

Underuse of Venous Thromboembolism Prophylaxis for General Surgery Patients

Physician Practices in the Community Hospital Setting

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Background: Venous thromboembolism is a common complication of surgery. Although surveys of physician self-reported practices have suggested near universal support for routine use of measures to prevent venous thromboembolism, medical record auditing has demonstrated underuse.

Objective: To assess physician practices of venous thromboembolism prophylaxis in the community hospital setting.

Methods: Retrospective review of the medical records from 20 hospitals in Oklahoma of 419 Medicare patients aged 65 years or older undergoing major abdominotheracic surgery between April 1 and December 31, 1995. Utilization rates of prophylaxis stratified according to patient risk for venous thromboembolism were measured.

Results: Prophylaxis measures were implemented for only 160 (38%) of 419 patients studied (95% confidence interval, 33%-43%). There was little variation in the use of prophylaxis based on the risk for venous thromboembolism. Only 97 (39%) of 250 patients (95% confidence interval, 33%-45%) at very high risk received any form of prophylaxis and of these 97, only 64 patients (66%) received appropriate measures (95% confidence interval, 56%-75%).

Conclusions: Despite widely disseminated, evidence-based recommendations, venous thromboembolism prophylaxis is underused in Medicare patients undergoing major abdominotheracic surgery in community hospitals in Oklahoma.

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VENOUS thromboembolism is a common complication of surgery, occurring in up to 65% of patients undergoing orthopedic surgery and 33% or more of patients undergoing general surgical procedures.¹ Since the early 1970s, multiple clinical trials²⁻⁵ have established the effectiveness of prophylaxis for preventing postoperative deep vein thrombosis and fatal pulmonary embolism. Cost-effectiveness analyses have established that the use of prophylaxis reduces health care costs.⁶⁻⁹ Consensus recommendations for use of prophylaxis have been widely disseminated.^{4,5,10}

Prophylaxis to prevent venous thromboembolism in patients undergoing major orthopedic surgery appears to be widely used. A 1994 survey¹¹ of 5000 orthopedic surgeons in the United States reported that 95% of respondents used some form of prophylaxis for their patients undergoing hip and knee arthroplasty. Recently, based on medical record auditing of patients undergoing total hip arthro-

plasty, Anderson and Audet¹² reported that 93% received prophylaxis.

Data are limited, however, on the use of prophylaxis for venous thromboembolism in patients undergoing major nonorthopedic surgery. In a 1982 survey of 994 randomly selected general surgeons, Conti and Daschbach¹³ reported that although most respondents agreed that prophylaxis was necessary, only 19% selected effective prophylaxis for patients at high risk of venous thromboembolism. Anderson et al,¹⁴ in an audit of the records of medical and surgical patients from 16 hospitals in Massachusetts in 1986, reported that prophylaxis for venous thromboembolism was administered to approximately one third of the high-risk surgical patients. More recently, a survey¹⁵ of 3500 randomly selected Fellows of the American College of Surgeons found that of the 1018 surgeons responding to the survey, 90% reported routine use of prophylaxis for their patients. Both surveys^{13,15} of physician self-reported practices have suggested near universal support for routine use of measures to prevent venous thromboembolism. How-

METHODS

Based on information derived from the Oklahoma Medicare Claims database of hospital admissions, 100% of the medical records from 20 hospitals of patients aged 65 years or older undergoing 3 elective surgical procedures between April 1 and December 31, 1995, were selected. The surgical procedures included gastrectomy (*International Classification of Diseases, Ninth Revision, Clinical Modification*¹⁷ diagnosis codes 43.5-43.7, 43.81, 43.89, 43.91, and 43.99), partial or total bowel resection (codes 45.51, 45.52, 45.61-45.63, 45.71-45.73, 45.75, 45.76, 45.79, 45.8, and 46.04), and lung resection (codes 32.29-32.6 and 32.9). The urban and rural hospitals selected for the study had between 50 and 250 licensed beds (mean, 151 beds), performed between 140 and 1700 surgical procedures per year on Medicare patients aged 65 years or older, and were geographically distributed across the state.

Each of the medical records was subjected to case review by 1 of 2 nurse abstractors using a standard electronic data collection form and explicit predefined instructions. Along with demographic and baseline patient characteristics, information was collected regarding risk factors for venous thromboembolism and prophylactic interventions used.

