INSTRUCTIONS FOR USE
This protocol provides assistance in interpreting UnitedHealthcare benefit plans. When deciding coverage, the enrollee specific document must be referenced. The terms of an enrollee's document (e.g., Certificate of Coverage (COC) or Evidence of Coverage (EOC)) may differ greatly. In the event of a conflict, the enrollee's specific benefit document supersedes this protocol. All reviewers must first identify enrollee eligibility, any federal or state regulatory requirements and the plan benefit coverage prior to use of this Protocol. Other Protocols, Policies and Coverage Determination Guidelines may apply. UnitedHealthcare reserves the right, in its sole discretion, to modify its Protocols, Policies and Guidelines as necessary. This protocol is provided for informational purposes. It does not constitute medical advice. This policy does not govern Medicare Group Retiree members.

UnitedHealthcare may also use tools developed by third parties, such as the MCG™ Care Guidelines, to assist us in administering health benefits. The MCG™ Care Guidelines are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.

COMMERCIAL AND MEDICAID COVERAGE RATIONALE
This policy refers to the following products:

<table>
<thead>
<tr>
<th>Factor VIIa (recombinant)</th>
<th>NovoSeven® (coagulation factor VIIa (recombinant))</th>
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<tr>
<td></td>
<td>NovoSeven® RT (coagulation factor VIIa (recombinant))</td>
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<tr>
<td>Factor XIII (plasma-derived)</td>
<td>Corifact™ (factor XIII concentrate (human))</td>
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<tr>
<td>Factor VIII (plasma-derived)</td>
<td>Hemofil M® (antihemophilic factor (human))</td>
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<td>Koate®-DVI (antihemophilic factor (human))</td>
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<td>Monoclave-P® (antihemophilic factor (human))</td>
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<tr>
<td>Factor VIII (plasma-derived)</td>
<td>Alphanate® (antihemophilic factor (human))</td>
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<td>Clotting Factors and Coagulant Blood Products</td>
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<tr>
<td>von Willebrand Factor Complex (plasma-derived)</td>
<td>Humate-P® (antihemophilic factor (human))</td>
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<tr>
<td>Factor VIII (recombinant)</td>
<td>Advate® (antihemophilic factor (recombinant))</td>
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<td>Kogenate® FS (antihemophilic factor (recombinant))</td>
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<td>Recombinate® (antihemophilic factor (recombinant))</td>
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<td>Factor IX (plasma-derived)</td>
<td>AlphaNine® SD (coagulation Factor IX)</td>
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<td>Factor IX (recombinant)</td>
<td>BeneFIX® (coagulation factor IX (recombinant))</td>
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<td>Factor IX (recombinant), Fc fusion protein</td>
<td>Alprolix™ (coagulation factor IX (recombinant), Fc fusion protein)</td>
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<tr>
<td>Anti-Inhibitor Coagulant Complex (plasma-derived)</td>
<td>FEIBA NF® (anti-inhibitor coagulant complex)</td>
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<tr>
<td>Fibrinogen Concentrate (plasma-derived)</td>
<td>RiaSTAP® (fibrinogen concentrate (human))</td>
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<tr>
<td>Factor XIII A-subunit (recombinant)</td>
<td>Tretten® (coagulation factor XIII A-subunit (recombinant))</td>
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<tr>
<td>Factor VIII (recombinant), Fc fusion protein</td>
<td>Eloctate™ (antihemophilic factor (recombinant), Fc fusion protein)</td>
</tr>
<tr>
<td>Factor VIII (recombinant), porcine sequence</td>
<td>Obizur® (antihemophilic factor (recombinant), porcine sequence)</td>
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The following information provides the indications and criteria for which specific clotting factors and coagulant blood products are considered **medically necessary**:

**A. Congenital Factor XIII Deficiency (i.e., Fibrin Stabilizing Factor Deficiency)**

1. Factor XIII (plasma-derived) [Corifact] is **medically necessary** when both of the following criteria are met:
   a. Diagnosis of congenital Factor XIII deficiency
   -AND-
   b. **One** of the following:
      1. Routine prophylactic treatment
      -OR-
      2. Peri-operative management of surgical bleeding
      -OR-
      3. Treatment of bleeding episodes
2. Coagulation Factor XIII A-subunit (recombinant) [Tretten] is **medically necessary** when both of the following criteria are met:
   a. Diagnosis of congenital factor XIII A-subunit deficiency
      -AND-
   b. ONE of the following:
      (1) Used for routine prophylactic treatment
      -OR-
      (2) Treatment of bleeding episodes

B. Von Willebrand Disease (VWD)

1. Factor VIII (plasma-derived) / von Willebrand Factor Complex (plasma-derived) [Alphanate or Humate-P] is **medically necessary** when both of the following criteria are met:
   a. **One** of the following:
      (1) Diagnosis of severe von Willebrand disease
      -OR-
      (2) **Both** of the following:
         (a) Diagnosis of mild or moderate von Willebrand disease
         -AND-
         (b) History of failure, contraindication or intolerance to treatment with desmopressin
         -AND-
   b. One of the following:
      (1) Treatment of spontaneous and trauma-induced bleeding episodes
      -OR-
      (2) Prevention of excessive bleeding during surgery (i.e., surgical prophylaxis)

2. Factor VIII (plasma-derived) / von Willebrand Factor Complex (plasma-derived) [Wilate] is **medically necessary** when one of the following criteria is met:
   a. **Both** of the following:
      (1) Diagnosis of severe von Willebrand disease
      -AND-
      (2) Treatment of spontaneous and trauma-induced bleeding episodes
      -OR-
   b. **Both** of the following:
      (1) Diagnosis of mild or moderate von Willebrand disease
      -AND-
      (2) History of failure, contraindication or intolerance to treatment with desmopressin

3. Von Willebrand factor (recombinant) [Vonvendi] is **medically necessary** when both of the following criteria are met:
   a. Diagnosis of von Willebrand disease
      -AND-
   b. On-demand treatment and control of bleeding episodes
C. Congenital Factor VII Deficiency

1. Factor VIIa (recombinant) [NovoSeven RT] is medically necessary when both of the following criteria are met:
   a. Diagnosis of congenital factor VII deficiency
   -AND-
   b. One of the following:
      (1) Treatment of bleeding episodes
      -OR-
      (2) Prevention of bleeding in surgical interventions or invasive procedures (i.e., surgical prophylaxis)

D. Hemophilia A (i.e., Factor VIII Deficiency, Classical Hemophilia)

1. Factor VIII (plasma-derived) / von Willebrand Factor Complex (plasma-derived) [Alphanate or Humate-P], Factor VIII (plasma-derived) [Hemofil M, Koāte-DVI or Monoclate-P], and Factor VIII (recombinant) [Kogenate FS, Kovalty, NovoEight or Nuwiq] are medically necessary when both of the following criteria must be met:
   a. Diagnosis of hemophilia A
   -AND-
   b. One of the following:
      (1) Treatment of bleeding episodes
      -OR-
      (2) Prevention of bleeding episodes (prophylaxis)
      -OR-
      (3) Prevention of bleeding in surgical interventions or invasive procedures (e.g., surgical prophylaxis)

Additional information to support medical necessity review where applicable:
Antihemophilic Factor (Recombinant) [Helixate] and Antihemophilic Factor (Recombinant), Pegylated [Adynovate] are not medically necessary for treatment of hemophilia A for the following: on-demand treatment and control of bleeding episodes; perioperative management of bleeding; and routine prophylaxis to reduce the frequency of bleeding episodes. Published clinical evidence does not demonstrate superiority in efficacy and treatment adherence of Helixate or Adynovate to other available recombinant factor products.

