

VTE: the current situation

Roopen Arya

King's College Hospital



VTE Exemplar Centres

Providing leadership in thrombosis care

Disclosure of interests

Research funding: Bayer, Covidien

Honoraria: Sanofi, Bayer, Boehringer-Ingelheim, Pfizer

VTE: the current situation

- Current VTE prevention structures
- Have we made a difference?
- What is new in VTE prevention?
- What next for VTE prevention in the NHS?

Where we started

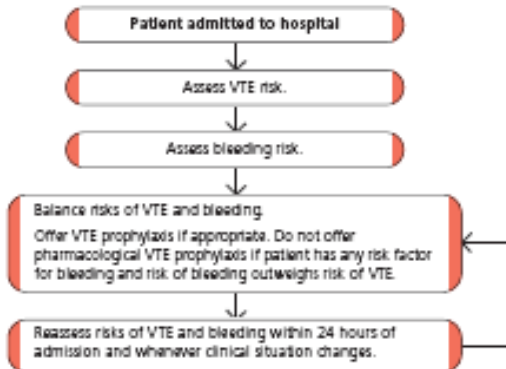
- Limited awareness of burden of hospital-associated thrombosis
- Inconsistent approach to VTE prevention
- No risk assessment for VTE risk
- Prophylaxis use in mainly surgical patients
- No knowledge of VTE outcomes

The National VTE Prevention Programme in England

- **Systematic approach:**
Uniform VTE risk assessment tool ➡ NICE guidance VTE prevention
- **VTE at heart of Quality Framework:** CQUIN, CQC, NHSLA
- **Increasing awareness of outcomes:** NOF VTE indicator
- **Leadership:**
‘Four Professions’ leadership
National VTE Exemplar Centres Network

VTE prevention care pathways for all adult hospitalised patients

Care pathway



Assessing risks of VTE and bleeding

Patients who are at risk of VTE

Medical patients

- If mobility significantly reduced for ≥ 3 days or
- If expected to have ongoing reduced mobility relative to normal state plus any VTE risk factor.

Surgical patients and patients with trauma

- If total anaesthetic + surgical time > 90 minutes or
- If surgery involves pelvis or lower limb and total anaesthetic + surgical time > 60 minutes or
- If acute surgical admission with inflammatory or intra-abdominal condition or
- If expected to have significant reduction in mobility or
- If any VTE risk factor present.

VTE risk factors¹

- Active cancer or cancer treatment
- Age > 60 years
- Critical care admission
- Dehydration
- Known thrombophilia
- Obesity (BMI > 30 kg/m²)
- One or more significant medical comorbidities (for example: heart disease; metabolic, endocrine or respiratory pathologies; acute infectious diseases; inflammatory conditions)
- Personal history or first-degree relative with a history of VTE
- Use of HRT
- Use of oestrogen-containing contraceptive therapy
- Varicose veins with phlebitis

¹ For women who are pregnant or have given birth within the previous 6 weeks see page 23.

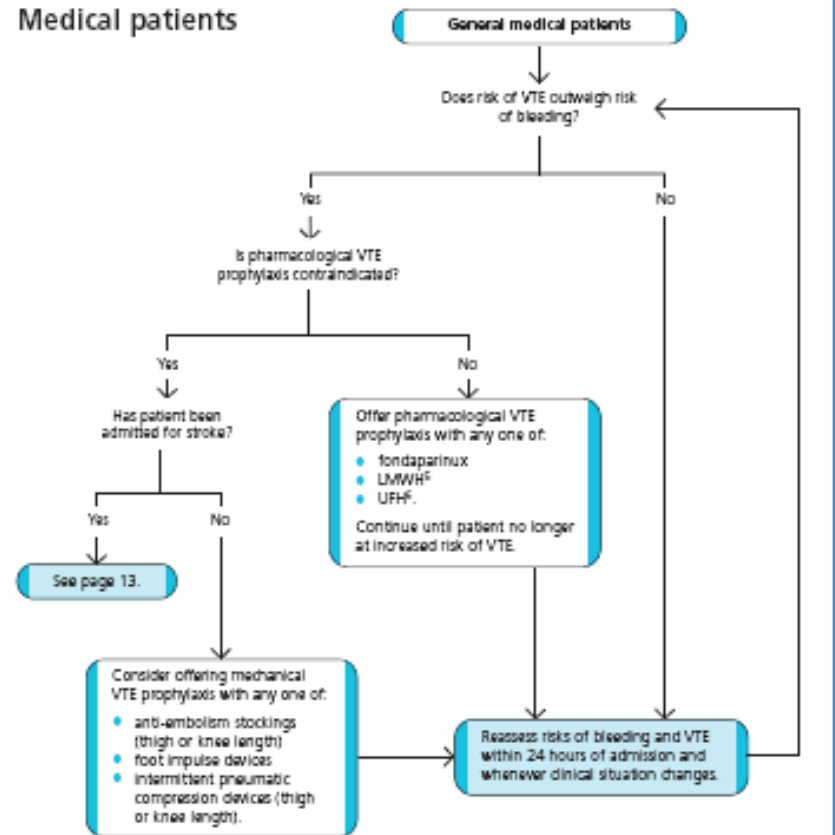
Patients who are at risk of bleeding

All patients who have any of the following

- Active bleeding
- Acquired bleeding disorders (such as acute liver failure)
- Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with INR > 2)
- Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours or expected within the next 12 hours
- Acute stroke
- Thrombocytopenia (platelets $< 75 \times 10^9$)
- Uncontrolled systolic hypertension ($\geq 230/120$ mmHg)
- Untreated inherited bleeding disorders (such as haemophilia or von Willebrand's disease)

Quick reference guide

Medical patients



by 2010

amboer
e risk

of venou
bosis and
ted to ho

dates NIC

RISK ASSESSMENT FOR VENOUS THROMBOEMBOLISM (VTE)

All patients should be risk assessed on admission to hospital. Patients should be reassessed within 24 hours of admission and whenever the clinical situation changes.

STEP ONE

Assess all patients admitted to hospital for level of mobility (tick one box). All surgical patients, and all medical patients with significantly reduced mobility, should be considered for further risk assessment.

STEP TWO

Review the patient-related factors shown on the assessment sheet against thrombosis risk, ticking:

Any tick

The risk factors identified are not exhaustive. Clinicians may consider additional risks in individual patients and offer thromboprophylaxis as appropriate.

STEP THREE

Review the patient-related factors shown against bleeding risk and tick each box that applies (more than one box can be ticked).

Any tick should prompt clinical staff to consider if bleeding risk is sufficient to preclude pharmacological intervention.

Guidance on thromboprophylaxis is available at:

National Institute for Health and Clinical Excellence (2010) *Venous thromboembolism: reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital*. NICE clinical guideline 92. London: National Institute for Health and Clinical Excellence.

<http://www.nice.org.uk/guidance/CG92>

This document has been authorised by the Department of Health
Gateway reference no: 10278

RISK ASSESSMENT FOR VENOUS THROMBOEMBOLISM (VTE)

Mobility – all patients (tick one box)	Tick		Tick		Tick
Surgical patient		Medical patient expected to have ongoing reduced mobility relative to normal state		Medical patient NOT expected to have significantly reduced mobility relative to normal state	
Assess for thrombosis and bleeding risk below				Risk assessment now complete	

Thrombosis risk					
Patient related	Tick	Admission related		Tick	
Active cancer or cancer treatment		Significantly reduced mobility for 3 days or more			
Age > 60		Hip or knee replacement			
Previous VTE		Major surgery			
Other factors					
Total					
Bleeding risk					
Patient related	Tick	Admission related		Tick	
One or more significant medical comorbidities (eg heart disease; metabolic, endocrine or respiratory pathologies; acute infectious diseases; inflammatory conditions)		Acute surgical admission with inflammatory or intra-abdominal condition			
Personal history or first-degree relative with a history of VTE		Critical care admission			
Use of hormone replacement therapy		Surgery with significant reduction in mobility			
Use of oestrogen-containing contraceptive therapy					
Varicose veins with phlebitis					
Pregnancy or < 6 weeks post partum (see NICE guidance for specific risk factors)					

Patient related	Tick	Admission related		Tick	
Active bleeding		Neurosurgery, spinal surgery or eye surgery			
Acquired bleeding disorders (such as acute liver failure)		Other procedure with high bleeding risk			
Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with INR > 2)		Lumbar puncture/epidural/spinal anaesthesia expected within the next 12 hours			
Acute stroke		Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours			
Thrombocytopenia (platelets < 75 x 10 ⁹ /l)					
Uncontrolled systolic hypertension (≥ 200/120 mmHg or higher)					
Untreated inherited bleeding disorders (such as haemophilia and von Willebrand's disease)					

Commissioning for Quality and Innovation (CQUIN) 2010–2014

- **National CQUIN goal:**
reduce avoidable death, disability and chronic ill health from VTE
- **Quality indicator:**
>95% of all adult inpatients risk assessed for VTE on admission to hospital, using the national tool



