CHEST

Original Research

VENOUS THROMBOEMBOLISM

Venous Thromboembolism Prophylaxis in Acutely Ill Hospitalized Medical Patients*

Findings From the International Medical Prevention Registry on Venous Thromboembolism

Victor F. Tapson, MD, FCCP; Hervé Decousus, MD; Mario Pini, MD; Beng H. Chong, MD, PhD; James B. Froehlich, MD, MPH; Manuel Monreal, MD; Alex C. Spyropoulos, MD, FCCP; Geno J. Merli, MD; Rainer B. Zotz, MD; Jean-François Bergmann, MD; Ricardo Pavanello, MD; Alexander G.G. Turpie, MD; Mashio Nakamura, MD; Franco Piovella, MD; Ajay K. Kakkar, MD, PhD; Frederick A. Spencer, MD; Gordon FitzGerald, PhD; and Frederick A. Anderson, Jr, PhD; for the IMPROVE Investigators

Background: **Evidence-based guidelines recommend that acutely ill hospitalized medical patients who are at risk of venous thromboembolism (VTE) should receive prophylaxis. Our aim was to characterize the clinical practices for VTE prophylaxis in acutely ill hospitalized medical patients enrolled in the International Medical Prevention Registry on Venous Thromboembolism (IMPROVE).**

Methods: **IMPROVE is an ongoing, multinational, observational study. Participating hospitals enroll the first 10 consecutive eligible acutely ill medical patients each month. Patient management is determined by the treating physicians. An analysis of data on VTE prophylaxis practices is presented.**

Results: **From July 2002 to September 30, 2006, 15,156 patients were enrolled from 52 hospitals in 12 countries, of whom 50% received in-hospital pharmacologic and/or mechanical VTE prophylaxis. In the United States and other participating countries, 52% and 43% of patients, respectively, should have received prophylaxis according to guideline recommendations from the American College of Chest Physicians (ACCP). Only approximately 60% of patients who either met the ACCP criteria for requiring prophylaxis or were eligible for enrollment in randomized clinical trials that have shown the benefits of pharmacologic prophylaxis actually received prophylaxis. Practices varied considerably. Intermittent pneumatic compression was the most common form of medical prophylaxis utilized in the United States, although it was used very rarely in other countries (22% vs 0.2%, respectively). Unfractionated heparin was the most frequent pharmacologic approach used in the United States (21% of patients), with low-molecular-weight heparin used most frequently in other participating countries (40%). There was also variable use of elastic stockings in the United States and other participating countries (3% vs 7%, respectively).**

Conclusions: **Our data suggest that physicians' practices for providing VTE prophylaxis to acutely ill hospitalized medical patients are suboptimal and highlight the need for improved implementation of existing evidence-based guidelines in hospitals.** ***(CHEST 2007; 132:936–945)***

Key words: acutely ill; medical patients; prophylaxis; venous thromboembolism

Abbreviations: ACCP = American College of Chest Physicians; ARTEMIS = Arixtra for Thromboembolism Prevention in a Medical Indications Study; DVT = deep vein thrombosis; ES = elastic stockings; IMPROVE = International Medical Prevention Registry on Venous Thromboembolism; IPC = intermittent pneumatic compression; LMWH = low-molecular-weight heparin; MEDENOX = Prophylaxis in Medical Patients with Enoxaparin; PE = pulmonary embolism; PREVENT = Prevention of Recurrent Venous Thromboembolism; UFH = unfractionated heparin; VTE = venous thromboembolism

The vast majority (80%) of hospitalized patients with symptomatic venous thromboembolism (VTE) have not undergone recent surgery.[1–3] Furthermore, 70 to 80% of cases of fatal pulmonary embolism (PE) in the hospital occur in medical (nonsurgical) patients.[4–6] Placebo-controlled studies[7–9] have shown that the incidence of objectively confirmed VTE in acutely ill hospitalized medical patients ranges from 5 to 15%, and can be reduced by between one half and two thirds with appropriate VTE prophylaxis. Despite these data and evidence-based guidelines recommending that prophylaxis should be given to acutely ill hospitalized medical patients who are at risk of VTE,[10,11] it is often underused or used suboptimally in this patient population.[12–15] To date, prophylaxis practices in these patients remain poorly characterized, and published reports[14,16–18] have been limited to single-center or national data. No multinational studies of prophylaxis patterns in acutely ill hospitalized medical patients have been reported.

The International Medical Prevention Registry on Venous Thromboembolism (IMPROVE) is an ongoing, multinational, observational study that is designed to assess routine clinical practices in the provision of VTE prophylaxis to acutely ill hospitalized medical patients, and to examine the relationships among patient characteristics, the use of prophylaxis, and clinical end points. The aim of this analysis of the IMPROVE registry is to describe current physician practices for providing VTE prophylaxis to acutely ill hospitalized medical patients. To benchmark observed management practices, we also examined practices in subsets of patients who would have been eligible for enrollment in major randomized controlled trials[7–9] that have shown the benefits of pharmacologic prophylaxis in this population, and in a subset of patients[10] who would have been recommended to receive prophylaxis according to criteria from the American College of Chest Physicians (ACCP) consensus guidelines for VTE prevention.

