

Ambulatory Care

CONSENSUS GUIDELINES FOR COORDINATED OUTPATIENT ORAL ANTICOAGULATION THERAPY MANAGEMENT

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OBJECTIVE: To provide primary and referring healthcare practitioners with guidelines for the provision of safe and effective anticoagulation management in any venue to standardize and improve quality of care and to permit negotiation for reimbursement from third-party payers.

DATA EXTRACTION AND SYNTHESIS: Data on the current practice of anticoagulation providers and outcomes related to anticoagulation clinic care were obtained through the literature, interviews with anticoagulation providers, and a focus group meeting of anticoagulation clinic stakeholders. This information collation process revealed that an anticoagulation service consists of three separate areas for which guidelines should be developed. Based on the consensus opinions of the committee members, the literature review, and the current practice of anticoagulation services providers, a draft guideline was developed and reviewed by an independent multidisciplinary panel of anticoagulation services providers whose comments were incorporated into the final guideline.

CONCLUSIONS: Systematic outpatient anticoagulation services are systems of care designed to coordinate and optimize the delivery of anticoagulation therapy by (1) evaluating patient-specific risks and benefits to determine the appropriateness of therapy; (2) facilitating the management of anticoagulation dosages and prescription pick up or delivery; (3) providing ongoing education of the patient and other caregivers about warfarin and the importance of self-care behavior leading to optimal outcomes; (4) providing continuous systematic monitoring of patients, international normalized ratio results, diet, concomitant drug therapy, and disease states; and (5) communicating with other healthcare practitioners involved in the care of the patient. To create a reproducible framework for the provision of these services, guidelines for structure, process, and outcomes of coordinated outpatient anticoagulation management services were developed. Guidelines for organization and management include (1) qualifications for personnel, (2) supervision, (3) care management

and coordination, (4) communication and documentation, and (5) laboratory monitoring. Guidelines for the process of patient care include (6) patient selection and assessment, (7) initiation of therapy, (8) maintenance and management of therapy, (9) patient education, and (10) management and triage of therapy-related and unrelated problems. Guidelines for the evaluation of patient outcomes include (11) organizational components and (12) patient outcomes. The impact of these 12 guidelines on patient care and reimbursement procurement will depend on their implementation and the perceived value of their use.

KEY WORDS: anticoagulants, reimbursement.

Ann Pharmacother 1997;31:604-15.

THE USE OF ORAL ANTICOAGULATION THERAPY has increased dramatically over the last decade as knowledge of its safety and efficacy has been confirmed and indications have expanded. When properly administered and carefully monitored in study patients with atrial fibrillation, warfarin — the most commonly prescribed oral anticoagulant in North America — prevents 20 strokes for every major bleeding complication it causes.¹ In spite of its demonstrated safety and efficacy, oral anticoagulation therapy is still underused for certain conditions.¹⁻³ The Agency for Health Care Policy and Research (AHCPR) recently stated that expanded use of anticoagulation therapy could decrease stroke due to atrial fibrillation by 50% each year and that "proper anticoagulation could save \$600 million annually."¹ Then why are healthcare practitioners reluctant to prescribe warfarin?¹⁻³ The literature¹⁻³ identifies three principal barriers to greater anticoagulant use: (1) gaps in knowledge of or belief in its effectiveness, (2) concerns about its safety, and (3) concerns about the difficulty of managing patients taking anticoagulation therapy.

Great strides have been made reducing the first two barriers by such efforts as the series of Consensus Conferences on Antithrombotic Therapy sponsored by the American College of Chest Physicians (ACCP).⁴ However, less has been accomplished in a systematic way to improve and facilitate the management of therapy for the primary healthcare practitioner.

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Funded by a grant from DuPont Pharma, Wilmington, DE.

^aSee page 613 for listing.

It is well known that the risk of hemorrhage from oral anticoagulation is dependent on several patient-specific variables such as comorbid disease, a past history of bleeding, drug interactions, and the intensity of anticoagulation.⁵⁻⁸ What is not well known is the impact that the model of management has on the safety and efficacy of therapy. The management of oral anticoagulation is a labor-intensive process involving frequent patient-practitioner encounters and international normalized ratio (INR) measurements to achieve desirable clinical outcomes. Hemorrhagic complication rates, as reported in the literature, are frequently derived from clinical studies of selected patients whose management is provided in a systematic and organized way. This form of coordinated care is often provided in the setting of what has become known as an anticoagulation clinic. There is scant evidence in the literature of the outcome of anticoagulant therapy when administered and monitored by individual physicians without a systematic approach to oversight. However, such nonsystematic management is the model of therapy for most patients receiving therapy in the US.

Existing evidence suggests that coordinated anticoagulation therapy is more likely to achieve desirable clinical outcomes.⁹⁻¹³ Based on a growing foundation of evidence in the healthcare literature and the experience of many practitioners, the hypothesis is proposed that a systematic and coordinated approach to the management of oral anticoagulation will provide for better clinical outcomes than a less-structured approach. By improving safety and effectiveness of therapy and by easing the burden on the primary healthcare practitioner, one might expect that an increase in the use of anticoagulants would result in further enhancements of patient care and cost reduction. Although there are numerous studies describing different components of anticoagulation management, currently there are no widely accepted clinical guidelines or standards of care.

Standards of care are those principles that "define the appropriate environment, process, and procedures necessary for quality medical care and optimal health outcomes."¹⁴ The lack of standards for the treatment of disease and the reporting of outcomes is not unique to anticoagulation therapy. Health researchers have noted that there are significant variations in the management of different disease states.¹⁵ Furthermore, the prospective or capitated reimbursement system used by most third-party insurers or managed care organizations is an additional impetus for standardization. To address this problem, AHCPR supports the development of clinical guidelines intended to aid practitioners in the appropriate management of clinical conditions and to prevent ineffective care.^{15,16} Although guidelines regarding indications for and the optimum intensity of warfarin therapy for these indications have been published,^{17,18} there are currently no clinical guidelines for coordinated outpatient anticoagulation therapy.

