Original article

Patient compliance with venous thromboembolism prophylaxis (VTE)

John Ross Blackwell*, Parag Raval, John-Patrick Quigley, Amit Patel, Donald McBride

Royal Stoke University Hospital, Newcastle Rd, Stoke-on-Trent ST4 6QG, United Kingdom

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ABSTRACT

Venous thromboembolic disease (VTE) comprises pulmonary embolism (PE) and deep vein thrombosis (DVT), and causes morbidity and mortality, particularly in trauma and orthopaedic patients. Prevalence of 0.9% and 1.2% respectively are reported, with mortality rates up to 13.8%.

Chemical thromboprophylactic agents including low molecular weight heparin (LMWH) are considered cost effective in reducing VTE risk. Evidence for anti-platelets including Aspirin for VTE prophylaxis is less compelling and is not supported as monotherapy.

There has been no published data on patient compliance with LMWH in trauma outpatients.

We aimed to determine whether trauma outpatients accept LMWH after discussing their VTE risk and the evidence for prophylaxis. For those accepting prophylaxis, we also investigated their compliance for the duration of immobilisation.

Lower limb injured patients treated with external immobilisation over a 6 month period at our major trauma centre were included. On completion of immobilisation, they were requested to complete a 17-point questionnaire. Patients declining injectable subcutaneous LMWH as prophylaxis were offered Aspirin 75 mg as a second line agent.

Seventy-five questionnaires were completed and five were excluded. Nineteen patients required surgical intervention for their injury, 51 were managed non-operatively.

Thirty-one patients accepted LMWH and 30 chose Aspirin as an alternative. Nine patients declined or were not commenced on prophylaxis.

Nineteen reported no missed Aspirin doses and 25 reported no missed LMWH doses. No patients reported missed doses due to pain, side effects or cessation of treatment for another reason. The mean average pain score recorded on the VAS was 3.8.

No patients in the study were diagnosed with a VTE.

LMWH is a recognised chemical thromboprophylactic and is well tolerated by patients for VTE risk reduction in lower limb immobilised outpatients. With poor evidence supporting Aspirin as a solo prophylactic agent, our local policy has withdrawn Aspirin for this purpose.

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1. Introduction

Venous thromboembolism (VTE) is a condition which can cause significant morbidity and mortality.¹ Pulmonary embolism (PE) and deep venous thrombosis (DVT) are both considered under the spectrum of venous thromboembolic (VTE) disease. In those patients who undergo surgery, the prevalence can reach more than 50% without any form of thromboprophylaxis.²

Within trauma and orthopaedic surgery, the prevalence of DVT and PE has been estimated to be 1.16% and 0.93%, respectively.³ Mortality rates have been reported to range between 0.38% and 13.8%.^{4,5}

Thromboprophylaxis has been recognised as an effective and cost effective method of reducing the risk of DVT, PE and fatal PE.⁶ The National Institute of Clinical Excellence (NICE) published clinical guideline 92, in 2010: “Venous thromboembolism: reducing the risk”.⁷ This guideline provided detailed guidance which included specific recommendations for trauma and orthopaedic patients however, did not outline recommendations for non-operative trauma patients who may be immobilised as outpatients. A Cochrane review was published in 2014 after reviewing 6 randomised control trials examining the use of Low Molecular Weight Heparin (LMWH). It concluded that using “LMWH in outpatients significantly reduces VTE when immobilisation of the lower leg is required.”⁸

There have been no published data on patient compliance with LMWH in non-operative trauma patients.

* Corresponding author.

E-mail address: jrbblackwell@doctors.org.uk (J.R. Blackwell).

2. Aims

Given the limited guidelines for these patients, our primary aim was to determine whether patients in our major trauma centre accept an offer of LMWH in outpatients when their risk of DVT is discussed, and whether those trauma patients using LMWH comply with its administration for the duration of immobilisation.

Whilst it is not evidence-based practice to prescribe antiplatelets to reduce VTE risk in trauma patients, prior to commencing data collection, the authors noted this was a common patient choice in our outpatient department following discussion of the evidence and personal risk factors. Alternative oral prophylactic agents including Rivaroxiban[®] are not routinely prescribed by our unit.

After identifying the frequent use of Aspirin, secondary aims were included in our study to determine if those patients who declined LMWH following a discussion of the evidence and their personal risk factors, accepted Aspirin as an alternative prophylactic agent.

Tertiary aims were to establish the number of missed doses, the cause of missed doses, the pain or discomfort experienced from LMWH injections with a visual analogue scale (VAS) and whether the person administering the LMWH had any influence over compliance with LMWH.

3. Patients and methods

Trauma patients treated in consultant led fracture clinics at our major trauma centre, the Royal Stoke University Hospital, were included retrospectively over a 6-month period between 18/11/2014 and 18/05/2015.

