Venous Thromboembolism Prophylaxis in Acute Medical Admissions to a University Teaching Hospital

Abstract:
O Lyons1, J Loh1, M Lin1, D O'Riordan1, B Silke1
1Departments of Respiratory and Internal Medicine, St James Hospital, James St, Dublin 8

The objective of this study was to assess appropriate thromboprophylaxis prescription rates in a university hospital and to re-audit after a series of interventions. The notes of all acute medical patient admissions over a 4-week period were assessed for VTE risk factors and prescription of thromboprophylaxis. Subsequently, a series of hospital wide interventions including educational initiatives and a new drug prescription chart were introduced. 2 years post intervention the audit was repeated. Pre-intervention, 104 of 265 (39%) at risk patients were prescribed appropriate thromboprophylaxis. Post intervention the prescription rate increased to 108 of 188 (57%) at risk patients. The results of the pre-intervention audit are consistent with the published literature. While there was a significant increase in prescription rates post intervention, over 40% of at risk patients still did not receive thromboprophylaxis highlighting the challenge in attempting to close the gap between guidelines and actual practice.

Introduction

VTE is a common preventable cause of morbidity and mortality in hospitalised medical patients. These patients, often with one or more risk factors, have an overall 8-fold increased relative risk of developing VTE during or post hospital admission. The in-hospital fatality rate of VTE has been shown to be as high as 12% with long-term case fatality rates of 30% at 3 years. Patients diagnosed with VTE subsequently, have an increased risk of re-thrombosis, chronic pulmonary hypertension and post thrombotic syndrome, which may cause significant morbidity. Furthermore, therapeutic anti-coagulation is not without a significant bleeding risk. Failure to prevent VTE also has significant implications in terms of utilisation of healthcare resources with the need for potential future hospital re-admission, diagnostic imaging and long-term therapeutic anti-coagulation and monitoring. In those medical inpatients not receiving thromboprophylaxis, the incidence of objectively confirmed VTE is approximately 10-20%. Thromboprophylaxis with low dose heparin has been shown in numerous large clinical trials to effectively reduce the incidence of both Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE). A meta-analysis of nine randomised control trials, that included 20,000 patients, demonstrated that prophylaxis led to a reduction in the rates of fatal PE, symptomatic PE and asymptomatic DVT in the order of 64%, 58% and 53%, respectively. Prophylaxis has been shown to be safe with no significant increase in incidence of bleeding and is also cost effective.

Despite compelling evidence and numerous clinical guidelines emphasising the importance of VTE risk assessment and appropriate use of primary prophylaxis, rates of VTE prophylaxis use remain universally poor. The Endorse study, a multi-national cross sectional study, assessed 37,356 medical inpatients and determined 15,487 (41.5%) were at-risk assessed for VTE and appropriately prescribed thromboprophylaxis. All patients admitted to the hospital on acute medical take over a 4-week period were included in the study. A list of all the patients admitted over a 24-hour period was recorded and a review of the medical notes and drug prescription chart for each patient was performed 48 hours post admission. This automatically excluded any patients discharged within the first 48 hours of their admission. The in-hospital fatality rate of VTE has been shown to be as high as 12% with long-term case fatality rates of 30% at 3 years. Patients diagnosed with VTE subsequently, have an increased risk of re-thrombosis, chronic pulmonary hypertension and post thrombotic syndrome, which may cause significant morbidity. Furthermore, therapeutic anti-coagulation is not without a significant bleeding risk. Failure to prevent VTE also has significant implications in terms of utilisation of healthcare resources with the need for potential future hospital re-admission, diagnostic imaging and long-term therapeutic anti-coagulation and monitoring. In those medical inpatients not receiving thromboprophylaxis, the incidence of objectively confirmed VTE is approximately 10-20%. Thromboprophylaxis with low dose heparin has been shown in numerous large clinical trials to effectively reduce the incidence of both Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE). A meta-analysis of nine randomised control trials, that included 20,000 patients, demonstrated that prophylaxis led to a reduction in the rates of fatal PE, symptomatic PE and asymptomatic DVT in the order of 64%, 58% and 53%, respectively. Prophylaxis has been shown to be safe with no significant increase in incidence of bleeding and is also cost effective.

