

Compliance With Antithrombotic Guidelines: Current Practice, Barriers, and Strategies For Improvement

Deeply held, but not evidence-based, concerns about the possible risks of pharmacologic prophylaxis leave many patients at risk for DVT

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ABSTRACT

Venous thromboembolism (VTE) remains a significant threat to public health despite the availability of effective and safe prophylactic measures and treatments. Guidelines based on randomized clinical trials are available to improve the management of thromboembolic disease. However, gaps exist between recommendations and clinical practice, and many patients are unnecessarily exposed to the risk of a deep vein thrombosis or potentially fatal pulmonary em-

bolism. Barriers responsible for poor compliance with current antithrombotic guidelines include lack of familiarity with recommendations, overestimation of bleeding risk, underestimation of thrombotic risk, and logistical limitations of health care management systems. Improving compliance is a complex task, but successful initiatives rest upon improving thrombotic risk-assessment methods and facilitating appropriate prescribing of prophylaxis. Multifaceted, interdisciplinary strategies involving risk-assessment models, electronic reminders, and audit and feedback show the most potential to improve compliance with guidelines.

INTRODUCTION

Venous thromboembolism is a significant public health concern, accounting for an estimated 2 million cases of deep vein thrombosis (DVT) and 600,000 cases of pulmonary embolism (PE) each year in the United States (Hirsh & Hoak 1996). Overall, it is estimated that 10% of hospital deaths are attributable to PE (Geerts 2004), making it the most preventable cause of hospital death and disability. Highly susceptible patients include those with cancer, patients undergoing major orthopedic surgery, and those hospitalized for an acute medical illness, such as pneumonia or

stroke (Geerts 2004). Prevention is the most effective strategy to reduce the burden of this disease, and guidelines based on clinical evidence exist to guide and standardize care (Geerts 2004). Appropriate application of current antithrombotic management guidelines should reduce the disease burden of VTE, yet a significant gap exists between the availability of evidence-based guidelines and their application, resulting in wide variation in thromboprophylaxis prescribing patterns (Tapson 2005, Aujesky 2002, Learhinan 2003, Arnold 2001, Bratzler 1998). Many patients remain at unnecessary risk of thrombosis and its complications. Significant opportunities exist for improving primary and secondary prevention of thromboembolic disease.

THE ROLE OF GUIDELINES

Guidelines are systematically developed statements that outline recommended clinical practice. Developed by experts in the therapeutic area, clinical guidelines are designed to assist practitioner decisions on appropriate diagnosis and management in specific clinical circumstances (Field 1990). Successful and widespread implementation of clinical guidelines should improve quality of care and decrease variation in practice (Chassin 1990). A number of evi-

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dence-based guidelines in thrombosis are available, including the International Consensus Statement (Nicolaidis 2001) and recommendations from the American College of Chest Physicians (ACCP) (Geerts 2004). National guidelines are also available, such as those published by the Scottish Intercollegiate Guidelines Network (SIGN 2003). The first ACCP recommendations were published in 1986 (ACCP/NHLBI 1986). Since then, the ACCP guidelines have been updated every three years and have evolved into the most comprehensive resource for evidence-based recommendations available on all aspects of thromboembolic disease and its management. Its recommendations are now widely regarded as the standard of care (Geerts 2004).

The ACCP guidelines review and discuss the available clinical evidence and present the recommendations graded according to the risk/benefit assessment made by the experts

(Grade 1 or 2) and to the strength and quality of the data available to the consensus group (Grades A, B, C, or C+) (Guyatt 2004) (Table 1). Since the publication of the first set of guidelines, the number of clinical recommendations covering the prevention and treatment of thrombosis has increased 10-fold, particularly those listed grade A (i.e., supported by evidence from consistent results of randomized clinical trials) (Figure 1). This change reflects the rapid increase in new scientific evidence. However, the increased number and complexity of guidelines complicates implementation and leads to potential difficulties in practice.

