This guideline is applicable for the most common INR goal of 2.3. Therapeutic INR goals should be confirmed before reversal and INR adjusted according to warfarin indication. Examples of other INR goals are:
- High risk prosthetic valve 2.5-3.5
- Pulmonary hypertension 1.5-2.5

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**Warfarin Anticoagulation**

**Elevated INR or Non-Life-Threatening Bleeding**

**Supratherapeutic INR (> 3*)**
- NO significant Bleeding AND NO Recent or Urgent Surgery / Invasive Procedure

**INR < 5**
- Hold and/or decrease warfarin dose
- No phytonadione needed

**INR ≥ 5 and ≤ 10 with NO Increased Bleeding Risk**
- Hold the next 1 to 2 doses and consider warfarin dose adjustment

**INR ≥ 5 and ≤ 10 with Increased Bleeding Risk**
- Hold warfarin

**INR ≤ 3**
- Re-check INR in 24 hours

**INR > 10**
- Recheck for INR accuracy
- Hold/discontinue warfarin therapy

---

**Does the patient have adequate gastrointestinal absorption or perfusion?**

**NO**
- Recheck for INR accuracy
- Hold/discontinue warfarin therapy

**YES**
- Based upon thrombosis vs. bleeding risk, consider phytonadione 1-2.5 mg ORALLY.

---

**INR > 10 after 24 hours from most recent dose of phytonadione, follow respective protocol above based upon INR**

**FFP given**, check INR within 1 hr of administration and consider re-check in 6-12 hrs. If INR remains elevated at 6 hrs, consider more FFP and as stated below.

---

**Recheck INR within 24-48 hours unless clinical scenario indicates sooner follow-up.**
- If INR remains elevated with inadequate response to previous intervention, hold warfarin and may consider dose/re-dose of phytonadione by same route if indicated.
- If adequate INR response, consider warfarin re-initiation.

---

**NOTE**: Fresh Frozen Plasma (FFP) typically comes in volumes of 250-275 mL. Administer FFP 10-15 mL/kg and round to the nearest unit. For concerns of thrombosis in a patient if over-correction occurs, FFP units should be rounded down. In other cases of more severe bleeding, consider rounding the number of units up.

**INR increase occurs**
- Consider giving FFP for immediate effects. (Phytonadione and FFP should be administered together to avoid a rebound INR increase.)

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**Recent or Urgent Surgery**
- Give phytonadione 2.5 to 5 mg PO or if the patient has inadequate gastrointestinal absorption or perfusion give by slow IV INFUSION over 30 minutes

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**Serious or Life-Threatening Bleeding**

---

**Therapeutic INR**
- 1.2
- 2.5
- 3.5
- 5.0

---

**INR < 10 after 24 hours from most recent dose of phytonadione, follow respective protocol above based upon INR**

---

**Carefully assess risks/benefits of anticoagulation**
- If patient needs to remain anticoagulated, re-start warfarin therapy

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**If repeat INR > 3:**
- Consider holding additional dose(s) or restart warfarin with consideration to dose adjustment
- Recheck INR as clinically indicated

---

**Recheck for INR accuracy**
Serious or Life-Threatening Bleeding

- Serious or life-threatening bleeding includes spontaneous intracerebral hemorrhage, gastrointestinal bleed requiring intervention, retroperitoneal hemorrhage, ruptured hollow viscus, emergent surgery.
- For further management and treatment goals of spontaneous ICH, see the ICH Algorithm.
- For special populations such as LVADs, mechanical valves, or other patients at high risk for thromboembolic complications, consider consulting specialty areas / attendings.

**Kcentra® (a Prothrombin Complex Concentrate [PCC] product)**

See Contraindications and Precautions.** RISK (thromboembolism) vs. BENEFIT must be considered.

<table>
<thead>
<tr>
<th>Baseline INR</th>
<th>&lt; 4</th>
<th>≥ 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose</td>
<td>25 units/kg</td>
<td>35 units/kg</td>
</tr>
</tbody>
</table>

- Give phytonadione 10 mg by slow IV INFUSION over 30 min. (Do NOT give subcutaneously or intramuscular due to erratic absorption.)