Cases were classified for the risk of venous thromboembolism based on criteria described by Clagett et al,⁹ as modified from Salzman and Hirsh.¹⁸ Utilization rates for prophylaxis were determined for each level of risk. Appropriateness of prophylaxis measures was determined using evidence-based recommendations published in 1992 and 1995.^{4,5} All forms of prophylaxis except aspirin alone were considered appropriate for patients at moderate risk and all but the use of aspirin or elastic stockings alone or in combination were considered appropriate for patients at high risk. Low-dose unfractionated heparin, low-molecular-weight heparin, oral anticoagulants, or intermittent pneumatic compression either alone or in combination with heparin (low-molecular-weight or low-dose unfractionated) were considered appropriate for very high-risk patients.

To validate the accuracy and consistency of data collection, a random sample of 5% of the medical records reviewed by each nurse abstractor was blindly reviewed by a second abstractor. Based on 10 key variables identified from each medical record, the rate of agreement between abstractors was calculated. This review demonstrated a 96.2% and 95.2% overall rate of agreement between the 2 nurse abstractors, respectively. All collected data were analyzed using STATA statistical software (Stata Corporation, College Station, Tex).

ever, the only published medical record audit of prophylaxis in general surgery reported underuse.¹⁴

Therefore, we performed a medical record review to evaluate the use of prophylaxis against venous thromboembolism in patients undergoing general abdominal-thoracic surgery. This study was initiated to assess phy-

Patient Characteristics

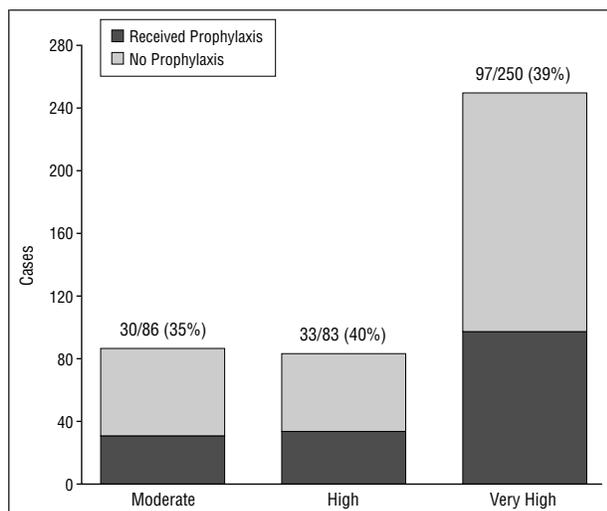
Characteristic	No. (%) (N = 419)
Mean \pm SD age, y (range)	76.6 \pm 7.4 (65-100)
Race	
White	393 (94)
Black	20 (5)
Other	6 (1)
Sex	
Male	180 (43)
Female	239 (57)
Surgery	
Gastrectomy	35 (8)
Partial/total bowel resection	346 (83)
Lung resection	38 (9)
Risk for venous thromboembolism	
Moderate	86 (20)
High	83 (20)
Very high	250 (60)
Malignancy	230 (55)
History of stroke or spinal cord injury	37 (9)
Previous venous thromboembolism	2 (<1)

sician practices in the community hospital setting and to determine if use of prophylaxis for general surgery patients has improved since the audit by Anderson et al¹⁴ published in 1991. Because the effectiveness of prophylaxis in preventing postoperative deep vein thrombosis and fatal pulmonary embolism has already been established by clinical trials,²⁻⁵ the focus of this study was on the process of use of any measures of prophylaxis. Measures of process of care that have been clearly linked by medical evidence to improved outcomes are valid indicators of quality.¹⁶

RESULTS

Of 421 patients identified, 2 underwent major orthopedic surgery during the same hospitalization as the index surgery and were excluded from the analysis. Characteristics of the 419 patients analyzed are summarized in the **Table**. Most patients (60%) were at very high risk for venous thromboembolism. Malignancy was a risk factor in more than half of the patients (Table).

Venous thromboembolism prophylaxis was implemented for only 160 (38%) of 419 patients (95% confidence interval [CI], 33%-43%). Prophylaxis was implemented for 35% of patients at moderate risk (95% CI, 25%-46%), 40% of patients at high risk (95% CI, 29%-51%), and 39% of patients at very high risk (95% CI, 33%-45%) (**Figure**). The most commonly used measures for the 160 patients receiving prophylaxis were elastic stockings alone in 46 (29%), low-dose unfractionated heparin alone in 28 (18%), intermittent pneumatic compression alone or in combination with elastic stockings in 28 (18%), elastic stockings with low-dose unfractionated or low-molecular-weight heparin in 27 (17%), intermittent pneumatic compression with low-dose unfractionated or low-molecular-weight heparin in 9 (6%), warfarin alone or in combination with elastic stockings or intermittent pneumatic compression in 4 (3%), low-



Use of any form of prophylaxis based on level of risk for venous thromboembolism among 419 Medicare patients from 20 hospitals undergoing major abdominothoracic surgery. Measures were implemented for patients at moderate risk (95% confidence interval [CI], 25%-46%), at high risk (95% CI, 29%-51%), and at very high risk (95% CI, 33%-45%). Overall utilization rate for prophylaxis was 38% (95% CI, 33%-43%).

molecular-weight heparin alone in 3 (2%), dextran and elastic stockings in 1 (<1%), and miscellaneous combinations in 14 (9%). Prophylaxis was initiated before surgery in 72 (45%) of 160 patients given prophylaxis.

