

**Research Article**

## **Improving VTE Risk Assessment in Hospitalised Patients in a Tertiary Care Hospital in Ireland**

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[Received: 02/05/2019; Accepted: 22/07/19; Published: 24/07/2019]

### **ABSTRACT**

The main objective of this study was to establish and implement a Thromboprophylaxis (TP) policy and VTE risk assessment (VTE-RA) tool for all hospitalised adult patients. This was a single centre before-after study, using a prospective cross-sectional design for both the baseline and post-intervention studies. All adult inpatients (>18 years) were eligible for inclusion. In the follow-up audit, one year post-implementation the main outcome measure was the documented evidence of VTE-RA and prescription of TP. Which showed significant ( $p < 0.001$ ) improvement in documentation of VTE-RA from 24% (244/1019) to 57% (612/1070) and the prescription of pharmacological TP increased significantly ( $p < 0.001$ ) from 43% (441/1019) to 67% (713/1070). Introduction of a TP policy and VTE-RA tool increased compliance by 33%. However, without a dedicated multidisciplinary "thrombosis team" to actively implement this, the achievements to date are unsustainable and attaining 90% compliance with VTE-RA is unlikely.

**Key Words:** Venous thromboembolism, hospital acquired thrombosis, intervention, education, thromboprophylaxis, multidisciplinary team, Ireland.

### **INTRODUCTION**

Hospital acquired thrombosis (HAT) is any venous thromboembolic (VTE) event that occurs within 90 days of hospitalisation<sup>1,2</sup>. VTE is the leading cause of preventable hospital death ahead of hospital acquired infection<sup>3</sup>. HAT accounts for up to 10% of total mortality in hospitalised patients and contributes to significant morbidity in the form of chronic embolic pulmonary hypertension and post thrombotic syndrome<sup>4,5</sup>. For more than three decades, evidence based guidelines on the prevention of VTE have been proven to be both safe and effective<sup>5,6</sup>. Despite this, VTE continues to be associated with a major global burden of disease. In 2013, 3.9 million cases of

HAT per annum were reported amongst 1.1 billion citizens of high income countries<sup>7</sup>.

The use of a mandatory VTE RA tool and appropriate TP in hospitalised patients significantly reduces VTE incidence<sup>8</sup>. Many countries such as the United Kingdom (UK) have introduced mandatory RA tools and TP guidelines with a goal of 90% compliance<sup>9</sup>. In order to achieve this goal and to promote compliance a financial penalty was introduced which was linked with the Commissioning for Quality and Innovation (CQUINN)<sup>10</sup>. This co-ordinated approach to VTE prevention in the UK helped to embed VTE risk assessment into everyday practice. Unlike the UK, Ireland does

not have such a commissioning structure to promote compliance and relies on active implementation of the VTE-RA and TP policy. In 2014, Cork University Hospital (CUH), a tertiary referral centre, undertook an initiative to develop and implement a TP policy along with a VTE-RA tool. This quality initiative was in response to studies conducted between 2014 and 2016 demonstrated that there was an urgent need to introduce a formal risk assessment process to enhance appropriate prescription of TP particularly for high risk patients<sup>11,12,13</sup>.

## METHODS

This was a single centre before-after study, using a cross-sectional study design for both the baseline and post-intervention studies. Ethical approval was received from the Clinical Research and Ethics Committee (CREC) in 2014.

All adult inpatients (>18 years) were eligible for inclusion in this study. Details of the inclusion and exclusion criteria have already been published<sup>11</sup>. The main outcome measurement for the post-intervention study was whether or not a patient had their VTE-RA tool completed in the drug prescription chart along with prescription of TP. If there was no documentation, the researchers risk assessed these patients in both the pre and post audit using the medical information available to them in the patient's medical notes and drug prescription charts. Following risk assessment patients were stratified into three risk groups as per National Institute for Clinical Excellence (NICE)<sup>9</sup>, these included, high risk of VTE with low risk of bleeding; high risk of VTE with significant risk of bleeding and low risk of VTE. Other variables collected were: patients' demographics, VTE risk factors, their VTE risk category, their admitting consultant and consultant specialty. A number of interventions were included in methodology after the base line data. The Hospital Thrombosis Group (HTG) was established under the lead of a Consultant Haematologist. The results of the audit were reviewed and a series of PDSA cycles were initiated. A TP policy and a VTE-RA tool were developed using NICE 2010 guidance<sup>9</sup>. This

mandatory RA tool was incorporated into the drug prescription charts and piloted for a month in the acute medical unit prior to implementation. The TP policy was easily accessible on all hospital computers.