2. Antihemophilic Factor (recombinant) [Advate or Recombinate] is medically necessary when all of the following criteria must be met:
   a. Diagnosis of hemophilia A
   -AND-
   b. One of the following:
      (1) Submission of documentation showing failure to meet clinical goals (e.g., continuation of spontaneous bleeds, inability to achieve appropriate trough level) after a trial of three of the following recombinant products:
         (a) Kogenate FS
         (b) Kovaltry
(c) NovoEight  
(d) Nuwiq

(2) Submission of documentation showing history of hypersensitivity to three of the following recombinant factor products:
   (a) Kogenate FS  
   (b) Kovaltry  
   (c) NovoEight  
   (d) Nuwiq

-OR-

c. Patient is currently on Advate or Recombinate therapy  
-AND-
d. One of the following:
   (1) Patient has not received a manufacturer supplied sample at no cost in prescriber office or a 30 day free trial from a pharmacy as a means to establish as a current user of Advate or Recombinate
   -OR-
   (2) Both of the following:
      (a) Patient has received a manufacturer supplied sample at no cost in prescriber office or a 30 day free trial from a pharmacy as a means to establish as a current user of Advate or Recombinate  
      -AND-
      (b) One of the following:
         i. Submission of documentation showing failure to meet clinical goals (e.g., continuation of spontaneous bleeds, inability to achieve appropriate trough level) after a trial of three of the following recombinant factor products:
            (a) Kogenate FS  
            (b) Kovaltry  
            (c) NovoEight  
            (d) Nuwiq
         ii. Submission of documentation showing history of hypersensitivity to three of the following recombinant factor products:
            (a) Kogenate FS  
            (b) Kovaltry  
            (c) NovoEight  
            (d) Nuwiq

3. Antihemophilic Factor (recombinant) [Xyntha] is medically necessary when all of the following criteria are met:
   a. Diagnosis of hemophilia A  
   -AND-
   b. One of the following:
      (1) Treatment of bleeding episodes  
      (2) Prevention of bleeding in surgical interventions or invasive procedures (e.g., surgical prophylaxis)  
   c. One of the following:
(1) Submission of documentation showing failure to meet clinical goals (e.g., continuation of spontaneous bleeds, inability to achieve appropriate trough level) after a trial of three of the following recombinant factor products:
   (a) Kogenate FS
   (b) Kovaltry
   (c) NovoEight
   (d) Nuwiq

(2) Submission of documentation showing history of hypersensitivity to three of the following recombinant factor products:
   (a) Kogenate FS
   (b) Kovaltry
   (c) NovoEight
   (d) Nuwiq

-OR-

d. All of the following:
   (1) Patient is currently on Xyntha
   -AND-
   (2) One of the following:
      (a) Submission of documentation showing failure to meet clinical goals (e.g., continuation of spontaneous bleeds, inability to achieve appropriate trough level) after a trial of three of the following recombinant factor products:
         i. Kogenate FS
         ii. Kovaltry
         iii. NovoEight
         iv. Nuwiq
      -OR-
      (b) Submission of documentation showing history of hypersensitivity to three of the following recombinant factor products:
         i. Kogenate FS
         ii. Kovaltry
         iii. NovoEight
         iv. Nuwiq

4. Antihemophilic Factor (recombinant), FC Fusion Protein [Eloctate] is proven when all of the following criteria are met:
   a. Diagnosis of hemophilia A
   -AND-
   b. One of the following:
      (1) Treatment of bleeding episodes
      -OR-
      (2) Prevention of bleeding episodes (prophylaxis)
      -OR-
      (3) Prevention of bleeding in surgical interventions or invasive procedures (e.g., surgical prophylaxis)
   -AND-
c. Prescribed dosage and interval utilized is within range as defined by the prescribing information.

Additional information to support medical necessity review where applicable:
Antihemophilic Factor (recombinant), FC Fusion Protein [Eloctate] is medically necessary for the treatment of Hemophilia A when one of the following criteria is met:

a. All of the following:
   1. Diagnosis of severe hemophilia A
   -AND-
   2. Documentation of endogenous factor VIII levels less than 2% of normal factor VIII (< 0.02 IU/mL)
   -AND-
   3. Patient is not a suitable candidate for treatment with shorter half-life Factor VIII (recombinant) products [e.g., Kogenate FS, Kovaltry, Novoeight, or Nuwiq] as attested by the prescribing physician
   -AND-
   4. One of the following:
      1. Treatment of bleeding episodes
      2. Prevention of bleeding in surgical interventions or invasive procedures (e.g., surgical prophylaxis)
      3. Prevention of bleeding episodes (i.e., routine prophylaxis)
   -AND-
   5. Documentation of both of the following:
      1. Dose does not exceed 50 IU/kg
      2. Administering no more frequently than every 4 days
   -OR-

b. All of the following:
   1. One of the following:
      1. Both of the following:
         i. Moderate hemophilia A
         ii. Endogenous factor VIII level 2% < 5% (0.02 IU/mL to less than 0.05 IU/mL)
      -OR-
      2. Both of the following:
         i. Mild hemophilia A
         ii. Endogenous factor VIII level > 5% (greater than 0.05 IU/mL)
   -AND-
   2. Patient is not a suitable candidate for treatment with shorter half-life Factor VIII (recombinant) products [e.g., Kogenate FS, Kovaltry, Novoeight or Nuwiq] as attested by the prescribing physician
   -AND-
   3. One of the following:
      1. Treatment of bleeding episodes
      2. Prevention of bleeding in surgical interventions or invasive procedures (e.g., surgical prophylaxis)
3. Prevention of bleeding episodes (i.e., routine prophylaxis) with documentation of one of the following in an 8 week period:
   i. \( \geq 1 \) or more episodes of spontaneous/traumatic bleeding into joint
   ii. \( \geq 1 \) episode of spontaneous/traumatic bleeding into the central nervous system
   iii. \( \geq 1 \) episode of severe soft tissue bleeding (i.e., ileopsoas)

   -AND-

   (4) Documentation of both of the following:
   1. Dose does not exceed 50 IU/kg
   2. Infusing no more frequently than every 4 days

5. Anti-Inhibitor Coagulant Complex (plasma-derived) [FEIBA] and Factor VIIa (recombinant) [NovoSeven RT] are medically necessary when all of the following criteria are met:
   a. Diagnosis of hemophilia A
   -AND-
   b. Documentation of inhibitors (e.g., Bethesda inhibitor assay)
   -AND-
   c. One of the following:
      (1) Treatment of a spontaneous bleeding episode
      -OR-
      (2) Prevention of bleeding in surgical interventions (i.e., surgical prophylaxis)
      -OR-
      (3) Routine prophylaxis to prevent or reduce the frequency of bleeding episodes

6. Factor VIIa (recombinant) [NovoSeven RT] and antihemophilic factor (recombinant), porcine sequence [Obizur] are medically necessary when both of the following criteria are met:
   a. Diagnosis of acquired Factor VIII hemophilia (e.g., acquired hemophilia A, Factor VIII deficiency)
   -AND-
   b. Treatment or prevention of bleeding episodes

E. Hemophilia B (i.e., Congenital Factor IX Deficiency, Christmas Disease)
1. Factor IX (plasma-derived) [AlphaNine SD, Bebulin, Mononine, or Profilnine SD] is medically necessary when both of the following criteria must be met:
   a. Diagnosis of hemophilia B
   -AND-
   b. Prevention and treatment of bleeding episodes

2. Factor IX (recombinant) BeneFIX or Rixubis], Coagulation Factor IX (recombinant), Fc Fusion Protein (Alprolix) and Coagulation Factor IX (recombinant), albumin fusion protein (Idelvion) are medically necessary when all of the following criteria must be met:
   a. Diagnosis of hemophilia B
   -AND-
b. One of the following:
   (1) Control and prevention of bleeding episode
   -OR-
   (2) Prevention of bleeding in surgical interventions (i.e., surgical prophylaxis)

Additional information to support medical necessity review where applicable:
Coagulation Factor IX (Recombinant) [Ixinity] is not medically necessary for treatment of hemophilia B for the following: control and prevention of bleeding episodes; perioperative management; and routine prophylaxis of to prevent or reduce the frequency of bleeding episodes. Published clinical evidence does not demonstrate superiority in efficacy and treatment adherence of Ixinity to other available recombinant factor products.

3. Anti-Inhibitor Coagulant Complex (plasma-derived) [FEIBA] and Factor VIIa (recombinant) [NovoSeven RT] are medically necessary when all of the following criteria are met:
   a. Diagnosis of hemophilia B
   -AND-
   b. Documentation of inhibitors (e.g., Bethesda inhibitor assay)
   -AND-
   c. One of the following:
      (1) Treatment of a spontaneous bleeding episode
      (2) Prevention of bleeding in surgical interventions (i.e., surgical prophylaxis)
      -OR-
      (3) Routine prophylaxis to prevent or reduce the frequency of bleeding episodes

F. Fibrinogen Deficiency (i.e., Factor I deficiency)
1. Fibrinogen Concentrate (plasma-derived) [RiaSTAP] is medically necessary when all of the following criteria must be met:
   a. Diagnosis of congenital fibrinogen deficiency, including afibrinogenemia and hypofibrinogenemia
   -AND-
   b. One of the following:
      (1) Treatment of acute bleeding episode
      -OR-
      (2) Prevention of bleeding in surgical interventions (i.e., surgical prophylaxis)
      -OR-
      (3) Routine prophylaxis to prevent or reduce the frequency of bleeding episodes

G. Glanzmann thrombasthenia
1. Factor VIIa (recombinant) [NovoSeven, NovoSeven RT] is medically necessary when all of the following criteria must be met:
   a. Diagnosis of Glanzmann’s thrombasthenia
   -AND-
   b. Refractory to platelet transfusions
   -AND-
   c. One of the following:
      (1) Treatment of a spontaneous bleeding episode
OR

(2) Prevention of bleeding in surgical interventions

H. Congenital Factor X Deficiency
   1. Coagulation Factor X (human) [Coagadex] is medically necessary when both of the following criteria are met:52
      a. Diagnosis of congenital Factor X deficiency
         -AND-
      b. One of the following:
         (1) On-demand treatment and control of bleeding episodes
         -OR-
         (2) Perioperative management of bleeding in patients with mild hereditary Factor X deficiency

MEDICARE COVERAGE RATIONALE

Medicare does cover blood clotting factors for hemophilia patients when criteria have been met. Refer to the National Coverage Determination (NCD) for Anti-Inhibitor Coagulant Complex (AICC) (110.3). Local Coverage Determinations (LCDs) for Nevada do not exist at this time (Accessed January 2017)


Anti-Inhibitor Coagulant Complex (AICC)
NCD 110.3
Indications and Limitations of Coverage:
Anti-inhibitor coagulant complex, AICC, is a drug used to treat hemophilia in patients with factor VIII inhibitor antibodies. AICC has been shown to be safe and effective and has Medicare coverage when furnished to patients with hemophilia A and inhibitor antibodies to factor VIII who have major bleeding episodes and who fail to respond to other, less expensive therapies.