The use of venous thromboembolism prophylaxis was also analyzed for the different surgical procedures, patient sex, and the presence of malignancy. Of 346 patients undergoing partial or total bowel resection, 130 patients (38%) received prophylaxis (95% CI, 32%-43%). Prophylaxis measures were implemented for 13 (37%) of 35 patients undergoing gastrectomy (95% CI, 21%-55%) and 17 (45%) of 38 patients undergoing lung resection (95% CI, 29%-62%). Measures were implemented for 89 (37%) of 239 female patients (95% CI, 31%-44%) and 71 (39%) of 180 male patients (95% CI, 32%-47%) undergoing surgery. Prophylaxis measures were implemented for 90 (39%) of 230 patients with malignancy (95% CI, 33%-46%) and for 70 (37%) of 189 patients who did not have a malignancy (95% CI, 30%-44%).

Prophylaxis measures were appropriate for all 30 patients (100%) at moderate risk of venous thromboembolism for whom prophylaxis was implemented (95% CI, 88%-100%). Measures were appropriate for 25 (76%) of 33 high-risk patients receiving prophylaxis (95% CI, 58%-89%). Measures were appropriate for 64 (66%) of 97 patients at very high risk receiving prophylaxis (95% CI, 56%-75%).

COMMENT

Our study demonstrated significant underuse of prophylaxis for venous thromboembolism. Most patients had additional risk factors for venous thromboembolism and 80% were classified as at either high or very high risk (Table). There was little variation in the use of prophylaxis between patient groups of varying risk. One third of the patients receiving prophylaxis in the very high-risk group were given inadequate measures. Similarly, there was little

variation in the use of prophylaxis based on sex, surgical procedure, or the presence of malignancy.

We evaluated the use of prophylaxis in hospitals with between 50 and 250 licensed beds performing an average of 870 surgical procedures on Medicare patients aged 65 years or older each year. Underuse of prophylaxis in hospitals of this size has the potential to affect many patients at risk for venous thromboembolism. Facilities that have between 50 and 199 licensed beds account for 48% of the hospitals in the United States.¹⁹ Approximately 29% of the surgeries (nearly 7 million procedures) performed during 1995 occurred in hospitals of this size.¹⁹

We acknowledge several limitations in this study. Our results are based on data collected from smaller hospitals and the rates of utilization may not be generalizable to larger institutions. We may have underestimated the risk of venous thromboembolism in some patients because of potentially missing documentation of risk factors in the medical record. However, since 80% of our patients were identified as at high or very high risk, this bias, if it occurred, would only strengthen our conclusion that prophylaxis was underused. Finally, our results are based on review of a limited number of hospitals and patients within a single state, and may not be generalizable to other states.

Despite widely disseminated consensus recommendations, utilization rates for venous thromboembolism prophylaxis during 1995 in our study were similar to those reported in the 1986 medical record audit published by Anderson et al in 1991.¹⁴ In a follow-up to the 1986 audit, Anderson et al²⁰ achieved significantly increased use of venous thromboembolism prophylaxis in those hospitals by providing continuing medical education along with hospital-specific data that demonstrated a compelling need for improvement. In a recent systematic review of continuing medical education strategies and their effect on physician performance, Davis et al²¹ showed that widely used education delivery methods such as formal continuing medical education and distribution of educational materials, in the absence of enabling or practice-reinforcing strategies, have relatively little impact on improving professional practice. Strategies that include reminder systems or other systematic practice-based activities were more likely to be effective at changing physician performance.

In conclusion, our study demonstrates that despite widely disseminated, evidence-based recommendations,^{4,5,10} venous thromboembolism prophylaxis remains underused for Medicare patients undergoing major abdominothoracic surgery in community hospitals in Oklahoma. There is an urgent need to change this practice. Improving the use of prophylaxis will require educational strategies and systematic practice-reinforcing interventions that go beyond publication and dissemination of consensus recommendations. Our results suggest that similar reviews should be performed in other states to determine if the practice of underuse in smaller hospitals, demonstrated in Oklahoma, is widespread.

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