Coordinated Anticoagulation Care: Anticoagulation Clinic Model

Successful anticoagulation therapy requires patient education, frequent INR testing, careful assessment of results, communication with patients, and coordination of care.

Currently, however, persons receiving outpatient oral anticoagulation therapy interact with many healthcare practitioners, including physicians, physician assistants, pharmacists, nurses, nurse practitioners, and laboratory personnel. This may lead to fragmentation of services and deleterious outcomes. There is sparse coordination of care.

Systematic outpatient anticoagulation management services (ACSS) were first established in the US in the late 1960s.¹⁹ These services may be defined as a system of care designed to coordinate and optimize the delivery of anticoagulation therapy by evaluating patient-specific risks and benefits to determine the appropriateness of therapy; facilitating the management of anticoagulation dosing and prescription attainment; providing continuous systematic monitoring of patients, INR results, diet, concomitant drug therapy, and disease states; providing ongoing education of the patient and other caregivers about warfarin and the importance of self-care behavior leading to optimal outcomes; and communicating with other healthcare practitioners involved in the care of the patient.

The two most common models of ACS are the medical director and the primary care referral-protocol-directed models. In the medical director model, the ACS in an institutional or large group practice setting is often directed by a single physician, who usually assumes no direct responsibility for the primary care of patients under the management of the program. The routine management is usually conducted by pharmacists, registered nurses, nurse practitioners, or physician assistants. In the primary care referral-protocol-directed model, these individuals manage a population of patients with direction provided by different primary or referring physicians for specified patients. It is generally believed that the positive outcomes described with coordinated care are related to improved patient education, communication, and follow-up.^{9-13,19-21} However, the value of outpatient anticoagulation management programs in comparison with traditional medical care has not been rigorously evaluated.

The importance of randomized, controlled clinical trials in validating the effectiveness of therapeutic models is well recognized in epidemiology and medicine. However, in the absence of such evidence, other descriptive and analytic study designs are used. The literature evaluating the outcomes of anticoagulation care, whether it is coordinated as described above or based on individual physician management, is poorly developed. Results are based almost entirely on level IV (nonrandomized historic cohort studies) and V (case series) evidence as defined by the ACCP.²²

Tables 1-3 outline the available literature describing the outcomes of anticoagulation care in either a coordinated fashion or under routine management. However, only three studies in the recent literature (i.e., last 2 decades) specifically address the frequency of adverse events of anticoagulation when management is provided by the patient's individual physician (Table 1).^{7,23,24} Table 2 summarizes those studies of coordinated management for which adverse events can be analyzed on the basis of patient-years of therapy.^{5,21-26} Table 3 analyzes those reports that compare coordinated management to routine medical care within individual studies.^{9,12,25}

of the major difficulties in evaluating the anticoagulation clinic literature is the lack of standardization in reporting. There are major differences in classification of outcomes, and direct comparison of bleeding episodes must be done with caution because of variable definitions. Other confounding factors prohibit direct comparison and limit the ability to generalize the results. Studies focus on different indications for warfarin, making the results less applicable to the total anticoagulation population. In many

of the studies, the design was such that controlling for concomitant illness was absent; thus, comorbidities may have contributed to the event. In such instances, analyzing and reporting true complication rates are precluded.

Another flaw of many studies is the absence of a control or comparison group. Those that do use a control or comparison design are retrospective. An additional shortcoming of this literature is that most of the studies describing an educational component as a vital part of the treatment do not measure the effectiveness of this component.

Most importantly, many of the studies were conducted before the use of the INR was introduced. Consequently, the intensity of therapy was often higher or lower than that currently recommended with the INR. Since the sensitivity of the thromboplastins is not reported at each particular center and within centers when different reagents were used, study comparisons are difficult.

Many clinical trials of anticoagulation therapy for specific indications, such as atrial fibrillation,²⁶⁻⁴¹ report adverse event statistics much lower than those reported in Tables 2 and 3. In all of these studies, anticoagulation care was provided in a highly controlled and coordinated fashion, further supporting the concept of coordinated care. Finally, the indications for anticoagulation were uniform, possibly providing fewer confounding characteristics.

Table 1. Frequency of Hemorrhage and Thromboembolism with Routine Anticoagulation Management

REFERENCE ^a	NO. OF PTS.	PT.-YEARS	HEMORRHAGE		FATAL EVENTS ^b
			MAJOR (% per pt.-y of therapy)	MINOR (% per pt.-y of therapy)	
Pelitti et al. (1986) ²³	2422	NA	18	NA	NA
Landefeld and Goldman (1989) ⁷	565	876	7.4	7.4	10 (1.77%)
Gitter et al. (1995) ²⁴	261	221	8.1	14.5	1 (0.38%)

NA = not available.

^aNo incidence of thromboembolism was reported in either study.

^bIndications for treatment: venous thromboembolism for the Pelitti et al. study,²³ mixed indications for the Landefeld and Goldman⁷ and Gitter et al.²⁴ studies.

^cFatal events are expressed as individual events; their rates are included under Major Hemorrhage; the number of fatal events as a percentage of total patients is indicated in parentheses.

Method of Developing a Clinical Guideline

The components or goals of anticoagulation therapy have been described under the definition of an ACS. Although most of the anticoagulation literature mentions the

Table 2. Frequency of Hemorrhage and Thromboembolism with Anticoagulation Clinic Management

