

# Venous Thromboembolism Prophylaxis in Outpatient Lower Limb Fractures and Injuries

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## SUMMARY

**Background.** The risk of venous thromboembolism (VTE) is a preventable complication of trauma in ambulatory patients requiring temporary lower limb immobilisation. We introduced a VTE risk assessment and management tool in fracture clinics, to help improve appropriate VTE management of trauma patients that do not require hospitalisation. This was based on guidelines published by the College of Emergency Medicine (UK). Clinicians were asked to follow the screening tool and manage patients as per the pathway. We aimed to determine the rate of VTE risk assessment and management of outpatient fracture patients following the introduction of the new assessment tool.

**Material and methods.** We prospectively evaluated a cohort of lower limb fracture patients presenting to a fracture clinic following the introduction of the new VTE risk assessment group and compared it to a retrospective cohort treated prior to the new tool.

**Results.** Prior to introduction of the new assessment tool only 5 of 30 (16.7%) patients were assessed for VTE risk. After introduction of the VTE screening tool, 27 of 28 patients (96.4%) were assessed for VTE risk ( $P < 0.001$ ).

**Conclusion.** We are able to show that implementing a VTE screening tool in an orthopaedic outpatient fracture clinic to patients with lower limb trauma requiring temporary limb immobilisation can improve VTE risk assessment in accordance with current guidelines.

**Key words:** venous thromboembolism, assessment, prophylaxis, outpatient lower limb fracture and injuries

## BACKGROUND

The risk of venous thromboembolic events (VTE) in relation to orthopaedic surgery is considerable. Traditionally the highest risk of VTE was seen in patients who had lower limb arthroplasty procedures [1]. In order to help reduce the risk of VTE, there is a vogue in UK hospitals for inpatients to have risk assessment and expedite commencement of prophylaxis [2]. As a result VTE assessment and prophylaxis is an integral part of patient safety, and can help clinicians and hospitals reduce exposure to litigation and financial penalties [3].

There is evidence suggesting a link between lower limb cast immobilisation and VTE in the outpatient setting [4]. The incidence of Deep Venous Thrombosis (DVT) in patients with temporary lower limb immobilisation is considerable and varies from 5-39% depending on the type of immobilisation and patient factors [4-6]. Given the obvious risks of lower limb cast immobilisation it appears that the same emphasis is not placed on VTE assessment in outpatients that are treated for lower limb trauma with cast immobilisation. Recently published guidelines suggest that ambulatory patients with cast immobilisation should be assessed for their risk of developing VTE and prophylactic treatment offered [7].

A simple and cost-effective VTE risk screening tool utilised during clinic can improve patient safety and assist clinicians in mitigating medico-legal risk. We introduced and implemented a VTE risk assessment and management tool in orthopaedic fracture clinics that was based on recent good practice guidelines published by the College of Emergency Medicine [UK]. It involved a VTE risk assessment pathway printed on a single page proforma that was attached to the front of patient case notes by clinic staff to any patient attending the senior author's Orthopaedic fracture clinic. The clinicians in these clinics were thus reminded to follow the screening tool at the beginning of clinics and manage patients as per the specified pathway.

The aim of this study was to assess the effectiveness of this new VTE assessment tool and how successfully it has been implemented.

## MATERIAL AND METHODS

The VTE risk assessment pathway was based on guidelines for the use of thromboprophylaxis in ambulatory trauma patients requiring temporary limb immobilisation published by the College of Emergency Medicine (UK) [7]. This was printed and attached to the front of patient case notes by clinic staff to any patient attending the orthopaedic fracture clinic of the senior author (Fig. 1). The clinicians in these

fracture clinics were asked to follow the pathway and document its use when seeing patients with lower limb trauma. The printed pathway attached specifically to the front of the notes aimed to act as a memory aid to the clinicians.

According to the VTE pathway, any patient over the age of sixteen that presented with lower limb trauma requiring rigid cast immobilisation or altered weight bearing status should be evaluated for VTE prophylaxis using Dalteparin. If no contraindication to chemical prophylaxis was identified, the need for prophylaxis should be discussed with the patient and their acceptance or refusal of prophylaxis would be documented in the clinical notes. Patients deemed to require prophylaxis would have it prescribed by the clinician seeing the patient and they would be given 5000 units of Dalteparin once per day for the duration of cast immobilisation. When VTE prophylaxis was prescribed, base line blood tests were taken including full blood count, Urea and electrolytes and liver function tests. Patients were asked to contact their general practitioner for repeat blood tests 2 weeks later or have the bloods repeated at a subsequent fracture clinic to ensure there was no evidence of Heparin induced thrombocytopenia [HIT]. Additionally, a dictated letter was sent to the patient's general practitioner as a safety net to help ensure patients would be screened for the HIT in the community.

We retrospectively assessed a cohort of patients who had lower limb trauma necessitating limb immobilisation over a 4 month period, before the screening tool was implemented. These patients were identified from plaster room prescription sheets. Following identification of this cohort clinical letters were reviewed to determine the documentation of assessment and treatment of patients at risk of VTE events. A prospective data collection was then undertaken in orthopaedic fracture clinic once implementation of the new VTE assessment tool had occurred. The screening tool was used as an aid by the clinician to help identify patients at risk of VTE, allowing for investigation of treatment when indicated. The proformas were collected at the end of each clinic and data analysed to assess the effectiveness and compliance with assessment of VTE risk and appropriate management. The approval for the work was obtained through our local institutions R&D department.

### Statistical analysis

Data was collated in Microsoft Excel 2007 and analysed using Statsdirect statistical software version 2.8.0. The dataset was deemed to be categorical data and therefore analysed using Fisher's exact test. Statistical significance was established at the  $P < 0.05$  level.