Education sessions regarding VTE morbidity, mortality and prevention were also initiated on volunteer basis, members of HTG would present at different sessions in order to increase awareness and provide feedback on performance. Efforts to raise awareness amongst the public and hospital staff included a partnership with the International Society on Thrombosis and Haemostasis (ISTH) organisation World Thrombosis Day (WTD). An information day was held in CUH on the 13<sup>th</sup> of October 2016. Information stands with a thrombosis quiz and prizes at all entry points to the hospital and the canteen. In addition, patient information leaflets were disseminated in pre-op assessment, admissions and out patients departments. Patient information sheets were also sent out with patient meals on that day. Information about WTD and VTE were available via the WTD and CUH websites, the CUH radio station and was tweeted via CUH and WTD twitter accounts. Point prevalence audits were conducted on monthly basis in four wards and determined the proportion of VTE-RA documented as well as TP prescription. The CUH TP policy and RA tool was shared amongst the hospitals in South/South West Hospital Group (SSWHG) and nationally at the Haematology Association of Ireland (HAI) conference.

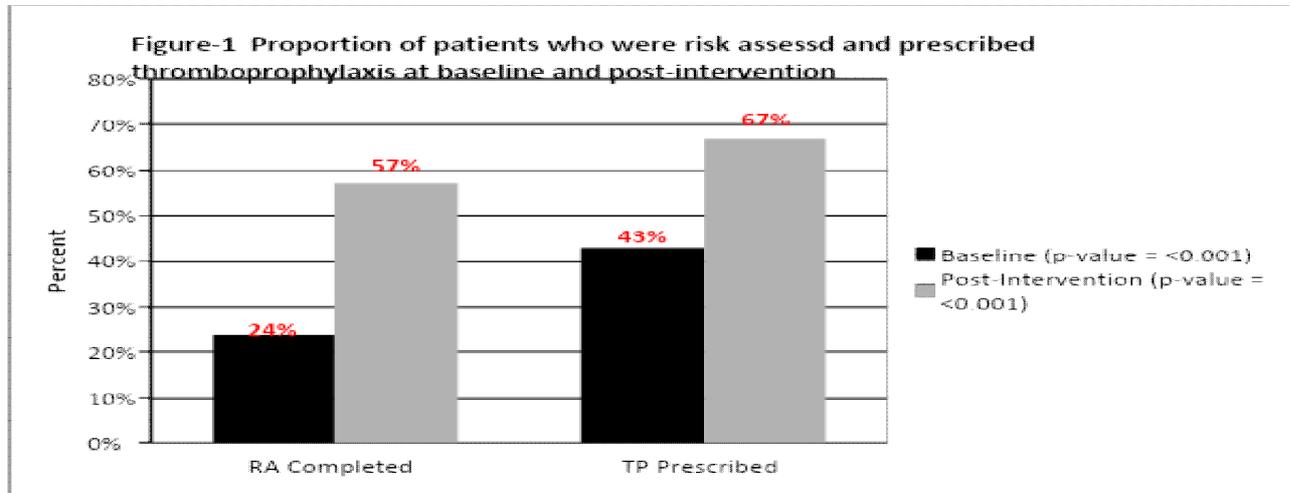
The proportion of RA completed, TP prescribed and thrombotic risk factors were calculated using cross-tabulations and p-values were calculated using chi-square. Data analysis was completed in SPSS for Windows.

## RESULTS

A total of 1070 patients were included in the post intervention study. The majority of these patients were medical 64.3 % (n=689) and 27.1% (n=290) were surgical and 8.5% (n=91) were unknown. 64.3% (n=688) of patients were aged 60 years or older. Post intervention audit showed improvement in VTE-RA from 24%

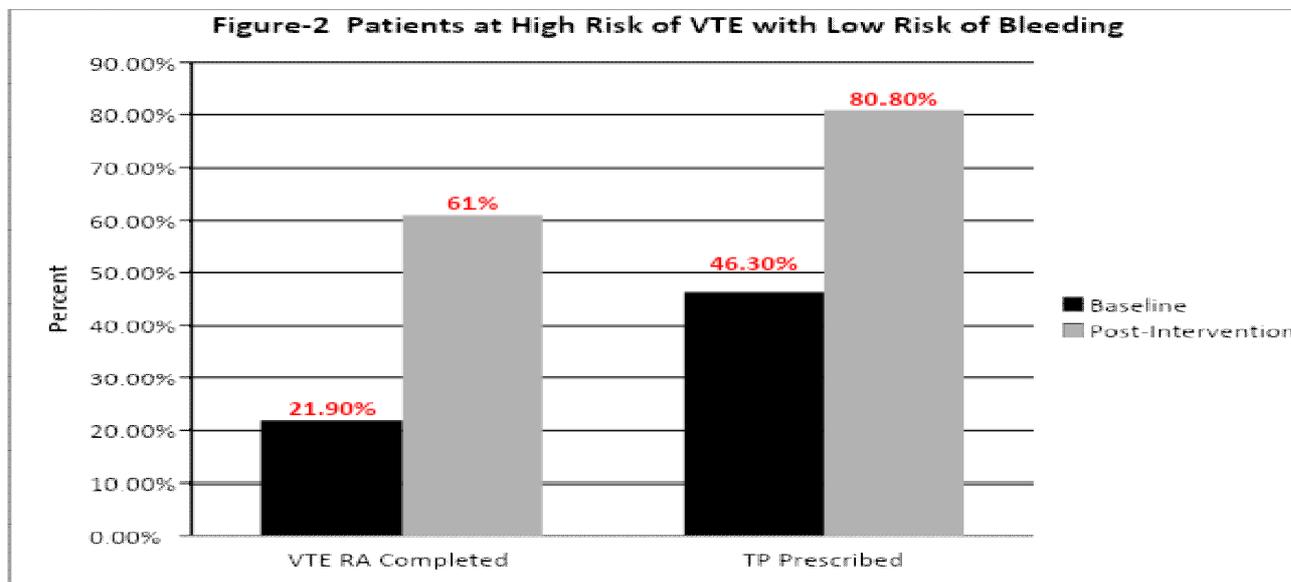
(244/1019) to 57% (612/1070) and the prescription of chemical TP also increased from 43% (441/1019) to 67% (713/1070). In post-intervention the proportion of VTE-RA

documented increased by 33% from baseline and prescription of chemical TP also increased by 24% from baseline (Figure-1).

