

The Royal College of Emergency Medicine

VTE RISK IN LOWER LIMB IMMOBILISATION

NATIONAL QUALITY IMPROVEMENT PROJECT

R

NATIONAL REPORT 2018/19

Published: 15 July 2019

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Executive Summary

Overview

This report contains the findings from the 2018-19 RCEM national quality improvement project (QIP) on VTE risk management of ambulatory adult Emergency Departments (ED) patients requiring leg immobilisation.

A total of **14,376** patients presenting to **171** EDs had their documented care reviewed in this national clinical audit and QIP. This was the second time the audit had been run, and the first time the topic had been conducted using QI methodology.

The purpose of the audit and QIP was to monitor documented care against the standards published in July 2018, and to facilitate improved care using QIP methodology and weekly data feedback. QIP methodology was promoted to encourage EDs to improve towards more consistent delivery of these standards, helping clinicians examine the work they do day-today, benchmark against their peers, and to recognise excellence.

The performance summary charts in the next section are a summary of the weekly performance against the standards between August 2018 – January 2019.

Key findings

This is the first year in which RCEM has used a platform capable of tracking improvements using QI methodology. This likely represents a year in which departments have been familiarising themselves with the new platform before concerted efforts to improve. It also represents the difficult nature of effecting change in busy departments and during a period which has seen particular challenges of crowding and poor hospital flow. This report represents not just another large scale national clinical audit but the delivery of a shared platform providing QI tools and real time data with, which individual departments can use to progress towards achieving the national standards.

Patient data

The QIP focussed on the proportions of eligible patients who were VTE risk-assessed, who received timely thrombo-prophylaxis and who received an appropriate patient information leaflet.

The data showed significant improvement in the proportion of patients with a documented VTE risk assessment (43.7% vs. 25.9% in the previous audit). There was also improvement in the proportion of patients provided with written information (20.9% vs 13.3% in the previous audit, with overall performance remaining low). But only around 15% of patients whose thromboprophylaxis was initiated in the ED received their first dose of medication before leaving the department.

During the six-month QIP period (August 2018 – January 2019), improvements in performance were seen against all three standards.

Organisational data

EDs were asked to provide information on the type of tool used locally to VTE risk- assess patients.

- Only 19% of EDs are using a tool of the type recommended by NICE
- Of the remaining departments, 14% responded that no guideline or protocol was in place locally

Key recommendations

- 1. All EDs that have not already done so should introduce a NICE guideline NG 89-compliant tool for the assessment of VTE risk in ambulatory adult patients requiring leg immobilisation.
- 2. Patients discharged from the ED with a leg immobilisation device should routinely be provided with a patient information leaflet that outlines the increased risk of VTE and the need to seek urgent medical attention if they develop symptoms suggestive of a clot.
- 3. All patients in whom risk assessment reveals a need for thromboprophylaxis should have their initial dose of medication before leaving the ED.

Performance Summary

The below graphs shows the weekly performance against standards for this audit. See the appendices for a guide to interpreting these charts.



Foreword



Dr Taj Hassan, RCEM President

The commitment of Emergency Departments to engage in quality improvement is a source of great pride to us. We applaud the enthusiasm with which departments have embraced our new style of national clinical audit with integrated QIP methodology. RCEM recognises the pressurised environment most departments continue to work in and is keen to support your fantastic efforts by keeping this QIP open online for you to use locally whenever you want.

We encourage you all to build upon the fantastic quality improvement successes shown in this report. For all three standards we have seen consistent national improvement over the six-month period, which is likely to be a testament to the engagement of local teams in quality improvement. Consider how your department can make progress on the three recommendations, particularly if your data shows that this is a challenging area.

We call on all EDs to introduce a NICE guideline NG 89-compliant tool to assess VTE risk in ambulatory adult patients requiring leg immobilisation if they have not already done so. Once a risk assessment tool is in place, patients assessed as needing thromboprophylaxis should have their initial dose of medication before leaving the ED.

Providing patients with adequate information to allow them to truly take control of their care is highly important to me personally and to the specialty of emergency medicine. Patients discharged from the ED with a leg immobilisation device should be given a patient information leaflet describing the increased risk of VTE and the importance of urgent medical attention if they experience signs that may indicate a clot.

Dr Taj Hassan, RCEM President

Dr Simon Smith, Chair of Quality in Emergency Care Committee

El Jaunders

Dr Elizabeth Saunders, Chair of Quality Assurance & Improvement Subcommittee

Introduction

This report presents the results of a national clinical audit and quality improvement project for patients aged 17 years and older who presented to an Emergency Department (ED) or Minor Injuries Unit part of an ED with a lower limb injury, and who were discharged with temporary immobilisation of the limb using a plaster cast or air boot.

Background

Temporary cast immobilisation of a leg in adults is associated with a 2-3% risk of deep venous thrombosis (DVT) and its potential consequences of long-term leg pain and swelling, pulmonary embolism (PE) and even death. Many experienced emergency physicians will have personal experience in dealing with patients who have developed those complications.

There is evidence from systematic reviews that thromboprophylaxis (TP) with low-molecularweight heparins (LMWH) can reduce the risk of DVT by around 50% (1).

The 2010 guideline 'Venous thromboembolism: reducing the risk' from the National Institute for Health and Clinical Excellence (NICE) recommended an assessment of the risk of venous thromboembolism (VTE) and bleeding, with consideration of thromboprophylaxis (TP) using low molecular weight heparin (LMWH) or unfractionated heparin (UFH) where appropriate, in patients with lower limb plaster casts but explicitly excluded 'people presenting to emergency departments (ED) without admission' (2). The 2012 RCEM 'Guideline for the use of thromboprophylaxis in ambulatory trauma patients requiring temporary limb immobilisation' first provided the impetus for a practice change in UK emergency departments and its uptake was explored by the 2015-16 RCEM VTE audit.

Last year, NICE published its replacement guideline 'Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism' and the scope of this document now includes 'people discharged from hospital, (including from A&E)' (3). Key recommendations from the guideline include risk assessment for VTE and bleeding, the provision of verbal and written advice, and prompt initiation of TP where indicated and formed the basis for this QIP.