Methods

St James Hospital (SJJ) is a university-based teaching hospital and tertiary referral centre that is on continuous call for emergency medical admissions. On average, 5,000 acute general medical patients are admitted annually. The first part of the study was a prospective observational study to record the proportion of acute medical admissions risk-assessed for VTE and appropriately prescribed thromboprophylaxis. All patients admitted to the hospital on acute medical take over a 4-week period were included in the study. A list of all the patients admitted over a 24-hour period was recorded and a review of the medical notes and drug prescription chart for each patient was performed 48 hours post admission. This automatically excluded any patients discharged within the first 48 hours of their admission. Exclusion criteria consisted of the following: Discharge within 48 hours, transfer of care to other disciplines, therapeutic anticoagulation at admission, admission with confirmed VTE, pregnancy, and failure to perform therapeutic anticoagulation and confirmed or suspected diagnosis of significant haemorrhage contraindicating the use of thromboprophylaxis. Risk factors were reviewed for risk factors for VTE. Risk factors were identified based on the American College of Chest Physicians (ACCP) and National Institute of Clinical Excellence (NICE) guidelines. If, on review, patients were assessed to be at-risk for VTE, they were then screened for contraindications to thromboprophylaxis. The prescription of thromboprophylaxis was determined by review of the drug prescription chart. After completion of this initial part of the study the results were presented at the Hospital Grand Rounds. Subsequently a series of planned interventions were developed in discussion with the Pharmacy Department, Haematology Department and General Medical Physicians, with a view to re-audit after implementation of the interventions.

The interventions that were implemented included the following: Educational posters with reminders to risk-assess patients and including the relevant risks were placed in the Acute Medical Admissions Unit and medical wards. Prescribing doctors were targeted in a series of didactic lectures. A new drug prescription chart was introduced on a trial basis. In this new prescription chart, the regular medications section included a printed portion reminding the medical teams to assess for VTE and prescribe as appropriate. (see Figure 1). A detailed summary list of risk factors for VTE were also printed on the back page of the new drug prescription chart for easy reference and as a reminder (see Figure 2). The Hospital Prescribers guide included detailed sections regarding risk-assessment for VTE in both the hard copies and the online hospital system version. Following the implementation of the interventions detailed, a re-audit of the appropriate prescription of thromboprophylaxis was performed 2 years later, again over a 4-week period and with the same methodology as in the first part of the study. Statistical analysis was performed using a chi-square test or Fisher's test as appropriate.

Figure 1: Physical reminder to consider VTE prescription in the acute medical admission drug prescription chart

Figure 2: Risk factors assessment for the acute medical admission
Results

Pre-Intervention

The first loop of the audit recruited a total of 523 patients, mean age 63 (+/- 21), M:F 1:1.09, over 28 days with an average of 18.7 patients admitted per take. 149 patients were excluded based on the criteria listed above, leaving 374 to be further assessed for presence of risk factors for VTE. 283 individuals were deemed to have risk factors present, of which a small proportion (18 patients) had contraindications to Heparin. 104 of the remaining 265 patients were appropriately placed on TP, which accounted for 39% of the cohort. This left 61% of at-risk patients not placed on appropriate thromboprophylaxis (see Figure 3).

Post-Intervention

The second loop of the audit recruited a total of 425 patients, mean age 62 (+/- 20), M:F 1:1.33, were recruited into the study over the 28 days. After the exclusion of 130 patients, 295 were assessed for risk factors. 205 of these patients were at-risk, of which 17 individuals had contraindications to Heparin. 108 (57%) of the remaining 188 patients were appropriately placed on Heparin. 90 patients had no risk factors for VTE; of these, 12 individuals (13%) were inappropriately placed on LMWH (see Figure 4). Post intervention figures showed an increase in prescription of TP to appropriate at-risk patients from 39% (104/265) to 57% (108/188), p<0.001 and chi square statistic 14.634. The number of patients without risk factors for VTE inappropriately placed on TP, increased from 5% (5/91) to 13% (12/90), p = 0.071, chi square statistic 3.267.

