


Name of Policy: <u>Pharmacy Consultation, Dosing and Monitoring</u> Policy Number: 3364-133-64 Department: Pharmacy Approving Officer: Senior Hospital Administrator Responsible Agent: Director of Pharmacy Scope: University of Toledo Medical Center	 Effective Date: 2/20/2023 Initial Effective Date: 12/22/2005
<input type="checkbox"/> New policy proposal <input type="checkbox"/> Minor/technical revision of existing policy <input type="checkbox"/> Major revision of existing policy <input checked="" type="checkbox"/> Reaffirmation of existing policy	

(A) Policy Statement

Pharmacists deemed competent will combine sound pharmacokinetic principles with rational clinical judgement to optimize drug therapy regimens for our patients. Pharmacy residents with appropriate training under the supervision of competent pharmacists may perform pharmacy consultation, dosing and monitoring. Competency is deemed through privileging and/ or annual competency.

(B) Purpose of Policy

To establish uniform procedures within the pharmacy department for medication consultations, dosing and monitoring. Separate policies may exist for automatic conversions, adjustments and discontinuations, laboratory monitoring, dose rounding and other pharmacotherapeutic activities.

(C) Procedure

1. The provider prescribes an order for pharmacy-to-dose or adjust a specified medication. Providers may consult pharmacist to dose any medication on formulary.
2. Upon receiving the order for therapeutic drug monitoring, a pharmacist will assess the patient and collect relevant information necessary to appropriately monitor the specified medication so as to achieve therapeutic response while minimizing the risk of toxicity.
3. After selecting a dosing and/or monitoring plan the pharmacist will enter applicable orders into the electronic medical record on behalf of the provider consulting.
4. The pharmacist will write or electronically enter a progress note in the chart upon initial consult and periodically thereafter to provide information regarding the course of the dosing and/or monitoring services.
5. The pharmacist will be responsible for follow-up monitoring and/or dose adjustments as deemed necessary.
6. The pharmacy pharmacokinetics list and patient monitoring profile is to be updated daily by the pharmacist performing the consult.

<p>Approved by:</p> <p><u>/s/</u> Lindsey Eitnear PharmD, BCPS, AAHIVP</p> <p><u>02/16/2023</u> Date</p> <p><u>/s/</u> Russell Smith PharmD, MBA, BCPS Senior Hospital Administrator</p> <p><u>02/16/2023</u> Date</p> <p><i>Review/Revision Completed By:</i> <i>Pharmacy</i></p>	<p>Review/Revision Date: 5/2011 10/2012 9/2015 9/2017 2/2020 2/2023</p> <hr/> <p>Next Review Date: 2/1/2026</p>
<p>Policies Superseded by This Policy:</p>	

Appendix I

WARFARIN DOSING PROTOCOL

This document is intended as a guide to managing warfarin therapy in hospitalized patients. It should be coupled with, and not supersede, clinical judgment. Evidence-based tools, such as dosing nomograms, should always be used in conjunction with clinical information pertaining to specific patient characteristics and conditions.

1. Initial Warfarin Dose Day #1

Patient Condition	Initial Dose
Previously on warfarin with no change in health status	Restart the previous dose if the INR was in the target range
No high risk conditions*	5 – 10 mg
High risk condition	≤ 5 mg
<ul style="list-style-type: none"> • Age >60 years old • Of Asian descent • Impaired nutritional status or low BMI • Congestive heart failure • Liver disease (Child-Pugh Grade B/C) • Taking medications known to increase warfarin activity or increase bleeding risk¶ • Recent major surgery or high risk of bleeding 	

Chest 2008; 133; 71-109

¶ amiodarone, atorvastatin, fluvastatin, lovastatin, rosuvastatin, simvastatin, fluconazole, itraconazole, ketoconazole, voriconazole, sulfamethoxazole, aspirin (doses > 100 mg), ciprofloxacin, levofloxacin, gemfibrozil, metronidazole, sulfasalazine, sulfadiazine, disulfiram

*Consider using a higher dose (within range) for those of African American descent

2. Warfarin Dosing on Days #2-#7

Days of Therapy	INR	Warfarin Dose* (Desired INR = 2-3)	Warfarin Dose* (Desired INR = 2.5-3.5)
2	---	Continue initial dose	Continue initial dose
3	<1.5	1-1.5 x initial dose	1.5 x initial dose
	1.5-1.9	Continue initial dose	Continue initial dose
	2.0-2.5	0.5-1 x initial dose	Continue initial dose
	2.6-3.0	0.5 x initial dose	0.5-1 x initial dose
	>3.0	Hold dose	0.5 x initial dose
4	<1.5	1.5-2 x initial dose	2 x initial dose
	1.5-1.9	1-1.5 x initial dose	1.5 - 2 x initial dose
	2.0-2.5	Continue last dose	Continue last dose
	2.6-3.0	0.75 x initial dose	Continue last dose
	3.0-3.5	Hold dose	Continue last dose
	>3.5	Hold dose	Hold dose
5	<1.5	2x initial dose	2.5 x initial dose
	1.5-1.9	1.5-2x initial dose	2 x initial dose
	2.0-2.5	Continue last dose	1.5 x initial dose
	2.6-3.0	0.75 x initial dose	Continue last dose
	3.0-3.5	0.5 x initial dose	Continue last dose
	>3.5	Hold dose	0.75 x initial dose
6	<1.5	2x initial dose	2.5 x initial dose
	1.5-1.9	1.5-2x initial dose	2 x initial dose
	2.0-2.5	Continue last dose	1.5 x initial dose
	2.6-3.0	Continue last dose	Continue last dose
	3.0-3.5	0.8-0.9 x initial dose	Continue last dose
	>3.5	0.8 x initial dose	0.8-0.9 x initial dose
7	<2.0	2x initial dose	2.5 x initial dose
	2.0-2.5	Continue last dose	1.5-2 x initial dose
	2.6-3.0	Continue last dose	Continue last dose
	3.0-3.5	0.8-0.9 x initial dose	Continue last dose
	>3.5	0.8 x initial dose	0.8-0.9 x initial dose