Materials and Methods

Patient recruitment into the IMPROVE registry took place between July 2002 and September 2006. In contrast to randomized, controlled, clinical studies, no experimental interventions were imposed. Patient management was determined by the treating physicians, and hence the data reflect a real-world approach to VTE prevention.

Study Design

The study was developed and coordinated under the guidance of a Scientific Advisory Board (see Appendix 1) by the Center for Outcomes Research (University of Massachusetts Medical School, Worcester, MA). Physicians or trained study coordinators at each participating hospital systematically enrolled the first 10 consecutive, eligible, acutely ill, hospitalized medical patients at the start of each month. All patients who met the enrollment criteria, including those who died during hospitalization, were considered to be eligible for study enrollment. Patients were enrolled either retrospectively or prospectively. Informed patient consent was obtained when required by the ethics review committee at each participating hospital.

*From the Duke University Medical Center (Dr. Tapson), Durham, NC; Institut National de la Santé et de la Recherche Médicale (Dr. Decousus), CIE3, Saint-Etienne, France; Ospedale di Fidenza Medicina Interna (Dr. Pini), Fidenza, Italy; Medicine Department (Dr. Chong) St. George Hospital, Kogarah, NSW, Australia; Vascular Medicine (Dr. Froehlich), University of Michigan Health System, Ann Arbor, MI; Servicio de Medicina Interna (Dr. Monreal), Hospital Germans Trias i Pujol, Badalona, Spain; Lovelace Medical Center (Dr. Spyropoulos), Clinical Thrombosis Center, Albuquerque, NM; Jefferson Antithrombotic Therapy Service (Dr. Merli), Division of Internal Medicine, Philadelphia, PA; Universitätsklinikum Düsseldorf (Dr. Zotz), Institut für Hämostaseologie und Transfusionsmedizin, Düsseldorf, Germany; Hôpital Lariboisiere Clinique Thérapeutique (Dr. Bergmann), Paris, France; Hospital do Coração Clínica Médica (Dr. Pavanello), São Paulo, Brazil; Hamilton Health Sciences General Hospital (Dr. Turpie), Hamilton, ON, Canada; Faculty of Medicine (Dr. Nakamura), First Department of Internal Medicine, Mie University, Tsu Mie, Japan; Istituto di Ricovero e Cura a Carattere Scientifico Policlinico San Matteo (Dr. Piovella), Servizio Malattie Tromboemboliche, Pavia, Italy; Centre for Surgical Sciences (Dr. Kakkar), Barts and The London, Queen Mary School of Medicine, London, UK; Division of Cardiovascular Medicine (Dr. Spencer), Center for Outcomes Research, (Drs. FitzGerald and Anderson), University of Massachusetts Medical School, Worcester, MA.

All authors significantly contributed to the concept and design of the study, the interpretation of data, and critical revision of the manuscript. All authors approved the final version of the manuscript. Dr. FitzGerald performed all statistical analyses of data from IMPROVE.

IMPROVE is supported by an unrestricted educational grant from sanofi-aventis to the Center for Outcomes Research, University of Massachusetts Medical School, Worcester, MA.

Dr. Bergmann has received honoraria from Sanofi-Aventis and AstraZeneca. Dr. Froehlich has served as a consultant for Sanofi-Aventis. Dr. Kakkar has received consultancy/research funding from Sanofi-Aventis, sponsors of the IMPROVE registry. Dr. Merli has participated in research studies with AstraZeneca, Sanofi-Aventis, and Boehringer Ingelheim; has served on advisory boards with Bayer, Bacchus Scientific, AstraZeneca, and Sanofi-Aventis; and has been a speaker for AstraZeneca and Sanofi-Aventis. Dr. Pini has received fees from Sanofi-Aventis for being a member of the IMPROVE advisory board, and for conducting clinical studies and for lectures. Dr. Spencer has been a consultant for and has received a grant from Sanofi-Aventis. Dr. Spyropoulos has received grants/research support from and has been a consultant for Sanofi-Aventis and Astra-Zeneca. Dr. Tapson has received grants/research support from and has been a consultant for Sanofi-Aventis. Drs. Decousus, Chong, Monreal, Zotz, Pavanello, Turpie, Nakamura, Piovella, FitzGerald, and Anderson have reported to the ACCP that no significant conflicts of interest exist with any companies/organizations whose products or services may be discussed in this article.

Manuscript received December 13, 2006; revision accepted May 14, 2007.

Correspondence to: Victor F. Tapson, MD, FCCP, Professor of Medicine, Division of Pulmonary and Critical Care, Box 31175, Room 351 Bell Building, Duke University Medical Center, Durham, NC 27710; e-mail: tapso001@mc.duke.edu

DOI: 10.1378/chest.06-2993