VTE PREVENTION PATHWAY

Identify at-risk patient



Counsel at-risk patient



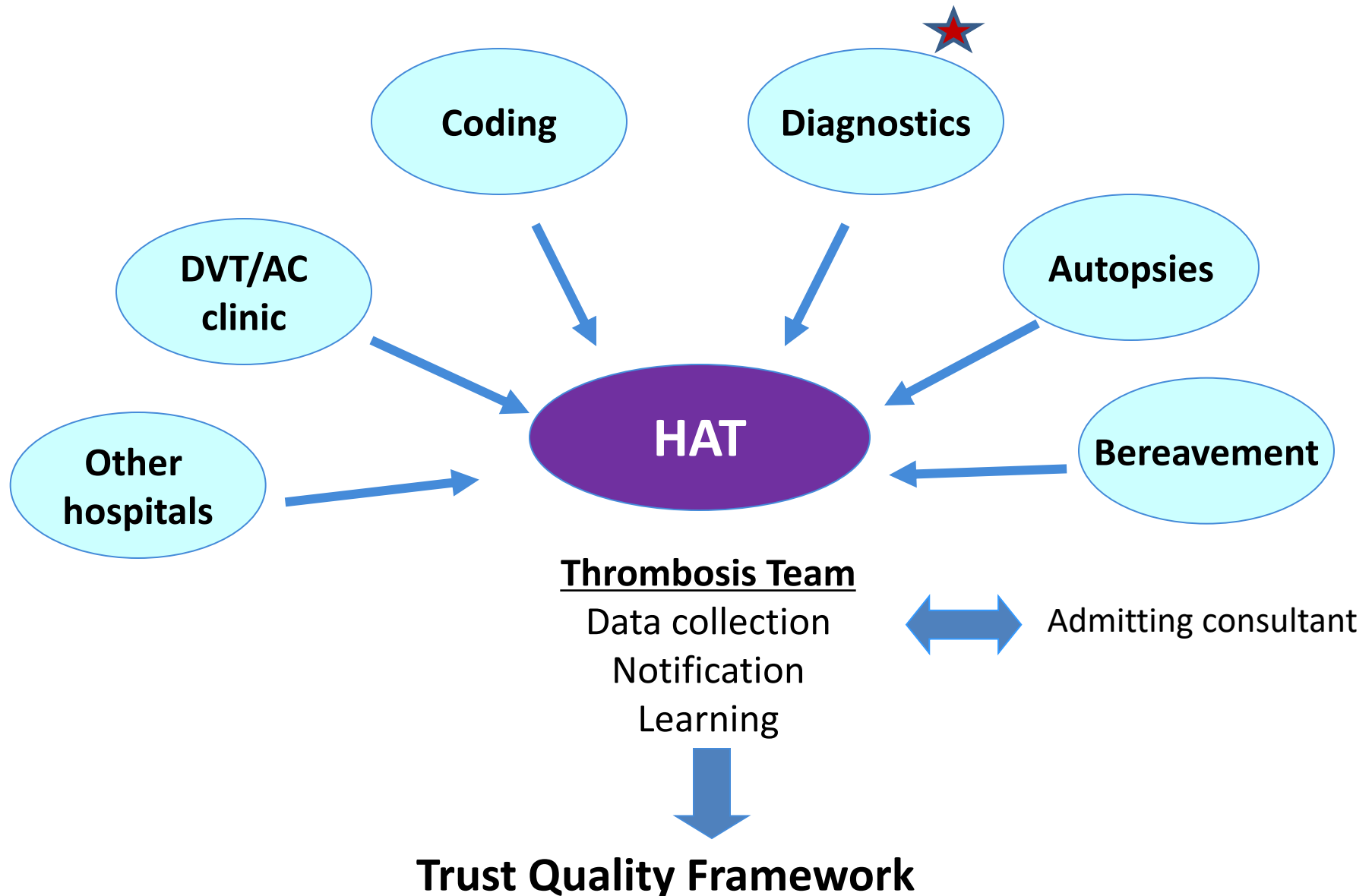
Prescribe
thromboprophylaxis



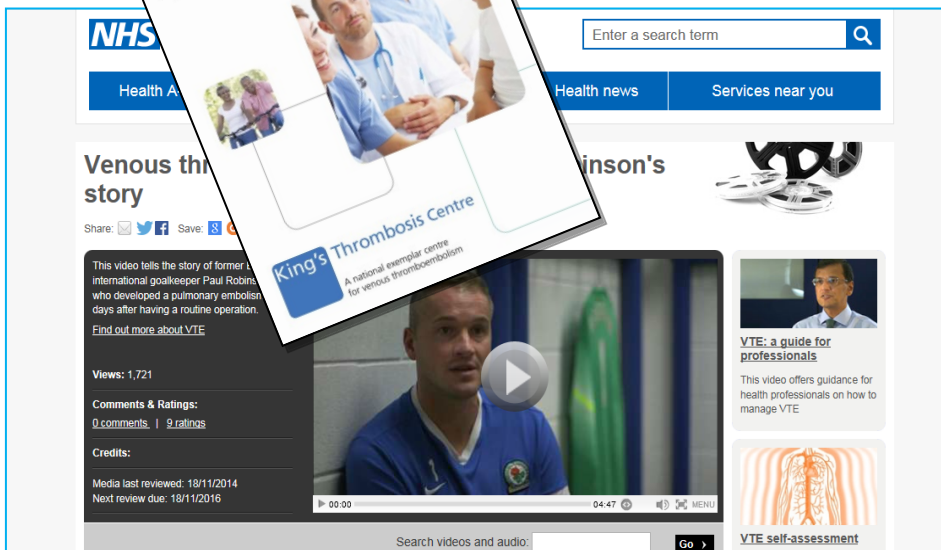
Administer
thromboprophylaxis

NICE
Quality
Standard 3

Identifying potentially preventable cases of HAT



Patient empowerment



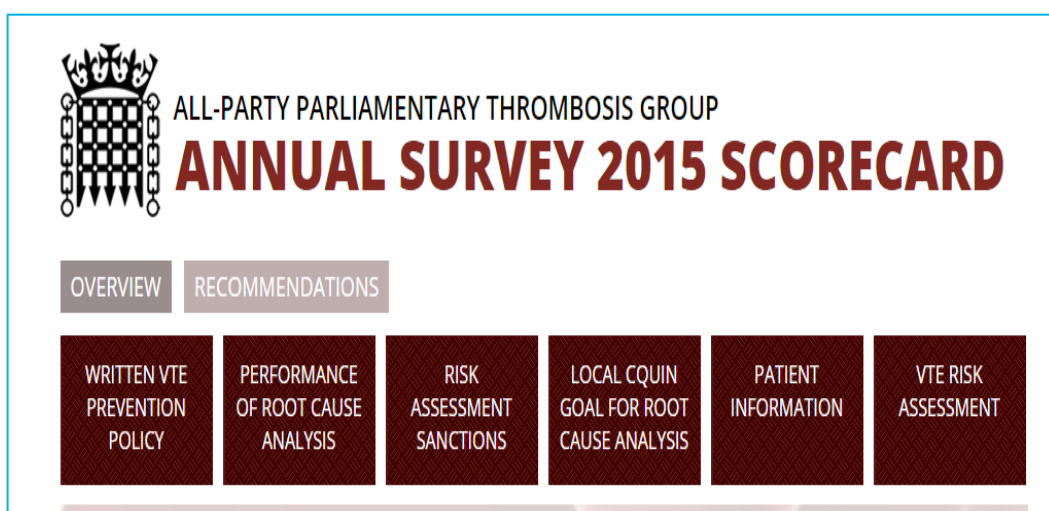
The screenshot shows the NHS website with a search bar at the top. Below the search bar, there are links for 'Health news' and 'Services near you'. A video player is featured, showing a man in a blue shirt speaking. The video is titled 'Venous thrombosis: a guide for patients at King's College Hospital'. The video player includes a play button, a progress bar, and a volume icon. Below the video player, there are links for 'Find out more about VTE', 'Views: 1,721', 'Comments & Ratings: 0 comments | 9 ratings', and 'Credits: Media last reviewed: 18/11/2014 Next review due: 18/11/2016'. To the right of the video player, there is a section titled 'VTE: a guide for professionals' with a video player and a link to 'VTE self-assessment'.



The screenshot shows the Thrombosis UK website. The header includes the Thrombosis UK logo, navigation links for 'AWARENESS', 'RESEARCH', 'CARE', 'AUDIO/VISUAL', and buttons for 'DONATE' and 'MENU'. The main content area features a large blue banner with the text 'Thrombosis UK is dedicated to promoting awareness, research & care of Thrombosis'. Below this banner are links for 'WHAT IS THROMBOSIS', 'FAQS', 'SIGNS, SYMPTOMS & RISKS', 'PATIENT INFORMATION', and 'LEARN MORE'. To the right of the banner, there is a red section titled 'It is estimated that: Every 6 seconds a person dies from VTE globally.' and a yellow section titled 'Fundraise' with a link to 'BECOME A FUNDRAISER AND SUPPORT THROMBOSIS UK'. At the bottom right, there is a 'Donate' section with the text 'and make a difference' and 'HELP US STOP THE CLOTS'.