AND EITHER

**Kcentra®** is a factor IX concentrate that contains factors II, VII, IX, X, Protein C & S, Antithrombin III, human albumin, and heparin. Contraindicated in patients with heparin allergy. Dose is based on factor IX units. It is ordered / supplied by pharmacy. Baseline Labs should include chem 7, CBC, PT/INR, ionized calcium, arterial or venous blood gas.

- Recheck INR 15-30 minutes after Kcentra® administration
- If repeat INR ≥ 1.4 consider re-dosing Kcentra® with reduced dose.
  - Do not exceed a maximum cumulative dose of 5000 units or 50 units/kg in a 24-hour period

- Consider additional FFP for persistent bleeding.
- Phytonadione may be repeated every 12 hours.

- Consider giving Recombinant factor VII 1 mg IVP over 2-5 minutes.
  - Recheck INR after 15-30 minutes.
  - If INR remains elevated, repeat dose.

* Kcentra® was not studied in subjects who had a thromboembolic event, myocardial infarction, disseminated intravascular coagulation, cerebral vascular accident, transient ischemic attack, unstable angina pectoris, or severe peripheral vascular disease within the prior 3 months. Kcentra® may not be suitable in patients with thromboembolic events in the prior 3 months. PCC should only be administered to patients when the beneficial effects of use outweigh the serious risk of potential hypercoagulation. The use of factor products has been associated with thromboembolic complications including thrombosis and disseminated intravascular coagulation. Clinical surveillance for early signs of consumptive coagulopathy should be initiated with appropriate biological testing when administering PCC.
NOTE: For most common dental procedures/surgeries, no change in anticoagulation intensity is needed. Recent studies have reported that there was no significant difference in post-procedural bleeding at low or higher INR values. If bleeding complications are feared, epsilon aminocaproic acid mouthwash may be used without the interruption of anticoagulation.

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Risk Stratification as an Indication for Anticoagulant Bridging Based Upon Thromboembolic Risk When NOT Fully Anticoagulated

<table>
<thead>
<tr>
<th>Anticoagulation Bridging Advised</th>
<th>Anticoagulation Bridging as a case-by-case basis</th>
<th>Anticoagulation Bridging Not Advised</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Severe thrombophilia†</td>
<td>• Recurrent (≥2) thromboembolic events</td>
<td>• Remote thromboembolic event &gt;12 months ago and no other risk factors</td>
</tr>
<tr>
<td>• Thromboembolic event within last 3 months</td>
<td>• Cerebrovascular disease w/o multiple strokes/TIAs w/o risk factors for cardioembolism</td>
<td>• Intrinsic cerebrovascular disease w/o recurrent strokes/TIAs</td>
</tr>
<tr>
<td>• Rheumatic atrial fibrillation</td>
<td>• AFib CHADS2 score of 3 or 4</td>
<td>• AFib CHADS2 score of 0 or 2 (assume no prior stroke or TIA)</td>
</tr>
<tr>
<td>• Acute cardiac thromboembolism evidenced by echocardiogram</td>
<td>• Mechanical bileaflet aortic valve and ≥ 1 of following: A Fib, prior stroke or TIA, HTN, DM, CHF, age &gt;75 y</td>
<td>• Mechanical bileaflet aortic valve without A Fib and no other risk factors for stroke</td>
</tr>
<tr>
<td>• Older mechanical valve</td>
<td>• Venous thromboembolism &gt;3 to 12 months ago</td>
<td></td>
</tr>
</tbody>
</table>
References


Guideline Authors

- Erik Abel, PharmD, BCPS
- Margueritte Hevezi, PharmD, BCPS
- Erin Reichert, PharmD
- Colin Kaide, MD
- Ginny Mitchell, PharmD, BCPS

Quality Measures

- Warfarin discontinued in all serious or life-threatening bleed cases
- Percent of patients who receive Kcentra®
- Baseline INR versus post-PCC INR
- Median time to repeat INR
- Mortality rate
  - Hospital mortality
  - 30-day mortality
- Mean hospital length of stay (days)

Guideline Approved


Disclaimer: Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.

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