In the absence of an accepted gold standard risk assessment tool, NICE recommends using one 'published by a national UK body, professional network or peer-reviewed journal'. Tools that fit those requirements currently include the following:

- <u>Department of Health VTE risk assessment</u> tool (3)
- GEMNet rule (4)
- <u>Plymouth rule</u> (5)
- L-TRiP(cast) rule (6)

The current UK '<u>Thromboprophylaxis in Lower</u> <u>Limb Immobilisation</u> (TiLLI)' study project is expected to provide some much-needed clarity in this area.

Meanwhile, many EDs have made their own arrangements, varying from routine provision of TP for all patients without contraindications to restrictive use of TP in patients at particularly high risk, such as those with Achilles tendon rupture or a personal history of VTE.

When this audit was run in 2015-16, it revealed considerable room for improvement with regards to the utilisation of risk assessment tools as well as the documented provision of written patient information.

The present QI project therefore posed an opportunity to provide an updated UK-wide picture in this important area of practice, while it was hoped that the new online QI tools would allow departments to track the effect of quality improvement (QI) interventions on their performance.

Case study of a patient



Mary^{*}, a 50 year-old lady presented to a Minor Injuries Unit following a fall in which she injured her left leg. She was seen by an Emergency Nurse Practitioner (ENP) and

referred to the local Emergency Department (ED) where she attended later that day.

Mary was reviewed there by a second ENP who requested an X-ray. This confirmed that Mary had sustained a break of the upper end of the left fibula.

A plaster cast was applied and Mary was discharged home with crutches with advice to rest and bear weight only partially through the plastered leg when walking. No assessment of her risk of developing a blood clot in her leg or lungs ('VTE' assessment) was undertaken and the patient was discharged home without thromboprophylaxis. An appointment was scheduled for the Trauma Clinic.

Seven days later Mary attended Trauma Clinic where she was reviewed by a Registrar. It was decided that the plaster should be changed to a fibreglass ('soft') cast knee cylinder to allow foot and ankle movement. Again, no VTE assessment was completed and no thromboprophylaxis was prescribed. On returning home from work 12 days later, Mary's son Michael* found her in a collapsed state and she subsequently had a cardiac arrest. With CPR in progress, she was transferred to the same ED that had treated her fracture, but the attempts at resuscitating her were sadly unsuccessful and she died.

The post-mortem findings recorded the cause of death as:

- 1a. Pulmonary Embolism,
- 1b. Deep vein thrombus,
- 2. Fracture of left fibula, hypertensive heart disease and non-insulin dependent diabetes mellitus

Risk assessment might have revealed that Mary had an increased risk, which would have prompted her to be treated with LMWH. There is evidence from systematic reviews that thromboprophylaxis (TP) with low-molecularweight heparins (LMWH) can reduce the risk of DVT by around 50% (Zee AA, 2017)

* Names have been changed

Methodology

Participation summary

Nationally, **14,376** cases from **171** EDs were included in the audit. Click the map below to open an interactive map of participating EDs.



Country	Number of relevant EDs	Number of cases
National total	171/229 (75%)	14,376
England	151/176 (86%)	12,928
Scotland	4/28 (14%)	203
Wales	7/13 (58%)	604
Northern Ireland	7/9 (78%)	515
Isle of Man /Channel Islands	2/3 (67%)	126

Audit methodology and history

All 'Type 1' EDs in the UK were invited to participate in July 2018. Data were submitted using an online data collection portal. The audit is included in the NHS England Quality Accounts list for 2018/2019.

Participants were asked to collect data from ED patient records on consecutive cases who presented to the ED between 1 August 2018 – 31 January 2019.

See appendix 1 for the audit questions and the standards section of this report for the standards.

Sample size

To maximise the benefit of the new run charts and features RCEM recommended entering 5 consecutive cases per week. This enabled contributors to see their EDs performance on key measures change week by week and visualise any shifts in the data following a quality intervention (PDSA cycle).

Expected patient numbers	Recommended sample size	Recommended data entry frequency
<5 a week	All patients	Weekly
>5 a week	5 consecutive patients	Weekly

Alternative

In case EDs found weekly data entry too onerous, departments were provided guidance on an alternative methodology of entering monthly data instead. The system recorded each patient's arrival date and automatically split the data into weekly arrivals, thereby preserving the benefit of seeing weekly variation.

Expected patient numbers	Alternative sample size	Alternative data entry frequency
<5 a week	All patients	Monthly
>5 a week	20 consecutive patients	Monthly

Pilot methodology

A pilot of the audit was carried out prospectively from 2 to 13 July. This tested the standards, questions, quality of data collectable, as well as the functioning of the online portal and reporting templates.

A number of improvements were made to the final project based on feedback from the pilot sites. RCEM are grateful to contacts from the following trusts for helping with the development of the audit and integrated QIP:

- Frimley Health NHSFT
- St Helens & Knowsley Teaching Hospitals NHS Trust
- University Hospitals of Derby and Burton NHSFT
- St George's University Hospitals NHS Foundation Trust

Standards

The audit asked questions against standards published by RCEM in June 2018:

ST/	NDARD	GRA	DE
1.	There should be written evidence that patients who are fitted with a new leg cast or boot have their risk of VTE and bleeding assessed during their visit to the ED	0	Fundamental
2.	There should be written evidence that a patient information leaflet (PIL) outlining the risks and need to seek medical attention if they develop symptoms of VTE has been given to ALL patients with temporary lower limb immobilisation who are discharged from the emergency department, regardless of their risk.	⊘	Fundamental
3.	If pharmacological thromboprophylaxis is documented as being indicated, there should be written evidence of the treatment having been initiated in the ED	~	Developmental

Understanding the different types of standards

Fundamental: need to be applied by all those who work and serve in the healthcare system. Behaviour at all levels and service provision need to be in accordance with at least these fundamental standards. No provider should provide any service that does not comply with these fundamental standards, in relation to which there should be zero tolerance of breaches.

Developmental: set requirements over and above the fundamental standards.

Aspirational: setting longer term goals.

For definitions on the standards, refer to the appendix.

Casemix

National casemix and demographics of the patients.



Q1.2: Day of arrival

Sample: all patients (national data)

The data showed a relatively even split of patient arrivals over the seven days of the week. There was a slightly higher proportion of patients attending on a Monday (16%), however this may be due to EDs choosing a sampling method that selected case notes from the start of the week. The proportion of patients.

Q1.3: Age of patient on attendance



Sample: all patients

Patients aged 17-40 years old at the time of attendance made up 43% of the sample for this audit. A third of patients were aged 41-59 years old, and 23% of patients were aged 60 years or older. This audit excluded patients aged under 17 years old.

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Q2.1: What was the documented diagnosis for the lower limb injury?

Sample: all patients (national data)

The majority of patients (86%) included in this audit had a documented diagnosis in their notes of a fracture of the lower limb. Far fewer patients had a documented diagnosis of Achilles tendon rupture (6%), sprain (3%), dislocation (1%) or other soft tissue injury (3%). Some patients may have had more than one diagnosis documented in their notes. It is reassuring to see that the incidence of having a diagnosis not recorded in the patient notes was very low (less than 1%).

VTE and bleeding risk assessment

See appendix 6 for a guide to understanding these charts.

Fundamental Standard 1: There should be written evidence that patients who are fitted with a new leg cast or boot have their risk of VTE and bleeding assessed during their visit to the ED.

Q3.1: Was a VTE and bleeding risk assessment carried out in the ED prior to discharge?



Sample excludes Q3.1 = 'No – but the reason was recorded'

The proportion of patients who received a documented VTE risk assessment has increased significantly since the last audit (mean 44.8% vs. 25.9%), with sustained further gains throughout the life of this project.



Q3.1a: Was the level of VTE risk (e.g. high/low) explicitly documented in the notes?

Sample: Q3.1 = yes

Among patients who received a documented VTE risk assessment, there has been a small improvement in the proportion of those with an explicitly stated level of risk (mean 73.7% vs. 70% at the last audit), again with sustained further gains during the runtime of the project.

Q3.2: Is there documented evidence on whether or not thromboprophylaxis is indicated?



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Sample: Q3.1 = yes

In patients for whom a VTE and bleeding risk assessment was carried out in the ED prior to discharge, the documented notes show that thromboprophylaxis was indicated for 46%, and not indicated for 45%. In only around 10% of patients, the need (or otherwise) for thromboprophylaxis was not recorded.

NB: a comparison to the previous RCEM VTE audit is not possible.

Patient information

Fundamental Standard 2: There should be written evidence that a patient information leaflet (PIL) outlining the risks and need to seek medical attention if they develop symptoms of VTE has been given to ALL patients with temporary lower limb immobilisation who are discharged from the emergency department, regardless of their risk.

Q5.1: Is there written evidence that an information leaflet on the risk of VTE, symptoms and where to seek medical help was provided to the patient?



Sample excludes Q5.1 = 'No - but the reason was recorded'

While the national proportion of patients who received a VTE risk leaflet has increased since the last audit (mean 22.7% vs. 13.3%, with sustained further gains throughout the project), overall performance against this standard still leaves a lot of room for improvement. The upper control limit of 54.79% indicates that without system changes it is highly unlikely that we will achieve this standard nationally for more than half of patients.

Thromboprophylaxis initiated in ED

Developmental Standard 3: If pharmacological thromboprophylaxis is documented as being indicated, there should be written evidence of the treatment having been initiated in the ED.

Q4.1: Is there written evidence of the patient receiving [pharmacological] thromboprophylaxis?



Sample excludes Q3.2 = 'Yes - not indicated'

Nationally there were improvements in the documentation of patients receiving pharmacological thromboprophylaxis over the life of this project. The sample for this measure included all patients who had a VTE and bleeding risk assessment carried out in the ED, excluding those for whom thromboprophylaxis was not indicated. Pharmacological thromboprophylaxis included low-molecular-weight heparin (LMWH), direct oral anticoagulants (DOAC), unfractionated heparin (UFH), fondaparinux or warfarin.

Any patients notes documenting that no thromboprophylaxis was received in the ED but that the patient was referred for this purpose to another service did not meet this standard.

Q4.2: Did the patient receive a STAT dose in the ED?



Sample: Q4.1 = pharmaceutical treatment received in ED

Most patients in whom thromboprophylaxis was initiated by an ED clinician had no documented evidence that they received the first dose of medication before discharge. Pharmacological thromboprophylaxis included low-molecular-weight heparin (LMWH), direct oral anticoagulants (DOAC), unfractionated heparin (UFH), fondaparinux or warfarin.

NB: no comparison to previous audit is possible.



What pharmacological thromboprophylaxis did the patient receive?

Sample: all patients (national data)

The most commonly used pharmacological thromboprophylaxis was low-molecular-weight heparin (LMWH) followed by direct oral anticoagulants (DOAC). Other agents mentioned nationally included aspirin.

Organisational data

Organisational Q1.1: Does your ED have a guideline or protocol to assess the risk of VTE and bleeding in adult patients who are discharged with a new leg cast or boot?

Sample: 88 EDs (national data)



15% EDs use an assessment tool published by a national UK body

Locally developed tool



67% EDs use a locally developed assessment tool

No guidance or protocol



14% EDs reported no guidelines or protocols

Professional network



4% EDs use an assessment tool published by a professional network



Organisational Q1.1: Does your ED have a guideline or protocol to assess the risk of VTE and bleeding in adult patients who are discharged with a new leg cast or boot?

Sample: 88 EDs (national data)

One in seven (14%) EDs reported having no guidelines or protocols to assess the risk of VTE and bleeding in adult patients who are discharged with a new leg cast or boot. The majority of those that did report having guidance were using locally developed guidance, which introduces the risk of variations in care.

Analysis

Patient data

Since the 2015-16 RCEM VTE audit, emergency departments have made significant progress in their performance against the RCEM standards and further improvements were seen over the data collection period of the QIP. Well over 40% of eligible patients are now being VTE assessed, and the provision of a patient information leaflet has improved by 157%, albeit from a lower baseline.

Departments now need to work on ensuring that rates of improvement are sustained and that VTE risk management in ambulatory adults fitted with leg immobilisation devices becomes firmly embedded into routine practice. Unless already in place, EDs should make a suitable information leaflet available to their patients and document this in the patient notes. EDs are encouraged to continue using the online portal to monitor care on the dashboard charts periodically.

The submitted data suggest that only a minority of eligible patients have their thromboprophylaxis started before leaving the ED. This may put patients at risk from early clot formation and thereby limit the effectiveness of thromboprophylaxis.

A significant number of departments are now using direct oral anticoagulants (DOACs) instead of LMWH for thromboprophylaxis in ambulatory adults requiring leg immobilisation. While this approach undoubtedly is more convenient to patients and may thereby increase compliance, it should be recognised that data on the effectiveness and safety of that strategy are currently still outstanding.

Patient notes excluded

For the purposes of this audit, the following patient populations were excluded:

- Any patient under the age of 17 years
- Patients who are admitted to a ward as an inpatient (excluding observation and short stay wards under the jurisdiction of the ED)
- Patients already on warfarin, a Direct Oral Anticoagulant (DOAC), a heparin or fondaparinux
- Patients with lower limbs immobilised by other means e.g. cricket splint etc

Organisational data

In the absence of a universally accepted VTE risk assessment tool for ambulatory adults requiring leg immobilisation, many EDs have developed a local protocol.

Fewer than 1 in 5 departments report to be using a tool from one of the categories recommended by NICE. While this may partially reflect imperfect understanding on the part of the submitting clinicians of the evidence base underpinning the local guidance, EDs have a duty to ensure that their VTE risk assessment tool is based on the best available evidence or wide consensus as recommended by NICE.

It is concerning that some departments still report that not even locally developed guidance is in place to govern the risk assessment. Those EDs are strongly encouraged to adopt one of the tools made available on the RCEM website.

The '<u>Thromboprophylaxis in Lower Limb</u> <u>Immobilisation</u> (TiLLI)' study project is due to report soon and is expected to provide further clarity.

Summary of recommendations

- All EDs that have not already done so should introduce a NICE guideline NG 89-compliant tool for the assessment of VTE risk in ambulatory adult patients requiring leg immobilisation
- 2. Patients discharged from the ED with a leg immobilisation device should routinely be provided with a patient information leaflet that outlines the increased risk of VTE and the need to seek urgent medical attention if they develop symptoms suggestive of a clot
- 3. All patients in whom risk assessment reveals a need for thromboprophylaxis should have their initial dose of medication before leaving the ED.

Using the results of this QI project to improve patient care

Firstly RCEM would like to extend thanks to all the individuals and emergency departments who participated in this clinical audit and QIP. By participating you have made the first step to making sustainable changes in care – and a lot of you have made many more steps depending how extensively you made use of the PDSA capabilities of the portal.

The results of this QI project should be shared widely with staff who have a responsibility for looking after ambulatory adult ED patients requiring leg immobilisation, especially the doctors and nurses directly involved in care provision. In addition to the clinical team RCEM recommend sharing the report with the clinical audit and/or quality improvement department, departmental governance meeting, ED Clinical Lead, Head of Nursing and Medical Director as a minimum. Without having visibility of the data and recommendations we cannot expect to see improvements in practice.

Now that EDs have a six-month picture of their weekly performance on key measures RCEM encourages the clinical team and audit department to work together to review the effectiveness of PDSA cycles already completed, and design further cycles to improve performance where the data shows they are required. Engaging staff in the process of action planning and PDSA cycles will lead to more effective implementation and sustainable improvements. The RCEM portal will remain live so that departments can continue to track their performance and evaluate the effects of further PDSA cycles.

For further QI advice and resources, please visit the <u>RCEM Quality Improvement webpage</u>.

PDSA example & learning 1

An ED has kindly shared the details of some of the PDSA cycles that they ran during the QIP and what they learned throughout their journey.

- **Cycle 1** We thought that the most efficient way to embed the RCEM thromboprophylaxis (TP) guideline into standard practice was to integrate its clinical decision rule into our electronic fracture clinic referral form. The most immediate feedback concerned the lack of prescribing guidance for low molecular weight heparin (LMWH) within the tool.
- **Cycle 2** Since it was not possible to add this to the electronic form, we launched a separate intranet-based LMWH prescribing aid. Further feedback revealed that users found it difficult to use the electronic form because the system regularly logged them out during the time it took to counsel the patient about the risks and benefits of TP.
- **Cycle 3** We replaced the electronic form with a standalone VTE risk assessment paper proforma. Uptake improved, but discussion within the consultant team revealed doubt about the evidence base behind the RCEM guideline and concerns about the lack of inclusion of patients with Achilles tendon injury.
- Cycle 4 Approached Trust thromboprophylaxis committee; joint literature review resulted in the selection of the prospectively validated L-TRiP(cast) rule plus mandatory TP for patients with thrombophilia, previous VTE or Achilles tendon injury. Good feedback on the revised proforma received through usability testing, but many eligible patients still reluctant to opt for TP as Emergency Nurse Practitioners (ENPs) are finding it hard to strike the right balance when explaining risks and benefits.
- **Cycle 5** Launched infographic to aid discussion with patients about the relative risk of VTE vs. LMWH, resulting in improved uptake of TP when offered. Two further issues are becoming apparent:

- ENPs still do not always prescribe TP when indicated because feedback from trauma clinic has revealed that TP started in ED is often not re-prescribed there. Fracture clinic management state that it will be impossible to change workflow there to allow re-prescribing.
- Patients regularly breach the fourhour Emergency Care Standard (ECS) while awaiting blood test results required prior for TP prescribing (FBC and U&E).
- Cycle 6 Final steps of the pathway (i.e. blood tests and prescribing) moved out of ED and onto the ED observation ward. Patients are now provided with the entire 42-day supply of take-home medicine course to eliminate the need for re-prescribing by fracture clinic or the primary care team. Further increases in use of the pathway and TP prescribing observed but the VTE patient information leaflet (PIL) is still not always handed out and a first dose of TP is still not always given before discharge
- Cycle 7 Discharge checklists added to ED and observation ward pathway documents, with tick boxes for the PIL and first TP dose. This significantly improves compliance.
- Further development Following an investigation into the death of a (non-ED) fracture clinic patient from PE who had been fitted with a leg brace after an Achilles tendon injury but not been prescribed TP, the ED VTE risk management pathway has now also been introduced in fracture clinic as well as on the trauma-orthopaedic wards for use prior to discharge.