REFERENCE ^a	NO. OF PTS.	PT.-YEARS	TARGET PTR/INR	HEMORRHAGE		FATAL EVENTS ^b (%)	THROMBOEMBOLISM (% per pt.-y of therapy)
				MAJOR (% per pt.-y of therapy)	MINOR (% per pt.-y of therapy)		
Davis et al. (1977) ¹⁹	263	254	1.5-3.0	4.3	4.3	0	NA
Forfar (1979) ²²	541	1362	1.8-2.6	4.2	NA	2 (0.37)	NA
Erichetti et al. (1984) ²³	144 ^c	105.3	1.3-2.0	6.6	24.7	NA	NA
Conte et al. (1986) ²⁴	141 ^c	153.3	NA	2.6	58.0	NA	8.4
Petty et al. (1988) ²⁵	321 ^c	384.6	NA	7.3	NA	3 (0.93)	NA
Charney et al. (1988) ²⁶	73	76.8	1.5-2.5	0	42.0	0	5.0
Bussey et al. (1989) ²⁷	82	199.3	NA	2.0	15.5	NA	3.5
Kornblit et al. (1990) ²⁸	177	147.55 ^d	NA	5.4	30.5	1 (0.56)	NA
Scabrook et al. (1990) ²⁹	93	157.6	1.5-2.0	3.8	6.9	0	4.4 ^e
Fihn et al. (1993) ⁶	1103 ^c	1950	1.3-1.8	13.4	54.9	4 (0.36)	7.5
Van der Meer et al. (1993) ²⁰	6814	6085	2.4-5.3 (INR)	3.3	13.8	39 (1.37)	NA
Cannegieter et al. (1995) ³⁰	1608	6475	2.0-4.9 (INR)	2.5	NA	22	0.7
TOTAL	11360	17350.4		4.6 (0-13.4)	27.8 (4.3-58.0)		4.8 (0.7-8.4)

INR = international normalized ratio; NA = not available; PTR = prothrombin time ratio.

^aMixed indications for anticoagulation (i.e., venous and arterial disease), except the study of Cannegieter et al.,³⁰ which was for prosthetic heart valves only.

^bFatal events are expressed as individual events; their rates are included under Major Hemorrhage; the number of fatal events as a percentage of total patients is indicated in parentheses.

^cCourses of therapy are listed rather than the number of patients.

^dPatient years of therapy not provided, but calculated from average duration of follow-up.

^eArterial events only.

inclusion of these components, not all studies include a description of their processes or evaluate the effectiveness of each component. A clinical guideline will provide not only a means to perform each process, but a template for program evaluation. To develop guidelines for coordinated outpatient anticoagulation therapy, the following process based on the methods of the AHCPR, the National Diabetes Advisory Board, and the Ontario Cancer Treatment and Research Foundation was used^{14,16}: define the clinical area for guideline development; conduct a preliminary survey; do a MEDLINE search (January 1980 to September 1995) for relevant literature; invite information and comments on the topic from professional organizations, clinicians, and payers at an open meeting (October 1995); draft guidelines; conduct external peer review by an anticoagulation clinic task force; revise draft guidelines on analysis and comments from peer review; and revise guidelines reviewed and approved by the task force.

Based on the consensus opinions of the committee members, the literature review, and the current practice of ACS providers, draft guidelines were developed. An outline of these guidelines is presented in Table 4.

Guidelines for Organization and Management

QUALIFICATIONS OF PERSONNEL

1.1 Anticoagulation providers should meet minimum competencies and hold a license in a patient-oriented health-related field (e.g., medicine, nursing, pharmacy).

Comment

A review of the literature and current practice reveals that anticoagulation therapy is frequently undertaken by a multidisciplinary team representing medicine, nursing, and pharmacy.^{9,13,23,24,27-29,42} Other aspects of patient management, such as scheduling, may be delegated to nonclinical personnel.

Studies describing both inpatient and outpatient anticoagulation management show that inexperience and lack of knowledge regarding the pharmacokinetic and pharmacodynamic properties of warfarin lead to suboptimal anticoagulant therapy.^{27,43} Although the educational requirements are not described, studies describing clinics indicate that nonphysician anticoagulation therapy providers receive specialized training and education.^{10,20,24,42}

The American Society of Health-System Pharmacists and some state pharmacy societies have developed an anticoagulation traineeship program to train pharmacists. However, these programs do not extend to other healthcare practitioners. Outside of this formal mechanism, there are currently no recognized means of ensuring the competency of anticoagulation therapy providers.

Anticoagulation providers should be required to demonstrate competence in the following content areas: understanding of coagulation, antithrombotic therapy, and thrombogenesis; understanding of pharmacokinetic and pharmacodynamic properties of warfarin and other anticoagulants used in the outpatient setting; ability to describe the expected impact of and identify the medications, disease

Table 3. Frequency of Hemorrhage and Thromboembolism with Routine Medical Care Versus Anticoagulation Clinic Care

REFERENCE ^a	TYPE OF CARE	NO. OF PTS.	PT.-YEARS	TARGET PTR/INR	HEMORRHAGE		FATAL EVENTS ^b	THROMBOEMBOLISM (% per pt.-y of therapy)
					MAJOR (% per pt.-y of therapy)	MINOR (% per pt.-y of therapy)		
Hamilton et al. (1985) ¹⁵	RMC	49	73.25	NA	6.8	21.0	NA	8.0
	ACC	41	91.75		6.5	23.0		8.0
Cohen et al. (1985) ⁹	RMC	17	NA	1.5-2.5	9.0 ^c	NA	0	NA
	ACC	18			6.9 ^c		0	
Garabedian-Ruffalo et al. (1985) ¹⁰	RMC	26	64.3	1.5-2.5	12.4	NA	NA	6.2
	ACC	26	41.9		2.4			0
Cortelazzo et al. (1993) ¹¹	RMC	271	677	3.0-4.5	4.7	NA	0	6.6
	ACC	271	669		0.1 ^d		0	0.6 ^d
Witt et al. (1995) ¹²	RMC	NA	34.97	NA	28.6	14.3	NA	48.6
	ACC		80.38		0	13.7		0
Bussey et al. (1996) ¹³	RMC	117	92	NA	4.3	NA	NA	11.7
	ACC	146	110		0.9 ^e			3.6 ^e
TOTAL	RMC	480+	941.52+		10.9	17.6		16.2
					(4.3-26.8)	(14.3-21.0)		(6.2-48.6)
	ACC	562+	993.03+		2.8	18.3		2.4
					(0-6.9)	(13.7-23.0)		(0-8.0)

ACC = anticoagulation clinic care; INR = international normalized ratio; NA = not available; PTR = prothrombin time ratio; RMC = routine medical care.

^aMixed indications for anticoagulation (i.e., venous and arterial disease) except the studies of Hamilton et al.¹⁵ and Cortelazzo et al.,¹¹ which were for prosthetic heart valves only.