3. Warfarin Dosing After Week #1:

INR	Warfarin Dose* (to achieve goal INR of 2-3)
<1.5	Increase weekly dose by 10 – 20%
1.5-1.9	Increase weekly dose by 10 – 15%
2.0-3.3	Continue current dose
3.4-4.0	Decrease weekly dose by 5 – 15%
4.1-5.0	Hold 1 – 2 doses AND decrease weekly dose by 10 – 20%
5.1-9.0	Hold 3 doses AND decrease weekly dose by 15 – 20% Can give vitamin K 1 – 2.5 mg PO if concerned about bleeding
>9.0	Hold warfarin AND give vitamin K 2.5 – 5 mg PO Restart when INR is 2 – 3 AND decrease weekly dose by 15 – 20%

*Round all doses to the nearest 0.5 mg.

INR	Warfarin Dose* (to achieve goal INR of 2.5-3.5)
<2.0	Increase weekly dose by 10 – 20%
2.0-2.4	Increase weekly dose by 10 – 15%
2.5-3.7	Continue current dose
3.8-4.0	Decrease weekly dose by 5 – 15%
4.1-5.9	Hold 1 – 2 doses AND decrease weekly dose by 10 – 20%
6.0-9.0	Hold 2 doses AND decrease weekly dose by 15 – 20% Can give vitamin K 1 – 2.5 mg PO if concerned about bleeding
>9	Hold warfarin AND give vitamin K 2.5 – 5 mg PO; Restart when INR is 2.5 – 3.5 AND decrease weekly dose by 15 – 20%

*Round all doses to the nearest 0.5 mg.

Appendix II

Sample Progress Note

S: 68 year old male with new onset atrial fibrillation. Coumadin day #2

O: INR today = 1.4. Patient received first dose of 5mg PO of warfarin yesterday. Target INR range = 2 – 3. Today's hemoglobin = 12.9 (stable). The patient is not currently prescribed any medication that interacts with warfarin.

A: INR subtherapeutic due to initiation of therapy.

P: Administer 5mg of warfarin today as per initiation nomogram and recheck INR in AM

Thank you for this consult, will continue to follow this patient.

J. Doe, RPh.

Appendix III: CLINICALLY SIGNIFICANT INTERACTIONS WITH WARFARIN BY CAUSATION AND DRUG GROUP

Potentiation				
Level of Causation	Anti-Infectives	Cardiovascular Drugs	Analgesics	CNS Drugs
High Probable	Ciprofloxacin Clotrimazole Erythromycin Fluconazole Isoniazid Metronidazole Miconazole Oral Gel Miconazole Vaginal Suppos Voriconazole	Amiodarone Clofibrate Diltiazem Fenofibrate Propafenone Propranolol Sulfinpyrazone	Phenylbutazone Piroxicam	Alcohol Citalopram Entacapone Sertraline
Probable	Amoxicillin/Clav Azithromycin Clarithromycin Itraconazole Levofloxacin Ritonavir Tetracycline	Fluvastatin Quinidine Ropinirole Simvastatin	Acetaminophen Acetylsalicylic Acid Celecoxib Interferon Propoxyphene Tramadol	Disulfiram Chloral Hydrate Fluvoxamine Phenytoin
	Amoxicillin Chloramphenicol Miconazole Topical Naldixic Acid Norfloxacin Ofloxacin Saquinavir Terbinafine	Disopyramide Gemfibrozil Metolazone		Felbamate
Highly Improbable	Cefamandole Cefazolin Sulfisoxazole	Heparin	Levamisole Methylprednisolone Nabumetone	Fluoxetine Quetiapine
Inhibition				
Highly Probable	Griseofulvin Nafcillin Ribavirin Rifampin	Cholestyramine	Mesalamine	Barbiturates Carbamazepine
Probable	Dicloxacillin Ritonavir	Bosentan	Azathioprine	Chlordiazepoxide
Possible	Terbinafine	Telmisartan	Sulfasalazine	
Highly Improbable	Cloxacillin Dicloxacillin Nafcillin Teicoplanin	Furosemide		Propofol

Note: This is not an all inclusive list of interactions. Please consult other references for questions regarding interactions.