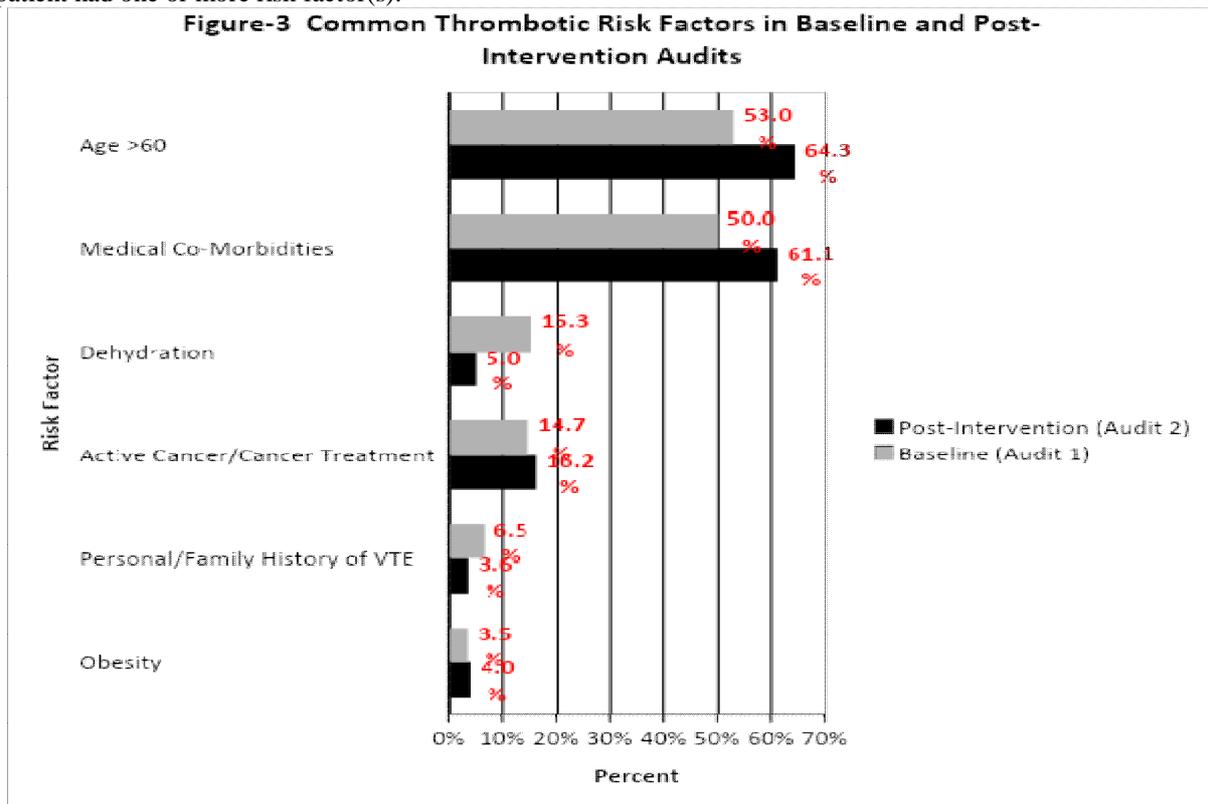


75.4% of patients included in the study were classed as having high risk of VTE with low risk of bleeding whereas this proportion was 80.3% at baseline (Table-1). The improvement in RA was highest in patients with increased risk of thrombosis from 21.9% (n=180/819) to 61% (n=493/807) increasing by 39.1% from baseline. Similarly TP prescription also increased in this category from 46.3% (n=380) to 80.8% (n=652) rising by 34.5% from baseline (Figure-2).

	High Risk of VTE, Low Risk of Bleeding		High Risk of VTE, High Risk of Bleeding		Low Risk of VTE	
	Baseline (Audit 1)	Post-Intervention (Audit 2)	Baseline (Audit 1)	Post-Intervention (Audit 2)	Baseline (Audit 1)	Post-Intervention (Audit 2)
Number of patients	80.3% (n=819)	75.4% (n=807)	16.6% (n=170)	19.5% (n=209)	2.9% (n=30)	5% (n=54)
VTE risk assessment documented	21.9% (n=180)	61% (n=493)	32% (n=55)	50.7% (n=106)	30% (n=9)	24% (n=13)
TP Prescribed	46.3% (n=380)	80.8% (n=652)	28.8% (n=49)	26.3% (n=55)	40% (n=12)	22.2% (n=12)



Patient related risk factors for VTE comparing baseline and post intervention audit can be seen in Figure-3, each patient had one or more risk factor(s).



**DISCUSSION**

Prior to the introduction of a VTE-RA and TP policy in CUH only 24% of patients were risk assessed for VTE, which was considered a patient safety risk<sup>11</sup>. Similarly on a national level only 25% of Irish hospitals reported in a survey that had either a VTE-RA tool and/or TP policy with no formal process in place for auditing the use of same.<sup>13</sup>.

The post-intervention audit showed that adherence to documenting the risk assessment had increased significantly from 24% to 57% across the hospital (Figure-1).

The post-intervention audit found 75.4% (n=807) of inpatients to be at high risk of VTE (with low risk bleeding) which was similar to the baseline audit 80.3% (n=819). Formal risk assessment of patients in this VTE category also increased significantly from 21.9% (n=180) to 61% (n=493), which is a threefold increase.