^bFatal events are expressed as individual events; their rates are included under Major Hemorrhage; the number of fatal events as a percentage of total patients is indicated in parentheses.

^cCombined major and minor hemorrhage.

^dp < 0.01.

^eRelative risk = 0.21.

^fRelative risk = 0.30.

states, as well as dietary and lifestyle changes that alter anticoagulation therapy; assessment skills to elicit the signs and symptoms of bleeding and knowledge of when to refer to a physician; assessment skills to elicit the signs and symptoms of a thromboembolism and knowledge of when to refer to a physician; skills to identify, triage, or manage other medical problems through the appropriate healthcare practitioner; understanding of the effects of socioeconomic, behavioral, psychological, and environmental factors on patient adherence; ability to describe the meaning of a prothrombin time (PT), an INR, and an international sensitivity index (ISI) value and the relationship between these values, their limitations, and reasons for variability; ability to interpret INR and related laboratory values and adjust warfarin dosage accordingly; proper use of capillary blood testing devices if such are used at their practice setting (e.g., Coumatrak, Coaguchek); determination of optimal intensity and duration of antithrombotic therapy for individual patients; determination of appropriate options for interrupting and/or reversing anticoagulation; ability to communicate with patients and anticoagulation providers; and skills to authorize and coordinate follow-up with patients and other healthcare providers.

SUPERVISION

2.1 The physician or healthcare practitioner with ultimate responsibility for therapeutic decisions should develop an agreed-upon policy and procedure for personnel supervision and oversight of healthcare practitioners who are actually managing the anticoagulation therapy.

Comment

The availability and accessibility of physicians is dependent on the clinic site. In an individual or group medical practice, physicians are often available to see anticoagulation patients if such a visit is warranted. In other settings, physicians may not be present at the anticoagulation clinic site. The development of a policy describing the supervisory process for nonphysician healthcare practitioners is

Table 4. Guidelines for Coordinated Outpatient Anticoagulation Therapy Management

Organization and management
qualifications of personnel
supervision
care management and coordination
communication and documentation
laboratory monitoring
Process of patient care
patient selection and assessment
initiation of therapy
maintenance and management of therapy
patient education
management and triage of therapy-related and unrelated problems
Evaluation of patient outcomes
organizational components
patient outcomes

deemed essential to establish and clarify the roles and responsibilities of those involved in providing care.

CARE MANAGEMENT AND COORDINATION

3.1 Written protocols for the management of anticoagulation should be established.

Comment

Policies and procedures serve as a clinical tool and a quality assurance mechanism to preserve the quality of care. If there is more than one referring healthcare practitioner to an anticoagulation provider, the policies and procedures should be developed in concert with the provider and those primary healthcare practitioners. These policies and procedures may address, but are not limited to, the following areas: patient assessment; patient education; indications for, intensity of, and planned duration of anticoagulation therapy; systematic method for therapy initiation; systematic method for interpretation of INR results and management of nontherapeutic laboratory values; intervals for monitoring INR and other laboratory parameters pertinent to anticoagulation therapy (e.g., complete blood count, urinalysis); adverse event protocol with definitions of minor and major bleeding and disease recurrence with appropriate actions; method for dosage adjustment based on INR results, patient assessment, and evaluation of dietary, disease state, and lifestyle changes; management of patient nonadherence to blood tests or clinic visits; guidelines for discharge of patients from a clinic program if applicable; and reimbursement procurement.

3.2 The anticoagulation provider should have a systematic process to identify patients who need to be scheduled for a blood sample and/or medical assessment, to schedule the necessary appointments, to retrieve laboratory results, and to provide patient instruction and follow-up.

Comment

A major cause of suboptimal anticoagulant therapy is fragmented medical care.^{43,44} It has been suggested that the success of clinic-managed anticoagulation therapy is related to the ability of the clinic to maintain continuity of care, regulate anticoagulation dosage, avoid complications by early identification of potential interferences with therapy, and provide regular monitoring with systematic follow-up and education. The system must be well defined, organized, and complete. The minimum components of this system include: a patient database; a systematic mechanism for transition between inpatient and ambulatory care, and vice versa; a mechanism for scheduling regular laboratory appointments and retrieving laboratory data; a method of appointment scheduling and follow-up with patient; and other fail-safe mechanisms identified by the anticoagulation provider as necessary for continuity of care.

COMMUNICATION AND DOCUMENTATION

4.1 The anticoagulation provider should have policies and procedures regarding communications with the pa-

primary care physician or healthcare practitioner, laboratory, and designated pharmacy(s). Documentation of patient interactions and documentation of outcomes assessment should be recorded in the patient database.

Comment

Anticoagulation therapy requires interaction among patients, physicians, and other healthcare practitioners. Information regarding laboratory values, start and stop dates of other concomitant medications, and patient variables are needed to make the appropriate therapy adjustments. These changes need to be clearly communicated to the patient, the pharmacy of the patient, and other healthcare practitioners. Communication with the referring physician (if not the one managing the anticoagulation) is also essential. Lack of communication can result in poor patient outcomes.

A policy on the outcomes of patient interactions to be shared with the referring healthcare practitioner on a timely basis should be established. Communication should be the same as that which would occur between a primary care physician who refers to a specialist for treatment. The mechanism by which patient communication occurs is up to the individual clinic (e.g., face-to-face, telephone, postcards).

Copies of all letters sent to patients and other healthcare practitioners should be included in the patient's medical record. Documentation of other communications, including telephone calls or mailed postcards, should also be included. In addition, the database of the patient should include information regarding patient demographics, indications for anticoagulant therapy, the desired intensity and expected length of therapy, the tablet size(s) of warfarin prescribed and used, other disease states, laboratory values, dosage and medication adjustments, communications, and other information pertinent to the patient's anticoagulation care. The name, dose, route, and frequency of administration, as well as start and stop dates for concomitant medications, including over-the-counter medications, should also be included. A flow chart documenting the INR and warfarin dosage of the patient is a useful tool that allows the clinician to track trends. Information should be readily available to those caring for the patient.

LABORATORY MONITORING SYSTEMS

5.1 The anticoagulation provider should use the INR to assess patient anticoagulation control.

Comment

A critical component of anticoagulation monitoring is the interpretation of the laboratory value. In response to variations in sensitivity of thromboplastin reagents used to calculate the PT, the World Health Organization (WHO) developed a reference standard, the ISI, to calibrate thromboplastin reagents and permit standardization.⁴⁵ The WHO calibration model is the INR. The INR is the PT ratio that would have been obtained if the WHO thromboplastin standard (ISI = 1) had been used. If the INR is not reported by the laboratory, it can be calculated according to the following formula:

$$\text{INR} = (\text{patient PT}/\text{mean of normal PT range})^{\text{ISI}}$$

Failure to use the INR system can compromise anticoagulation control.¹⁷ Although more valid than the PT ratio, there are still limitations to the INR system. Anticoagulation providers should be cognizant that reagents with ISI values of 1.5 or more and the type of equipment used for clot detection may affect INR values.

The anticoagulation provider should have knowledge of the laboratory testing sites in their region, the type of equipment used by those laboratories, and the quality of the laboratory reagents. They should also be familiar with the technology of the new methods of INR monitoring (e.g., capillary whole blood testing) and related regulations if using such methods in their setting.

Guidelines for the Process of Patient Care

PATIENT SELECTION AND ASSESSMENT

6.1 The referring physician or healthcare practitioner recommending anticoagulation therapy shall determine the appropriateness of anticoagulation therapy for a particular patient. The actual anticoagulation provider or director of the service, in order to manage the care, must agree on the appropriateness of therapy.

Comment

Indications for oral anticoagulation therapy are listed in Table 5. When considering the use of anticoagulants, one must weigh the risks of therapy versus the benefits. A definite trend between the presence of a concomitant disease and the occurrence of a bleeding episode has been identified in a number of studies.^{4,18,22}

There is controversy as to whether advanced age (>65 y) is a definitive risk factor for warfarin-associated bleeding.^{5,7,8,46,47} As with all ages, careful patient selection and risk-benefit evaluation reduces the incidence of bleeding. Coordinated anticoagulation monitoring provided by a clinic or an individual anticoagulation provider may facilitate the management of higher-risk patients who may not otherwise receive therapy. If the provider of anticoagulation management cannot agree on the appropriateness of therapy, then that individual has the right to decline the management of the patient under consideration.

6.2 The anticoagulation provider should assess the patient's current medical, medication, dietary, and lifestyle history, level of understanding and literacy, health beliefs and attitudes, motivation for self-care behavior, and other environmental or behavioral barriers to learning and adherence when therapy is instituted.

Table 5. Indications for Oral Anticoagulation Therapy

Prevention of venous thromboembolism
Treatment of deep-vein thrombosis and pulmonary embolism
Acute myocardial infarction
Prosthetic heart valves
Atrial fibrillation
Recurrent systemic embolism

Comment

The initial assessment of the person referred for anticoagulation therapy is an important component of care. This process reveals the current beliefs and expectations of the patient about treatment, in addition to information regarding their medical, social, and lifestyle history. Since the therapeutic outcomes of anticoagulation are affected by concomitant medications, comorbid conditions, and variations in diet, this evaluation is an integral part of the care process. Furthermore, the patient's acceptance of the disease state impacts further educational efforts.

INITIATION OF THERAPY

7.1 A patient-specific INR range, based on the medical literature and other patient-specific information, should be established.

Comment

Establishing a targeted INR range entails careful assessment of the indication for therapy as well as patient-specific risks and benefits. Guidelines in the peer-reviewed literature should be used to aid clinicians in selecting the appropriate intensity of therapy. The Committee on Antithrombotic Therapy of the ACCP recommends an INR of 2.0–3.0 for all indications except mechanical prosthetic heart valves and following myocardial infarction, for which an INR of 2.5–3.5 is recommended.¹⁷ However, such recommendations are not universally accepted, especially in the higher therapeutic range, and other studies suggest a higher intensity of therapy for some indications.^{20,21,22}

Therapy should not be initiated with a loading dose, as once recommended, since it has been shown to be associated with a high risk of early hemorrhage and a false sense of full anticoagulation in early treatment.^{17,18} Initiation of therapy should use an average or sometimes slightly higher (e.g., 5–10 mg) maintenance dose unless there are reasons to initiate therapy at an even lower dose (e.g., patients who are elderly, are malnourished, or have liver diseases).^{5,17,18,20}

7.2 The anticoagulation provider should base dosage adjustments on INR and other pertinent laboratory results, individual assessment, patient-specific response, and guidelines approved by the ACS as part of its policies and procedures.

Comment

There is no single standard pharmacokinetic model to predict the optimum maintenance anticoagulant dose or to perform dosage adjustments. Various equations and computer-assisted models have been developed to assist clinicians in dosage titration.^{17,51} The role of such models in actual clinical practice needs to be further studied.

Warfarin dosage adjustments should be limited to 5–20% of total weekly (or total daily) dosage since there is a non-linear relationship between warfarin dose and pharmacodynamic response. Anticoagulation clinics use different methods for dosage titration. Some may instruct patients to skip doses, take extra doses, and/or alter the patient's therapeutic regimen. The anticoagulation provider should de-

cide the method of dosage titration most appropriate for each patient. Ideally, this dosage adjustment should be verbally communicated to the patient. In extenuating circumstances, a written (postcard) intervention may be necessitated.

Dosage regimens should be kept as simple as possible, with the fewest number of different strength tablets as possible. Some clinicians advocate the use of a single-strength tablet to simplify the regimen for all patients, and use fractions or multiples of the same tablet to achieve individualized dosing. The anticoagulation provider should do as much as possible to aid patient understanding and adherence (e.g., written instructions, pill boxes, calendar cards).

7.3 Initial monitoring should occur every week or more frequently following initiation of therapy or hospital discharge, depending on the hemodynamic stability of the patient. After the patient's anticoagulation has been stabilized, follow-up evaluation should occur at least every 4 weeks.

