

## Family Health Centre

### Warfarin Maintenance Dosing by Nurses and Pharmacists

#### Policy and Procedures

##### Policy:

This policy applies to any patient in the Family Health Centre on warfarin therapy under the following condition: The patient has attained two consecutive INRs within the desired therapeutic range and has been on warfarin for at least 2 weeks.

Any nurse or pharmacist in the Family Health Centre meeting all the requirements of the **medical directive (MDFHC001)**, will follow the procedures outlined in this document.

##### Note:

*Pharmacist refers to pharmacists licensed under Part A (direct patient care) with the Ontario College of Pharmacists.*

*Nurse refers to Registered Nurses (RN) or Primary Care Nurse Practitioners - extended-class (RN(EC)).*

##### Procedure:

1. The Pharmacist or Nurse will write an order in the patient's health record for "Warfarin Maintenance Dosing per Medical Directive"
2. A pre-determined rotating schedule will determine which pharmacist or nurse is responsible for warfarin dose adjustments on a weekly basis.
3. The physician will:
  - Prescribe the initial warfarin dose, route and frequency – this may be done in consultation with the pharmacist
  - Document the indication for warfarin therapy in the health record
  - Establish INR goal
  - Order INR tests
  - Establish the duration of warfarin therapy
4. Upon commencing warfarin maintenance dose adjustment per **Medical Directive MDFHC001**. The pharmacist or nurse will ensure that the following information is obtained and documented in the patient's anticoagulation/health record:
  - Patient's age
  - Patient's weight
  - Indication for warfarin therapy
  - Target INR range
  - Past history of bleeding

- Current and past anticoagulation history, including prior dose
  - Current and past medical problems
  - Concomitant medications including herbal/alternative therapies, over-the-counter medications and vitamins
  - Known allergies and drug intolerances
  - Name and telephone number of patient's community pharmacy
  - Name and telephone number of contact person for warfarin dose adjustments if not the patient themselves
5. The pharmacist will arrange to meet with the patient for warfarin medication counseling and explain the process for monitoring and dosage adjustments.
  6. During the maintenance phase INR should be repeated at least every 4 weeks for INR 1.8 – 3.2 (target 2.0 – 3.0) or 2.3 – 3.7 (target 2.5. – 3.5)
  7. More frequent INR testing may be required under the following circumstances:
    - patient is experiencing an adverse effect, e.g. minor or intermediate bleeding, (*refer to pg 6 for "Risk Assessment for Bleeding"*)
    - bleeding risk increased
    - patient recently started a new medication that has the potential to result in sub or supra –therapeutic INRs
    - There is some flexibility in when to order subsequent INRs after dose changes. Ordinarily, the INR should be re-checked in 3-14 days, depending on the various factors (e.g. how high or low the INR was, the extent of the dose change, the risk of bleeding, etc.)
    - Due to the long half-life of clotting factors, it will take at least 4-7 days to achieve a new steady state concentration and response from a new dose
    - An earlier repeat INR should be done if there is a risk of persistent INR elevation or bleeding

(*Refer to "Guidelines for Warfarin Dose Adjustment" on page 4 for assessing INR results*)
  8. Upon assessment of INR results, if dosage adjustments are required, the pharmacist or nurse will contact the patient (or designated caregiver) by telephone or in person (e.g. if the patient has a clinic appointment that day) to review the dosage change and future monitoring plans
  9. All INR assessments and/or warfarin dosage adjustments will be accompanied by a pharmacist or nursing note in the progress note section of the anticoagulation module of the patient's health record. The following information may be documented:
    - Target INR value and current dose
    - Current INR value
    - Potential reasons for current value (e.g. non-adherence; change in medications; change in disease state; dose titration)
    - Recommended dose changes and monitoring plan

- Rationale for dose selection and monitoring plan

10. The primary care physician or delegate will be notified immediately by the pharmacist or nurse, if any of the following should occur.