LACK OF COMPLIANCE

Implementation of antithrombotic guidelines is complicated and requires physicians, other caregivers, and hospital management to familiarize themselves with current recommendations and then to formulate their own local

prophylaxis strategies and interdisciplinary care pathways. Despite the evidence-based nature of recommendations, VTE prophylaxis is still underutilized or inappropriately prescribed for many patients at risk of thrombotic disease (Arnold 2001, Learhinan 2003, Vallano 2004, Anderson 1994, Aujesky 2002, Tapson 2003, Goldhaber & Tapson 2004).

Thromboprophylaxis

Surveys of prophylaxis use indicate that the percentage of medical and surgical patients receiving prophylaxis ranges from 38 to 94 according to the type of illness or procedure (Stratton 2000, Arnold 2001, Friedman 2003, Bratzler 1998, Anderson 1998, Ageno 2002).

A chart review of a cohort of surgical and medical patients in the United States with 253 objectively confirmed cases of DVT showed that two thirds of VTE cases in prophylaxis-eligible patients could poten-

TABLE 1

Summary of the grading system for the management of venous thromboembolism recommendations in the Seventh American College of Chest Physicians (ACCP) guidelines (Adapted from Guyatt 2004)

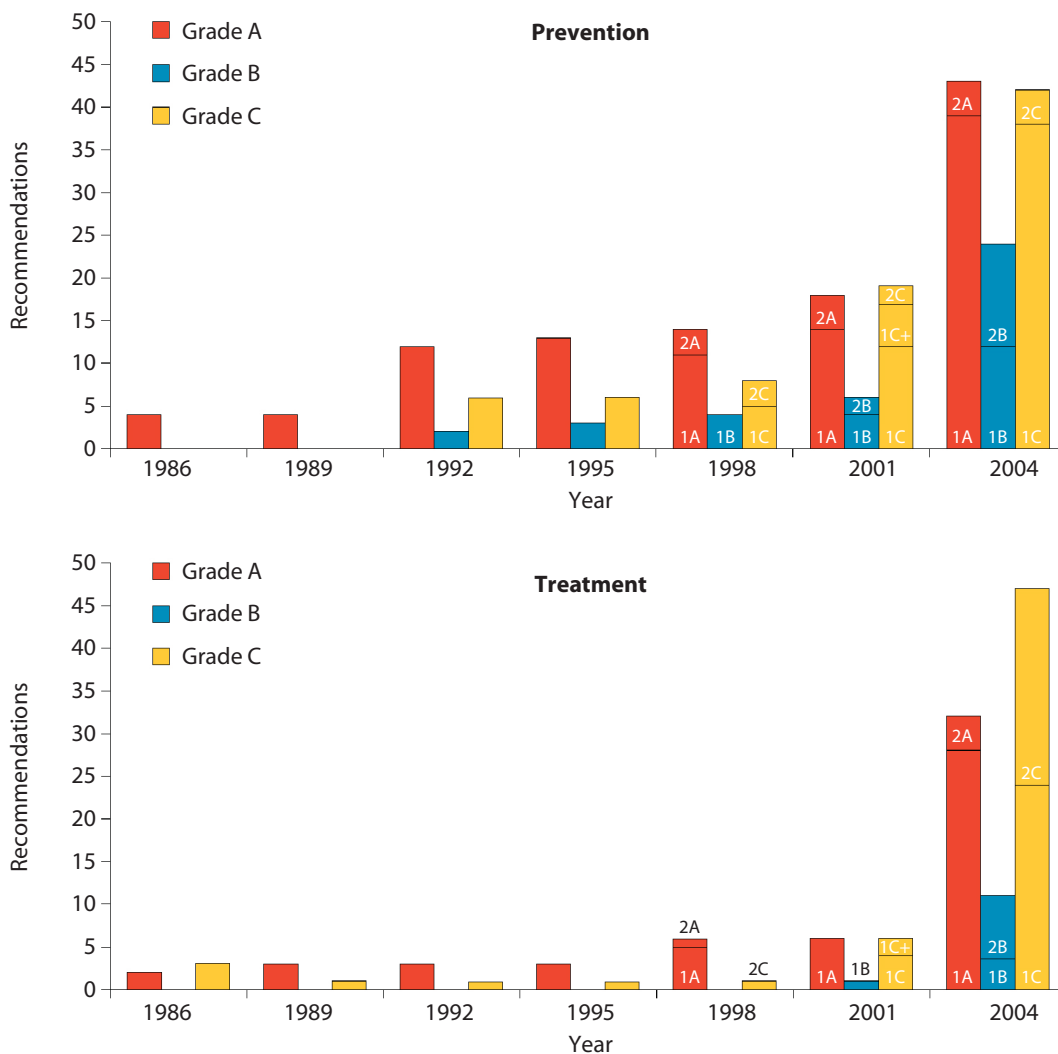
Grade	Risk/benefit situation	Source of supporting evidence	Strength of recommendation
1A	Clear	RCTs with no major limitations	Strong, can usually apply without reservation
1C+	Clear	No RCTs, but RCT results from other areas can be extrapolated or strong observational data	Strong, applies to most patients in most situations
1B	Clear	RCTs with significant weaknesses (e.g., methodological, loss of patient numbers in follow up)	Strong, likely to apply to the majority of patients
1C	Clear	Observational data only	Moderate: subject to revision as data emerge
2A	Unclear	RCTs with no major limitations	Moderate: best practice may depend on patients' circumstances or societal values
2C+	Unclear	No RCTs but RCT results from other areas can be extrapolated or strong observational data	Weak: best practice may depend on patients' circumstances or societal values
2B	Unclear	RCTs with significant weaknesses (e.g., methodological, loss of patient numbers in follow up)	Very weak: alternative approaches likely to be better for some patients under some circumstances
2C	Unclear	Observational studies	Very weak: other alternatives may be equally reasonable

RCT= randomized controlled trial.

Modified with permission (*Chest* 2004;126:179-187S).

FIGURE 1

Number of recommendations in each grading category for the prevention and treatment of VTE. 'Year' denotes year of ACCP consensus statement publication



tially have been prevented if physicians had followed the ACCP guidelines (Arnold 2001). The most common reasons given for inadequate prophylaxis were lack of prophylaxis (47.7%), inadequate duration (22.7%), and incorrect type of prophylaxis (20.5%). Surprisingly, a tendency has also been reported for prophylaxis to be administered less frequently with increasing VTE risk level (Peterson 1999, Bratzler 1998, Ahmad 2002). Why this occurs is not known, though it may reflect physician concerns that the risk of bleed-

ing may be greater in very high-risk patients.

Despite ample documentation of VTE risk in hospitalized medical patients, such patients are less likely to receive appropriate thromboprophylaxis than surgical patients. In DVT-FREE, a prospective registry of 5,451 patients with DVT confirmed by ultrasound, only 22.2% of medical patients received prophylaxis compared with 46.9% of the surgical cohort (Tapson & Goldhaber 2003). Similarly, IMPROVE, a registry of acutely ill medical patients, reported

that only 39% of patients hospitalized for 3 days or more received VTE prophylaxis (Tapson 2003). In a review of prophylaxis patterns in a tertiary care center in the United States, 75% of medical patients were classified as having a high risk for VTE, yet only 43% of these patients received any form of prophylaxis (Stinnett 2005). After a program of educational initiatives to improve compliance, 79% of patients were identified as being at risk for VTE, while the prophylaxis rate improved to 72% (Stinnett 2005). In a study of 272 critically ill

medical patients who received intensive care for at least 24 hours, pharmacologic prophylaxis was used in only 38% of patients, but its use reduced the risk of in-hospital death by 55% compared to patients who did not receive pharmacologic prophylaxis (Lentine 2005).

Cost of noncompliance

Underuse of prophylaxis and inadequate treatment of VTE both increase chronic morbidity from recurrent thrombosis and the post-thrombotic syndrome (PTS). Estimates based on a cost-of-illness study suggest that in the U.S., the annual per-patient cost of severe PTS is \$3,816 in the first year and \$1,677 per annum thereafter, while the cost of DVT and PE complications have been estimated at \$3,798 and \$6,604, respectively (Caprini 2003).

Complications arising from a single DVT can lead to a significant long-term health care burden, which forms a strong economic rationale for optimizing thromboprophylaxis (Caprini 2003, Sullivan 2003).