Figure 3: Flow chart of the pre-intervention audit

Figure 4: Flow chart of the post-intervention audit
Discussion

Despite longstanding recommendations and a robust evidence base showing its effectiveness and safety, the rates of thromboprophylaxis use remain universally poor. In the US the low rates of VTE prophylaxis use have led to an increasing interest from regulatory authorities such as the Agency for Healthcare Research and Quality and the National Quality Forum. The issue has also received significant attention at government level in England where it is estimated that there are over 25,000 deaths each year from VTE contracted in-hospital and that the overall cost of managing VTE each year is £640 million. This has led to a national strategy on VTE and an expert working group to develop recommendations on VTE risk-assessment and prevention. In the UK, under the CQUIN payment framework, a certain proportion of remuneration to hospitals is based on meeting agreed set targets, one of which is that a minimum of 90% of all patients are risk-assessed for VTE.

The initial component of our study was a prospective, observational study evaluating use of VTE prophylaxis in a cohort of acute unselected general medical admissions over a 4-week period. As predicted, a large proportion, over three-quarters, were assessed to be at-risk for VTE. However, only 39% of this at-risk group was prescribed appropriate primary prophylaxis. While disappointing, this result is not at all surprising and is consistent with the published literature on under use of thromboprophylaxis in the acute medical population; indeed the rate is the same as the primary prophylaxis. While disappointing, this result is not at all surprising and is consistent with the published literature on under use of thromboprophylaxis in the acute medical population; indeed the rate is the same as the published rate of prophylaxis use demonstrated in the multi-national ENDORSE study. While one previous study in the Irish setting has shown a significant improvement in VTE prophylaxis rates in a general medical population one month post educational intervention alone, there is a significant evidence to suggest that education alone or indeed any single intervention alone is not effective in maintaining improved practice long term, and that hospital-wide strategies that include multi-faceted quality improvement interventions may ensure sustained long-term improvement with relatively few resources.

This evidence informed our attempts in designing a robust system of interventions, designed to increase and maintain VTE prophylaxis rates. While education still had a large, central role we also incorporated other interventions, including physical reminders in the form of posters in clinical areas, the incorporation of VTE prophylaxis guidelines in the in-hospital prescribers guide and in all drug prescription charts and importantly the addition of a pre-printed prophylaxis box in the prescription chart. A deliberate decision was made to delay re-audit for at least one year to ensure that the re-audit would accurately reflect real practice in the hospital and not measure a potential spike in prescription rates that might be expected immediately after the initial audit and interventions. As such the post-intervention result, that 57% of at-risk patients were prescribed prophylaxis, is a true reflection of actual practice in the hospital. While this is a significant improvement from the baseline 39% and represents a 46% relative increase in prescribing rates, the results are disappointing when one considers that over 40% of at-risk patients still do not receive appropriate prophylaxis. It is worth noting also that while there was an increase in the number of patients inappropriately prescribed prophylaxis, 5% (5/91) to 13% (12/90), this was not a statistically significant change (p=0.071.)

While we can take some encouragement from these results, there is obviously a need for further significant improvements to the hospital strategy to ensure that all at-risk patients receive appropriate prophylaxis. Potential initiatives include the expansion of the role of the clinical pharmacist as a champion of thromboprophylaxis and also the use of a computer based alert program as described by Kuchar. To be successful, any planned strategy will need to incorporate ongoing re-audit, the results of which would be used to guide future interventions and feedback to prescribing physicians. At a hospital level, we would hope that an ongoing robust process of multi-faceted interventions to include education, audit and feedback will foster a cultural change where systematic risk-assessment of patients and the appropriate use of VTE prophylaxis become an institutional priority for both physicians and hospital management. Of course, given ongoing healthcare resource limitations, it could well be that future changes to healthcare policy, potentially including an incentive payment structure linked to satisfactory adherence to VTE guidelines, will play a major role in guiding clinical practice.

Correspondence: O Lyons
Guy’s and St. Thomas’ Hospitals, Westminster Bridge Road, London SE1 7EH, UK
Email: owendlyons@gmail.com

Acknowledgements
B Carr and B Cooke at St James Hospital for their invaluable help with the production of the new drug prescription chart and K Bennett at St James Hospital for her help with statistical analysis.

References


Comments: