Ir J Med Sci (2017) 186:743–745
DOI 10.1007/s11845-016-1529-0

ORIGINAL ARTICLE

Venous thromboembolism prophylaxis risk assessment in a general surgery cohort: a closed-loop audit

D. M. McGoldrick[1] · H. P. Redmond[1]

Received: 8 August 2016 / Accepted: 2 November 2016 / Published online: 9 November 2016

Abstract
Background and aims Venous thromboembolism (VTE) is a potential source of morbidity and mortality in surgical in-patients. A number of guidelines exist that advise on prophylactic measures. We aimed to assess VTE prophylaxis prescribing practices and compliance with a kardex-based risk assessment tool in a general surgery population.
Methods Data on general surgery in-patients were collected on two separate wards on two separate days. Drug kardexes were assessed for VTE prophylaxis measures and use of the risk assessment tool. NICE and SIGN guidelines were adopted as a gold standard. The audit results and information on the risk assessment tool were presented as an educational intervention at two separate departmental teaching sessions. A re-audit was completed after 3 months.
Results In Audit A, 74 patients were assessed. 70% were emergency admissions. The risk assessment tool was completed in 2.7%. 75 and 97% of patients were correctly prescribed anti-embolic stockings (AES) and low-molecular weight heparin (LMWH), respectively. 30 patients were included in Audit B, 56% of whom were emergency admissions. 66% had a risk assessment performed, a statistically significant improvement ($p < 0.0001$). Rates of LMWH prescribing were similar (96%), but AES prescribing was lower (36%).
Conclusion Rates of LMWH prescribing are high in this general surgical population, although AES prescribing rates vary. Use of the VTE risk assessment tool increased following the initial audit and intervention.

Keywords Audit · Venous thromboembolism · Surgery

Introduction

Venous thromboembolism (VTE) is a potential source of morbidity and mortality amongst hospital in-patients. Surgical patients are particularly at risk. It has previously been estimated that VTE may account for up to 25,000 deaths annually in the UK [1]. As a result, VTE prophylaxis measures have been recommended in a number of evidence-based national and international guidelines. Prophylaxis is recommended based on the silent nature of VTE and also the preventable nature of the disease.

The risk of DVT and fatal PE in general surgery patients not receiving prophylaxis is estimated to be between 15–30% and 0.2–0.9%, respectively, based on previous cohort studies [2]. Appropriate prophylactic measures, including low-molecular weight heparin (LMWH) and anti-embolic stockings (AES), however, have been estimated to reduce the risk of VTE in surgery patients by up to 60% [2]. Despite this obvious benefit, the agents may not be suitable for all patients and a risk of bleeding exists with LMWH use.

As a result, a risk assessment is commonly recommended as part of the hospital admission process to document and clarify the best prophylactic protocol. This recommendation is present in both the National Institute of Clinical Excellence (NICE) and Scottish Intercollegiate Guideline Network (SIGN) guidelines [3, 4]. As yet, no Irish national guideline on VTE prophylaxis in surgical patients has been published. Our centre uses an evidence-

✉ D. M. McGoldrick
davidmcgoldrick@gmail.com

[1] Department of Surgery, Cork University Hospital, Wilton, Cork, Ireland

based institutional guideline that makes recommendations similar to the above UK guidelines [5].

In the UK, VTE measures, including assessment, are commonly linked to tariffs for Hospital Trusts leading to high rates of compliance (95%) [6]. The situation in the Irish setting is, however, less certain. We aimed to assess venous thromboembolism prophylaxis prescribing practices and compliance with a kardex-based risk assessment tool in our general surgery population.

Methods

Two audit cycles were completed. As part of the initial baseline audit cycle (Audit A) data on all general surgery inpatients, on two separate surgical wards on two separate days in October 2015, was collected. All data collection was performed by the lead author. Drug kardexes were assessed for VTE prophylaxis measures and use of the risk assessment tool contained in the drug kardex. The adequacy of VTE prophylactic measure compliance was based on the risk assessment tool recommendations. A pro-forma modelled on the SIGN audit tool was used for data collection. The NICE, SIGN, and institutional guidelines were adopted as a gold standard for audit against [3–5]. All state that patients should undergo a risk assessment for VTE and bleeding risk at admission and that appropriate mechanical and pharmacological prophylaxis should be prescribed based on this.

The initial audit results and information on the risk assessment tool were presented as an educational intervention at two separate departmental teaching sessions. All grades of doctor from the various general surgical teams as well as medical students routinely attend these sessions. Approximately 25 members of the general surgical teams attended these meetings. A second follow-up audit (Audit B) to close the audit loop and assess response was completed at 3 months in January 2016. Statistical analysis was performed using GraphPad QuickCalc (Graphpad Inc., California, USA). Analysis assessing any change post-intervention was performed using the fisher exact test with a p value of 0.05 or less considered to be statistically significant.

Results

In Audit A, 74 patients were assessed. Emergency admissions accounted for 70% of patients assessed. Elective admissions included a range of patients from the various surgical teams, including colorectal, breast, and vascular surgery. The new kardex-based risk assessment tool was completed in 2.7%. In relation to VTE prophylactic measures, AES were advised in 55 patients (74%). It was prescribed in 75% of these cases. LMWH was advised in 65 patients and was prescribed in 97% of cases.