Medicolegal issues are raised when a patient develops VTE and caregivers have not complied with recommended prophylaxis or treatment standards. Physicians have a duty of care to minimize VTE risk where possible (Di Blasi 2000). Practice guidelines offer legal protection and improve health care because they define expected standards of care (Chassin 1990). A review of malpractice litigation and practice guidelines found that guidelines are cited both as evidence of malpractice (i.e., failure to comply with guidelines) and as exonerating evidence in physicians' defense (Hyams 1995). The National Guideline Clearinghouse currently holds 1,820 clinical guideline summaries, reflecting the breadth of guidelines available to physicians. The concept of strict adherence to recommendations and guidelines is considered by some to threaten professional autonomy. However, it appears that

following clinical recommendations where possible offers some medicolegal protection and improves quality of patient care. Both outcomes are received favorably by physicians and hospital management.

REASONS FOR LACK OF COMPLIANCE

Translating clinical recommendations into improved patient outcomes requires commitment, understanding, and adherence from treating physicians. The processes and factors that influence physician practice in response to guidelines are poorly understood. However, as the introduction of clinical guidelines increases, it is becoming clear that there are several barriers that hinder compliance with recommendations (Cabana 1999, Ellrodt 1995) (Table 2).

First, attitudes may limit a physician's willingness to follow guidelines. These barriers include lack of awareness, disagreement with guidelines (either specifically or as a general concept), resistance to changing established behaviors and practices, and doubt that the new approach will change outcomes. Lack of awareness and poor understanding are major hindrances to guideline compliance. In a systematic review of surveys measuring lack of awareness as a barrier to compliance, more than 10% of physicians were unaware of the existence of the guideline in 36 out of 46 surveys (Cabana 1999). Moreover, casual awareness does not equal familiarity, meaning sufficient knowledge to critically evaluate and apply recommendations.

Fear of bleeding complications

Many physicians still cite bleeding risk as a reason for not prescribing recommended pharmacologic prophylaxis to medical and surgical patients who are at risk. For example, concern exists over the antithrombotic management of patients who have recently suffered a stroke or undergone a neurosurgical procedure,

despite the fact that data exist to demonstrate the safety and efficacy of pharmacologic prophylaxis (Wen 1998, McCarthy 1986). In patients receiving heparin prophylaxis, the incidence of bleeding complications, particularly major bleeding, is overestimated (Nurmohamed 1992, Kakkar 1993, Koch 2001, Mismetti 2001). Bleeding complications are often treatable, but the acute and chronic sequelae of DVT and PE are much more severe. In essence, when prescribed appropriately, prophylaxis with heparin or low-molecular-weight heparin (LMWH) has a favorable risk/benefit ratio and is cost-effective (Geerts 2004).

However, established attitudes are hard to change, as highlighted by a study of anticoagulation in the elderly. Physicians attached more importance to the perceived risks of bleeding than to the proven benefits of treatment (e.g., prevention of stroke). This survey also reported that bleeding related to anticoagulant therapy was regretted more by physicians than thromboembolic events caused by failure to prescribe appropriate anticoagulation (Dhond 2003).

Asymptomatic nature of thrombosis

DVT is often asymptomatic or accompanied by what seem to be trivial complaints and, too often, the first sign of VTE is a life-threatening PE. In surgical patients, the incidence of clinically apparent VTE during the short postoperative hospital stay is very low. Therefore, the chances of an individual surgeon witnessing an acute PE or major DVT are relatively rare. Physicians are also prone to overlook the minor signs and symptoms that often accompany a thrombotic event, hence many treatable "early" DVTs may go undiagnosed. Finally, the trend toward shorter hospital stays, even for patients who undergo major orthopedic surgery, means that many symptomatic thromboembolic complications occur

after hospital discharge, and physicians and surgeons are unaware of the true incidence of VTE in their patients (Bergqvist 1993, Trowbridge 1994).

Routine clinical surveillance for VTE is clinically and economically inefficient. Effective prophylaxis for all patients at risk is the most effective strategy to prevent unnecessary VTE events (Geerts 2004).