- INR result  $\geq 5.0$
- Patient no longer consents to warfarin therapy
- Patient exhibits new signs and symptoms of thromboembolism
- Patient exhibits new signs and symptoms of hemorrhage/bleeding
- Patient has experienced a fall or other trauma recently (i.e. since the last dose of warfarin was administered and/or the since the last contact with the patient)
- Patient status changes in any way that does or may affect the stability of anticoagulation.

Under the above conditions, the pharmacist or nurse will cease to adjust warfarin doses until the physician has assessed the patient and determined that the patient can resume warfarin therapy.

11. The pharmacist or nurse responsible will be notified immediately by the physician or delegate of any changes to the patient's medication profile. The pharmacist or nurse will review and determine the impact of medication changes on anticoagulation management

12. If the patient's warfarin therapy is to be discontinued (e.g. course of treatment finished, patient no longer adherent with therapy or testing), they will be referred back to the physician by the pharmacist or nurse. The physician will be responsible for writing an order to indicate that therapy has been discontinued.

## Guidelines for Warfarin Dose Adjustment

### Warfarin Maintenance Dosing Algorithm <sup>2,4</sup>

Note: INR results may be reported with up to 2 decimal places. The value should be rounded up or down to the nearest 0.1 value (i.e. readings  $\geq 0.05$  will be rounded up;  $< 0.05$  will be rounded down)

<b>INR up to 4.9: <i>Managed by nurse or pharmacist (per Medical Directive MDFHC001)</i></b>		
<b>Goal: 2.0-3.0</b>	<b>Goal: 2.5-3.5</b>	<i>Note: Adjust warfarin only if a change in INR is deemed to be permanent.</i>
< 2.0	< 2.5	<ul style="list-style-type: none"> <li>Consider reloading with 1 extra dose of warfarin.</li> <li>Increase weekly warfarin by 10-20%</li> </ul>
2.0-3.0	2.5-3.5	<ul style="list-style-type: none"> <li>No change.</li> </ul>
3.1-3.5	3.6-4.0	<ul style="list-style-type: none"> <li>Decrease weekly warfarin dose by 10-20%.</li> </ul>
3.6-4.0	4.1-4.5	<ul style="list-style-type: none"> <li>Hold 1 dose of warfarin.</li> <li>Decrease weekly warfarin dose by 10-20%.</li> </ul>
4.1-4.9	4.6-4.9	<ul style="list-style-type: none"> <li>Hold warfarin until INR in therapeutic range.</li> <li>Decrease weekly warfarin dose by 10-20%.</li> <li>Consider low dose Vitamin K if high risk of bleeding* (consult physician).</li> </ul>
<p><b>Note on flexibility:</b> The dosing and INR recommendations outlined in this algorithm should be followed in most cases. Professionals may exercise judgment for minor deviations outside the defined INR limits.</p>		
<b>INR 5.0-8.9: <i>Managed by physician</i> <sup>5</sup></b>		
No increased risk of bleeding*		<ul style="list-style-type: none"> <li>Hold 1 or 2 doses of warfarin</li> <li>Monitor INR more frequently (e.g. re-check INR in 1-2 days)</li> <li>Resume warfarin at a lower dose when INR is within therapeutic range (e.g. decrease weekly warfarin dose by 10-20%)</li> </ul>
Increased risk of bleeding* or Minor bleeding		<ul style="list-style-type: none"> <li>Hold 1-2 doses of warfarin.</li> <li>Give Vitamin K 1.0-2.5 mg orally.</li> <li>Monitor INR more frequently (e.g. re-check INR in 1-2 days)</li> <li>Resume warfarin at a lower dose when INR is within therapeutic range (e.g. Decrease weekly warfarin dose by 10-20%)</li> </ul>
Rapid reversal required (within 24 hours; e.g. for surgery)		<ul style="list-style-type: none"> <li>Hold warfarin.</li> <li>Give up to 5 mg Vitamin K orally (INR should be reduced within 24 hours).</li> <li>If INR remains high, give an additional dose of Vitamin K 1.0-2.0 mg orally.</li> </ul>
Serious bleeding		<ul style="list-style-type: none"> <li>See below</li> </ul>
<b>INR 9.0 and above: <i>Managed by physician</i> <sup>5</sup></b>		
9.0-20.0 and No serious bleeding		<ul style="list-style-type: none"> <li>Hold warfarin.</li> <li>Give Vitamin K 5 – 10 mg orally (INR should be reduced within 24-48 hours).</li> <li>Monitor INR more frequently and repeat Vitamin K as necessary.</li> <li>Restart warfarin at lower dose once INR is within therapeutic range.</li> </ul>

