Anticoagulation Management

Anne Rose
Editor

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A Guidebook for Pharmacists

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To Benjamin and Caleb:

*Thank you for giving me a reason to be silly
and for understanding whenever I said
“mommy has to write.”*

To Warren:

*Your love, encouragement, and support
throughout the development of this book and
also our life together have meant everything
to me. You are the best.*

Preface

Anticoagulants are commonly involved in medication errors and adverse drug events within health systems. Reviews of medication errors and adverse events databases show that unfractionated heparin and warfarin are the two most commonly cited anticoagulants involved in these types of events. This is likely because unfractionated heparin and warfarin are the two most utilized anticoagulants. Because of the high adverse drug event rate and the potential for significant patient harm if an error were to occur, the Institution for Safe Medication Practices (ISMP) has given the designation of “high-alert medication” to unfractionated heparin and warfarin. Additionally, regulatory agencies and national organizations have called for safer practices with anticoagulation management and have focused on the prevention and treatment of venous thromboembolism to improve patient care outcomes.

In order for health systems to achieve the goals set by these regulatory agencies, national organizations, or even their own internal leadership, there needs to be an identified group of individuals to lead and influence practice change. Pharmacists are often sought after to develop these initiatives for their clinical skills, expertise of pharmacology, attention to detail, and communication skills.

The purpose of this book is to provide pharmacists with practical applications of anticoagulation management in multiple care settings. This book will aim to highlight the role of the pharmacist in anticoagulation management, as well as provide examples for how the pharmacist can develop their role in the many areas of anticoagulation management. This book will cover practice areas including inpatient, ambulatory, and emergency services. It will also cover the management of specific anticoagulants (e.g., warfarin) and the management of anticoagulants in specific disease states (e.g., heparin-induced thrombocytopenia). With the large scope of anticoagulants, disease states, and practice sites covered within this book, the goal will be to summarize best practices and provide “real-world” examples of how pharmacists can be involved and, when available, summarize the impact of their involvement as described in the literature.

This book is separated into three distinct parts. Part 1 will focus on medication management, part 2 will concentrate on disease state management, and part 3 will

take a closer look at care settings. Specific examples related to anticoagulation management provided within the chapters will include management plans, dosing protocols, monitoring recommendations, documentation plans, and patient education tools.

I hope this book provides your institution with the information and tools needed to both enhance a current role and create a new role for the pharmacist in anticoagulation management. Pharmacists are truly in a unique position to improve patient care outcomes related to the management of anticoagulants, which can decrease medication errors, adverse events, and healthcare costs.

Madison, WI, USA

Anne E. Rose, PharmD
May 25, 2014

Abbreviations

ACCP	American College of Chest Physicians
ACEP	American College of Emergency Physicians
ACT	Activated clotting time
AF	Atrial fibrillation
AHA	American Heart Association
AMS	Anticoagulation monitoring service
aPCC	Activated prothrombin complex concentrate
ASA	Aspirin
ASA	American Stroke Association
ASCO	American Society of Clinical Oncology
ASP	Anticoagulation stewardship program
BMI	Body mass index
BNP	Brain natriuretic peptide
BUN	Blood urea nitrogen
CAD	Coronary artery disease
CBC	Complete blood count
CDC	Centers for Disease Control
CDT	Catheter-directed thrombolysis
CFC	Clotting factor concentrate
CHEST	American College of Chest Physicians
CI	Contraindicated
CPOE	Computerized physician order entry
CrCl	Creatinine clearance
CT	Computed tomography
CVA	Cerebral vascular accident
DIC	Disseminated intravascular coagulation
DOAC	Direct oral anticoagulant
DTI	Direct thrombin inhibitor
dTT	Dilute thrombin time
DVT	Deep vein thrombosis
ECMO	Extracorporeal membrane oxygenation

ECT	Ecarin clotting time
ED	Emergency department
eGFR	Glomerular filtration rate
EHR	Electronic health record
EKG	Electrocardiogram
ELISA	Enzyme-linked immunosorbent assay
EM	Emergency medicine
EMA	European Medicines Agency
ESA	Erythropoietin-stimulating agents
ETP	Endogenous thrombin potential
FDA	Food and Drug Administration
FFP	Fresh frozen plasma
GI	Gastrointestinal
GIB	Gastrointestinal bleed
HCT	Hematocrit
HEP	HIT expert probability
Hgb	Hemoglobin
HIPA	Heparin-induced platelet activation
HIT	Heparin-induced thrombocytopenia
HITT	Heparin-induced thrombocytopenia with thrombosis
HRT	Hormone replacement therapy
HTN	Hypertension
IABP	Intra-aortic balloon pump
IBD	Inflammatory bowel disease
ICU	Intensive care unit
INR	International normalized ratio
ISMP	Institute for Safe Medication Practices
IU	International unit
IV	Intravenous
IVC	Inferior vena cava
Kg	Kilogram
LFT	Liver function test
LMWH	Low molecular weight heparin
MI	Myocardial infarction
NIHSS	National Institutes of Health Stroke Scale
NPSG	National patient safety goal
NSAIDS	Nonsteroidal antiinflammatory drug
NVAF	Non-valvular atrial fibrillation
OD	Optical density
OTC	Over the counter
PCC	Prothrombin complex concentrate
PCI	Percutaneous coronary intervention
PCP	Primary care physician
PDAS	Pharmacist-directed anticoagulation service
PE	Pulmonary embolism

PESI	Pulmonary embolism severity index
PLT	Platelet
PMAC	Pharmacist-managed anticoagulation clinics
PT	Prothrombin time
PTT	Partial thromboplastin time
PWM	Pharmacist warfarin management
RAM	Risk assessment model
SBP	Systolic blood pressure
SCIP	Surgical care improvement project
Scr	Serum creatinine
SRA	Serotonin release assay
TIA	Transient ischemic attack
TIMI	Thrombolysis in myocardial infarction (bleeding score)
tPA	Tissue plasminogen activator
TTR	Time within therapeutic INR range
UFH	Unfractionated heparin
VAD	Ventricular assist device
VKA	Vitamin K antagonist
VQ Scan	Ventilation perfusion scan
VTE	Venous thromboembolism
VWF	von Willebrand factor

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