Lack of awareness

The majority of clinical trials in prevention of VTE have studied surgical patients, but medical patients are also at significant risk of thrombotic disease (Geerts 2004). Fewer than 25% of patients who suffer a fatal PE have recently undergone surgery (Lindblad 1991), and autopsy studies suggest that PE causes or contributes to up to 10% of in-hospital deaths in medical patients (Sandler 1989, Lindblad 1991, Baglin 1997). The average incidence of DVT in medical patients is 10%–20%, but can be much higher in certain groups. For example, without prophylaxis, VTE occurs in 24% of patients with an acute myocardial infarction, and the incidence of DVT after a stroke can be as high as 55% (Geerts 2001, Gensini 1997). Cancer is a major thrombotic risk factor because of the hypercoagulable state induced by the malignancy and increased risk associated with cancer surgery and chemotherapy (Kakkar 1997, Geerts 2004).

EXTERNAL BARRIERS

Other barriers to guideline implementation are often embedded in the health care system. For example, although cost-effective, VTE prophylaxis incurs costs and consumes resources which need to be procured and accounted for. If VTE risk assessment and graded prophylaxis recommendations are integrated into hospital protocols, physicians find it easier to comply with guidelines than if they are not standard practice. Equally, lack of support from colleagues — either perceived or actual

TABLE 2

Barriers to implementation of antithrombotic management guidelines

Physician-related

- Lack of awareness/familiarity with guidelines
- Lack of agreement with guidelines
- Misconception of risk
- Negative attitudes to guidelines
- Fear of jeopardizing patient-clinician relationship
- Pressure of time
- Forgetfulness
- Perceived lack of support from peers
- Primary focus on underlying disease or surgical procedure
- Concern over bleeding risk
- Lack of confidence in performing procedure/therapy
- Lack of outcome expectancy
- Inertia of previous practice
- Lack of awareness of the diverse range of clinical signs and symptoms for VTE

Guideline-related

- Evidence insufficiently strong
- Difficult to understand/inconvenient
- Inconsistent

Environmental

- Lack of resources/equipment
- Inappropriate skill mix/lack of staff
- Lack of forcing strategies
- Lack of reminder system
- Low payment
- Increased costs
- Patient preferences: inability to reconcile patient preferences to guidelines
- Low incidence of clinically apparent VTE in the perioperative period

VTE=venous thromboembolism.

— impedes implementation of prophylaxis guidelines.

OVERCOMING BARRIERS

How can compliance with guidelines be improved? Guidelines that recommend changing established practice (e.g., pharmacologic prophylaxis instead of mechanical) are more difficult to implement than guidelines that recommend new behavior (Cabana 1999, Winkler 1985). Strategies aimed at improving compliance have been designed and evaluated (Table 3) and are described below.

Dissemination of educational material

Intervention strategies based on continuing medical education

(CME) initiatives, including lectures and dissemination of guideline summaries/reminders for VTE prophylaxis, have been shown to improve the implementation of thromboprophylaxis guidelines (Anderson 1994, Peterson 1999, McEleny 1998).

Investigators Against Thromboembolism (INATE) produced a concise pocket guide summarizing prophylaxis guidelines in orthopedics and trauma (Kakkar 2004, for download at «www.inate.org»). The pocket guide also unifies the recommendations from the ACCP and the European consensus group, the International Union of Angiology (IUA), thereby removing another potential cause of confusion.

Risk assessment models (RAM)

Accurate assessment of individual VTE risk is critical to optimize prophylaxis. Indeed, the ACCP guidelines describe categories of VTE risk and recommend methods of prophylaxis at each risk level. Risk assessment models (RAMs) are available to help physicians assess VTE risk and choose appropriate prophylaxis.

One such model (Caprini 2001) uses a simple list of risk factors and incorporates a simple scoring system to facilitate patient assignment to 1 of the 4 VTE risk categories identified in the ACCP guidelines (low, moderate, high, very high). An appropriate prophylaxis regimen can then be chosen.

A RAM developed by Cohen et al. (2005) addresses appropriate prophylaxis in the heterogeneous population of medical patients. The simple scheme identifies all patients aged >40 years with an acute medical illness and reduced mobility as candidates for prophylaxis. It accounts for the presence of risk factors and acute illness to provide clinicians with a simple “yes” or “no” answer for prophylaxis.