For Medicare and Medicaid Determinations Related to States Outside of Nevada:
Please review Local Coverage Determinations that apply to other states outside of Nevada. http://www.cms.hhs.gov/mcd/search

Important Note: Please also review local carrier Web sites in addition to the Medicare Coverage database on the Centers for Medicare and Medicaid Services’ Website.

BACKGROUND

Factor VIIa (FVIIa) is a vitamin K-dependent glycoprotein made up of 406 amino acid residues, and is structurally similar to human plasma-derived factor VIIa. FVIIa promotes hemostasis by forming complexes with tissue factor and activating coagulation factors in the intrinsic pathway: factor X to factor Xa, and factor IX to factor IXa. Activated factor X, complexed with other factors, converts prothrombin to thrombin and fibrinogen to fibrin to form a hemostatic plug.
Factor XIII (FXIII) is a naturally occurring glycoprotein in plasma that promotes cross-linking of fibrin during the coagulation process, and protects the newly formed clot from fibrinolysis. FXIII is a proenzyme which is activated in the presence of calcium ion, to form activated factor XIIIa. The activated form is homodimeric, with only the A-subunit having intracellular activity. The B-subunit has no enzymatic activity and functions to stabilize the structure against proteolysis.

Coagulation factor XIII A-subunit is a recombinant human factor XIII-A(2) homodimer composed of 2 factor XIII A-subunits. Recombinant coagulation factor XIII A-subunit binds to free human factor XIII B-subunit and is activated by thrombin in the presence of calcium. Once activated, it increases the mechanical strength of fibrin clots, retards fibrinolysis, and enhances platelet adhesion to the site of injury in a dose-dependent manner.

Antihemophilic Factor VIII (FVIII) is a dried concentrate of Factor VIII derived from pooled human plasma. FVIII is the coagulant portion of the Factor VIII complex in plasma. FVIII acts as a co-factor for Factor IX to activate Factor X, ultimately causing the formation of thrombin and fibrin, promoting platelet aggregation and adhesion to damaged vascular endothelium.

Antihemophilic Factor VIII / von Willebrand Factor Complex (Human) is a lyophilized concentrate of factor VIII and von Willebrand Factor, which facilitates the activation of factor X ultimately causing the formation of thrombin and fibrin promoting platelet aggregation and adhesion to damaged vascular endothelium.

Antihemophilic Factor (recombinant), FC Fusion Protein is a fusion protein that temporarily replaces the missing Coagulation Factor VIII needed for effective hemostasis. It contains the Fc 12 region of human immunoglobulin G1 (IgG1), which binds to the neonatal Fc receptor (FcRn). FcRn is part of a naturally occurring pathway that delays lysosomal degradation of immunoglobulins by cycling them back into circulation and prolonging their plasma half-life.

Antihemophilic Factor (recombinant), Porcine Sequence temporarily replaces the inhibited endogenous factor VIII that is needed for effective hemostasis in patients with acquired hemophilia A.

Recombinant antihemophilic Factor VIII is not derived from human blood. It is a lyophilized preparation of factor VIII, which facilitates the activation of factor X ultimately causing the formation of thrombin and fibrin promoting platelet aggregation and adhesion to damaged vascular endothelium. All forms of factor IX (FIX) achieve hemostasis through the same mechanism. A complex of factor VII and tissue factor (via the extrinsic coagulation pathway) and factor Xla (via the intrinsic pathway) activate factor IX which, in combination with factor VIII:C, activates factor X to Xa. Through this pathway, prothrombin is converted to thrombin which, in turn, converts fibrinogen to fibrin clot.

The exact mechanism of action of anti-inhibitor complex (AICC) is unknown. It may be related to one or more of the active clotting factors and their ability to bypass the factor VIII inhibitor. In vitro experiments suggest the possibility of a factor Xa–like substance; or a complex of FVIIIC:Ag, factor IXa, and phospholipid as the active principle, which is only minimally inhibited by an inhibitor.

Factor IX Fc fusion protein recombinant transiently replaces missing coagulation factor IX required to achieve hemostasis during bleeding episodes in patients with factor IX deficiency. The Fc region of the
drug binds to the neonatal Fc receptor (FcRn). FcRn assists in the delay of lysosomal degradation of immunoglobulins by cycling them back into circulation and increasing their plasma half-life.

Hemophilia B patients have a prolonged activated partial thromboplastin time (aPTT), which is an established test for the biological activity of factor IX; factor IX Fc fusion protein recombinant therapy shortens the aPTT over the effective dosing period.

Fibrinogen (coagulation factor I) is a soluble plasma glycoprotein and a physiological substrate of 3 enzymes: thrombin, factor XIIIa, and plasmin. Thrombin converts fibrinogen into fibrin. Fibrin is stabilized in the presence of calcium ions and by activated Factor XIII. Factor XIIIa induces cross-linking of fibrin polymers which result in the fibrin clot being more elastic and more resistant to fibrinolysis. The cross-linked fibrin is the end result of the coagulation cascade. Cross-linked fibrin is the end result of the coagulation cascade, and provides tensile strength to a primary hemostatic platelet plug and structure to the vessel wall.

Antihemophilic factor VIII (recombinant) pegylated is a temporarily replaces coagulation factor VIII, thereby providing hemostasis in patients with congenital hemophilia A. Pegylation of the parent molecule (antihemophilic factor VIII recombinant) extends the half-life via reduced binding to the factor VIII clearance receptor (LRP1).

Coagulation Factor IX (recombinant), albumin fusion protein, temporarily replaces absent coagulation Factor IX to provide adequate hemostasis. The recombinant albumin is fused with recombinant Factor IX to extend the half-life of Factor IX.

Coagulation Factor X (human) is converted from its inactive form to the active form (Factor Xa) and with Factor Va on the phospholipid surface forms a prothrombinase complex which activates prothrombin to thrombin in the presence of calcium ions. Thrombin acts upon soluble fibrinogen and Factor XIII to generate a cross-linked fibrin clot.

Von Willebrand factor (recombinant) reduces factor VIII clearance by acting as a carrier protein and protecting factor VIII from rapid proteolysis. It promotes hemostasis by mediating platelet adhesion to damaged vascular subendothelial matrix (e.g., collagen) and platelet aggregation.

**CLINICAL EVIDENCE**

**Medically Necessary**

**Congenital Factor XIII Deficiency**

In a multinational, open-label, single-arm, phase 3 trial, researchers evaluated the efficacy and safety of prophylactic treatment with recombinant FXIII (rFXIII) [Treten] in congenital FXIII-A subunit deficiency. Forty-one patients ≥ 6 years of age (mean, 26.4; range, 7-60) with confirmed congenital FXIII-A subunit deficiency were enrolled into the trial which consisted of a 4-week run-in period, followed by a 52-week treatment period (visits 2-15) of monthly (28 ± 2 days) IV doses of 35 IU/kg of rFXIII. During the rFXIII treatment period, 5 bleeding episodes (all trauma induced) in 4 patients were treated with FXIII-containing products. Crude mean bleeding rate was significantly lower than the historic bleeding rate (0.138 vs 2.91 bleeds/patient/year, respectively) for on-demand treatment. Transient, non-neutralizing, low-titer anti-rFXIII antibodies (Abs) developed in 4 patients; however, this did not result in allergic reactions, changes in any bleeds requiring treatment, or changes in FXIII
pharmacokinetics during the trial or follow-up. These non-neutralizing Abs declined below detection limits in all 4 patients despite further exposure to rFXIII or other FXIII-containing products. Researchers conclude that prophylactic treatment with rFXIII is safe and effective in preventing bleeding episodes in patients with congenital FXIII-A subunit deficiency.