Comment

Initiation of anticoagulation therapy will require frequent blood sampling and dosage adjustments until the patient is adequately anticoagulated and INR results are stable. Once the INR has been stabilized, monitoring intervals can be extended to every 2 weeks and eventually to every 4 weeks. Stability with respect to other medical illnesses, medication use, diet, and lifestyle must all be evaluated when establishing this interval. Since patients are most likely to experience hemorrhagic complications in the first several months of therapy, more frequent monitoring may be required during this time period.

After the target INR of the patient has been reached, follow-up is still essential. Many clinics have a 4-week follow-up as a maximum time interval. The most recent American Heart Association medical/scientific statement regarding oral anticoagulant therapy recommends that a PT for patients who are hemodynamically stable be obtained every 4 weeks.¹⁴ However, the maximum time interval reported in the literature for patients stabilized on anticoagulation therapy may be as long as every 12 weeks.⁵² Although it has been reported that more frequent monitoring results in fewer complications,⁵³ until more definitive information is available, the maximum recommended time interval for follow-up remains at 4 weeks.¹⁸

MAINTENANCE OF THERAPY

8.1 The anticoagulation provider should have a systematic process for follow-up evaluations focused on patient assessment for potential adverse effects of therapy, recurrent disease, hemorrhagic complications, drug–drug, drug–disease state, and drug–food interactions, lifestyle changes, review of laboratory results, adherence issues, and patient education.

Comment

The positive outcomes associated with anticoagulation clinic care suggest that the frequency of follow-up is an

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important variable affecting outcomes. Follow-up evaluation should include assessment for changes in medication, health status, diet, and patient adherence. The patient should also be assessed for signs and symptoms of hemorrhagic complications or thromboembolism, and the dosage of warfarin should be maintained or adjusted on the basis of these findings.

8.2 The anticoagulation provider should have a policy defining the interval for follow-up blood testing after a dosage adjustment has been made. The determination should consider the magnitude of the nontherapeutic INR and dosage change, as well as other variables influencing patient responsiveness and stability.

Comment

Since it takes at least 3 days for the effect of a change in dosage to be reflected in the INR, the minimum time to schedule a PT test is approximately 3 days after therapy has been adjusted, and should be no longer than 2 weeks.

8.3 Anticoagulation providers should develop guidelines regarding management of anticipated changes in anticoagulant response due to a change in patient status, medication use, diet, or other factors.

Comment

Patients often function under the misconception that all healthcare practitioners involved in their care are aware of what the others are doing at all times. They may also assume that a diagnostic procedure or other variable is not of consequence. To help avert this type of problem, patients should be advised to contact their anticoagulation provider regarding all pending or scheduled dental, medical, or surgical appointments. The anticoagulation provider may adjust the dose appropriately, or maintain the dose but reassess the PT/INR response at a shorter interval than might have occurred otherwise. All patients must also be instructed to notify the ACS of any changes in medication, diet, or status of the disease state.

PATIENT EDUCATION

9.1 The anticoagulation provider should have a policy and a procedure pertaining to the desired goals and objectives of its educational program. Patient education should be individualized according to the initial assessment, based on the patient's level of understanding, accompanied by written information as a reinforcement, and reviewed on a regular basis.

Comment

Well-designed educational programs have been shown to increase adherence and improve outcomes.^{54,55} ACSs provide patient education as part of usual care. Researchers evaluating the results of their anticoagulation programs have concluded that the achievement of therapeutic end points, including improved stability of anticoagulation and low incidence of bleeding, are associated with continuous patient education.^{10,11,23,63} These educational initiatives are

often based on promoting self-care, which emphasizes the role of patients in their own care, as part of the teaching process.^{28,56} These types of programs are more likely to be successful than those that are strictly informational in nature.⁵⁷

According to the current practices of anticoagulation providers, education should be targeted to meet the following patient learning objectives. Having completed the initial session(s) with the health educator, the person taking warfarin (or other anticoagulant) will be able to: state the reason for taking warfarin and how it relates to clot formation; recite the name of the drug (generic and trade name); discuss how the drug works (e.g., interferes with clotting), and the problems caused by too much or too little anticoagulation; explain the need for blood tests and the target INR appropriate for treatment; recite the importance of adherence, listing the importance of close monitoring, regular appointments, and good follow-up; describe the common signs of bleeding; outline precautionary measures to decrease trauma and bleeding; identify diet, drug, and alcohol use that might cause problems with therapy; for women, explain the importance of not becoming pregnant and the need for birth control measures (or abstinence); report with accuracy and honesty changes in lifestyle, diet, medications, alcohol intake, or disease process; identify the importance of informing their healthcare practitioner when dental, surgical, or invasive procedures, and hospitalization are scheduled or occur unexpectedly; state what to do in case of an emergency; and identify the specific tablet(s) the patient is taking by color and markings.

The amount of information presented to the patient beginning anticoagulation therapy can be overwhelming. Research has shown that, on average, 40% of patients forget the information given to them.⁵⁸ Written information reinforces verbal information, helps patients remember important facts about therapy, and enhances knowledge about their disease. Since therapy is often long-term, and patient and disease characteristics are not static, periodic reassessment should be part of the educational program of the anticoagulation provider. Each component of the educational process, including assessment, educational plan, and follow-up should be documented in the patient database.

MANAGEMENT AND TRIAGE OF THERAPY-RELATED AND UNRELATED PROBLEMS

10.1 Anticoagulation providers should have a policy and a procedure for the management of major and minor bleeding episodes, signs and symptoms of thromboembolism, other potential anticoagulation adverse effects, or other medical problems not related to anticoagulation therapy. This should include the use of vitamin K or fresh frozen plasma to correct an excessively prolonged INR or to treat serious hemorrhage.

Comment

Since complications do not absolutely correlate with the INR, careful patient assessment and interpretation of laboratory values are necessary. Patients must be taught to self-monitor and report all signs and symptoms of possible bleeding or thrombosis to the ACS immediately.