There was also significant increase in the VTE-RA of patients with high risk of bleeding from 32% (n=55) to 50.7% (n=106) (table-1). It’s a well-known fact that the balance between bleeding and clotting must be considered when

prescribing chemical TP. A “blanket approach” i.e prescription of the same medication at the same dose and frequency in all patients may result in an increased risk of bleeding or being prescribed inadequate TP dose<sup>14,15</sup>. The benefits and harms must be assessed before the administration of TP and the VTE-RA tool facilitates this.

With the introduction of the mandatory VTE-RA tool and TP policy the prescription of TP increased significantly in the patients with high risk of VTE from 46.3% (n=380) to 80.8% (n=652). Similarly, as risk assessment increased in the patients with high risk of bleeding the prescription of TP decreased from 28.8% (n=49) to 26.3% (n=55). As expected, patients in the category of low risk of thrombosis also showed reduced prescription of TP in the post intervention audit from 40% (n=12) to 22.2% (n=12). Previous studies have shown approximately 37% overall improvement in TP prescription is achieved with education alone in high risk surgical and medical patients combined<sup>16</sup>. Other international studies have demonstrated that there was a 42%-58%

increase in appropriate TP prescription of hospitalised inpatients when there was a concerted effort such as a nurse led program which was implemented to change hospital culture and embed VTE prevention processes into practice<sup>17,18</sup>.

Expert and enthusiastic multidisciplinary team work led to the initial improvement in prevention of HAT strategy with the development of a TP policy and RA tool. However, this group was largely formed on a volunteer basis and is not sustainable or sufficient on its own to reach the pre-specified target of 90%. Resources are required such as a multidisciplinary “thrombosis team” to sustain, continue and spread improvement in VTE prevention.

Subsequent to the VTE prevention efforts in CUH, in the past 12-18 months there has been a renewed culture of awareness of the need for change nationally. VTE Ireland was also launched in October 2016 which aims to standardize efforts nationally (VTE Ireland 2016)<sup>19</sup>. This group consists of clinicians and aims to embed VTE RA into practice nationally. VTE Ireland also liaises with the patient group Thrombosis Ireland, which is a patient run charity established in 2016 to raise awareness of thrombosis and patients right to TP RA among services users and the general public (Thrombosis Ireland 2016)<sup>20</sup>.

Although there was an overall improvement of up to 57% (from 24%) in hospitalised patients risk assessed for VTE, the aim of 90% compliance is yet to be achieved. This improvement may be underestimated as the data collection method excluded some areas within the hospital such as cardiac intensive care. All cardiothoracic patients are risk assessed before transfer back to the ward from cardiac intensive care unit and this data was not captured. Although it can be argued that their change in clinical condition requires an updated risk assessment on transfer back to the ward. Similarly, the oncology team prescribe TP to all their patients provided their platelet count is above  $50 \times 10^9/l$ , this is done without completing a formal RA.

Achieving improvement in VTE RA, appropriate TP prescription and embedding it into practice is difficult but achievable. Education alone is not enough to achieve 90% compliance. Health service support at a local and national level is imperative to provide the necessary resources to implement the plans leading to a measureable improvement in the safety and quality of care provided to service users. However, without a dedicated multidisciplinary “thrombosis team” to provide ongoing audit, feedback, education, root cause analysis and real time intervention achieving the goal of 90% compliance with the TP policy, in keeping with international guidelines, is unlikely.

#### Contributorship statement

MIK had the original idea for study. MIK and SOS wrote the study protocol. MIK and COL collected data. MIK and AOB analysed the data. MIK, COL and AOB drafted the paper. SOS and CD agreed on analysis and reviewed the draft versions. All authors approved the final version of the paper.

#### Competing interests

There are no competing interests.

#### Funding

There is no funding to report for this submission.

#### Data sharing statement

No additional data are available.

#### Acknowledgements

The authors thank the Irish Haemostasis Research Foundation Limited for providing an educational grant to Dr. Khan to complete his PhD. We thank the Clinical Research Facility UCC for facilitating Dr. Khan’s research fellowship.

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