PDSA example & learning 2

An ED registrar has kindly shared the following examples of the changes they implemented using the Plan-Do-Study-Act (PDSA) methodology during the QIP.

After monitoring the trends in compliance with completing the VTE risk assessments, a number of significant interventions were made in week 12 to improve our rates of compliance with National Standards.

They are as follows:

1. Confirmation was given from our Orthopaedic colleagues about inclusion and exclusion criteria for completing risk assessments. They initially excluded patients who were discharged with walker boots, but after further discussion and clarification, our practice changed to including them.

2. Posters were placed around the department to raise awareness of the audit, especially in areas where VTE risk assessments are more likely to be needed, for e.g. plaster room, walker boot storage area and minor injuries unit.

3. Attachment of the VTE advice sheet to the risk assessment sheet encouraged staff to provide VTE risk advice regardless of the assessment outcome.

4. Emails were sent on a regular basis to ED staff, to consistently raise awareness and to encourage continuation of good work.

5. Face-to-face reminders were given to encourage staff to complete the assessments and to gain feedback on our assessment sheets.

6. An ENP was recruited to our Audit Team to educate other ENPs via word of mouth.

7. Our VTE risk assessment was compared to the Plymouth Scoring system, a nationally recognised standard, to assess whether the appropriate treatment is being given to patients. 8. At week 14 of the audit, a presentation was made to some of our colleagues in the department to educate them on our progress and encourage continuation of good work.

9. Work was done on addressing individual concerns regarding the audit, which may have been discouraging participation.

10. Recruitment of an additional audit team member near the end of the audit was done to ensure continuation of the audit upon our departure from the department.

Further Information

Thank you for taking part in this clinical audit and QIP. We hope that you find the process of participating and results helpful.

If you have any queries about the report please e-mail <u>audit@rcem.ac.uk</u>.

Details of the RCEM clinical audit and national QIP Programme can be found under the <u>Current Audits section of the RCEM website.</u>

Feedback

We would like to know your views about this report and participating in this audit and QIP. Please let us know what you think by completing our feedback survey: <u>www.surveymonkey.co.uk/r/RCEM_QIP19</u>

We will use your comments to help us improve our future topics and reports.

Useful Resources

- Site-specific report available to download from the <u>QIP portal</u> (registered users only)
- Online dashboard charts available from the <u>QIP portal</u> (registered users only). The dashboard remains open after the end of the national QIP project so you can keep monitoring local performance and doing PDSA cycles.
- Local data file available from the <u>QIP</u> <u>portal</u> (registered users only)
- Guidance on understanding SPC charts
- <u>RCEM Quality Improvement Guide</u> guidance on PDSA cycles and other quality improvement methods
- <u>RCEM Learning modules</u> on VTE

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Appendices

Appendix 1: Audit questions

Casemix

1.1	Reference (do not enter patient identifiable data)	
1.2	Date of arrival	dd/mm/yyyy
1.3	Age of patient on attendance	17-40
		41-59
		60 and over

Diagnosis

2.1	What was the documented diagnosis for	Fracture
	the lower limb injury?	Dislocation
	(tick all that apply)	Achilles tendon rupture
		Sprain
		Other soft tissue injury
		Not recorded

Assessment

3.1	Was a VTE and bleeding risk assessment	Yes
	carried out in the ED prior to discharge?	No – but the reason was
		recorded
		No – but VTE risk assessment
		would have been carried out
		at follow up (e.g. fracture
		clinic) within 24 hours of ED
		attendance
		No
3.1a	(Only answer if YES to 3.1) Was the level	Yes
	of VTE risk (e.g. high/low) explicitly	No
	documented in the notes?	
3.2	(Only answer if YES to 3.1) Is there	Yes – indicated
documented evidence o not thromboprophylaxis is	documented evidence on whether or	Yes – not indicated
	not thromboprophylaxis is indicated?	Not recorded

Treatment

4.1	Is there written evidence of the patient receiving thromboprophylaxis?	Low-molecular-weight heparin (LMWH)
	(tick all that apply)	Direct oral anticoagulants
		(DOAC)
		Unfractionated heparin (UFH)
		Fondaparinux
		Warfarin
		Other – please state
		Patient declined
		thromboprophylaxis
		No thromboprophylaxis in the
		ED but referred for this purpose
		to another service
		Not recorded
4.1.a	(Only answer if 4.1 = pharmacological	Yes
	treatment received in the ED)	No
	Did the patient receive a STAT dose in the ED?	Not recorded

Patient information

5.1	Is there written evidence that an	Yes
	information leaflet on the risk of VTE,	No – but the reason was
	symptoms and where to seek medical	recorded
	help was provided to the patient?	No

Notes	
(Optional	space to record any additional notes for local use)