Clinical decision-support systems (CDSS)

Software support systems are available. In a study of 1971 orthopedic surgery patients, implementation of clinical guidelines for VTE prophylaxis through a CDSS changed physician behavior and improved compliance with guidelines (Durieux 2000). All prescriptions for antithrombotic prophylaxis were ordered via the computer, which automatically compared requested prescriptions with current recommendations for that patient's level of VTE risk. Physicians were alerted when their management differed from the recommendations and were given the opportunity to change their prescription to match the standards. During the implementation of this CDSS, compliance with guidelines increased from 83% to 95%, and the risk of an inappropriate prescription was reduced four-fold (Durieux 2000).

Computer reminder system

An alternative to the CDSS approach is a computer reminder, which can be programmed to search the patient database/electronic record to alert physicians when VTE pro-

phylaxis is indicated for a specific patient. In a study of patients undergoing major surgery, prophylaxis rates increased significantly from 89.9% to 95% ($P < 0.0001$) after implementation of a computerized reminder system (Mosen 2004). An electronic alert system to identify hospitalized patients at risk of DVT was also developed and evaluated by Kucher et al. (2005). The computer alerted physicians to a patient's risk of thrombosis, requiring the physician to acknowledge the alert and then either order or withhold prophylaxis. This system significantly increased the use of prophylaxis, and reduced the incidence of DVT or PE at 90 days by 41% ($P < 0.0001$) (Kucher 2005).

Combined prescription and monitoring charts

To improve the management of inpatients on anticoagulant drugs, Phillips et al. (1997) designed combined prescription and monitoring charts that incorporated clinical guidelines. Developed for both heparin and warfarin, the patient charts contained all the essential clinical and laboratory information relating to the prescription and monitoring of anticoagulants. These were introduced throughout a 700-bed acute-care teaching hospital by a structured program of change management. The percentage of time for which anticoagulation levels were subtherapeutic with heparin fell significantly from 32.7% to 18.5% ($P < 0.0001$). The authors concluded that the introduction of the charts led to significant improvements in anticoagulant control.

Spoken prophylaxis policies

Reliance on spoken instruction alone to guide and enforce prophylaxis is considered an inadequate way of implementing guideline recommendations. This was confirmed by a study on a general surgical ward in the United Kingdom, in which spoken recommendations for prophylaxis

TABLE 3

Strategies for increasing compliance with antithrombotic guidelines

Educational support

- Materials (e.g., pocket guidelines, posters)
- Meetings
- Outreach visits
- Opinion leaders
- CME and QA programs

System support

- Clinical decision-support tools
- Risk-assessment models
- Computer reminder systems
- Combined prescription and monitoring charts

Process support

- Working groups to identify barriers
- Implementation and monitoring of local prophylaxis policies
- Audit/feedback

CME=continuing medical education; QA=quality assurance.

laxis by the consultant to the house officers resulted in poor uptake of measures and policy failure (Byrne 1996).

Pharmacy-based educational campaigns

Educational campaigns have been shown to improve prophylaxis rates. In one survey of surgical patients, initially only 59% of patients were receiving appropriate prophylaxis and only 25% of high-risk patients were given appropriate preventive treatment. However, following a multifaceted educational campaign involving presentations to staff, posters, and distribution of glossy cards summarizing the guidelines, rates of appropriate prophylaxis increased to 70%, with 77% of the high-risk patients receiving the recommended prophylaxis (Peterson 1999).

AN INTEGRATED APPROACH

Although passive dissemination of guidelines is considered unlikely to improve VTE prophylaxis practice, most other initiatives have shown promise (Tooher 2005, Grimshaw 2001). A systematic study of 41 reviews showed that multifaceted interventions targeting different barriers to change were more effective than single-strategy interventions (Grimshaw 2001). A combination approach was used for local adaptation of the 2001 ACCP guidelines in a large Italian teaching hospital (Scaglione 2005). Interventions included presentation of guidelines to hospital physicians; distribution of a pocket version of guidelines; creation of a working group to identify local barriers to change; and use of a printed reminder chart summarizing VTE risk factors and appropriate prophylaxis.

Rates of appropriate prophylaxis in surgical patients increased significantly, from 63.7% to 97.1% ($P = 0.0004$) and in medical patients from 25% to 41.7%, ($P = 0.0075$) (Scaglione 2005).