In Audit B, a smaller sample of 30 patients were included to assess the result of the intervention. In this group, 56% were emergency admissions. 66% had a risk assessment performed, a statistically significant improvement ($p < 0.0001$). AES were advised in 22 patients (73%); however, prescribing rates were lower at 36%. LMWH was advised in 27 patients (90%) and prescribed in 96% of patients. Table 1 provides a summary of the results.

Discussion

Given the potential risks associated with VTE, there is an understandable requirement for adequate prophylactic measures. Unfortunately, despite recognition of these risks adequate prophylaxis is often lacking. One large multinational study, ENDORSE, assessed prophylaxis in a large sample of both medical and surgical patients [7]. This study included patients from 358 hospitals in 32 different countries with a sample of 30,827 surgical patients assessed. Patients from most surgical specialities, including orthopaedics, were included. In this surgical group, 19,842 (64.4%) patients were deemed to be at risk based on the 2004 American College of Chest Physician Guidelines [2], but only 58.5% received adequate prophylaxis. A lower proportion, 31%, received some form of mechanical prophylaxis. The Irish component of this study examined 552 patients, including 175, at risk surgical patients. In this group, 64% received the recommended prophylaxis, including 54% placed in AES [8].

Audit plays a key role in the quality improvement process and the data collected during our study showed some interesting findings. We demonstrated a marked improvement in use of a new kardex-based risk assessment tool following the second audit cycle. It is likely the educational intervention accounted for some of this improvement. The initial audit highlighted very poor compliance with the risk

Table 1 Summary of audit findings

	Audit A		Audit B	
	N	%	*N*	%
Patients	74	–	30	–
Risk Assessment	2/74	2.7	20/30	66
LMWH				
Advised	65/74	88	27/30	90
Prescribed	63/65	97	26/27	96
AES				
Advised	55/74	74	22/30	73
Prescribed	41/55	75	8/22	36

assessment tool at baseline. However, as the tool had only recently been introduced in the hospital kardex, a lack of familiarity or awareness of it may account for this low initial rate. It would be expected that continuing education and familiarity with the risk assessment tool will lead to improved compliance. The intervention in this study was also limited to doctors. Given the involvement of nursing staff to VTE delivery, it might be expected that expansion to include nursing and allied health staff would improve compliance and results at further audits.

Our results also demonstrate very high rates of appropriate LMWH prescription in general surgical patients. Although our sample size is relatively small, this appears to be an improvement on previously reported rates and was evident in both audit cycles [7, 8]. Rates of AES use were also high in the initial audit; however, prescription rates varied between the two cycles, suggesting less consistency with this measure. Further educational intervention may need to highlight the importance and benefit of mechanical prophylaxis given this marked variation.

There are some limitations to our audit. Our sample size overall is small making the generalisability of our findings difficult to confirm. There is also a potential bias given the limited time period. Only one group of doctors rotating through the department at the time of the audit was assessed. Prescribing practices in this group could potentially be misrepresentative of other junior doctors. Despite this, we feel our findings that are reflective of current practice.

Conclusion

Our results demonstrate that rates of LMWH prescribing are high in this general surgical population although AES prescribing rates vary. The use of the VTE risk assessment tool, although low initially, increased following the initial audit and a simple educational intervention. This highlights the importance of regular audit and education to improve compliance with clinical standards.

Compliance with ethical standards

Funding This study received no funding.

Conflict of interest David McGoldrick declares that he has no conflict of interest. H Paul Redmond declares that he has no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Not required.

References

1. The House of Commons Health Committee (2005) The prevention of venous thromboembolism in hospitalised patients. The Stationery Office Limited, London
2. Geerts WH, Pineo GF, Heit JA et al (2004) Prevention of venous thromboembolism: The Seventh ACCP Conference on antithrombotic and thrombolytic therapy. Chest 126(3 suppl):338s–400s
3. National Institute for Health and Clinical Excellence (NICE) (2010) Venous thromboembolism: reducing the risk for patients in hospital. NICE, London. https://www.nice.org.uk/guidance/cg92. Accessed 01 May 2016 **(updated 2015)**
4. Scottish Intercollegiate Guideline Network (SIGN) (2010) Guideline122: prevention and management of venous thromboembolism. Edinburgh, Scotland. https://www.sign.ac.uk/pdf/sign122.pdf Accessed 01 May 2016 **(updated 2014)**
5. Hospital Thrombosis Group, Cork University Hospital (2015) Thromboprophylaxis guidelines for adult patients. http://www.emed.ie/Haematology/_img/Haem-TP_CUH_Guidelines_2015.pdf. Accessed 01 May 2016
6. NHS UK (2016) Venous thromboembolism (VTE) risk assessment data collection Quarter 3 2015/16 (October–December 2015). https://www.england.nhs.uk/statistics/2016. Accessed 01 May 2016
7. Cohen AT, Tapson VF, Bergmann JF et al (2008) ENDORSE Investigators. Venous thromboembolism risk and prophylaxis in the acute hospital care setting (ENDORSE study): a multinational cross-sectional study. Lancet 2(371):387–394
8. Murphy D, O'Connell O, Liston R et al (2012) Venous thromboembolism risk and prophylaxis in the acute hospital care setting: the Irish results of the ENDORSE study. Ir Med J 105(5):140–143