Appendix 2: Participating Emergency Departments

- ABERDEEN ROYAL INFIRMARY
- ADDENBROOKE'S HOSPITAL
- AINTREE UNIVERSITY HOSPITAL
- AIREDALE GENERAL HOSPITAL
- ALEXANDRA HOSPITAL
- ANTRIM AREA HOSPITAL
- ARROWE PARK HOSPITAL
- BARNET HOSPITAL
- BARNSLEY HOSPITAL
- BASILDON UNIVERSITY HOSPITAL
- BASINGSTOKE AND NORTH HAMPSHIRE HOSPITAL
- BASSETLAW HOSPITAL
- BEDFORD HOSPITAL
- BLACKPOOL VICTORIA HOSPITAL
- BRADFORD ROYAL INFIRMARY
- BRISTOL ROYAL INFIRMARY
- BRONGLAIS GENERAL HOSPITAL
- BROOMFIELD HOSPITAL
- CALDERDALE ROYAL HOSPITAL
- CAUSEWAY HOSPITAL
- CHELSEA & WESTMINSTER HOSPITAL
- CHELTENHAM GENERAL HOSPITAL
- CHESTERFIELD ROYAL HOSPITAL
- CITY HOSPITAL
- COLCHESTER GENERAL HOSPITAL
- CONQUEST HOSPITAL
- COUNTESS OF CHESTER HOSPITAL
- COUNTY HOSPITAL
- CRAIGAVON AREA HOSPITAL
- CROYDON UNIVERSITY HOSPITAL
- DAISY HILL HOSPITAL
- DARENT VALLEY HOSPITAL
- DARLINGTON MEMORIAL HOSPITAL
- DERRIFORD HOSPITAL
- DIANA, PRINCESS OF WALES HOSPITAL
- DONCASTER ROYAL INFIRMARY
- DORSET COUNTY HOSPITAL
- DR GRAY'S HOSPITAL
- EALING HOSPITAL
- EAST SURREY HOSPITAL
- EASTBOURNE DISTRICT GENERAL HOSPITAL
- EPSOM HOSPITAL
- FAIRFIELD GENERAL HOSPITAL
- FRIMLEY PARK HOSPITAL
- GEORGE ELIOT A&E
- GLANGWILI GENERAL HOSPITAL
- GLOUCESTERSHIRE ROYAL HOSPITAL
- GOOD HOPE HOSPITAL
- GRANTHAM A&E

- HARROGATE DISTRICT HOSPITAL
- HEARTLANDS HOSPITAL
- HILLINGDON HOSPITAL
- HINCHINGBROOKE HOSPITAL
- HOMERTON UNIVERSITY HOSPITAL
- HORTON GENERAL HOSPITAL
- HUDDERSFIELD ROYAL INFIRMARY
- HULL ROYAL INFIRMARY
- JAMES PAGET UNIVERSITY HOSPITAL
- JOHN RADCLIFFE HOSPITAL
- KETTERING GENERAL HOSPITAL
- KING GEORGE HOSPITAL
- KING'S COLLEGE HOSPITAL (DENMARK HILL)
- KING'S MILL HOSPITAL
- KINGSTON HOSPITAL
- LANCASHIRE TEACHING HOSPITALS NHSFT - CHORLEY AND SOUTH RIBBLE HOSPITAL
- LEEDS GENERAL INFIRMARY
- LEICESTER ROYAL INFIRMARY
- LEIGHTON HOSPITAL
- LINCOLN COUNTY HOSPITAL
- LISTER HOSPITAL
- LUTON & DUNSTABLE HOSPITAL
- MACCLESFIELD DISTRICT GENERAL HOSPITAL
- MANCHESTER ROYAL INFIRMARY
- MEDWAY MARITIME HOSPITAL
- MILTON KEYNES HOSPITAL
- MORRISTON HOSPITAL
- MUSGROVE PARK HOSPITAL
- NOBLE'S HOSPITAL
- NORFOLK & NORWICH UNIVERSITY HOSPITAL
- NORTH MANCHESTER GENERAL HOSPITAL
- NORTH MIDDLESEX HOSPITAL
- NORTHAMPTON GENERAL HOSPITAL (ACUTE)
- NORTHERN GENERAL HOSPITAL
- NORTHWICK PARK HOSPITAL
- NOTTINGHAM UNIVERSITY HOSPITALS
 NHS TRUST
- PETERBOROUGH CITY HOSPITAL
- PILGRIM HOSPITAL
- PINDERFIELDS GENERAL HOSPITAL
- PRINCESS ALEXANDRA HOSPITAL
- QUEEN ALEXANDRA HOSPITAL
- QUEEN ELIZABETH THE QUEEN MOTHER
 HOSPITAL

- QUEEN'S HOSPITAL
- QUEEN'S HOSPITAL, BURTON UPON TRENT
- ROTHERHAM DISTRICT GENERAL HOSPITAL
- ROYAL BERKSHIRE HOSPITAL
- ROYAL BLACKBURN HOSPITAL
- ROYAL BOLTON HOSPITAL
- ROYAL BOURNEMOUTH GENERAL HOSPITAL
- ROYAL CORNWALL HOSPITAL (TRELISKE)
- ROYAL DERBY HOSPITAL
- ROYAL DEVON & EXETER HOSPITAL (WONFORD)
- ROYAL FREE HOSPITAL
- ROYAL GWENT HOSPITAL
- ROYAL HAMPSHIRE COUNTY HOSPITAL
- ROYAL INFIRMARY OF EDINBURGH
- ROYAL OLDHAM HOSPITAL
- ROYAL PRESTON HOSPITAL
- ROYAL SHREWSBURY HOSPITAL
- ROYAL STOKE UNIVERSITY HOSPITAL
- ROYAL SURREY COUNTY HOSPITAL
- ROYAL SUSSEX COUNTY HOSPITAL
- ROYAL UNITED HOSPITAL
- ROYAL VICTORIA HOSPITAL
- RUSSELLS HALL HOSPITAL
- SALFORD ROYAL
- SALISBURY DISTRICT HOSPITAL
- SANDWELL GENERAL HOSPITAL
- SCARBOROUGH GENERAL HOSPITAL
- SCUNTHORPE GENERAL HOSPITAL
- SOUTH TYNESIDE DISTRICT HOSPITAL
- SOUTH WEST ACUTE HOSPITAL
- SOUTHAMPTON GENERAL HOSPITAL
- SOUTHEND HOSPITAL
- SOUTHMEAD HOSPITAL AWP
- SOUTHPORT GENERAL INFIRMARY
- ST GEORGE'S HOSPITAL (TOOTING)
- ST HELIER HOSPITAL
- ST JAMES'S UNIVERSITY HOSPITAL
- ST JOHN'S HOSPITAL AT HOWDEN
- ST MARY'S HOSPITAL
- ST MARY'S HOSPITAL (HQ)