A recent systematic review of strategies also concluded that multifaceted, interdisciplinary approaches have the most potential to improve adherence (Tooher 2005). The most effective approaches incorporated systems for reminding clinicians to assess patients for thrombotic risk, either a computer-based system or paper reminders. These strategies also incorporated audit and feedback, which were found to be valuable in the refinement of a prophylaxis policy (Tooher 2005). The authors concluded that to improve the prescribing of thromboprophylaxis, an initiative requires clinical evidence from local practice to highlight the need to use prophylactic therapy, education to improve understanding of risk assessment and appropriate prophylactic approaches, and a clinical

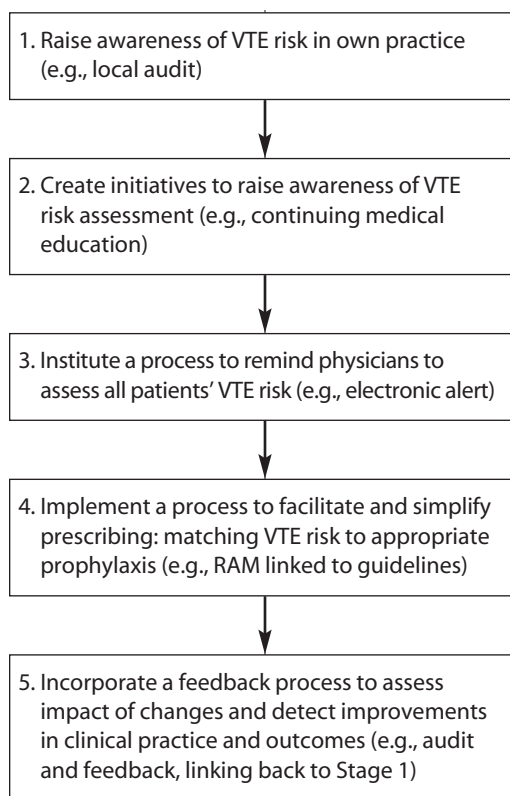
support system to overcome key barriers to effective prescribing. A flow chart summarizing the steps involved in a successful multifaceted strategy is shown in Figure 2.

Strategies to promote change in clinician behavior were also compared in a recent review published as part of the ACCP consensus recommendations (Schunemann 2004). Strategies were graded for feasibility, cost, and acceptability, and the study included a survey of ACCP conference participants. Recommendations from the ACCP were that to improve compliance, appreciable resources should be devoted to distribution of educational material, computer reminders, and patient-mediated interventions.

Conversely, the ACCP review recommended that few resources be de-

FIGURE 2

Schematic representation of a multifaceted intervention for improving compliance with thromboprophylaxis guidelines



RAM= risk assessment model; VTE=venous thromboembolism.

TABLE 4**Non-local methods to promote antithrombotic practices (from Trowbridge & Wachter 2001)**

Approach	Example	Advantages	Disadvantages
Accreditation	JCAHO patient safety standards	<ul style="list-style-type: none"> • May be more flexible and more easily modified than legislation • Implemented at the level of the health care organization • Health care providers may have the opportunity for input 	<ul style="list-style-type: none"> • Dependent on voluntary participation in the accreditation process • Limited enforcement ability • Generally assessed only every few years
Legislation	'Libby Zion' laws limiting resident working hours	<ul style="list-style-type: none"> • Potential for widespread implementation • Supported by government enforcement ability 	<ul style="list-style-type: none"> • Inflexible • Limited acceptance by health care providers • Potential to be developed with inadequate input from providers and experts • May be politically driven with limited applicability • May not provide for costs of implementation, leading to shifting of costs away from other beneficial patient safety
Professional societies	ACCP or IUA	<ul style="list-style-type: none"> • Readily accepted by health care providers • Developed by providers themselves, leading to better 'buy in' • More easily modified when new evidence or changes in practice emerge 	<ul style="list-style-type: none"> • Minimal enforcement potential; depends largely on voluntary participation of practitioners • Potential bias by professional societies
Market-based	Leapfrog Group	<ul style="list-style-type: none"> • Uses the power of the market to induce change (may be more acceptable for many providers than regulatory solutions) 	<ul style="list-style-type: none"> • Potential to cause disparity in care between affected groups and groups not covered by initiatives • Limited acceptance by health care providers • Potentially inadequate input from health care providers • Change is not required and, therefore, implementation may be limited • May involve higher payments for better practices to achieve impact

IUA= International Union of Angiology; JCAHO=Joint Commission on Accreditation of Healthcare Organizations.

voted to educational meetings, outreach visits, or audit and feedback processes because of small effects, relatively high cost, or limited feasibility.