<p>&gt; 20.0 or Serious bleeding</p>	<ul style="list-style-type: none"><li>• Send the patient to ER.</li><li>• Consider consulting hematology.</li><li>• Hold warfarin.</li><li>• Patient may require IV Vitamin K, fresh plasma, prothrombin complex concentrate or recombinant factor V11a depending on urgency of situation.</li></ul>
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\* see next page for **Risk Assessment for Bleeding**

## Notes on warfarin maintenance dosing algorithm

### Use of the algorithm

- This algorithm is to be used by nurses, pharmacists and physicians in the Family Health Centre
- The algorithm for managing INRs up to 4.9 may be followed by nurses and pharmacists approved under UHN Medical Directive (MDFHC001) without consulting a physician.
- The nursing/pharmacist component can be instituted once a patient newly started on warfarin has had two consecutive INRs in the therapeutic range and has been on warfarin for at least two weeks
- The patient's physician **must** be notified immediately and, in most cases, take over direct management of warfarin dosing under the following circumstances:
  - the INR  $\geq$  5.0,
  - patient no longer consents to warfarin therapy
  - patient exhibits new signs and symptoms of hemorrhage/bleeding (e.g. gingival bleeding, epistaxis, ecchymoses, hematuria, melena, blood per rectum, etc.)
  - patient exhibits new signs and symptoms of thromboembolism (e.g. shortness of breath, pain/swelling of extremity, changes in neurological status, changes in pattern of headaches, etc.)
  - any time the status of the patient changes in any way that **does** or **may** affect the anticoagulation status (e.g. patient experienced a fall or other trauma since the last dose of warfarin was administered or since the last contact with the patient
  - patient status changes in any way that does or may affect the stability of anticoagulation
  - an unexpected significant change of the INR result over a patient's established level, even if it does not exceed 4.9
- Once the physician decides that the patient's status has stabilized, the nurse or pharmacist may resume using the algorithm per medical directive. This must be communicated directly with the nursing or pharmacy staff and documented in the anticoagulation record

### Risk Assessment for Bleeding:

- Lowest incidence of bleeding occurs with INR  $\leq$  4.9
- Overall bleeding risk increases significantly with INR  $>$  5<sup>7</sup>
- Intracranial hemorrhage risk increases significantly with INR  $>$  4<sup>8,9</sup>

Risk of bleeding	Risk of clotting
<p>The "Outpatient Bleeding Risk Index"<sup>8</sup>:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Age &gt;65 years</li> <li><input type="checkbox"/> History of stroke (ever)</li> <li><input type="checkbox"/> History of GI bleeding (ever)</li> <li><input type="checkbox"/> Recent MI (within previous 1 month) <b>or</b></li> <li style="padding-left: 20px;">Severe anemia (Hct &lt;30%) <b>or</b></li> <li style="padding-left: 20px;">Renal insufficiency (SCr &gt; 130 <math>\mu</math>mol/l) <b>or</b></li> <li style="padding-left: 20px;">Diabetes mellitus</li> </ul> <p><i>If none:</i> Low risk (3% in 12 months)  <i>If 1-2:</i> Intermediate risk (12% in 12 months)  <i>If 3-4:</i> High risk (48% in 12 months)</p> <p>Other risk factors for bleeding may include:</p> <ul style="list-style-type: none"> <li>- Warfarin started within previous 1 month</li> <li>- Severe liver dysfunction</li> <li>- Uncontrolled hypertension (BP &gt;160/90)</li> <li>- Change of &gt;2.0 INR units from last INR</li> <li>- Malignancy</li> <li>- Recent surgery</li> <li>- Concomitant NSAID therapy</li> </ul>	<p>There is a greater risk of clotting in the following circumstances. This may warrant accepting a higher risk of bleeding.</p> <ul style="list-style-type: none"> <li>- Mechanical prosthetic valve</li> <li>- Bioprosthetic valve &lt; 3 months</li> <li>- DVT/PE &lt; 12 weeks of therapy</li> <li>- Antiphospholipid syndrome or &gt; 1 hypercoagulable state</li> <li>- Atrial fibrillation + valvular heart disease, prior stroke or systemic embolism +/-12 weeks of therapy</li> <li>- History of embolization on anticoagulant therapy</li> <li>- Acute MI within previous 12 weeks</li> </ul>

## Guidelines for Use of Vitamin K

- In the Family Health Centre, Vitamin K should be given orally only; do not inject it subcutaneously or intramuscularly as these routes provide erratic and less predictable absorption.
- If INR reversal is needed more urgently (i.e. within 12 hours), then the patient should be sent to the emergency department (e.g. for IV Vitamin K, fresh frozen plasma, etc.)
- For oral use, use an insulin syringe to withdraw the prescribed dose from a 10 mg (1 mL) ampoule of parental Vitamin K.
- Vitamin K is generally not required for INR <5 with no significant bleeding; instead the warfarin dose should be lowered or held

Patient's INR	Clinically significant bleeding present?	Rapid Reversal required:	Recommendations <sup>(adapted from 5,6)</sup>
< 5.0 (no significant bleeding)	No	No	Lower the dose of warfarin <i>Or</i> Omit 1 dose of warfarin, monitor more frequently and resume warfarin at a lower dose when INR is within therapeutic level If INR is only minimally greater than the therapeutic range, dose reduction may not be required
≥5 and < 9	No	No	Omit 1 or 2 doses of warfarin, monitor more frequently, and resume warfarin at a lower dose when INR is within therapeutic range <i>Or</i> Omit 1 dose of warfarin and administer 1 to 2.5 mg vitamin K orally (especially if patient is at increased risk of bleeding)
		Yes	If more rapid reversal if needed (e.g. urgent surgery required), administer up to 5 mg vitamin K orally; reduction in INR should occur within 24 h. Repeat with 1 to 2 mg vitamin K orally if INR remains high.
≥ 9	No	No	Hold warfarin, and administer 5 to 10 mg vitamin K orally; substantial reduction in INR should occur within 24 – 48 h. Monitor more frequently and use additional vitamin K, if necessary. Resume warfarin at a lower dose when INR is within therapeutic range
Any elevated INR	Yes	Yes	Refer to ER (patient may require IV Vitamin K, fresh plasma, prothrombin complex concentrate or recombinant factor V11a depending on urgency of situation)

### References:

1. Adapted from: University of Washington Anticoagulation Services (Aug. 2001)
2. Adapted Calgary Health Region Anticoagulation Management Services and Family Medicine Centre – The Ottawa Hospital – civic Campus,
3. Pharmacist assisted warfarin dosing program – UHN approved MAC Sept. 2006
4. UHN Warfarin Anticoagulation Guidelines (Cardiovascular Pharmacotherapy Handbook) – justification for 10-20% dosage adjustment in algorithm.
5. Ansell J, Hirsh J, Poller L, Bussey H, Jacobson A, Hylek E. The pharmacology and management of the vitamin K antagonists (The 7<sup>th</sup> ACCP conference on Antithrombotic and thrombolytic therapy). Chest 2004; 126: 204S-233S
6. Vanier et al. Can J Hosp Pharm 2006; 59(3):125-35
7. Cannegieter et al, NEJM 1995; 333(1): 11-17
8. Beyth et al, Am J Med 1998; 105: 91-99
9. Hylek et al, Ann Intern Med 1994; 120(11): 897-902