Patients requiring cast, brace or removable boot immobilisation are simultaneously seen in the fracture clinic and dedicated plaster room. All patients are given written instructions for their immobilisation device and the plaster room contact number for problems or concerns.

A questionnaire consisting of 17 questions on a double sided A4 sheet was formulated ([Appendix 1](#) – Questionnaire) and given to appropriate patients upon completion of their immobilisation treatment. This included all adult patients treated in cast, brace or removable boot regardless of their duration of treatment or weight bearing status. Clinical staff in the fracture clinic were instructed to support patients with questionnaire completion, but requested not to assist directly, and allow patients privacy whilst answering. Other than being competent to complete the questionnaire, no further exclusion criteria were set. VAS was completed by patients on a scale from 0 to 10 to represent the level of discomfort experienced from the injections.

Completed questionnaires for patients who recorded “no prophylaxis” were identified. Hospital electronic clinic records were reviewed to determine if a documented discussion regarding prophylaxis during their clinic visits occurred.

4. Results

A total of 75 questionnaires were completed. Five patients were excluded because; 3 questionnaires were inadequately completed to allow meaningful analysis, 1 was completed by a paediatric patient (15 years) and 1 had no patient identifying features to determine the reason they had no prophylaxis.

Of the 70 remaining patients, 19 patients had received surgical intervention, and 51 were managed non-operatively. Injuries sustained included; 47 ankle injuries, 16 foot injuries, 5 knee or tibia and 2 Achilles tendon.

The duration of non-weight bearing (NWB) and partial weight bearing (PWB) averaged 3 weeks and 1 week respectfully (range 0–9 weeks NWB, 0–8 weeks PWB).

Thirty-one patients accepted LMWH, however 30 declined and chose Aspirin as an alternative. Nine patients were not commenced on new prophylaxis; 6 had no documented discussion, 1 was advised to mobilise and did not require thromboprophylaxis, 1 patient was already on Rivoroxaban and 1 patient was already on warfarin.

Table 1 summarises patient compliance in the Aspirin group, with 19 reported not missing any doses.

The reason for missed doses in all but one case was; “forgotten”. The other cause was reported as a supply issue causing between 5 and 9 missed doses for that patient.

Table 2 summarises missed doses within the LMWH group, where 25 patients reported they missed no doses.

“Forgotten” was also the most common reason for the LMWH patients, however there were 2 patients who missed doses because of supply problems. One patient missed less than 5 doses because of this supply problem, but the other missed between 10 and 20 doses.

Table 3 highlights the correlation between missed doses of LMWH and the person administering the injection.

It is important to note that no patients reported missed LMWH doses due to pain, side effects or cessation of treatment for another reason. The mean average pain score recorded on the VAS, was 3.8, with a mode of 2, median of 3 but a range of 1–10 ([Fig. 1](#)).

Only one patient in the study had a past history of VTE, and they received LMWH for prophylaxis. Included in the questionnaire were 8 recognised independent risk factors for DVT ([Table 4](#)) which are identified during the discussion of personal risk with each patient.

Perceived risk factors recorded by patients in each group were comparable, without significant differences between them.

Of the 70 patients included, 3 were investigated for VTE during their treatment, 2 with negative D-Dimer tests and one negative USS Doppler and CT pulmonary angiogram.

Table 1
Missed Aspirin doses.

Number of missed doses	Number from Aspirin group
0	19
<5	5
5–9	1
10–20	2
>20	1

Table 2
Missed LMWH doses.

Number of missed doses	Number from LMWH group
0	25
<5	3
5–9	2
10–20	1

Table 3
Person performing LMWH injection.

LMWH administered by	Number	Missed doses
Patient	15	6
Relative	8	0
District nurse	7	0
Carer	1	0

Fig. 1. VAS pain score for LMWH injections.

Table 4

Patient perceived VTE risk factors.

Risk factor	Number of patients
Smoking	18
Obesity	12
Diabetes mellitus	6
Active cancer/treatment	3
Contraceptive pill (COCP) or Hormone replacement therapy (HRT)	3
Previous DVT or PE	2
1st degree relative with VTE	2
Pregnancy	1

5. Discussion

Patient non-compliance with medication therapy remains a challenging and expensive problem for healthcare systems around the world. However medical professionals can have an enormous influence on patient compliance.⁹

There is little published data demonstrating compliance with LMWH for prophylaxis against VTE in non-operative outpatients. Chemical thrombo-prophylaxis has been shown to provide a benefit in trauma patients and thus preventing potentially life threatening complications of otherwise benign, low energy trauma.⁷

Our study demonstrates that whilst some patients experience significant pain, the majority had only mild discomfort from LMWH injections and none of the patients missed doses or ceased treatment due to the discomfort. It was obviously only possible to observe discomfort in patients who accepted LMWH and those patients who declined, may be more likely to report discomfort or poor compliance based on phobia or past experience.