LEGISLATION AND ACCREDITATION APPROACHES

Although guidelines issued by professional societies can affect change, they lack the power to compel. Initiatives by more powerful organizations and institutions, such as federal and state governments and accreditation

agencies, may become valuable adjuncts to these guidelines (Trowbridge & Wachter 2001, Table 4). For example, the National Quality Forum (NQF), with support from the Agency for Healthcare Research and Quality (AHRQ), has identified 30 evidence-based safe practices to reduce or prevent adverse events and medical errors (AHRQ 2005). With regard to thrombosis, two safe practices are of particular relevance. Safe practice 17 states that all patients should have their risk for VTE as-

essed upon admission to the hospital, and regularly thereafter, and that clinically appropriate methods should be utilized to prevent VTE. Safe practice 18 says that dedicated antithrombotic (anticoagulation) services that facilitate coordinated care management should be utilized. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is now collaborating with the NQF to identify and develop a set of standardized measures to monitor these safe practices, and these will

become future mandates of the JCAHO.

LESSONS FROM OTHER SPECIALTIES

Guidelines are now common in all medical specialties. Barriers that prevent implementation are similar across disciplines, and useful insights can be gained from successful interventions in other therapeutic areas. For example, rewriting the NICE schizophrenia guidelines using "plain English" and behaviorally-specified terminology improved communication of guidelines and led to more positive perceptions with a greater proportion of practitioners indicating an intention to implement (Michie 2005). Similarly, a campaign of educational mailings combined with a visit from an educational adviser significantly increased the frequency with which primary care physicians conducted risk assessment and provided risk-reduction counseling for sexually-transmitted diseases (Rabin 1994).

In acute myocardial infarction, the distribution and dissemination of American College of Cardiology/American Heart Association (ACC/AHA) guidelines, followed by monitoring and feedback of predefined quality indicators (e.g., the percentage of patients receiving beta-blockers on hospital discharge, or the percentage of patients who received aspirin during hospitalization) improved patient care and reduced mortality (Scott 2000, Marciniak 1998).

In a study leading to increased prescription of beta-blockers in eight U.S. hospitals, the key elements for improved implementation of evidence-based therapies were found to be shared goals among providers, namely administrative support, strong clinical leadership, and high-quality feedback (Bradley 2005).

In acute coronary syndromes, three successful intervention programs demonstrated that a combined

approach incorporating CME for physicians, local opinion leaders and champions, patient education, physician reminders and care pathways, and total quality management efforts resulted in greater adherence to ACC/AHA practice guidelines and quality improvements in patient care (Roe 2004).

CONCLUSIONS

Evidence from high-quality randomized clinical trials and meta-analyses has greatly increased the number of clinical recommendations for both the treatment and prophylaxis of VTE. However, reports continue to identify a lack of consistent adherence to these guidelines. Lack of familiarity is often cited as a primary reason for failure of adequate prophylaxis — and educational programs have been shown to improve prophylaxis rates — but unfamiliarity does not solely explain the wide variation in compliance. Deeply held, but not evidence-based, concerns over the possible risks of pharmacologic prophylaxis and roadblocks inherent in the hospital environment (e.g., no standard VTE risk assessment protocol for all patients) leave many patients at unnecessary risk of a DVT or potentially fatal PE.

Computerized interventions, such as decision-support systems or automatic alerts in the patient's electronic record may go some way to assisting implementation and compliance. However, in our view, these initiatives alone will be insufficient. An active, integrated, and multifaceted approach is required to improve patient care, reduce the incidence of long-term complications, and reduce the burden of thrombotic disease in our health care systems.

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