- ST PETER'S HOSPITAL
- ST RICHARD'S HOSPITAL
- ST THOMAS' HOSPITAL
- STEPPING HILL HOSPITAL
- STOKE MANDEVILLE HOSPITAL
- TAMESIDE GENERAL HOSPITAL
- THE GREAT WESTERN HOSPITAL
- THE JAMES COOK UNIVERSITY HOSPITAL
- THE MAIDSTONE HOSPITAL
- THE PRINCESS ELIZABETH HOSPITAL
- THE PRINCESS ROYAL HOSPITAL
- THE ROYAL GLAMORGAN HOSPITAL
- THE ROYAL LIVERPOOL UNIVERSITY HOSPITAL
- THE ROYAL LONDON HOSPITAL
- THE ROYAL VICTORIA INFIRMARY
- THE TUNBRIDGE WELLS HOSPITAL
- THE WHITTINGTON HOSPITAL
- TORBAY HOSPITAL
- ULSTER HOSPITAL
- UNIVERSITY COLLEGE HOSPITAL
- UNIVERSITY HOSPITAL LEWISHAM
- UNIVERSITY HOSPITAL OF NORTH
 DURHAM
- UNIVERSITY HOSPITAL OF NORTH TEES
- UNIVERSITY HOSPITALS COVENTRY AND
 WARWICKSHIRE NHS TRUST
- WARRINGTON HOSPITAL
- WARWICK HOSPITAL
- WATFORD GENERAL HOSPITAL
- WEST MIDDLESEX UNIVERSITY HOSPITAL
- WEST SUFFOLK HOSPITAL
- WESTON GENERAL HOSPITAL
- WEXHAM PARK HOSPITAL
- WHISTON HOSPITAL
- WILLIAM HARVEY HOSPITAL (ASHFORD)
- WITHYBUSH GENERAL HOSPITAL
- WORCESTERSHIRE ROYAL HOSPITAL
- WORTHING HOSPITAL
- WYTHENSHAWE HOSPITAL
- YEOVIL DISTRICT HOSPITAL
- YORK HOSPITAL
- YSBYTY GWYNEDD

Appendix 3: Definitions

Standards definitions:

3	Pharmacological thromboprophylaxis	This includes: Low-molecular-weight heparin (LMWH), Direct oral anticoagulants (DOAC), Unfractionated heparin (UFH), Fondaparinux, Warfarin, or other pharmacological thromboprophylaxis.
		This does not include non-pharmacological thromboprophylaxis such as anti-embolism stocking, venous ligation, intermittent pneumatic compression, or venous foot pump.

Question and answer definitions:

Term	Definition
Pharmacological thromboprophylaxis / pharmacological treatment	Treatment with: • Low-molecular-weight heparin (LMWH) • Unfractionated heparin (UFH) • Fondaparinux • Direct oral anticoagulants (DOAC) • Warfarin • or other pharmacological thromboprophylaxis This does not include non-pharmacological thromboprophylaxis such as anti-embolism stocking, venous ligation, intermittent pneumatic compression, or venous foot pump.
VTE risk assessment	To select the answer YES there should be explicit evidence of the evaluation of recognised risk factors. This will often (if not always) be based on an assessment tool such as: - Department of Health VTE risk assessment tool - GEMNet rule - Plymouth rule - L-TRiP (cast) rule - and sometimes involves a proforma

	NB : Departments with a policy of routine provision of TP for all patients without contraindications may tick YES for all patients here, provided there is evidence of an assessment of the risk of bleeding.
Thromboprophylaxis: Yes – not indicated	If Q3.2 is answered as 'Yes – not indicated', where the patient was risk assessed but thromboprophylaxis was not indicated with good reason, Q4.1 should be answered as 'Not recorded'.

Appendix 4: Calculations

This section explains how the RCEM team have analysed your data. You are welcome to use this analysis plan to conduct local analysis if you wish. Analysis sample tells you which records were included or excluded from the analysis. The analysis plan tells you how the dashboard charts were graphed and which patient notes met or failed the standards.

	STANDARD	GRADE	Analysis sample	Analysis plan – conditions for the standard to be met
1.	There should be written evidence that patients who are fitted with a new leg cast or boot have their risk of VTE and bleeding assessed during their visit to the ED	F	Exclude: Q3.1 = 'No – but the reason was recorded'	SPC chart Met: Q3.1 = 'Yes' Not met: all other cases
2.	Evidence that a patient information leaflet (PIL) outlining the risks and need to seek medical attention if they develop symptoms of VTE has been given to ALL patients with temporary lower limb immobilisation who are discharged from the emergency department, regardless of their risk.	F	Exclude: Q5.1 = 'no but the reason was recorded'	SPC chart Met: Q5.1 = 'yes' Not met: Q5.1 = 'no'
3.	If pharmacological thromboprophylaxis is documented as being indicated, there should be written evidence of the treatment having been initiated in the ED	D	Exclude: Q3.2 = 'Yes – not indicated'	SPC chart Met: Q4.1 'LMWH' OR 'DOAC' OR 'UFH' OR Fondaparinux OR Warfarin Not met: Q4.1 = 'not recorded' OR 'No thromboprophylaxi s in the ED but referred for this purpose to another service' OR 'patient declined thromboprophylaxi s'

Analysis plan for casemix and diagnosis

Question	Analysis sample	Chart type and details
1.3 Age of patient on attendance	All patients	Pie chart showing age breakdown
2.1 What was the documented diagnosis for the lower limb injury?	All patients	Bar chart showing diagnoses, including 'not recorded'

Analysis plan for assessment and treatment

Question	Analysis sample	Chart type and details
3.1a Was the level of VTE risk (e.g. high/low) explicitly documented in the notes?	Q3.1 = 'Yes'	SPC showing Q3.1a = 'yes'
3.2 Is there documented evidence on whether or not thromboprophylaxis is indicated?	Q3.1 = 'Yes'	Pie chart showing: Yes – indicated, yes – not indicated – not recorded SPC showing both 'Yes' responses combined
4.1 Is there written evidence of the patient receiving pharmacological thromboprophylaxis?	Q4.1 = yes - indicated	SPC showing any treatment received
4.1a Did the patient receive a STAT dose in the ED?	Q8= UFH, OR LMWH, OR Fondaparinux, OR Warfarin, OR DOAC	SPC showing 'Yes'

Analysis plan for organisational data

Question	Analysis sample	Chart type and details
1.1. Does your ED have a guideline or protocol to assess the risk of VTE and bleeding in adult patients who are discharged with a new leg cast or boot?	All EDs (one response expected per ED)	Met: a 'Yes' option is ticked. Not met: 'No guideline or protocol'

