms in children for additional details.

PT: prothrombin time; INR: international normalized ratio; aPTT: activated partial thromboplastin time; vWD: von Willebrand disease; HMWK: high molecular weight kininogen; DIC: disseminated intravascular coagulation.

Co-Management Guide

**Diagnostic approach to a child with mucocutaneous bleeding (purpuric disorders) based on platelet count and platelet appearance on peripheral smear\***



© 2019 UpToDate, Inc. and/or its affiliates. All Rights Reserved.

ITP: immune thrombocytopenia (previously known as idiopathic thrombocytopenic purpura); vWD: von Willebrand disease.  
Graphic 82633 Version 6.0

\* Mucocutaneous bleeding in children is characteristic of disorders that cause abnormal platelet number and/or function. However, mucocutaneous bleeding can also occur in patients with abnormal coagulation (eg, hemophilia, disseminated intravascular coagulation). The diagnostic approach presented here represents a simplified approach based solely on platelet count and the appearance of the platelets on peripheral smear. In many cases, additional evaluation is warranted. Refer to UpToDate topic on the evaluation of bleeding symptoms in children for additional details.

**Two of the most common severe bleeding disorders are X-linked Hemophilia A and B**

A reference can be found on line:

[Guidelines for the management of hemophilia – Sirvastava – 2013 – Haemophilia – Wiley Online Library](#)

© 2019 UpToDate, Inc. and/or its affiliates. All Rights Reserved.

**Classification of Hemophilia**

- mild (factor activity level >5% and <40% of normal)
- moderate (factor activity level >=1% and <=5 % of normal)
- severe (factor activity level < 1% of normal)
  - Hemophilia A is most common (1 in 4000 male births) 1/2 – 2/3 will have severe disease

## Co-Management Guide

	<ul style="list-style-type: none"> <li>- Hemophilia B (1 in 15,000 male births) 1/3 – 1/2 have severe disease</li> <li>- Hemophilia is most commonly inherited however spontaneous mutations occur so a negative family history does not rule this out. Sporadic cases account for up to 55 % cases of severe hemophilia A in some studies.</li> <li>- Severe cases can present with severe and spontaneous bleeding at a young age. Some will present at time of circumcision with severe bleeding.</li> <li>- Patients with mild hemophilia often bleed with inciting events (i.e. surgery, cuts or trauma) and may not be diagnosed until later in life.</li> <li>- Patients with moderate hemophilia often bleed with minor injuries or invasive procedures and is usually less frequent than patients with severe hemophilia.</li> <li>- Female carriers of hemophilia with levels &lt;50% may have bleeding symptoms.</li> <li>- Most patients with severe disease will present within the first year of life with increased bruising, hemarthrosis, or bleeding due to oral injury.</li> </ul>
<p><b>Sites of Bleeding – Age Dependent</b></p>	<p><b>Infants</b></p> <ul style="list-style-type: none"> <li>- CNS (incidence 3-4%), cephalohematoma, bleeding with circumcision, heel sticks, and venipuncture</li> </ul> <p><b>Toddlers and Young Children</b></p> <ul style="list-style-type: none"> <li>- Mouth bleed with frenulum injury, forehead hematoma</li> <li>- Bruising, musculoskeletal bleeds, joint bleeds</li> </ul> <p><b>Older Children and Adults</b></p> <ul style="list-style-type: none"> <li>- Bleeds in joints, muscles, oral, GI tract and CNS</li> </ul> <p><b><u>Joint Bleeds</u></b> <i>Characteristic of Severe Disease</i></p> <p>Diagnosis is made clinically by history and presentation (pain, +/- swelling, tingling sensation in joint, refusal to bear weight or move joint)</p> <p><i><u>Treat and ask questions later in order to preserve joints bleeding as inflammation can cause irreversible damage to joints.</u></i></p> <p><b><u>Soft Tissue/Muscle Bleeds</u></b></p> <ul style="list-style-type: none"> <li>- pain or swelling</li> <li>- bleeds in muscles of arms or legs may result in compartment syndrome</li> </ul>
<p><b>Treatment</b></p>	<p><b>Treat and ask questions later in patients with known hemophilia and acute bleed.</b></p> <p>Always consult with hematologist when dealing with patient with known inhibitor. Also patients with hemophilia B can develop anaphylaxis to Factor IX and this may be the first symptom of inhibitor development. Newly diagnosed patients with Hemophilia B should receive their initial 10-20 treatments with Factor IX in a clinic or hospital capable of treating anaphylaxis.</p>
<p><b>Dosing of Factor</b></p>	<p><b><u>Joint bleeds</u></b></p> <ul style="list-style-type: none"> <li>- 40 units/kg IV factor VIII for Hemophilia A (raises factor VIII level 80%)</li> <li>- 80 – 90 units/kg IV factor IX for Hemophilia B (raises factor IX level 80%)</li> </ul> <p><i>*Following initial dose consult with hematologist for future doses.</i></p> <p><b><u>Muscle/soft tissue bleeding</u></b></p> <ul style="list-style-type: none"> <li>- 25 units/kg IV factor VIII for Hemophilia A (raises factor VIII level 50%)</li> <li>- 50 – 60 units/kg IV factor IX for Hemophilia B (raises factor IX level 50%)</li> </ul> <p><i>*Following initial dose consult with hematologist for future doses.</i></p>



Pediatric  
Hematology/Oncology

Bleeding disorders

## Co-Management Guide

### Minor bleeding

- Such as epistaxis or skin bleeding (not severe)
- Local measures –ice, pressure and elevation
- Antifibrinolytics such as aminocaproic acid helpful with mucosal bleeding
- Prolonged bleeding such as epistaxis may also require factor treatment

### Surgery

- Elective surgery should be planned in consultation with hematologist
- Emergent surgery
  - Preoperative factor VIII 50 units/kg IV for Hemophilia A
  - Preoperative factor IX 100 units /kg IV for Hemophilia B
  - Consult with hematologist for further dosing

### CNS bleed

- 50 units/kg IV factor VIII for hemophilia A
- 100units/kg IV factor IX for hemophilia B
- *Immediate consult with hematologist*