The screenshot shows the anticoagulationuk website. The header includes the anticoagulationuk logo and a search bar. Below the header, there are navigation links for 'Home', 'World of Anticoagulation', 'Cancer & Blood Clots', 'News', 'Conditions', 'Experiences', and 'Advice'. The main content area features a large image of a smiling woman. To the right of the image, there is a section titled 'anticoagulationuk' with the text 'THE MAGAZINE FOR PEOPLE TAKING ANTICOAGULANT THERAPY'. Below this section, there is a link to 'FIND OUT MORE ABOUT' and a list of topics: 'ATRIAL FIBRILLATION, DEEP VEIN THROMBOSIS, WARFARIN, NEW ORAL ANTICOAGULANTS, HEART VALVES, PATIENT STORIES, CAMPAIGNS, CURRENT NEWS & VIEWS AND MUCH MORE BESIDES'. At the bottom, there is a section titled 'SUPPORT FOR PATIENTS' with the text 'Keep up to date with what is happening in the world of anticoagulation and support ACE Buy individual copies of anticoagulationUK online'.



The screenshot shows the All-Party Parliamentary Thrombosis Group Annual Survey 2015 Scorecard. The header includes the Royal Coat of Arms and the text 'ALL-PARTY PARLIAMENTARY THROMBOSIS GROUP'. Below the header, there is a large section titled 'ANNUAL SURVEY 2015 SCORECARD'. Below this section, there are two tabs: 'OVERVIEW' and 'RECOMMENDATIONS'. Below the tabs, there are six boxes representing different areas of the survey: 'WRITTEN VTE PREVENTION POLICY', 'PERFORMANCE OF ROOT CAUSE ANALYSIS', 'RISK ASSESSMENT SANCTIONS', 'LOCAL CQUIN GOAL FOR ROOT CAUSE ANALYSIS', 'PATIENT INFORMATION', and 'VTE RISK ASSESSMENT'.

VTE Education

- 4 e-training modules created by King's Thrombosis Centre in partnership with HEE
- Part of mandatory training at every Trust in England
- Currently being updated



The screenshot shows the e-LfH e-VTE website. At the top, the e-LfH logo is on the left, followed by the text 'An extraordinary project in terms of breadth and skill of content' and 'e-Learning Age - Judges citation'. The NHS Health Education England logo is on the right. Below this is a navigation bar with links: Home, Programmes, About, Latest News, Support, Demo, and Contact Us. A search bar is also present. The main banner features the e-VTE logo and the text 'A web based education resource designed to help raise awareness and improve understanding of Venous Thromboembolism'. To the right of the banner is an image of red blood cells. Below the banner, there is a 'Menu' section with links: Programme home, More information (selected), Meet the team, and Access the e-learning. To the right of the menu is a 'More information' section titled 'VTE prevention e-learning course'. This section contains text about the resources developed in partnership with the NHS England National VTE Prevention Programme, aimed at healthcare professionals in Secondary Care. It mentions that the e-learning session was first published in 2010 and updated in 2013, and that three new sessions have been developed in 2014. The first session is aimed at Primary Care, the second at commissioners, and the third at undergraduates. At the bottom, a footer states 'e-LfH is a Health Education England Programme in partnership with the NHS and Professional Bodies' and provides links for Terms and Conditions, Accessibility Statement, and Site Map.

e-LfH
e-Learning for Healthcare

An extraordinary project
in terms of breadth and
skill of content

e-Learning Age -
Judges citation

Log in to your e-learning

NHS
Health Education England

Home Programmes About Latest News Support Demo Contact Us search...

e-VTE
A web based education resource designed to help raise awareness
and improve understanding of Venous Thromboembolism

Menu

- Programme home
- More information
- Meet the team
- Access the e-learning

More information

VTE prevention e-learning course

These resources have been developed in partnership with the NHS England National VTE Prevention Programme. The e-learning session for healthcare professionals in Secondary Care first published in 2010 and updated in 2013 is aimed at nurses, pharmacists and junior doctors to help them understand the concept of hospital-associated thrombosis and how to prevent it.

Three new sessions have been developed in 2014.

The first is aimed at Primary Care to increase the awareness of healthcare-related VTE and enhance the quality of patient care with respect to VTE prevention prior to hospital admission and after discharge. It is designed for all healthcare professionals including GPs, nurses, health visitors, midwives and community pharmacists.

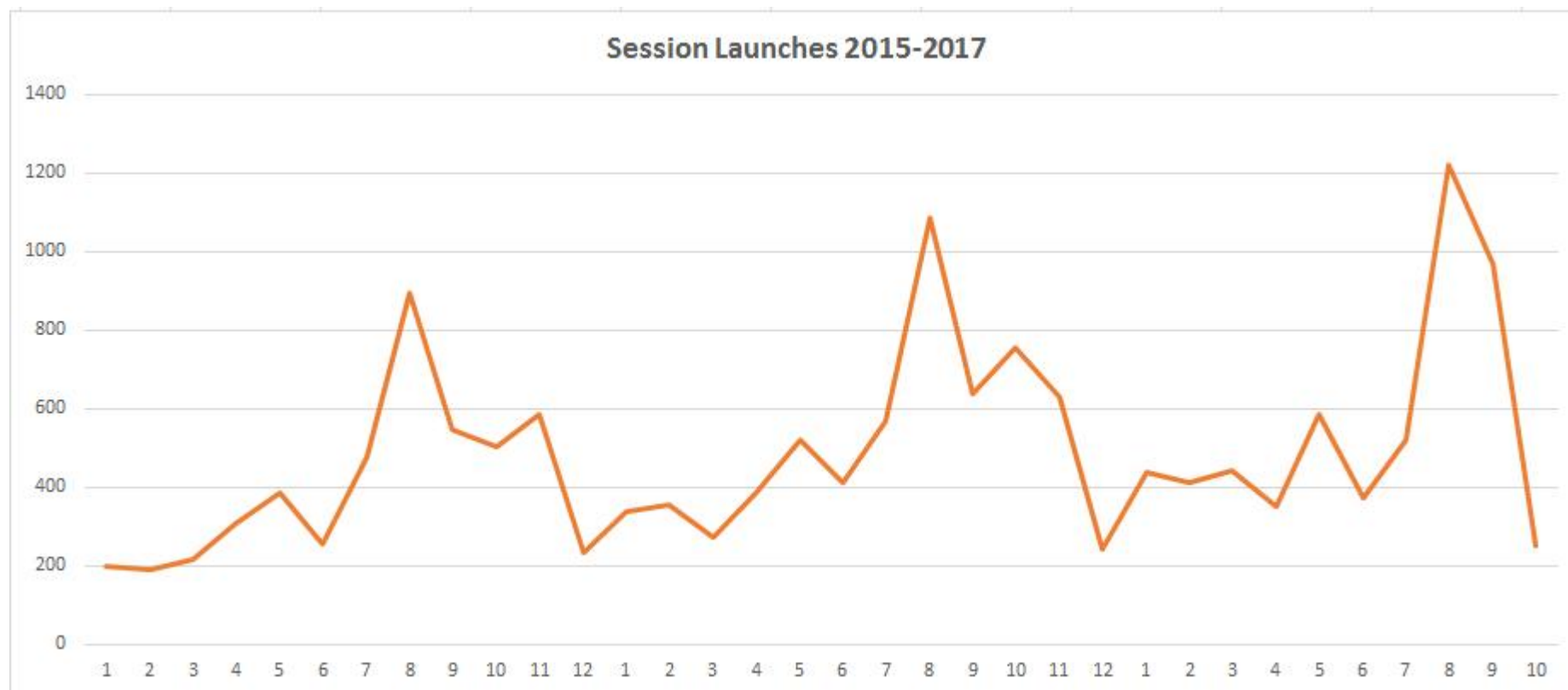
The second session has been developed for commissioners. This e-learning session provides a brief overview of venous thromboembolism as a condition and outlines the key role that commissioners have to play in ensuring that the delivery of acute care services across a range of medical & surgical specialities is underpinned by a high quality approach to VTE prevention in order to improve outcomes for patients.

The third e-learning session is aimed at undergraduates and is focused on the pathophysiology of VTE and pre-disposing risk factors, as well as outlining why prevention is so important in the context of the national programme.

e-LfH is a Health Education England Programme in partnership with the NHS and Professional Bodies