Our study demonstrates no statistically significant difference between compliance with LMWH and Aspirin therapies ($P = 0.334$, $p < 0.05$). LMWH had good compliance in the accepted group, however more robust evidence may improve acceptance rates further, following discussion with patients.

In keeping with other medications, missed doses were commonly the result of forgetfulness on the part of the

patient, but where injections were administered by a third party, missed doses were eliminated, proven to be statistically significant here ($P = 0.0036$, $p < 0.05$). It would appear more likely the dose is remembered if more people are involved with its delivery.

In our study adherence rates overall were very good. As mentioned the primary reasons for non-adherence was due to non-conforming adherence, which includes those who forget or get confused about medication.¹⁰ A solution to these missed doses could be through offering of an alarm based medical device which can serve as a reminder for patients, relatives or carers and have proven effective in improving self administered medication compliance.¹¹

The potential burden of medication non-adherence on health care delivery makes it an important public health concern.¹² In this study by ensuring good compliance of patients with chemothromboprophylaxis can help prevent repeat admissions and hospitalisations in the future due to VTE.

With the current available data and guidelines, it remains difficult to determine which patients require LMWH and the weighting of relative indications in determining a patients overall risk.

Aspirin currently has little evidence to suggest use as a monotherapy for thromboprophylaxis, particularly in trauma patients, however it is well accepted by patients and has good compliance rates and this could be inferred for other oral agents with more robust evidence supporting their efficacy. Although financially Aspirin is proven to be a cheaper modality, the effectiveness in comparison of LMWH or Warfarin should be considered for each patient individually.¹³

In our small study population, no patients were diagnosed with VTE in the Aspirin or LMWH group.

6. Limitations

Despite our series being the largest of its type, the authors accept the small numbers involved in this study. We would support further, large number, multi-centre analysis of LMWH compliance to reduce the error induced by small numbers and the under-reporting of missed doses with the questionnaire method of information gathering.

7. Conclusion

LMWH is a recognised chemical thromboprophylactic and is well tolerated by patients for VTE risk reduction in lower limb immobilised outpatients. Where compliance is a concern, third person administration may prove cost effective in reducing

missed doses, and ensuring effective prophylaxis throughout treatment.

Conflicts of interest

The authors have none to declare.

Appendix 1. Questionnaire

Thank you for agreeing to spend a few minutes completing this questionnaire. Deep vein thrombosis (DVT) is a blood clot which forms in the leg veins and can travel to the lungs. It is a serious condition affecting thousands of people every year, and is more common in patients with leg injuries.

This questionnaire will help us to improve our prevention of DVT and the methods of prevention we use.

Your answers are completely confidential and will not affect the care you receive in any way.

We will record your patient number only, so that your X-rays can be reviewed.

If you have any questions about this questionnaire or how to answer a question, please ask a member of fracture clinic staff who will be pleased to help.

- 1) How many weeks have you been in a

Cast	Weeks
Boot	Weeks
Splint	Weeks
- 2) Were you told not to put ANY weight through your leg/foot (non-weight bearing)?

Yes	No	If yes, for how many weeks?	Weeks
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- 3) Were you told only put part of your weight through your leg/foot (partial weight bearing)?

Yes	No	If yes, for how many weeks?	Weeks
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- 4) Whilst non weight bearing, how did you get around the house?

Crutches	Frame	Wheelchair	Bed rest	Other
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- 5) Did you have any surgery for the injury to your leg? Yes No
- 6) Was the risk of DVT (blood clots) discussed in clinic? Yes No
- 7) Did you receive written information about DVT? Yes No
- 8) Did you choose to take treatment to prevent a DVT? Yes No
- 9) If Yes, did you take;

Aspirin	Dalteparin	Other
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10) If No, do you already take blood thinning medication?
 Yes No Name

11) If you chose Daltaparin injections, who did the injections?
 Yourself Relative Carer District nurse Other

12) On average, how painful were the injections? (1=none, 10=extreme discomfort)
 1 2 3 4 5 6 7 8 9 10

13) How many times did you miss a dose of the blood thinning medication?
 (Tablet or injection)
 None Less than 5 Between 5 and 9 Between 10 and 20
 More than 20

14) What was the most common reason for missed doses?
 Forgotten No supply Side effects Decided to stop Other

15) Have you seen a doctor because of a possible DVT during your fracture treatment?
 Yes No

16) Have you had a blood clot in the past? Yes No

17) From the following list, how many risk factors for DVT apply to you?
 Smoking _____
 Diabetes _____
 Overweight _____
 Past history of a DVT _____
 1st degree relative had a DVT? (Brother, Sister, Parents) ____
 Current treatment for cancer _____
 Contraceptive pill or Hormone replacement (HRT) _____
 Pregnancy _____

Thank you for taking the time to complete our questionnaire.

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