Factor XIII concentrate (human) [Corifact] labeling included expanded information in regards to use of rFXIII for peri-operative treatment of bleeds. Out of the 41 patients included in the trial, 5 patients underwent surgical procedures (4 were elective and 1 was an emergency). Of the 4 elective surgeries, 3 patients received rFXIII prior to surgery (0 to 7 days prior to surgery) with no post-operative bleeding. One patient who received rFXIII 7 days prior to surgery experienced bleeding post-extraction of all four wisdom teeth. The bleeding was stopped four hours after the oral surgery with an additional dose of rFXIII (50% of the patient’s routine dose). One patient who required emergency surgery was pre-treated with plasma.

**Von Willebrand Disease (VWD)**
Gill et al. conducted a prospective, open-label, multinational study which evaluated the safety, efficacy and optimal dosing of a VWF/FVIII concentrate [Humate-P] in patients with von Willebrand disease (VWD) undergoing elective surgery and expected to require at least two consecutive days of perioperative treatment with a VWF/FVIII concentrate. Dosing of factor was based on VWF ristocetin cofactor (VWF:RCo) and FVIII pharmacokinetic assessments performed before surgery. The studied population was composed of 33 adults and 9 children who completed the PK infusion phase. Effective haemostasis was achieved in 91.4% (32/35) of subjects immediately after surgery. Reported median terminal VWF:RCo half-life was 11.7 h, and median incremental in vivo recovery was 2.4 IU dL(-1) per IU kg(-1) infused. Three patients developed major hemorrhage after the immediate postoperative period. Median VWF/FVIII concentrate loading doses ranged from 42.6 IU VWF:RCo kg(-1) (oral surgery) to 61.2 IU VWF:RCo kg(-1) (major surgery), with a median of 10 (range, 2-55) doses administered per patient. Eleven patients experienced a total of 25 postoperative bleeding events, most of which were categorized as mild (16) or moderate (8). Researchers conclude that the results of this trial indicate that this VWF/FVIII concentrate is safe and effective in the prevention of excessive bleeding during and after surgery in individuals with VWD.

Researchers conducted a prospective, open-label, multicenter, non-randomized study which evaluated the safety and efficacy of a factor VIII (FVIII)/VWF concentrate [Humate-P] when used in treatment regimens based on VWF:ristocetin cofactor (VWF:RCo) activity in subjects with VWD in which desmopressin was known or suspected to be inadequate in situations requiring urgent and necessary surgery. Thirty-nine eligible patients with 42 evaluable surgical treatment events were included. Researchers reported the median loading dose based upon VWF:RCo activity was 82.3 international units/kilogram (IU kg(-1); range 32.5-216.8 IU kg(-1)), and the median maintenance dose per infusion was 52.8 IU kg(-1) (range 24.2-196.5 IU kg(-1)) for a median of 3 days (range 1-50 days). The median number of infusions per event was 6 (range 1-67 infusions). A total of 55 adverse events (AEs) were reported in 24 (57.1%) of 42 surgical treatment events and 3 of those AE events (which included peripheral edema, extremity pain and pseudo-thrombocytopenia) were reported as potentially treatment-related. No serious drug-related AEs or thrombotic events were reported. Researchers concluded that this study supports the safety and efficacy of treatment with FVIII/VWF concentrate for the prevention of surgical haemorrhage in patients with VWD when administered in doses calculated in VWF:RCo units.
Forty-five patients with von Willebrand disease (VWD) who received on demand von Willebrand factor/coagulation factor VIII complex (human) [Wilate] were evaluated in prospective clinical trials. Bleeding was successfully controlled in 84.1% (95% confidence interval (CI), 81.8% to 86.2%) of episodes (898 of 1068 episodes); additionally, bleeding was successfully controlled in 93% of episodes in the 25 patients with VWD type 3. Non-successful treatment of a bleeding episode was documented if any of the following criteria was met: 1) the episodes was also treated with another VWF-containing product (excluding whole blood); 2) the patient required a blood transfusion during the bleeding episode; 3) the daily dosage of FVIII/VWF complex was 50% or greater above the initial required dose during follow-up treatment (for bleeding episodes requiring more than one day of treatment); 4) except for cases of gastrointestinal bleeding, FVIII/VWF complex was required for more than 4 days for the treatment of severe bleeding, more than 3 days for the treatment of moderate bleeding, or more than 2 days for the treatment of minor bleeding; and 5) the final bleeding episode had a moderate or none efficacy rating. Overall, most bleeding episodes were treated with FVIII/VWF complex for 1 to 3 days; however, patients with gastrointestinal bleeding the duration could be up to 7 days.

Congenital Factor VII Deficiency, Acquired Factor VIII Deficiency, Hemophilia A with Inhibitors, and Hemophilia B with Inhibitors

Mariani et al conducted a multi-center, prospective, observational, web-based study protocol to collect and describe treatment modalities and outcomes in congenital FVII deficiency (STER [Seven Treatment Evaluation Registry]). Forty-one surgical operations (24 'major' and 17 'minor') were performed in 34 patients diagnosed with FVII deficiency and administered recombinant activated Factor VII (rFVIIa) [NovoSeven]. Bleeding occurred during three major interventions of orthopedic surgery; however, rFVIIa was administered at very low dose in each case. An antibody to FVII was observed in one patient who underwent multiple dental extractions. No thromboses were reported during the 30-d follow up period. Replacement therapy with rFVIIa for surgery in FVII deficient patients is effective and safe when minimally effective doses were used, which, during the period of maximum bleeding risk (the day of operation), was calculated (Receiver Operated Characteristic analysis) to be of at least 13 μg/kg/body weight per single dose and no less than three administrations.

Hemophilia A

Mahlangu et al. conducted a multi-center, prospective, open-label, phase 3 study which evaluated the safety, efficacy, and pharmacokinetics of a recombinant FVIII Fc fusion protein (rFVIIIIFc) [Eloctate] for prophylaxis, treatment of acute bleeding, and perioperative hemostatic control in 165 previously treated males aged ≥12 years with severe hemophilia A. The study participants were divided up into 3 treatment arms: arm 1, individualized prophylaxis (25-65 IU/kg every 3-5 days, n=118); arm 2, weekly prophylaxis (65 IU/kg, n=24); and arm 3, episodic treatment (10-50 IU/kg, n=23). A subgroup compared recombinant FVIII (rFVIII) and rFVIIIIFc pharmacokinetics. Annualized bleeding rate (ABR) was the primary measured outcome; and inhibitor development and adverse events were secondary efficacy endpoints evaluated. The terminal half-life of rFVIIIIFc (19.0 hours) was extended 1.5-fold vs rFVIII (12.4 hours; P < .001). Across all arms, 757 bleeding episodes were treated with rFVIIIIFc during the efficacy period. Overall, 87.3% of bleeding episodes were resolved with 1 injection, and 97.8% were controlled with ≤2 injections. In arm 1, the median weekly dose was 77.9 IU/kg; approximately 30% of subjects achieved a 5-day dosing interval (last 3 months on study). Adverse events were representative of events occurring in the general hemophilia population and no participants developed inhibitors. The study was not designed to compare individualized and weekly prophylactic regimens (arms 1 and 2, respectively). Thus, although both the individualized (median
twice-weekly dosing) and weekly dosing regimens resulted in a significant reduction in ABR compared with episodic treatment, the superiority of one approach for prophylactic dosing over the other cannot be determined. Authors concluded that rFVIIIFc was well-tolerated and efficacious in the prevention and treatment of bleeding events, including within the setting of major surgery, in adolescents and adults with severe hemophilia A. Additionally, efficacy results supported the potential for rFVIIIFc dosing 1 to 2 times per week (current treatment guidelines recommend dosing 3-4 times weekly).

Three multi-center, open-label, non-controlled trials (n=213) were conducted to evaluate the safety and efficacy of antihemophilic factor (recombinant) [Novoeight] in the control and prevention of breakthrough bleeds, routine prophylaxis and perioperative management in previously treated patients with hemophilia A. Of the 213 patients included, 150 patients were 12 years or older and 63 patients were younger than 12 years of age with severe hemophilia A (factor VIII activity less than 1%) and no history of factor VIII inhibitors. The median annual bleeding rate for adults and children 16 years or older was 3.1 bleeds/year. All patients received routine prophylaxis with antihemophilic factor (recombinant); those 12 years or older received 20 to 50 international units/kg 3 times weekly or 20 to 40 international units/kg every other day. Those younger than 12 years of age received either 25 to 60 international units/kg 3 times weekly or 25 to 50 international units/kg every other day. More than 80% received the 3-times-per-week regimen. Bleeding episodes were treated according to the investigator's discretion, with a target factor VIII activity level greater than 0.5 international units/mL. Bleeding episodes and perioperative management with antihemophilic factor (recombinant) were considered successfully treated if the patient (home dosing) or investigator (supervised treatment) rated the response to treatment as excellent or good; moderate or none ratings were considered unsuccessful treatment. Bleeding episodes (89% mild/moderate; 62% spontaneous; 72% localized to joints) occurred 991 times in 158 patients, with 84% successfully treated and 1.7% having no response. Only 1 or 2 injections were necessary to treat 91% of the bleeding episodes. Of the 11 patients (age range, 14 to 55 years) undergoing surgical procedures, 10 of the procedures were major and 1 was minor (tooth extraction). Excellent or good efficacy ratings were given in all cases.