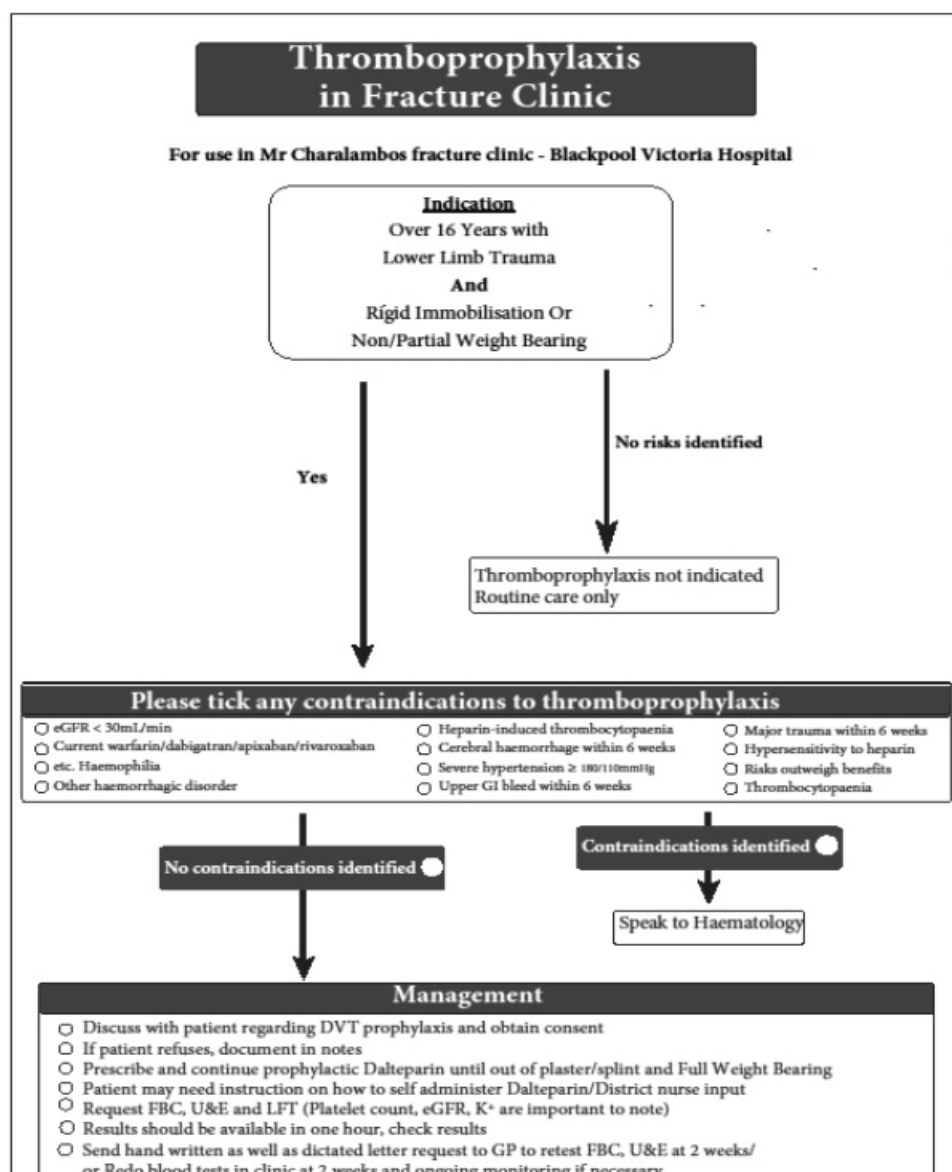


Fig. 1. DVT risk assessment tool and treatment algorithm modified from Roberts et al, 2012 [7]

## RESULTS

58 patients were included in this study. 28 patients were in the pre-tool group and 30 patients in the post-tool group. The average patient age in the pre-tool group was 45.3 years of age (range 20-82 years of age) and in the post-tool group 41.2 years of age (range 17-80). There were 13 males/15 females in the pre-tool group, and 14 males/ 16 females in the post-tool group.

The types of injuries that were treated with lower limb rigid immobilisation in both groups were similar (Fig. 2).

In the pre-tool group, 5/30 patients were VTE risk assessed. Of these, 4 were treated with VTE prophylaxis, with 1 declining VTE prophylaxis. In the post-tool group, 27/28 patients had VTE risk assessment. Twenty-five had VTE risk assessment in their first clinic visit and 2 in a subsequent clinic visit. Eighteen of the 27 (67%) patients had Dalteparin prescribed as per protocol whilst 9 refused chemical VTE prophylaxis (Tab. 1).

Tab. 1. Proportion of patients who had VTE risk evaluation between cohorts

	Patients identified to be at risk	Was prophylaxis discussed?	Percentage	P value
Pre-tool	30	5	16.7%	<0.0001
Post-tool	28	27	96.4%	