Appendix 5: Inclusion and exclusion criteria

Inclusion criteria

Patients must meet the following criteria for inclusion:

- Adults and adolescents 17 years of age and over
- Presenting to an ED or a Minor Injuries Unit that is part of the ED
- Presented with a lower limb injury
- Discharged with temporary immobilisation of the limb using a plaster cast or airboot

Exclusion criteria

Do **<u>not</u>** include:

- Any patient under the age of 17 years
- Patients who are admitted to a ward as an inpatient (excluding observation and short stay wards under the jurisdiction of the ED)
- Patients already on warfarin, a Direct Oral Anticoagulant (DOAC), a heparin or fondaparinux
- Patients with lower limbs immobilised by other means e.g. cricket splint etc

Appendix 6: Understanding your results

Statistical process control (SPC) charts

The charts in this report and your new online dashboard can tell you a lot about how your ED is performing over time and compared to other EDs. If you're not used to seeing data in this way it can take a little time to get used to. This section of the report will help you understand the charts and interpret your own data.

The main type of chart is known as a **Statistical Process Control (SPC) chart** and plots your data every week so you can see whether you are improving, if the situation is deteriorating, whether your system is likely to be capable to meet the standard, and also whether the process is reliable or variable.

As well as seeing your actual data plotted each week you will see a black dotted average line, this is the **mean** percentage of patients. The SPC chart will point out if your data has a run of points above (or below) the mean by changing the dots to white. If your data is consistently improving (or deteriorating) the dots will turn red so the trend is easy to spot. If a positive run or trend of data happens when you're trying a PDSA/change intervention this is a good sign that the intervention is working.

As well as the dotted mean line, you will see two other lines which are known as the **upper and lower control limits**. The control limits are automatically determined by how variable the data is. Around 99% of all the data will fall between the upper and lower control limits, so if a data point is outside these lines you should investigate why this has happened.

Interpreting your data

1. Performance is improving (or deteriorating)

A consistent run of data points going up or down with be highlighted with **red dots** so they are easy to spot. A run of data going up is a good sign that your service is making improvements that are really working. If the data is going down this may indicate that service is deteriorating for some reason – watch out for a lack of resources or deterioration as a result of a change somewhere else in the system.



2. Performance is consistently above (or below) the mean

A consistent run of data that is above or below the mean will be highlighted with **white dots** so they are easy to spot. If your data has been quite variable this is a good sign that the process is becoming more reliable.



3. Is your system likely to be capable of meeting the standard?

The **control limits** show where you can assume 99% of your data will be. If you find that the standard is outside your control limits, it is very unlikely that your system is set up to allow you to meet the standard. If you do achieve the standard, this will be an unusual occurrence and very unlikely to be sustained. If this is the case, it is recommended that you look at how the process can be redesigned to allow you to meet the standard.

In the below example, the process is performing consistently at around 50%. The control limits show us that most of the time we would expect the process to be between 33% - 62%. If the standard for this process was 50%, then the process is well designed. If, however, the standard was 75% then the chart warns us that the system is not currently set up to allow the process to achieve the standard.



5. Something very unusual has happened!

The majority of your data should be inside the upper and lower control limits, these are automatically calculated by the system. If a single data point falls outside these limits then something very unusual has happened. This will be flagged up with a **red diamond** so you can spot it.

In some cases it may mean that the data has been entered incorrectly and should be checked for errors. It may also mean that something unexpected has had a huge impact on the service and should be investigated.



Appendix 7: References

1. Low molecular weight heparin for prevention of venous thromboembolism in patients with lowerlimb immobilisation. **Zee AA, van Lieshout K, van der Heide M et al.** 8 2017, Cochrane Database Sys Rev, p. CD006681.

2. Venous thromboembolism: reducing the risk (CG92). National Institute for Health and Clinical Excellence. 2010, NICE guideline.

3. Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism (NG89). **National Institute for Health and Care Excellence.** 2018, NICE guideline.

4. Guidelines in Emergency Medicine Network (GEMNet): guideline for the use of thromboprophylaxis in ambulatory trauma patients requiring temporary limb immobilisation. **Roberts C, Horner D, Coleman G et al.** 30, 2013, Emerg Med J, pp. 968–82.

5. A practical VTE risk assessment score tool for patients treated with lower limb cast immobilization. **Keenan J, Hall MJ and Nokes TJC.** 40, 2009, Injury Extra, pp. 199-200.

6. Venous Thrombosis Risk after Cast Immobilization of the Lower Extremity: Derivation and Validation of a Clinical Prediction Score, L-TRiP(cast), in Three Population-Based Case–Control Studies. Nemeth B, van Adrichem RA, van Hylckama Vlieg A et al. 12, 2015, PLoS Med, p. e1001899.

7. Prevention of VTE in orthopedic surgery patients: Antithrombotic Therapy and Prevention of Thrombosis. Falck-Ytter Y, Francis CW, Johanson NA et al. 2012, American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest., Vol. 9, p. 141.

8. A critical evaluation of venous thromboembolism risk assessment models used in patients with lower limb cast immobilisation. Watson U, Hickey BA, Jones HM et al. 22, 2016, Foot Ankle Surg, pp. 191-5.

Name:_____

Appendix 8: Template to submit your QI initiatives for publication on the RCEM website

If you would like to share details of your QI initiative or PDSA cycle with others, please complete this document and email it to audit@rcem.ac.uk.

Email address:	
Hospital:	
Trust:	
Plan	
State the question you wanted to answer – what was your prediction about what would happen?	
What was your plan to test the change (who, what, when, where)?	
What data did you collect, how did you plan to collect it?	
Do	
How did you carry out the change?	
Did you come across any problems or unexpected observations?	
How did you collect and analyse the data?	
Study	
What did the analysis of your results show?	
How did it compare to your predictions?	
Summarise and reflect on what you learnt.	
Act	
Based on what you learnt, what did you adapt (modify and run in another test), adopt (test the change on a larger scale) or abandon?	

Did you prepare for another PDSA based on you learning?	
Reflection and learning	
What did you and the team learn from this QI initiative? What advice would you give to someone else in your position?	



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