Valentino et al. conducted an open-label, multicenter trial which compared the effectiveness of two prophylactic treatment regimens with antihemophilic factor (recombinant), plasma/albumin free method (rAHF-PFM) [Advate], as well as between on-demand and prophylaxis treatments, in preventing bleeding in hemophilia A. Sixty-six previously on-demand-treated patients aged 7-59 years with FVIII levels ≤ 2% received 6 months of on-demand treatment and were then randomized to 12 months of either standard (20-40 IU kg(-1) every other day) or pharmacokinetic (PK)-tailored (20-80 IU kg(-1) every third day) prophylaxis, both regimens intended to maintain FVIII trough levels at or above 1%. The primary endpoint was differences in annualized bleeding rates (ABRs) between the two prophylaxis regimens. Secondary endpoint evaluated included differences in ABRs between patients first treated on-demand and then on prophylaxis. A total of 1640 bleeding episodes occurred in 66 of 66 subjects during the on-demand period, 104 episodes occurred in 19 out of 32 subjects during standard prophylaxis and 141 episodes in 25 out of 34 subjects during the PK-tailored prophylaxis. Twenty-two (33.3%) patients on prophylaxis treatment experienced no bleeding episodes, whereas none treated on-demand were free from an episode of bleeding. ABRs for the two prophylaxis regimens were comparable, however, the differences between on-demand and either prophylaxis were statistically significant (p <0.0001): median (interquartile range [IQR]) ABRs were 43.9 (21.9), 1.0 (3.5), 2.0 (6.9) and 1.1 (4.9) during on-demand treatment, standard, PK-tailored and any prophylaxis,
respectively. No differences in FVIII consumption or adverse event rates between prophylaxis regimens were noted. No patient developed FVIII inhibitors. Researchers concluded that the outcomes of this trial demonstrated comparable safety and effectiveness for two prophylaxis regimens and that prophylaxis significantly reduces bleeding compared with on-demand treatment. Additionally, PK-tailored prophylaxis offers an alternative to standard prophylaxis for the prevention of bleeding in hemophilia A.

Hemophilia B

Powell et al conducted a phase 3, nonrandomized, open-label study which evaluated the safety, efficacy, and pharmacokinetics of coagulation factor IX Fc fusion protein recombinant (rFIXFc) [Alprolix] for prophylaxis, treatment of bleeding, and perioperative hemostasis in patients with severe factor IX deficiency (hemophilia B).32,52-53 Patients (age range, 12 to 71 years; n=123) were evaluated in trials to determine hemostatic efficacy of rFIXFc for prophylaxis, treatment of bleeding, and perioperative management. In the fixed-interval prophylaxis arm, patients received an initial dose of 50 IU/kg, which was then adjusted to maintain a factor IX trough level of at least 1% to 3% above baseline (median dose, 45.2 IU/kg). Patients in the individualized-interval arm received rFIXFc 100 IU/kg every 10 days, with the interval adjusted to maintain a factor IX trough of at least 1% to 3% above baseline (median dosing interval, 12.5 days). Patients in the episodic treatment arm received rFIXFc 20 to 100 IU/kg as needed for bleeding. The primary efficacy end point was the annualized bleeding rate, and safety end points included the development of inhibitors and adverse events. A total of 636 bleeding episodes were assessed in 114 patients, who received a median total dose of 46.99 IU per bleeding episode. During a median follow-up of 51.4 weeks, the annualized bleeding rates were decreased by 83% in the fixed-weekly interval group and 87% in the individualized group compared with the episodic treatment group. Most bleeding episodes (90.4%) were treated with 1 dose; 97.3% required 1 or 2 injections. The median annualized overall bleeding rates were 2.95% in the fixed-interval prophylaxis group, 1.38% in the individualized-interval prophylaxis group, and 17.69% in the episodic treatment group. Researchers concluded that rFIXFc is safe and effective for the treatment and prevention of bleeding events, including those incurred during major surgeries, in previously treated adolescents and adults with hemophilia B. Fc fusion did not impair factor IX activity or result in increased immunogenicity. The prolonged half-life of rFIXFc allowed for effective prophylaxis, with injections every 1 to 2 weeks. Additionally, the potential for higher trough levels of rFIXFc or longer intervals between doses may lead to greater use of prophylaxis among patients with hemophilia B.

In a prospective, open-label, uncontrolled trial, efficacy of routine prophylaxis with coagulation factor IX [Rixubis] in adult patients with hemophilia B (n=56) was evaluated. Primary endpoint was reduction in frequency of bleeding episodes. Patients received coagulation factor IX recombinant 40 to 60 international units/kg IV twice weekly for 3 months or longer. At screening, all patients had severe (factor IX level < 1%) or moderately severe (factor IX level ≤2%) hemophilia B, with 12 or more documented bleeding episodes requiring treatment within 12 months prior to enrollment. After a mean duration of 6 months of treatment with coagulation factor IX recombinant at a mean twice-weekly dose of 49.4 international units/kg/infusion, the mean total annualized bleeding rate was 4.3 for all bleeds, 1.7 for spontaneous bleeds, and 2.9 for joint bleeds compared with 33.9 +/- 17.37 mean total annualized bleeding rate in the on-demand arm (n=14) during the mean 3.5-month period.
Two studies were conducted to provide coagulation factor IX (human) [Mononine] for treatment of hemophilia B subjects who required extensive Factor IX replacement for surgery, trauma, or spontaneous bleeding (73 unique subjects and eight subjects enrolled twice for a total of 81 subjects), as well as to evaluate the safety and efficacy of coagulation factor IX (human) treatment. The overall mean recovery during treatment was determined to be 1.23 ± 0.42 IU/dL rise/IU/kg (K) (range = 0.59 to 2.92 K) among the 55 subjects included in recovery analyses in Study 1 and to be 1.12 ± 0.52 K (range = 0.61 to 2.08 K) among 10 subjects included in these analyses in Study 2. Five (5/81,6%) subjects reported adverse events attributed to coagulation factor IX (human) across both studies. In these studies, 100 doses of coagulation factor IX (human) were administered at a range of 71 to 161 IU/kg to a total of 36 subjects. Sixty-seven of these infusions were the subject of recovery analyses. Mean recovery tended to decrease as the dose of coagulation factor IX (human) increased: 1.09 ± 0.52 K at doses > 75-95 IU/kg (n=38), 0.98 ± 0.45 K at doses > 95-115 IU/kg (n=21), 0.70 ± 0.38 K at doses > 115-135 IU/kg (n=2), 0.67 K at doses > 135-155 IU/kg (n=1), and 0.73 ± 0.34 K at doses > 155 IU/kg (n=5). Among the 36 subjects who received these high doses, only one (2.8%) reported an adverse experience with a possible relationship to coagulation factor IX (human). No thrombogenic complications were observed or reported.

**Technology Assessments**

As an update to the 2011 intervention review, the Cochrane Collaboration published a 2015 review which evaluated the effectiveness of Factor VIIa (containing no human proteins) as compared to concentrates derived from plasma for of treating acute bleeding episodes in people with haemophilia with inhibitors. Researchers again concluded that although there is a need for further randomized controlled trials, both rFVIIa (NovoSeven®) and aPCC (FEIBA®) are similar in efficacy and safety. Additionally, the review suggested that researchers in the field define commonly agreed objective measures in order to enable the pooling of their results, thus increasing the power of comparisons.

The Cochrane Collaboration also published an intervention review which evaluated the effectiveness of clotting factor concentrate prophylaxis in the management of people with hemophilia A or B in 2011. Authors conclude that there is strong evidence from randomized controlled trials and observational trials that prophylaxis started early preserves joint function in children with hemophilia as compared to on-demand treatment. This effect is due to a consistent reduction in total bleeds and hemarthrosis and leads to a significant improvement in quality of life, however, treatment prophylaxis is linked to an increased factor usage and overall cost of therapy. There was insufficient evidence to show that treatment prophylaxis decreased bleeding and related complications in patients with existing joint damage. Randomized controlled trials are warranted to establish the best preventative regimen for these patients.

**Professional Societies**

In February 2016, the National Hemophilia Foundation (NHF) released updated hemophilia treatment guidelines entitled Medical and Scientific Advisory Council (MASAC) Recommendations Concerning Products Licensed for the Treatment of Hemophilia and Other Bleeding Disorders #240.22.55 A summary of the NHF recommendations for physicians treating patients with hemophilia A and B, von Willebrand Disease, and other congenital bleeding disorders are as follows:

<table>
<thead>
<tr>
<th>Treatment of Patients with Hemophilia A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recombinant Factor VIII</td>
</tr>
</tbody>
</table>

Clotting Factors and Coagulant Blood Products
### Clotting Factors and Coagulant Blood Products

<table>
<thead>
<tr>
<th>Concentrates</th>
<th>Helixate FS</th>
<th>Kogenate FS</th>
<th>Recombinase</th>
<th>Xyntane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma-derived Factor VIII Concentrates</td>
<td>Hemofil M</td>
<td>Monoclate-P</td>
<td>Recommended</td>
<td></td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>Cryoprecipitate</td>
<td>Not recommended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desmopressin</td>
<td>DDAVP</td>
<td>Stimate Nasal Spray for Bleeding</td>
<td>Recommended for use in mild hemophilia A. Children &lt; 2 years of age, pregnancy women, and patients with mild hemophilia A in whom desmopressin does not provide adequate Factor VIII levels should be treated with either recombinant or plasma-derived FVIII concentrates. Use with caution in pregnant women during labor and delivery.</td>
<td></td>
</tr>
</tbody>
</table>

**Treatment of Patients with Hemophilia B**

<table>
<thead>
<tr>
<th>Recombinant Factor IX Concentrate</th>
<th>BeneFIX</th>
<th>Rixubis</th>
<th>Treatment of choice in hemophilia B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged Half-Life Recombinase Factor IX Concentrate</td>
<td>Alprolix</td>
<td>Treatment of choice in hemophilia B.</td>
<td></td>
</tr>
<tr>
<td>Plasma-derived Factor IX Concentrates</td>
<td>AlphaNine SD</td>
<td>Mononine</td>
<td>Recommended</td>
</tr>
</tbody>
</table>

**Treatment of Patients with von Willebrand Disease (VWD)**

| Desmopressin | DDAVP | Stimate Nasal Spray for Bleeding | Recommended for most persons with VWD Type 1. Some Type 2A patients may respond to DDAVP, however clinical testing should be done to determine whether DDAVP can be used. Do not use in children < 2 years of age. Use with caution in pregnant women during labor and delivery. |
| Plasma-derived Factor VIII/ von Willebrand Factor | Alphanate | Humate-P | Wilate | Recommended in certain types of VWD that do not respond to DDAVP (i.e. Type 2B VWD and Type 3 VWD), and for use in Type 1 or 2A VWD patients who have become transiently unresponsive to DDAVP and in surgical situations, especially in young under the age of 2 years. In certain patients, Koate-DVI may also be effective. |
| Cryoprecipitate | Cryoprecipitate | Not recommended except in life- and limb-threatening emergencies when VWD-containing factor VIII concentrate is not immediately available. |

**Treatment of Patients with Inhibitors to Factor VIII or IX**

| Activated Prothrombin Complex Concentrate (aPCC) | FEIBA NF | Recommended, however, products are not interchangeable and are dependent on multiple factors including type of inhibitor (low- or high-responding), current titer of inhibitor, location of the bleed, and previous response to these products. Do not exceed recommended doses to reduce the risk of thrombosis. |
| Recombinant Factor VIIa Concentrate | NovoSeven RT | Recommended |

**Treatment of Patients with Factor VII Deficiency**

| Recombinant Factor VIIa Concentrate | NovoSeven RT | Recommended |
Clotting Factors and Coagulant Blood Products

The World Federation of Hemophilia developed 2013 guidelines which provides practical guidelines on the general management of hemophilia (level 1 corresponding to the strongest evidence and level 5 the weakest) as outlined below:21

- Prophylaxis prevents bleeding and joint destruction and should be the goal of therapy to preserve normal musculoskeletal function. (Level 2) In patients with repeated bleeding, particularly into target joints, short-term prophylaxis for 4–8 weeks can be used to interrupt the bleeding cycle. This may be combined with intensive physiotherapy or synoviorthesis. (Level 3)
- Prophylactic administration of clotting factor concentrates is advisable prior to engaging in activities with higher risk of injury. (Level 4) Preoperative assessment should include inhibitor screening and inhibitor assay, particularly if the recovery of the replaced factor is significantly less than expected. (Level 4)
- Patients with mild hemophilia A, as well as patients receiving intensive factor replacement for the first time, are at particular risk of inhibitor development and should be re-screened 4–12 weeks postoperatively. (Level 4)
- The WFH strongly recommends the use of viral-inactivated plasma-derived or recombinant concentrates in preference to cryoprecipitate or fresh frozen plasma (FFP) for the treatment of hemophilia and other inherited bleeding disorders. (Level 5)
- For treatment of FIX deficiency, a product containing only FIX is more appropriate than prothrombin complex concentrates, which also contain other clotting factors such as factors II, VII, and X, some of which may become activated during manufacture. Products containing activated clotting factors may predispose to thromboembolism.
• (Level 2) Whenever possible, the use of pure FIX concentrates is preferable for the treatment of hemophilia B as opposed to PCC (Level 2).

• Cryoprecipitate is preferable to FFP for the treatment of hemophilia A and VWD. (Level 4) Due to concerns about the safety and quality of FFP, its use is not recommended, if avoidable. (Level 4)

• DDAVP may be the treatment of choice for patients with mild or moderate hemophilia A when FVIII can be raised to an appropriate therapeutic level because it avoids the expense and potential hazards of using a clotting factor concentrate. (Level 3) Although DDAVP is not licensed for use in pregnancy, there is evidence that it can be safely used during delivery and in the postpartum period in an otherwise normal pregnancy. Its use should be avoided in pre-eclampsia and eclampsia because of the already high levels of VWF. (Level 3)

• Regular treatment with tranexamic acid alone is of no value in the prevention of hemarthroses in hemophilia. (Level 4) It is valuable, however, in controlling bleeding from skin and mucosal surfaces (e.g., oral bleeding, epistaxis, menorrhagia). (Level 2) Tranexamic acid is particularly valuable in the setting of dental surgery and may be used to control oral bleeding associated with eruption or shedding of teeth. (Level 4)

• Management of bleeding in patients with inhibitors must be in consultation with a center experienced in their management. (Level 5) Choice of treatment product should be based on titer of inhibitor, records of clinical response to product, and site and nature of bleed. (Level 4) Patients with a low-responding inhibitor may be treated with specific factor replacement at a much higher dose, if possible, to neutralize the inhibitor with excess factor activity and stop bleeding. (Level 4) Patients with a history of a high responding inhibitor but with low titers may be treated similarly in an emergency until an anamnestic response occurs, usually in 3–5 days, precluding further treatment with concentrates that only the missing factor. (Level 4)

The British Committee for Standards in Haematology released updated inhibitor treatment guidelines in 2013 entitled, “Diagnosis and treatment of factor VIII and IX inhibitors in congenital haemophilia.” A summary of the recommendations for the management of inhibitors is outlined below. Designations for the quality of evidence (A – highest, C – lowest) and strength of recommendation (1 – strong, 2 – weak) are given at the end of each recommendation.

• Bleeds may be managed with large doses of FVIII/IX in low responders and FVIII inhibitor bypassing activity (FEIBA) or activated recombinant FVII (rFVIIa) in high responders. FVIII can be considered for major bleeds in high responding patients with low-titre antibodies. For low-responding patients with low-titre inhibitors it is better to increase the frequency of FVIII/FIX infusions rather than increase the dose (2C).

• Bleeds may be managed with large doses of FVIII/IX in low responders and FVIII inhibitor bypassing activity (FEIBA) or activated recombinant FVII (rFVIIa) in high responders. FVIII can be considered for major bleeds in high responding patients with low-titre antibodies. For low-responding patients with low-titre inhibitors it is better to increase the frequency of FVIII/FIX infusions rather than increase the dose (2C).

• Patients who have experienced allergic reactions to FIX should be treated with rFVIIa (1C).

• Single dose FEIBA (50-100 µg/kg), single high dose (270 µg/kg) rFVIIa or 1-3 standard doses (90 µg/kg) of rFVIIa are all treatment options for early haemarthroses (1B).

• Treatment of non-joint bleeds should be with FVIII/FIX or standard doses of FEIBA or rFVIIa until further data are available (2C).
Tranexamic acid should be considered in all patients who are not receiving high doses of FEIBA (>200 iu/kg/d) but is especially important for mucosal bleeds (2C).

Some bleeds, unresponsive to bypassing agents, may be successfully treated by removal of the inhibitor using plasmaphaeresis and immunoabsorption together with high dose FVIII/IX concentrate (2B).

Combined treatment with rFVIIa and FEIBA should only be considered for life- or limb-threatening bleeds unresponsive to either agent used alone (2C).

The guidelines also address recommendations for the prophylaxis for inhibitor patients:

- Prophylaxis with a bypassing agent should be considered in young children after the first haemarthrosis to reduce the risk of arthropathy (2C).
- If prophylaxis is required in patients awaiting ITI, rFVIIa should be used (2C).
- Prophylaxis with bypassing agents in patients on ITI should undergo a trial reduction when FVIII recovery is measureable and stopped when the Bethesda titre is negative, assuming significant break-through bleeds do not result (2C).
- Prophylaxis may be considered in older patients with recurrent bleeds or progressive arthropathy (2C).
- The choice of product for prophylaxis should be considered on an individual basis, taking into account previous response to treatment, logistics of administration and cost (2C).
- If the initial regimen is unsuccessful, increasing the frequency of infusion is more likely to be effective than increasing the dose (2C).

The American Society of Hematology released an updated reference guide entitled 2012 Clinical Practice Guideline on the Evaluation and Management of von Willebrand Disease (VWD) which provides a summary of the 2007 von Willebrand Disease (VWD): Evidence-based Diagnosis and Management Guidelines, the National Heart, Lung, and Blood Institute (NHLBI) Expert Panel report (USA). A summary of the recommendations for the management of VWD is as follows:

- Therapeutic trial of DDAVP is recommended prior to use. VWF:RCo and FVIII activities should be measured at baseline and within 1 hour. Additional testing 2-4 hours after DDAVP should be considered to evaluate for shortened survival.
- Most type 1 VWD patients will respond to DDAVP, although patients with VWF:RCo <10 IU/dL and FVIII activity <20 IU/dL are less likely to have a clinically significant response. In type 2 VWD, DDAVP will increase the VWF concentration, but the VWF dysfunction will still be present. In type 2B VWD, DDAVP may result in transient thrombocytopenia. Therefore, DDAVP should be used with caution in type 2 VWD.
- To avoid tachyphylaxis, DDAVP therapy is typically discontinued after 2 or 3 daily doses.
- Minor bleeding should be treated with intravenous or nasal DDAVP, if results of a DDAVP trial support its use.
- In presence of inadequate DDAVP response, VWF concentrate should be used, with dosing primarily based on VWF:RCo units and secondarily on FVIII units.
- For patients with mild to moderate VWD undergoing oral surgery, antifibrinolytics combined with DDAVP are generally effective.
- For severe bleeding (e.g. intracranial, retroperitoneal) or major surgery prophylaxis, initial target VWF:RCo and Factor VIII activity levels should be >100 IU/dL, and levels >50 IU/dL should be maintained for at least 7-10 days. In all patients receiving VWF concentrate, clinicians should
perform proper thrombotic-risk assessment and institute appropriate strategies to prevent thrombosis.

**U.S. FOOD AND DRUG ADMINISTRATION (FDA)**

Advate (antihemophilic factor (recombinant)) is approved by the U.S. Food and Drug Administration (FDA) for use in children and adults with hemophilia A for the following: control and prevention of bleeding episodes; perioperative management; and routine prophylaxis to prevent or reduce the frequency of bleeding episodes. Advate is not indicated for the treatment of von Willebrand disease.

Adynovate (antihemophilic factor (recombinant), PEGylated) is FDA-labeled in adolescent and adult patients (12 years and older) with hemophilia A (congenital factor VIII deficiency) for the following: on-demand treatment and control of bleeding episodes; and routine prophylaxis to reduce the frequency of bleeding episodes. Adynovate is not indicated for the treatment of von Willebrand disease.

Afstyla (antihemophilic factor (recombinant)) is FDA-labeled in adults and children with hemophilia A (congenital Factor VIII deficiency) for the following: on-demand treatment and control of bleeding episodes; routine prophylaxis to reduce the frequency of bleeding episodes; and perioperative management of bleeding. Afstyla is not indicated for the treatment of von Willebrand disease.

Alphanate (antihemophilic factor/von Willebrand factor complex (human)) is FDA-labeled for control and prevention of bleeding in adult and pediatric patients with hemophilia A. It is also approved for surgical and/or invasive procedures in adult and pediatric patients with von Willebrand Disease in whom desmopressin (DDAVP) is either ineffective or contraindicated. Alphanate is not indicated for patients with severe VWD (Type 3) undergoing major surgery.

AlphaNine SD (coagulation factor IX (human)) is FDA-labeled for the prevention and control of bleeding in patients with Factor IX deficiency due to hemophilia B. AlphaNine SD contains low, non-therapeutic levels of Factors II, VII, and X, and, therefore, is not indicated for the treatment of Factor II, VII, or X deficiencies. This product is also not indicated for the reversal of coumarin anticoagulant-induced hemorrhage, nor in the treatment of hemophilia A patients with inhibitors to Factor VIII.

Alprolix (coagulation factor IX (recombinant), Fc fusion protein) is FDA-labeled in adults and children with hemophilia B for the following: on demand treatment and control of bleeding episodes; perioperative management of bleeding; and for routine prophylaxis to reduce the frequency of bleeding episodes. Alprolix is not indicated for induction of immune tolerance in patients with hemophilia B.

Bebulin (factor IX complex) is FDA-labeled for the prevention and control of bleeding episodes in adult patients with hemophilia B. Bebulin is not indicated for use in the treatment of Factor VII deficiency. No clinical studies have been conducted to show benefit from this product for treating deficiencies other than Factor IX deficiency.

BeneFIX (coagulation factor IX (recombinant)) is FDA-labeled for both control and prevention of bleeding episodes in adult and pediatric patients with hemophilia B, and for peri-operative
management in adult and pediatric patients with hemophilia B, and for peri-operative management in adult and pediatric patients with hemophilia B.

Coagadex (coagulation factor X (human)) is FDA-labeled in adults and children (aged 12 years and above) with hereditary Factor X deficiency for the following: on-demand treatment and control of bleeding episodes; and perioperative management of bleeding in patients with mild hereditary Factor X deficiency. Perioperative management of bleeding in major surgery in patients with moderate and severe hereditary Factor X deficiency has not been studied.

Corifact (factor XIII concentrate (human)) is FDA-labeled for routine prophylactic treatment and perioperative management of surgical bleeding in congenital Factor XIII deficiency.

Eloctate (antihemophilic factor (recombinant), Fc fusion proteins) is FDA-labeled in adults and children with Hemophilia A for the following: on demand treatment and control of bleeding episodes; perioperative management of bleeding; and routine prophylaxis to reduce the frequency of bleeding episodes. Eloctate is not indicated for the treatment of von Willebrand disease.

FEIBA (anti-inhibitor coagulant complex) is FDA-labeled in hemophilia A and B patients with inhibitors for the following: control and prevention of bleeding episodes; peri-operative management; and routine prophylaxis to prevent or reduce the frequency of bleeding episodes. FEIBA is not indicated for the treatment of bleeding episodes resulting from coagulation factor deficiencies in the absence of inhibitors to factor VIII or factor IX.

Helixate FS (antihemophilic factor (recombinant)) is FDA-labeled for the following: control and prevention of bleeding episodes in adults and children with hemophilia A; peri-operative management in adults and children with hemophilia A; routine prophylaxis to prevent or reduce the frequency of bleeding episodes in children with hemophilia A and to reduce the risk of joint damage in children without pre-existing joint damage; and routine prophylaxis to prevent or reduce the frequency of bleeding episodes in adults with hemophilia A. Helixate FS is not indicated for the treatment of von Willebrand disease.

Hemofil M (antihemophilic factor (human)) is FDA-labeled for the prevention and control of hemorrhagic episodes in hemophilia A. Hemofil M is not indicated in von Willebrand disease.

Humate-P (antihemophilic factor/von Willebrand factor complex (human)) is FDA-labeled for treatment and prevention of bleeding in adults with hemophilia A. It is also indicated in adults and children with von Willebrand disease (VWD) for treatment of spontaneous and trauma-induced bleeding episodes, and for prevention of excessive bleeding during and after surgery. This includes patients with severe VWD as well as patients with mild to moderate VWD where the use of desmopressin is known or suspected to be inadequate. Humate-P is not indicated for the prophylaxis of spontaneous bleeding episodes in VWD.

Idelvion (coagulation factor IX (recombinant), albumin fusion protein) is FDA-labeled in children and adults with hemophilia B (congenital Factor IX deficiency) for the following: on-demand control and prevention of bleeding episodes; perioperative management of bleeding; and routine prophylaxis to
prevent or reduce the frequency of bleeding episodes. Idelvion is not indicated for immune tolerance induction in patients with hemophilia B.

IXINITY (coagulation factor IX (recombinant)) is FDA-labeled for control and prevention of bleeding episodes in adults and children ≥ 12 years of age with hemophilia B. It is also indicated for perioperative management. IXINITY is not an indication for induction of immune tolerance in patients with hemophilia B.

Koâte-DVI (antihemophilic factor (human)) is FDA-labeled for the treatment of hemophilia A in which there is a demonstrated deficiency of activity of the plasma clotting factor, factor VIII, to control or prevent bleeding episodes, or in order to perform emergency and elective surgery on individuals with hemophilia. Koâte-DVI is not approved for the treatment of von Willebrand’s disease.

Kogenate FS (antihemophilic factor (recombinant)) is FDA-labeled for the following: control and prevention of bleeding episodes in adults and children with hemophilia A; peri-operative management in adults and children with hemophilia A; routine prophylaxis to prevent or reduce the frequency of bleeding episodes in children with hemophilia A and to reduce the risk of joint damage in children without preexisting joint damage; and routine prophylaxis to prevent or reduce the frequency of bleeding episodes in adults with hemophilia A. Kovaltry is not indicated for the treatment of von Willebrand disease.

Monoclate-P (antihemophilic factor (human)) is FDA-labeled for treatment of hemophilia A. Monoclate-P is not effective in controlling the bleeding of patients with von Willebrand’s disease.

Mononine (coagulation factor IX (human)) is FDA-labeled for the prevention and control of bleeding in Factor IX deficiency, also known as hemophilia B or Christmas disease. It is not indicated in the treatment or prophylaxis of hemophilia A patients with inhibitors to Factor VIII. Mononine is not indicated for replacement therapy of clotting Factors II, VII and X. It is also not indicated in the treatment or reversal of coumarin-induced anticoagulation or in a hemorrhagic state caused by hepatitis-induced lack of production of liver dependent coagulation factors.

Novoeight (antihemophilic factor (recombinant)) is FDA-labeled for the control and prevention of bleeding episodes in adults and children with hemophilia A. It is also indicated for peri-operative management and routine prophylaxis to prevent or reduce the frequency of bleeding episodes in adults and children with hemophilia A. Novoeight is not indicated for the treatment of von Willebrand disease.

NovoSeven RT (coagulation factor VIIa (recombinant)) is FDA labeled for the following: treatment of bleeding episodes in adults and children with hemophilia A or B with inhibitors with acquired hemophilia; perioperative management in adults and children with hemophilia A or B with inhibitors and in adults with acquired hemophilia; treatment of bleeding episodes and perioperative management in congenital Factor VII (FVII) deficiency; and treatment of Glanzmann’s thrombasthenia with refractoriness to platelet transfusions, with or without antibodies to platelets.
Nuwiq (antihemophilic factor (recombinant)) is FDA-labeled in adults and children with hemophilia A for the following: on-demand treatment and control of bleeding episodes; perioperative management of bleeding; and routine prophylaxis to reduce the frequency of bleeding episodes. Nuwiq is not indicated for the treatment of von Willebrand disease.

Obizur (antihemophilic factor (recombinant), porcine sequence) is FDA-labeled for the treatment of bleeding episodes in adults with acquired hemophilia A. Safety and efficacy of Obizur has not been established in patients with a baseline anti-porcine factor VIII inhibitor titer of greater than 20 BU. Obizur is not indicated for the treatment of congenital hemophilia A or von Willebrand disease.

Profilnine SD (factor IX complex) is FDA-labeled for the prevention and control of bleeding in patients with Factor IX deficiency due to hemophilia B. It is not indicated for use in the treatment of Factor VII deficiency.

Recombinate (antihemophilic factor (recombinant)) is FDA-labeled for use in hemophilia A (classical hemophilia) for the prevention and control of hemorrhagic episodes. It is also indicated in the perioperative management of patients with hemophilia A (classical hemophilia). Recombinate is not indicated for von Willebrand’s disease.

RiaSTAP (fibrinogen concentrate (human)) is FDA-labeled for the treatment of acute bleeding episodes in patients with congenital fibrinogen deficiency, including afibrinogenemia and hypofibrinogenemia.

Rixubis (coagulation factor IX (recombinant)) is FDA-labeled for the following: control and prevention of bleeding episodes in adults with hemophilia B; perioperative management in adults with hemophilia B; and routine prophylaxis to prevent or reduce the frequency of bleeding episodes in adults with hemophilia B. Rixubis is not indicated for induction of immune tolerance in patients with hemophilia B.

Tretten (coagulation factor XIII A-Subunit (recombinant)) is FDA-labeled for routine prophylaxis of bleeding in patients with congenital factor XIII A-subunit deficiency. It is not indicated for use in patients with congenital factor XIII B-subunit deficiency.

Vonvendi (von Willebrand factor (recombinant)) is FDA-labeled for on-demand treatment and control of bleeding episodes in adults diagnosed with von Willebrand disease.

Wilate (von Willebrand factor/coagulation factor VIII complex human) is FDA-labeled for the treatment of spontaneous and trauma induced bleeding episodes in patients with severe von Willebrand disease (VWD) as well as patients with mild or moderate VWD in whom the use of desmopressin is known or suspected to be ineffective or contraindicated. It is not indicated for the prophylaxis of spontaneous bleeding episodes, or the prevention of excessive bleeding during and after surgery in VWD patients or for treatment of hemophilia A.

Xyntha, Xyntha Solofuse (antihemophilic factor [recombinant], plasma/albumin-free) is FDA-labeled for control and prevention of bleeding episodes in patients with hemophilia A and for perioperative management in patients with hemophilia A. It is not indicated in patients with von Willebrand disease.
**APPLICABLE CODES**

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by the member specific benefit plan document and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Coverage Determination Guidelines may apply.

<table>
<thead>
<tr>
<th>HCPCS Codes</th>
<th>Description</th>
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<tbody>
<tr>
<td>J7175</td>
<td>Injection, factor x (human), 1 IU</td>
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<tr>
<td>J7178</td>
<td>Injection, human fibrinogen concentrate, 1 mg</td>
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<tr>
<td>J7179</td>
<td>Injection, von willebrand factor (recombinant), (Vonvendi), 1 IU vWF:RCo</td>
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<td>J7180</td>
<td>Injection, factor XIII (antihemophilic factor, human), 1 IU</td>
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<td>J7181</td>
<td>Injection, factor XIII A-subunit, (recombinant), per IU (Tretten)</td>
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<td>J7182</td>
<td>Injection, factor VIII, (antihemophilic factor, recombinant), (Novoeight), per IU</td>
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<td>J7183</td>
<td>Injection, von Willebrand factor complex (human), Wilate, 1 IU vWF:RCo</td>
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<td>J7185</td>
<td>Injection, factor VIII (antihemophilic factor, recombinant) (XYNTHA), per IU</td>
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<td>Injection, antihemophilic factor VIII/von Willebrand factor complex (human), per factor VIII i.u.</td>
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<td>Injection, von Willebrand factor complex (Humate-P), per IU VWF:RCO</td>
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<td>Injection, factor VIII (antihemophilic factor, recombinant), (obizur), per i.u.</td>
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<td>Factor VIIa (antihemophilic factor, recombinant), per 1 mcg</td>
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<td>J7190</td>
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<td>J7192</td>
<td>Factor VIII (antihemophilic factor, recombinant) per IU, not otherwise specified</td>
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<td>J7193</td>
<td>Factor IX (antihemophilic factor, purified, nonrecombinant) per IU</td>
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<td>Antiinhibitor, per IU</td>
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<td>D68.311</td>
<td>Acquired hemophilia</td>
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<td>D69.1</td>
<td>Qualitative platelet defects</td>
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</table>

**REFERENCES**


The National Hemophilia Foundation. MASAC Recommendations Concerning Products Licensed for the Treatment of Hemophilia and Other Bleeding Disorders. MASAC Document #228 May 2014


The National Hemophilia Foundation. MASAC Recommendations Concerning Products Licensed for the Treatment of Hemophilia and Other Bleeding Disorders. MASAC Document #228. May 2014.


**PROTOCOL HISTORY/REVISION INFORMATION**

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<td>12/19/2013</td>
<td>Corporate Medical Affairs Committee</td>
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The foregoing Health Plan of Nevada/Sierra Health & Life Health Operations protocol has been adopted from an existing UnitedHealthcare coverage determination guideline that was researched, developed and approved by the UnitedHealthcare Coverage Determination Committee.