Patients whose therapy is managed at the office of their primary healthcare practitioner should have their problems triaged by a licensed healthcare practitioner. If the patient is under the care of an anticoagulation provider, a licensed healthcare practitioner should assess whether the bleeding is minor or major. The patient should then be seen by the appropriate healthcare practitioner within an appropriate period of time based on the urgency of the bleeding. The referring healthcare practitioner should be contacted regarding the nature of the episode.

An excessively prolonged INR (>5.0) is associated with an increased risk of bleeding.^{54,57,58,60} When such values are observed, the patient should be contacted by the ACS and assessed by the appropriate healthcare practitioner. Depending on the degree of elevation of the INR and whether bleeding is present, the appropriate interventions should be undertaken to correct the excessive degree of anticoagulation. Besides altering the dosage of warfarin, this may involve the administration of vitamin K and/or fresh frozen plasma. An ACS should have established guidelines for the use of such therapy based on opinions published in the literature or on other criteria established by the ACS.¹⁷

When elevated INR values are associated with serious bleeding, reversal of the anticoagulant effect is usually necessitated. In addition to receiving vitamin K, patients may require administration of fresh frozen plasma and hospitalization. Anticoagulation providers should facilitate and coordinate the provision of emergency services when necessary.

10.2 Anticoagulation providers should have a policy and procedure for the management of anticoagulation when the patient requires an invasive procedure.

Comment

When considering changes in a patient's current anticoagulation therapy regimen due to a scheduled medical, dental, or surgical procedure, the risk of excessive or uncontrolled bleeding must be carefully weighed against the potential for recurrent thromboembolism. Both patient-specific variables and the type of procedure (e.g., major surgery vs. dental procedure) should be evaluated to determine the optimal treatment plan. Current practice options include close monitoring, discontinuation of anticoagulation therapy 3–5 days prior to the procedure, initiation of a lower anticoagulation dosage, short-term substitution of intravenous heparin therapy, and the use of tranexamic acid mouthwash.

10.3 Anticoagulation providers should have a policy and procedure for the management of patients who are nonadherent with therapy, appointments, or other aspects of anticoagulation treatment. This policy should include guidelines for termination of anticoagulation management by the anticoagulation service.

Comment

Anticoagulation requires a combination of provider and patient responsibilities. Some patients who require anticoagulation therapy for clinical reasons lack the personal and social resources to comply safely with their prescribed an-

ticoagulation therapy regimen. To protect anticoagulation providers against liability, policies and procedures regarding management of nonadherent patients must be in place. To protect both the provider and the patient, guidelines for termination from the ACS must also be present.

Guidelines for the Evaluation of Patient Outcomes

EVALUATION OF ORGANIZATIONAL COMPONENTS

11.1 The anticoagulation provider should perform a program evaluation of organizational components on an annual basis, or more often as deemed necessary. Anticoagulation providers should analyze the contribution of various processes to patient outcomes.

Comment

The evaluation of organizational components should include a systematic review of all factors contributing to outcomes — systems efficiency, care processes, laboratory monitoring, and patient education. Process indicators can be used to gauge the efficiency of these components. Continuous quality improvement (CQI) strategies can then be implemented to improve deficiencies. Failure to address this component of evaluation may lead to a type III error — the evaluation of a program that has not been adequately implemented.⁵⁹ The purpose of this evaluation is to ensure that the outlined processes are being implemented as intended.

EVALUATION OF PATIENT OUTCOMES

12.1 The anticoagulation provider should perform an outcomes evaluation on an annual basis, or more often as deemed necessary. This outcomes assessment should include, as a minimum, information pertaining to the degree of therapeutic effectiveness as determined by the INR, hemorrhagic complication rates, thromboembolism rates, and other complications resulting from anticoagulant therapy.

Comment

Outcomes are the ultimate objectives of a health or therapeutic intervention as related to patients, anticoagulation providers, and payers. For patients, outcomes include not only improved health, but also improved self-care skills and improved quality of life.⁵⁶ For payers, outcomes include decreased use of medical care and cost-effectiveness.

Each anticoagulation provider should review the frequency of untoward events in the provider's facility annually, or more often as deemed necessary. This should include all deaths, minor and major bleeding episodes, recurrent thromboembolism, and patient use of healthcare systems secondary to anticoagulation problems (e.g., emergency department visits, hospital admissions). Since the frequency of complications corresponds to the variability of the INR over time,^{30,60} an intermediate outcome should include the percentage of time each patient spends within the targeted therapeutic range. Anticoagulation providers should perform CQI monitoring targeting the maintenance of a therapeutic INR.

Periodic surveys regarding quality-of-life issues, as well as patient and referring healthcare practitioner satisfaction with services, should be included in the anticoagulation provider's outcomes evaluation. Future program planning and quality improvement strategies should be based on the results of the organizational, clinical, and patient-specific evaluation components.

Conclusion

These clinical guidelines provide a framework for health-care practitioners on the facets of anticoagulation therapy needed to provide quality care. The impact of these guidelines depends on their implementation and the perceived value of their use. The development of these clinical guidelines is a first step in providing a system or process to ensure positive outcomes for patients taking oral anticoagulation therapy. Issues regarding implementation, education of anticoagulation providers, certification of anticoagulation providers and/or clinic sites, and standardization of outcomes evaluation must still be addressed. The value of specific components of therapy, including frequency of follow-up, cost-effectiveness of routine testing for nonevident hemorrhage, and the appropriate INR range for specific indications must be further elucidated.

Historically, the creation of standards has been the inaugural force behind healthcare policy and reimbursement changes. For example, accreditation by the Joint Commission on Accreditation of Healthcare Organizations has now become an integral factor in public compensation through Medicare and Medicaid. Guidelines or standards of care are also used by quality medical review programs (e.g., by peer review organizations) to guide coverage decisions. This evolution from standardization to reimbursement follows a logical progression. We hope that these guidelines will not only improve the care of patients taking anticoagulation therapy and increase the number of patients taking oral anticoagulation therapy who will receive a benefit, but also guide future coverage and payment policies. =

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EXTRACTO

OBJETIVO: El proveer guías para el manejo de la terapia con anticoagulantes orales a profesionales de salud, las cuáles sean seguras y efectivas con el propósito de estandarizar y mejorar la calidad del cuidado al paciente. Además, se espera que estas guías permitan que se pueda negociar pago por los servicios de manejo de la terapia con anticoagulantes por parte de los seguros de salud.