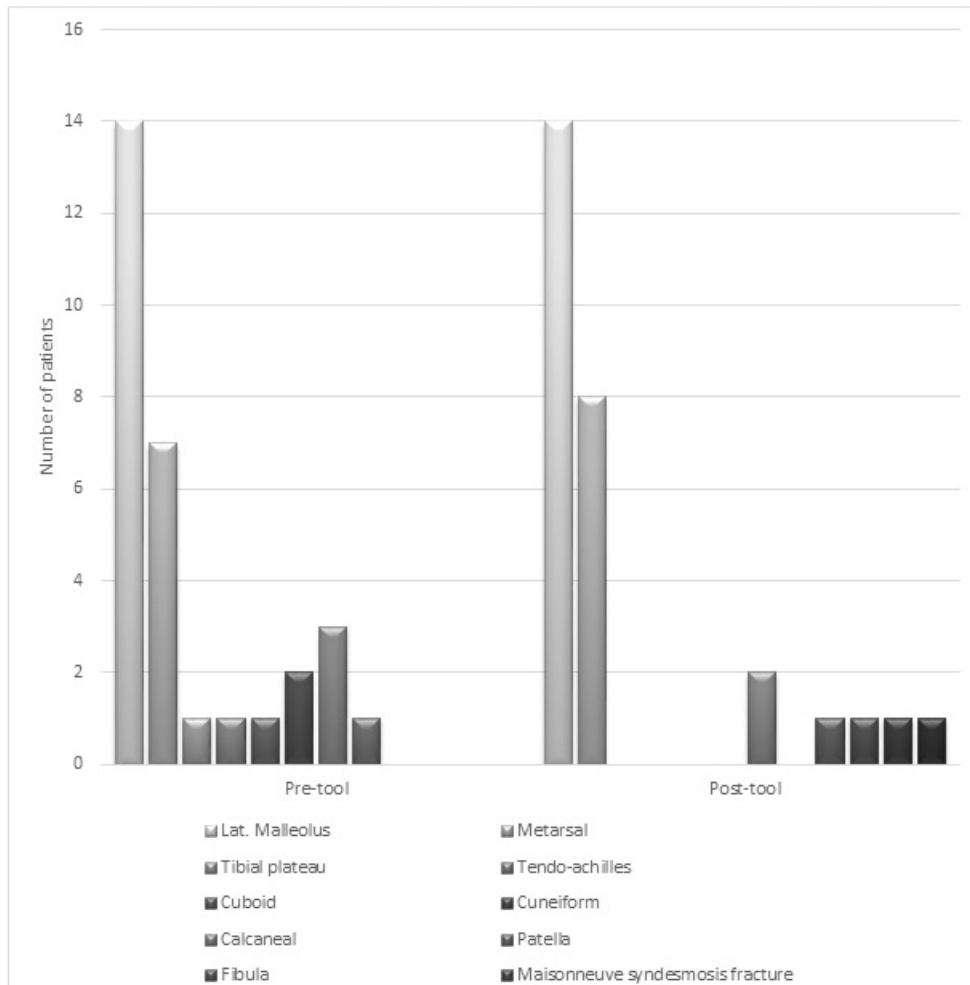


Fig. 2. The types of injuries that were seen and treated between the two patient groups

### DISCUSSION

The relationship between immobility and venous thromboembolism (VTE) is well documented [4,5, 6]. In 2006, up to 62% of British Orthopaedic departments did not routinely use VTE prophylaxis and only 11% performed risk stratification in ambulatory lower limb trauma patients with rigid immobilisation [8]. The UK, France and Germany now have national guidelines which recommend use of VTE prophylaxis in lower limb rigid immobilisation patients [7, 9].

Developing deep vein thrombosis as a consequence of trauma and cast immobilisation is potentially preventable. Numerous authors have commented on the proportion of DVTs which arise from the distal calf [10-12]. However, there remains debate over the management of distal calf thrombi and the value in treating distal DVT events [13,14]. While this treatment debate continues, the sequelae to DVT's are potentially serious and have marked impact on morbidity [15,16]. These sequelae can range in severity from

venous insufficiency, oedema and ulceration to pulmonary embolism and death [15,17].

Further to the release of College of Emergency Medicine [UK] guidelines in 2012, there has been little evidence to demonstrate the efficacy and impact these guidelines can have on orthopaedic clinical practice [7]. These guidelines were designed to be implemented in the acute accident and emergency situation. However, we have shown they are transferable across speciality and can be effectively applied to an orthopaedic fracture clinic.

Since the implementation of the new VTE risk assessment and management tool in the senior author's clinic, there has been a significant increase in the number of patients identified at risk of DVT and having prophylaxis discussed and documented in the clinical notes. Our results show that a simple and cost effective measure such as a printed proforma attached to the front of clinical notes can act as a successful prompt. This tool can also help doctors

to effectively evaluate and prescribe VTE prophylaxis when indicated in ambulatory patients who undergo treatment with lower limb cast immobilisation.

The effective implementation of the risk assessment tool was of paramount importance in changing clinical practice in this study. We encouraged the use of the tool by giving reminders to doctors and non-medical staff at the start of clinics. We also ensured that patients were not missed by stipulating the assessment tool should be placed at the front of all clinical notes to help serve as an aide-memoire. Such a memory prompt can be of great value in busy clinics, and in clinics with high turnover of clinical staff (such as teams with trainees). There is a huge step between developing clinical guidelines to actu-

ally implementing those guidelines, and practical measures that can facilitate such implementation are important. This is in line with the challenges faced in implementing osteoporosis secondary prevention measures in fracture clinics [18,19,20,21,22,23] despite the vast literature supporting the benefits of such measures [18,19,21,22,23,24,25].

## CONCLUSION

Our VTE assessment tool can improve the quality of patient care and may also help orthopaedic clinicians mitigate the medico-legal implications that currently exist around VTE assessment and prophylaxis in the outpatient fracture clinic setting.

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