EXTRACCIÓN DE DATOS: Información referente a los actuales patrones de práctica de los proveedores de servicios de anticoagulación y datos relacionados con los resultados clínicos de las clínicas de anticoagulantes, fueron obtenidos utilizando la literatura médica, entrevistas con profesionales de salud que brindan servicios de seguimiento de terapia con anticoagulantes, y en foros con directores de las clínicas de anticoagulantes. El análisis de esta información demostró que existen tres áreas diferentes para las cuales se deben desarrollar guías de práctica. Las guías que se desarrollaron fueron basadas en el consenso de las opiniones de los expertos miembros del comité, la información en la literatura médica, y los patrones de práctica de las diferentes clínicas de anticoagulación. El borrador de estas guías fue revisado por un panel multidisciplinario de proveedores de servicios de salud. Las sugerencias y comentarios de este grupo fueron incorporados en las guías finales.

CONCLUSIONES: Los servicios de las clínicas ambulatorias son un sistema de cuidado diseñado para coordinar y optimizar la terapia con anticoagulantes orales a través de (1) evaluación de los riesgos y beneficios específicos de cada paciente y la determinación de la terapia apropiada para cada paciente; (2) facilitar el manejo de la dosis y de la prescripción; (3) proveer educación continua al paciente y sus familiares acerca de la warfarina y la importancia del comportamiento de cada paciente en alcanzar resultados clínicos óptimos; (4) proveer un seguimiento sistemático continuo de los pacientes, de los resultados de la Razón Internacional Normalizada, de la dieta del paciente, de la terapia con medicamentos y de las diferentes enfermedades que tenga el paciente; y (5) comunicación con los profesionales de salud envueltos en el cuidado del paciente. Utilizando esta información se creó un marco para la provisión de estos servicios, unas guías para la estructura, proceso y resultado clínico deseado en los servicios de seguimiento de anticoagulantes orales. Las guías desarrolladas en el área de organización y manejo de un servicio de seguimiento de anticoagulantes orales incluyen (1) cualificaciones del personal, (2) supervisión, (3) manejo del cuidado del paciente y coordinación de servicios, (4) comunicación y documentación, y (5) seguimiento de las pruebas de laboratorio. Las guías desarrolladas en el área del proceso de cuidado al paciente incluyen, (6) selección y evaluación del paciente, (7) iniciación de la terapia, (8) mantenimiento y manejo de la terapia, (9) educación al paciente, y (10) manejo y referido de los problemas con la terapia o otros problemas no

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relacionados con la terapia con anticoagulantes. Guías para la evaluación de los resultados clínicos obtenidos incluyen, (11) componentes de organización, y (12) resultados clínicos del paciente. El impacto de estas 12 guías en el cuidado del paciente y en los métodos de reembolso o pago por estos servicios clínicos dependerá de su implementación y el valor o utilidad percibido por los diferentes profesionales de la salud.

MAGALY RODRÍGUEZ DE BITTNER

RÉSUMÉ

OBJECTIF: Fournir aux praticiens de santé primaires et consultants des recommandations pour le traitement sain et efficace de l'anticoagulation qui ait lieu dans une clinique quelconque. Le but est de standardiser et améliorer la qualité de soin et de permettre des négociations pour le remboursement d'un troisième payeur.

SELECTION ET SYNTHÈSE DES DONNÉES: Les données au sujet de la pratique courante des praticiens d'anticoagulation et le dénouement des soins reçus à une telle clinique ont été obtenus de la littérature, par des entrevues avec des généralistes d'anticoagulation, et d'une réunion d'un groupe d'individus impliqués dans une clinique d'anticoagulation. Ce processus de collation d'information a révélé trois domaines pour lesquels des recommandations devraient être développées. On s'est basé sur les opinions des membres du comité, sur la revue de la littérature et sur la pratique courante des praticiens de services d'anticoagulation afin de développer des recommandations préliminaires. Celles-ci ont été revues par une commission multi-disciplinaire indépendante de praticiens de services d'anticoagulation. Leurs commentaires furent incorporés dans les recommandations finales.

CONCLUSIONS: Les services d'anticoagulation organisés sont un système de soin devisé pour coordonner et optimiser la provision de la thérapie

d'anticoagulation par (1) évaluer les risques et les bénéfices de chaque patient afin de déterminer la convenance de la thérapie; (2) faciliter l'administration du dosage d'anticoagulation et de l'acquisition de l'ordonnance; (3) pourvoir à une éducation continue du patient et des autres proveurs de santé au sujet de la warfarine et de l'importance du soin et du comportement de soi, menant à de meilleurs résultats; ainsi que; (4) fournir une surveillance systématique du patient, des résultats de le Rapport International Normalisé, de la diète, ainsi que les médicaments et les maladies qui existent simultanément; et (5) communiquer avec les autres proveurs de santé qui sont impliqués dans le soin du patient. Afin de créer un cadre reproductible pour la provision de ces services, des recommandations ont été développées pour la structure, le procès, et l'évaluation des résultats des services d'anticoagulation coordonnés des patients. Les recommandations pour l'organisation et l'administration de la thérapie incluent (1) les qualifications du personnel, (2) la supervision, (3) l'administration et la coordination des soins, (4) la communication et la documentation, et (5) la surveillance au laboratoire. Les recommandations pour le procès du soin du patient incluent, (6) la sélection et l'évaluation du patient, (7) l'initiation de la thérapie, (8) la continuation et l'ajustement de la thérapie, (9) l'éducation du patient, et (10) l'entretien de la thérapie ainsi que le triage des problèmes ayant rapport et n'ayant pas de rapport à l'anticoagulation. Les recommandations pour l'évaluation du dénouement des patients incluent, (11) les parties constitutives de l'organisation et (12) le dénouement des patients. L'impact de ces 12 recommandations sur le soin du patient et le remboursement pour les services fournis dépendra de leur implémentation et de la valeur perçue de leur utilité.

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