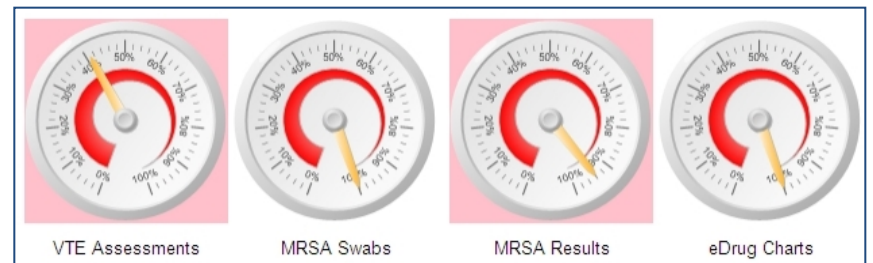
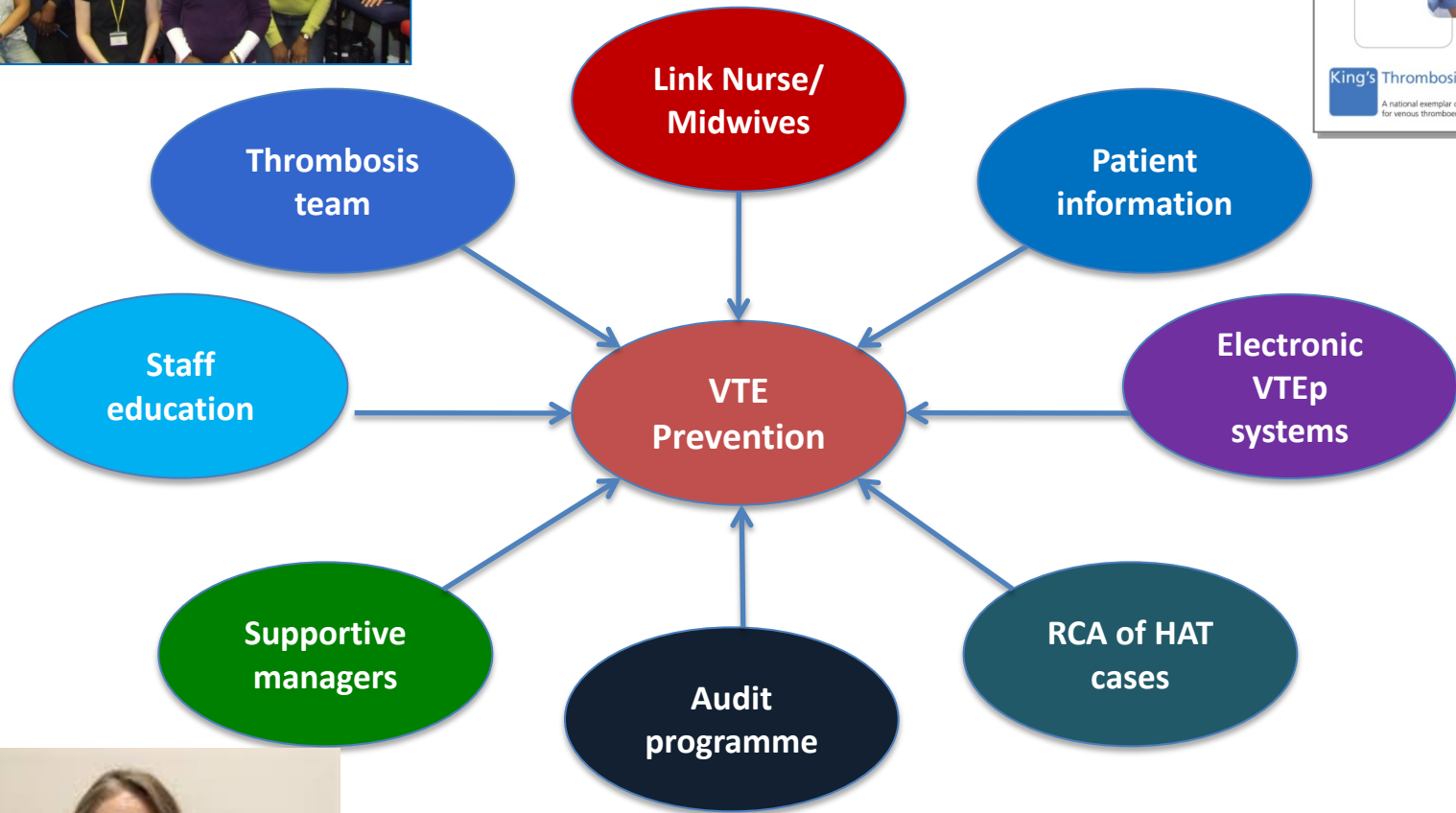
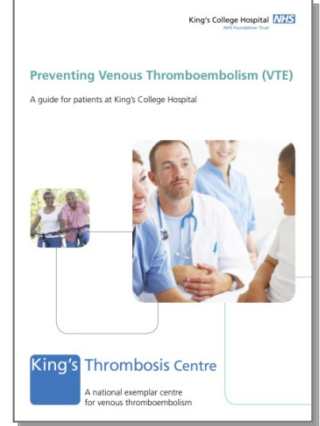
Terms and Conditions | Accessibility Statement | Site Map

Uptake of VTE prevention training >60,000 completions





Preventing VTE



The VTE Exemplar Centres Network

Instituted by DH in 2007 to develop and disseminate best practice in VTE prevention and care; currently 32 centres of excellence



The National VTE Exemplar Centres Network







Global Leaders

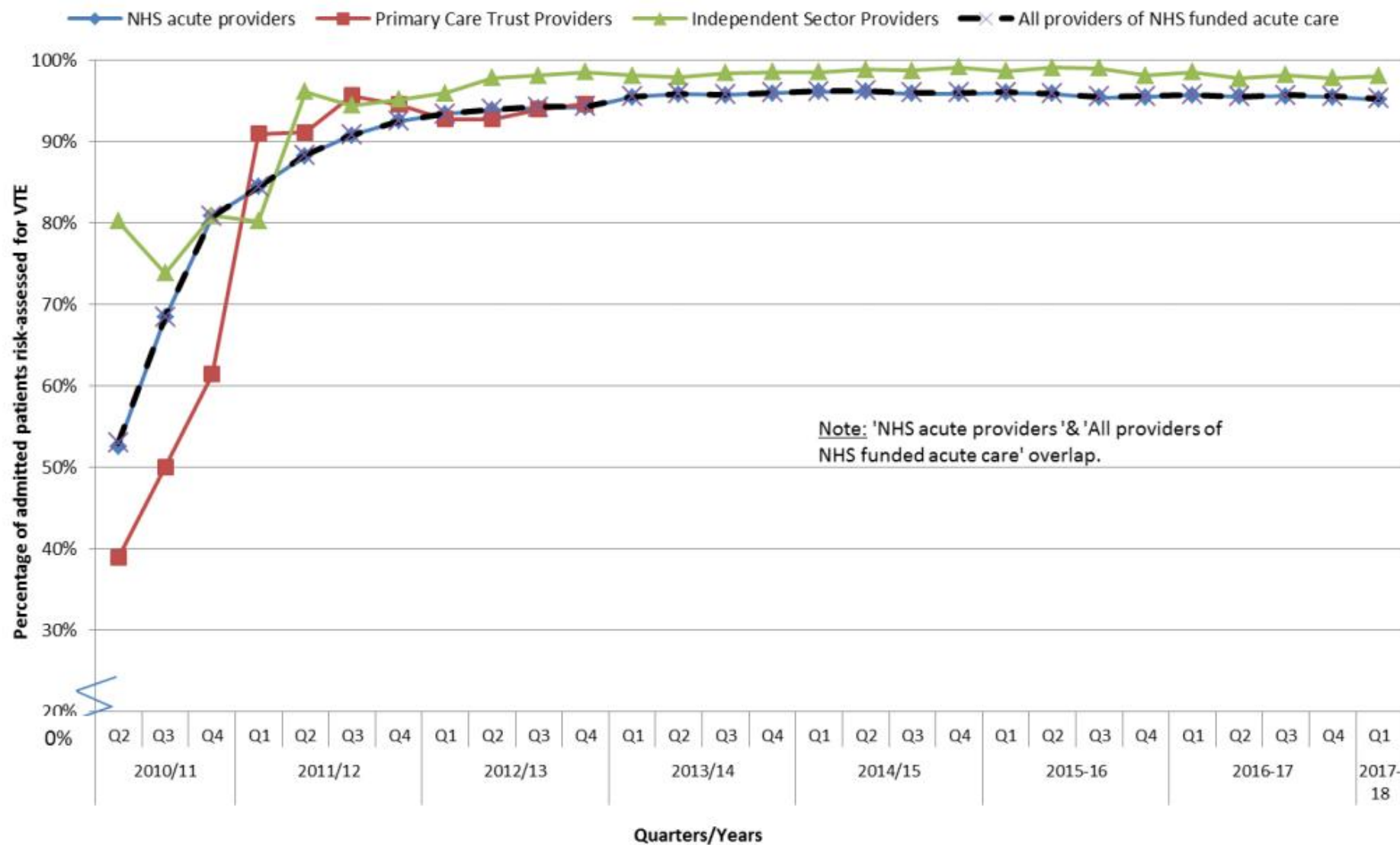
- Comprehensive, systematic approach to VTE prevention
- First national initiative of its kind anywhere in the world
- Key patient safety initiative:
 - ✓ Delivering high quality care
 - ✓ Reducing avoidable harm
 - ✓ Safer hospitals
- Delivered change, enabled by levers provided by NHS
- Consistent >95% VTE risk assessment within acute care in England

**Has the National VTE Prevention Programme
made a difference?**

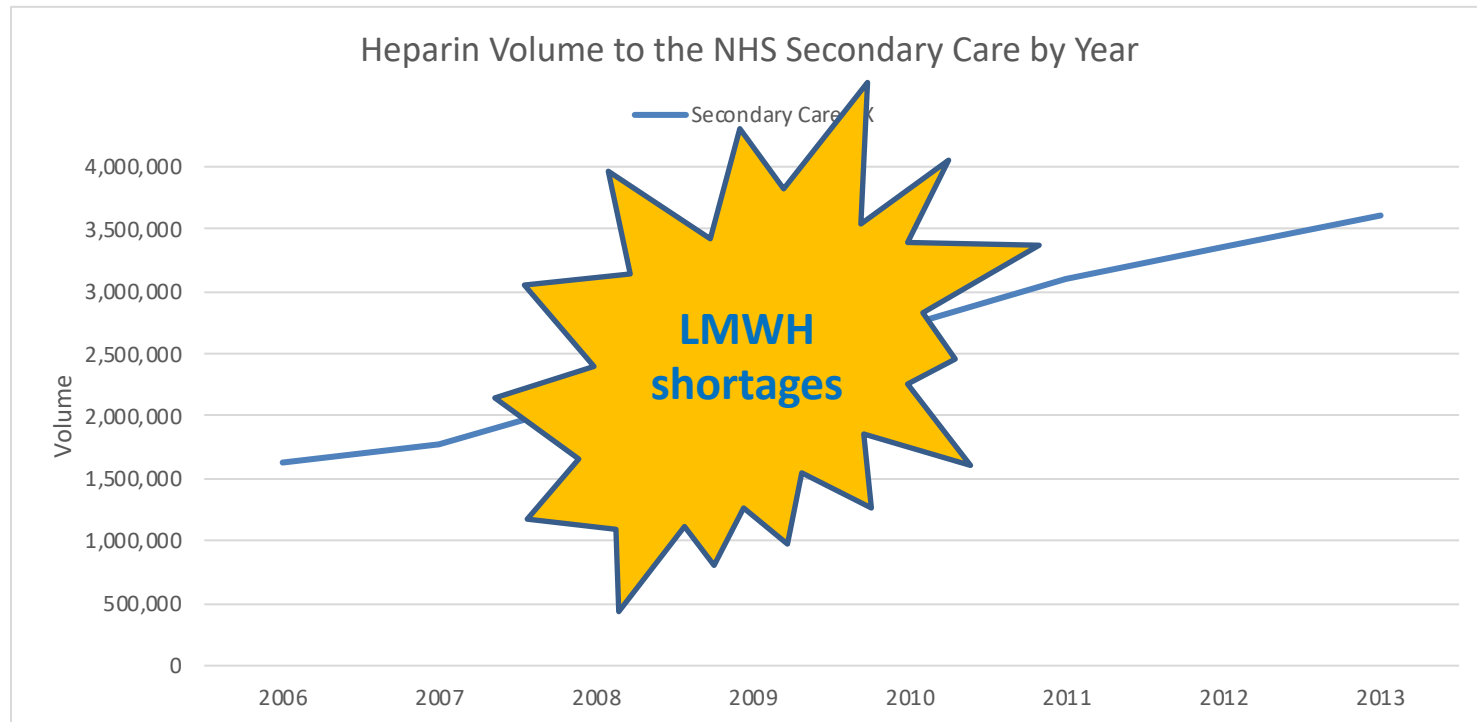
VTE prevention in the NHS

- VTE is high on Trust Quality and Patient Safety agendas.
- There is local and national oversight of VTE risk assessment rates.
- Local audit of VTE prevention and monitoring of HAT
- Impact on outcomes?

VTE risk assessment rates



Usage of prophylactic LMWH



Process measures: AUDIT

Reducing Risks

7 Did Patient receive any of the following - please select all that apply

Enoxaparin	<input checked="" type="checkbox"/>	Rivaroxaban	<input type="checkbox"/>
AES (Anti embolism Stockings / TED stockings)	<input checked="" type="checkbox"/>	UFH (un-fractionated Heparin)	<input type="checkbox"/>
IPC (intermittent pneumatic compression)	<input type="checkbox"/>	Other (please specify)	<input type="checkbox"/>
Already on warfarin	<input type="checkbox"/>	None prescribed	<input type="checkbox"/>

8 If Enoxaparin was prescribed what was the dose?

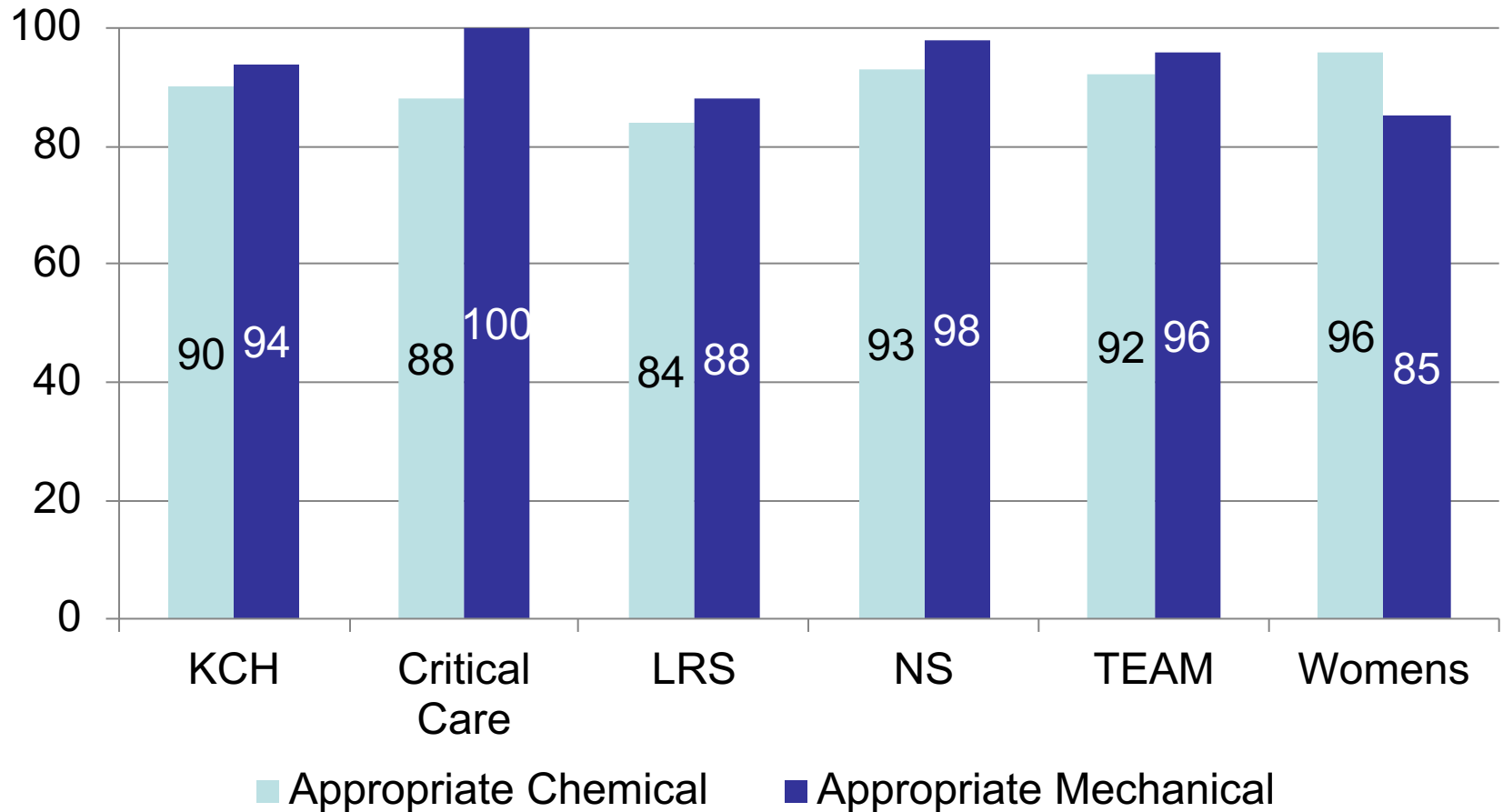
20mg od	40mg od	40mg bd	60mg bd	Other, please specify	Enoxaparin not prescribed
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9 Is the patient wearing AES?

Yes	No
<input checked="" type="radio"/>	<input type="radio"/>

Audit findings: Standard 4

Was pharmacological or mechanical TP correct?



King's College Hospital data

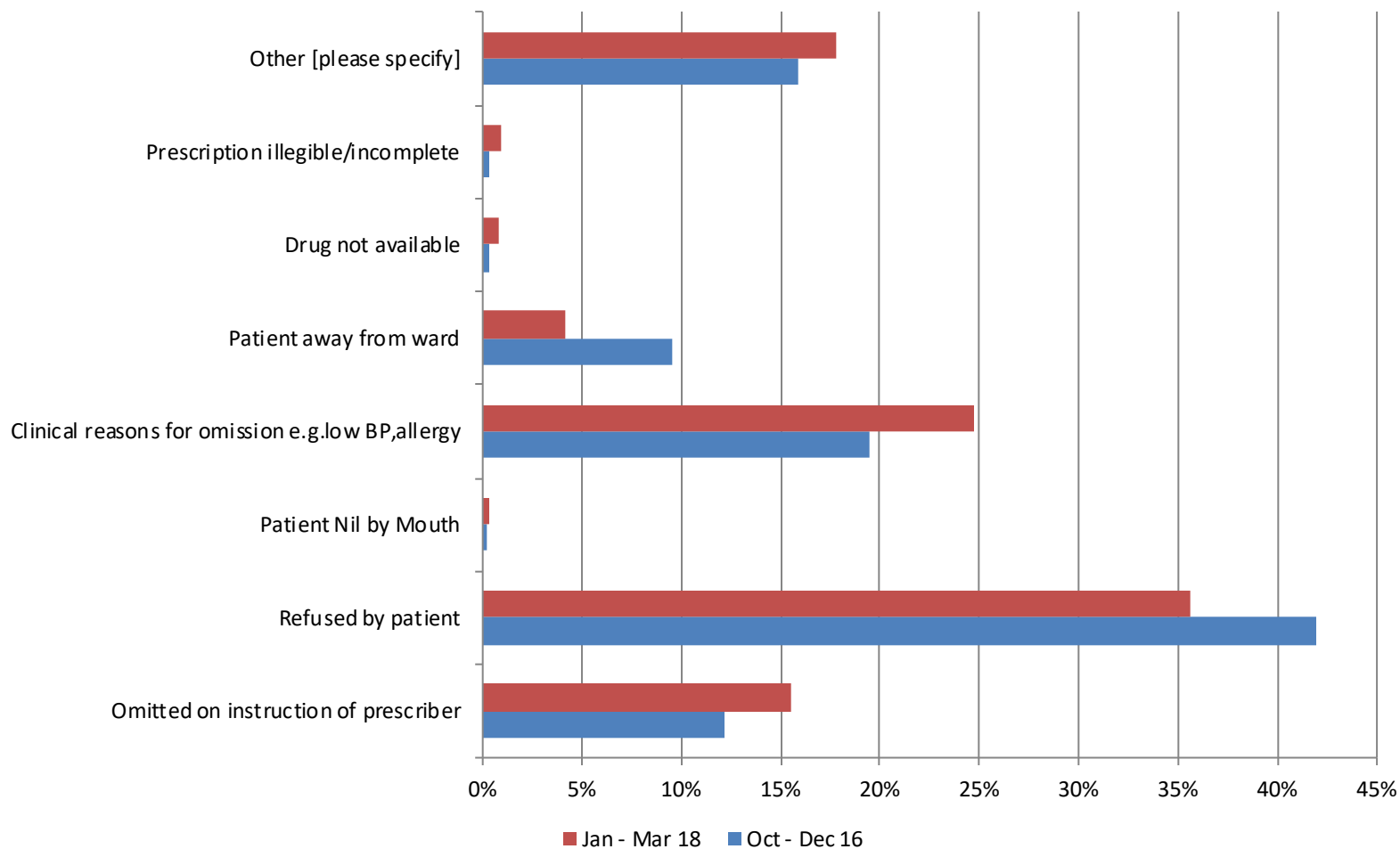
Local audit of LMWH omissions

	Oct-Dec 16	Jan - Mar 18
No. of doses prescribed	41508	34342
No. of omissions	5334	2829
Percentage of doses omitted over doses prescribed	13%	8%

Absolute reduction in total omissions of 5%,
relative reduction of 46%

King's College Hospital data

Reasons for LMWH omissions



King's College Hospital data

The Joint Commission Journal on Quality and Patient Safety 2019; 45:145–147

Please stop using venous thromboembolism (VTE) outcomes for Pay-for-Performance and Public reporting

Elliott R. Haut, MD, PhD, FACS

COMMENTARY

 blood advances

TO THE EDITOR:

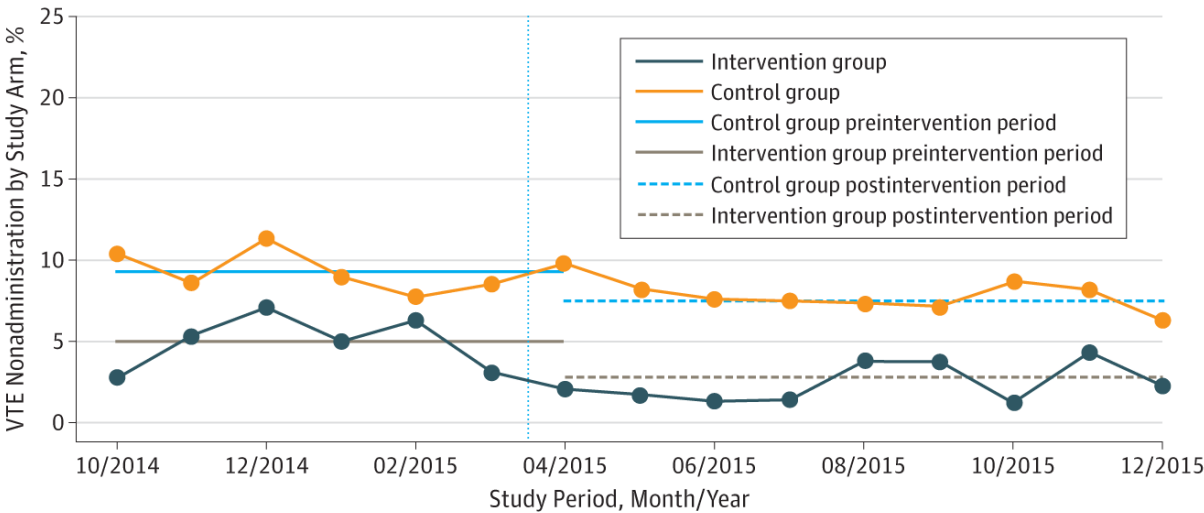
**What the 2018 ASH venous thromboembolism guidelines omitted:
nonadministration of pharmacologic prophylaxis in hospitalized patients**

Oluwafemi P. Owodunni,¹ Brandyn D. Lau,²⁻⁵ Michael B. Streiff,^{4,6} Peggy S. Kraus,⁷ Deborah B. Hobson,^{1,8} Dauryne L. Shaffer,^{1,8}
Kristen L. W. Webster,^{1,4} Mujan Varasteh Kia,¹ Christine G. Holzmueller,^{1,4} and Elliott R. Haut^{1,4,5,9,10}

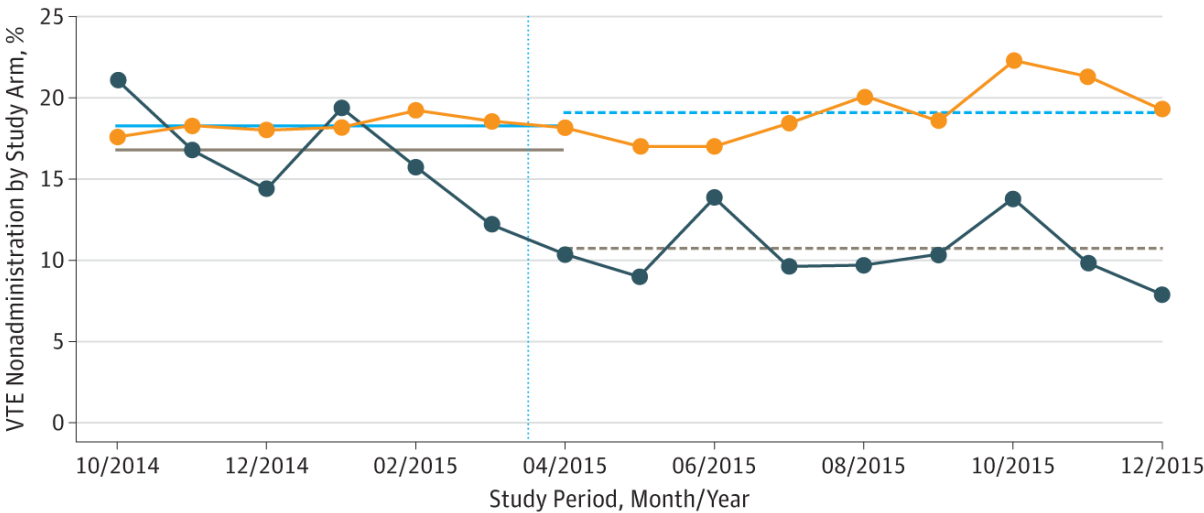
- At John Hopkins: 12% prescribed doses LMWH not administered, 40% missed ≥ 1 dose
60% due to patient or family member refusal
- Quality improvement programmes have targeted prescription of prophylaxis alone
Missed doses constitute the next target for quality improvement
- Two approaches:
 1. Web-based education module for nurses
 2. Patient education bundle

Effect of Real-time Patient-Centered Education Bundle on Administration of Venous Thromboembolism Prevention in Hospitalized Patients

A Surgical units



B Medicine units



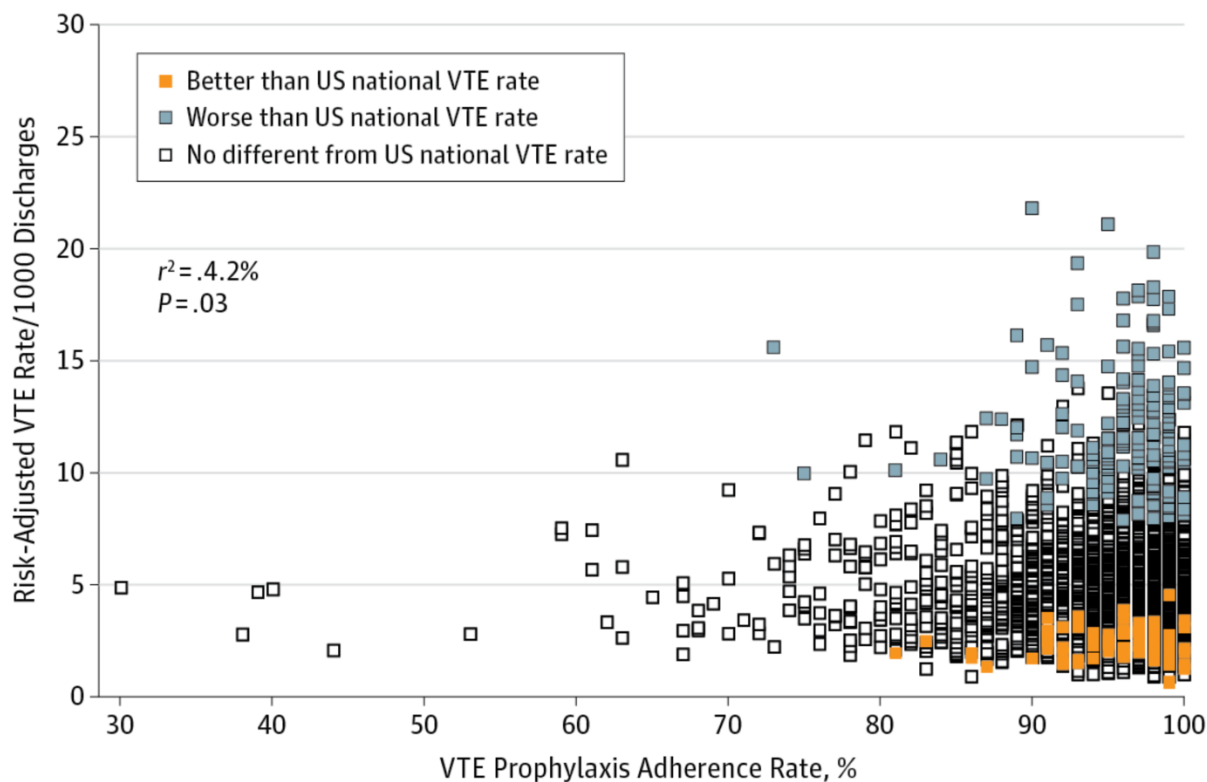
Impact of national VTE prevention programme in England on real world outcomes:

Understanding VTE outcomes

- Limitations of thromboprophylaxis
- Limitations of coding
- Limitations of death reporting
- Limitations of the outcome indicator as marker for quality of VTE prevention process

Surveillance Bias and the Validity of the VTE Quality Measure

Hospital VTE Prophylaxis Adherence Rates & Risk-Adjusted VTE Event Rates



Bilimoria *et al*, JAMA. 2013;310(14):1482-1489.

Impact of national VTE prevention programme in England

Global burden of cardiovascular disease

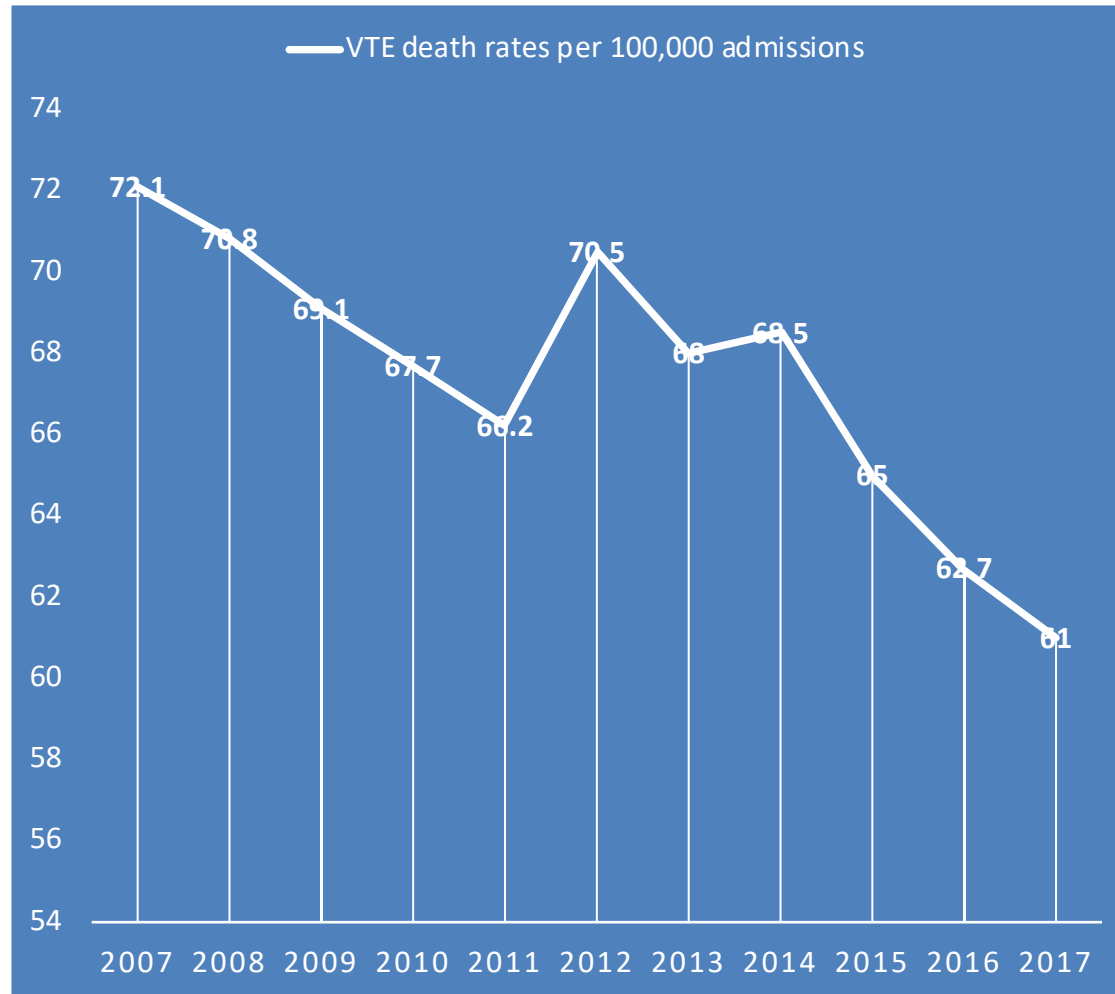
Impact of the national venous thromboembolism risk assessment tool in secondary care in England: retrospective population-based database study

David Catterick^{a,b} and Beverly J. Hunt^c

*Tom Zoller, Nick Freeman, Anna Segal, Samir Hajj, John Vasey,
Domenico Pagano^{1,2}*

1. Blood Coagul Fibrinolysis 2014; 25(6):571-62.
2. Heart 2013; 0:1–6.
3. Chest. 2013 ; 144(4):1276-81.

Deaths from VTE related events within 90 days post discharge from hospital rate per 100,000 adult admissions, 2007/08 to 2017/2018

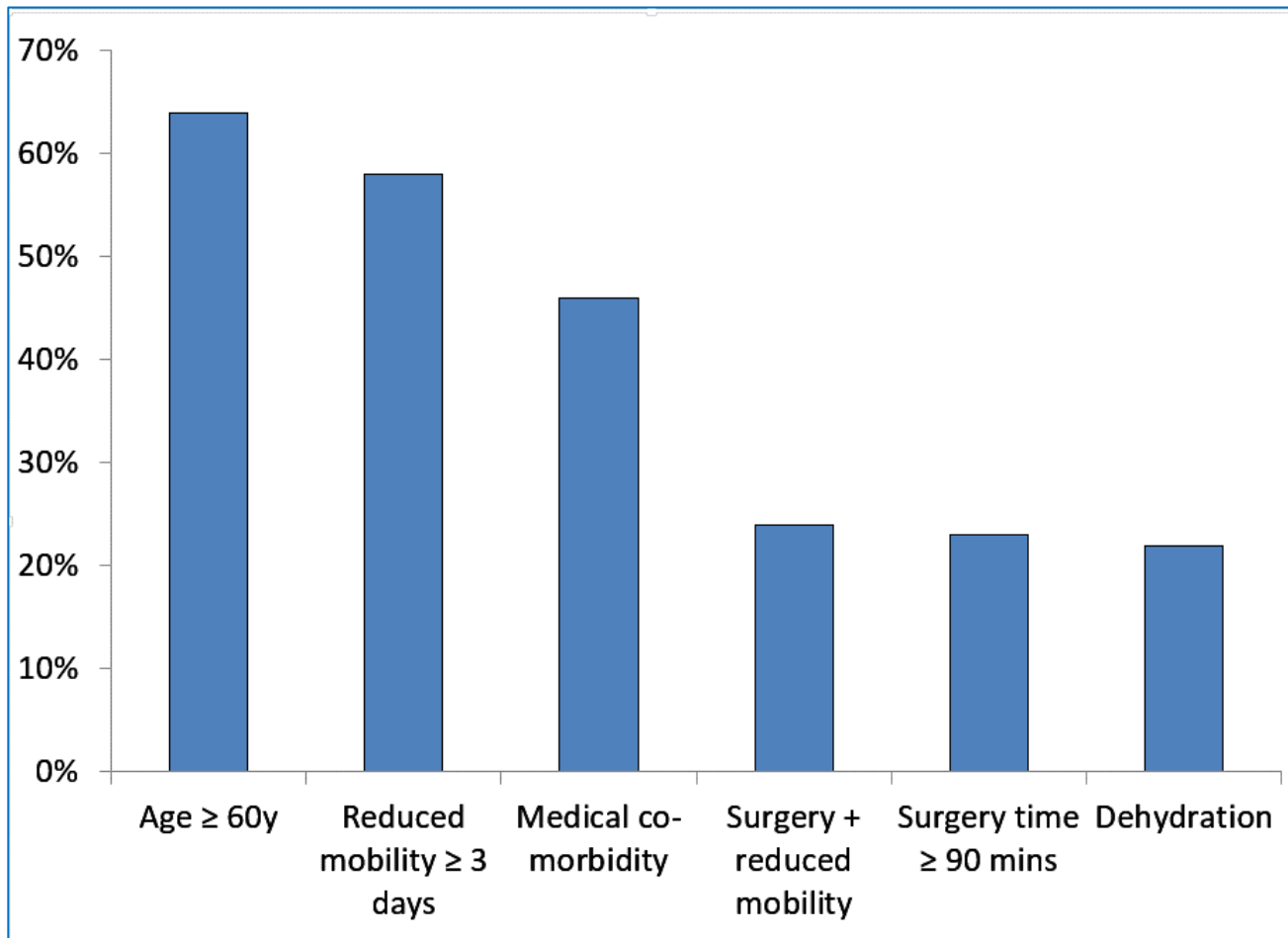


What we have learnt from RCA of hospital-associated thrombosis

- **Multidisciplinary approach** in prophylaxis implementation help reduce preventable HATs.
- **Multifaceted interventions** including education and electronic prompts improve prophylaxis prescription and administration.
- **Rapid communication** of learning from incidents via regular teaching sessions reduce repetitive errors.

HAT root cause analysis:

Majority of cases received appropriate thromboprophylaxis



King's College Hospital data

Limitations of the current approach to VTE prevention

- Paucity of real world outcome data
- Outdated risk estimates
- Outdated prophylaxis studies
- Absence of standardised approach to audit and RCA

Limitations of the current approach to VTE prevention

- Modern studies particularly in medical patients show low event rates and limited benefit of extended thromboprophylaxis
- Are we overusing prophylaxis in certain indications?
- No knowledge of bleeding rates
- Many grey areas:
 - LL immobilisation
 - mental health
 - Rehab / nursing homes

What's new in VTE prevention?

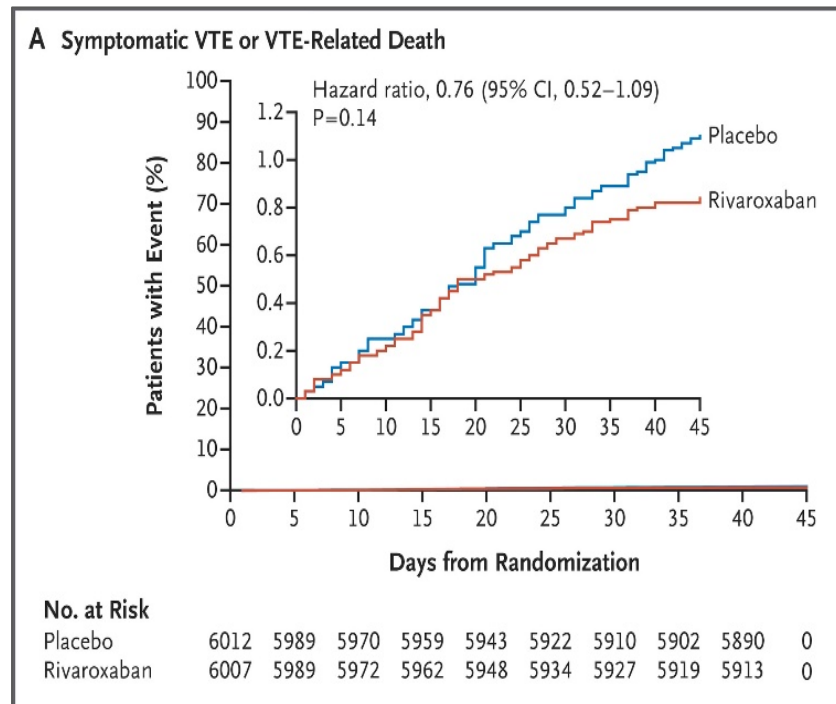
APEX: extended thromboprophylaxis with betrixaban in acutely ill medical patients

- 7513 acutely ill medical patients with reduced mobility & specific risk factors for VTE: extended duration betrixaban vs standard duration enoxaparin
- Sequential analyses in 3 prespecified, progressively inclusive cohorts, based on elevated D-dimer and age ≥ 75 years.
- Conclusion: Among acutely ill medical patients with elevated D-dimer no significant difference in primary efficacy outcome
- APEX landmark analysis: d6 to d35 prophylaxis with betrixaban reduces symptomatic VTE 1.33% to 0.88% (NNT 233) “50-60% medical inpatients eligible” Bleeding 0.7% vs 0.6%

Betrixaban licensed by FDA but not by EMA

MARINER Study: rivaroxaban for thromboprophylaxis after hospitalization for medical illness

Patients identified on basis of IMPROVE score ≥ 4 or IMPROVE of 2/3 + high D-dimer;
Received 45 days Riva 10 mg od vs placebo **after discharge**



Primary efficacy outcome:
0.83% riva vs 1.1% placebo

Secondary outcome, symptomatic nonfatal PE:
0.18% riva vs 0.43% placebo

Major bleeding: 0.28% riva vs 0.15% placebo

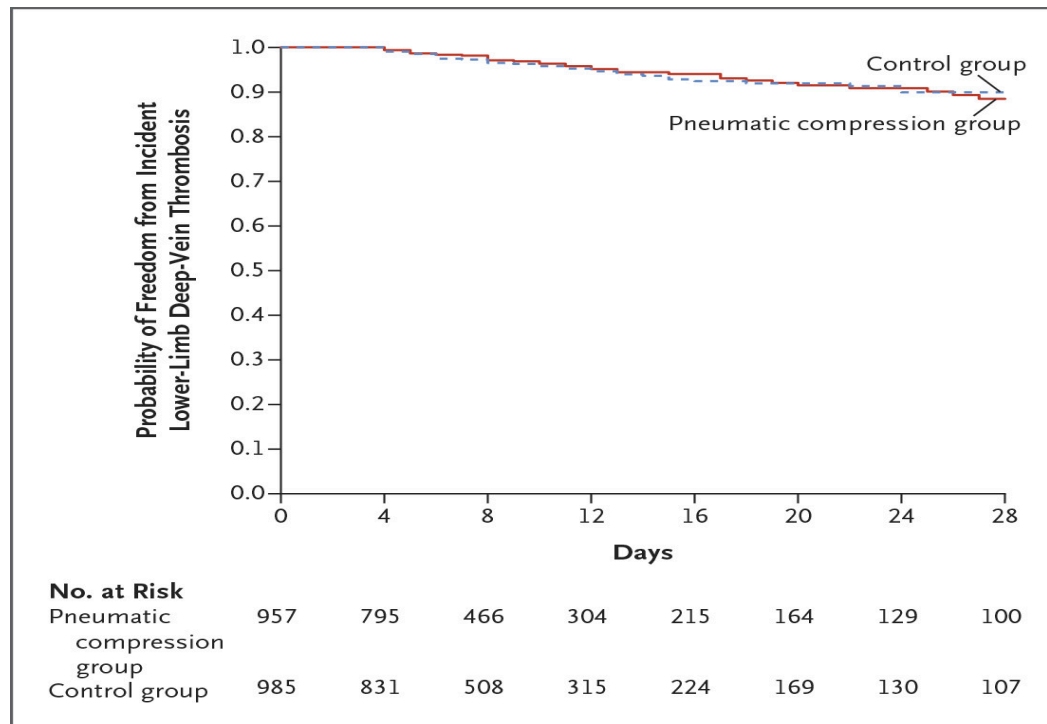
Conclusion: Rivaroxaban given to medical patients for 45 days after hospital discharge did not significantly lower risk of symptomatic VTE / VTE death. Incidence of major bleeding was low.

DOACs for thromboprophylaxis in ambulatory patients with cancer

Cumulative Analysis of the AVERT and CASSINI Trials.*									
Outcome	CASSINI Trial		AVERT Trial		Cumulative Values				No. Needed to Treat or Harm†
	Rivaroxaban	Placebo	Apixaban	Placebo	DOACs	Placebo	Relative Risk (95% CI)	Absolute Difference	
	number/total number (percent)						percentage points		
Primary efficacy outcome									
ITT analysis	25/420 (6.0)	37/421 (8.8)	12/288 (4.2)	28/275 (10.2)	37/708 (5.2)	65/696 (9.3)	0.56 (0.38–0.83)	–4.1	24
Analysis during treatment period	11/420 (2.6)	27/421 (6.4)	3/288 (1.0)	20/275 (7.3)	14/708 (2.0)	47/696 (6.8)	0.29 (0.16–0.53)	–4.8	21
Symptomatic VTE: ITT analysis	15/420 (3.6)	19/421 (4.5)	9/288 (3.1)	22/275 (8.0)	24/708 (3.4)	41/696 (5.9)	0.58 (0.35–0.94)	–2.5	40
Major bleeding	8/405 (2.0)	4/404 (1.0)	10/288 (3.5)	5/275 (1.8)	18/693 (2.6)	9/679 (1.3)	1.96 (0.88–4.33)	1.3	77
Death from any cause	84/420 (20.0)	100/421 (23.8)	35/288 (12.2)	27/275 (9.8)	119/708 (16.8)	127/696 (18.2)	0.92 (0.73–1.16)	–1.4	71

- **AVERT study**: apixaban was associated with lower incidence of VTE than placebo but with a higher incidence of major bleeding; 37% discontinued treatment.
- **CASSINI study**: incidence of VTE lower with rivaroxaban in the per-protocol analysis but not in the primary ITT analysis; no difference in major bleeding; 47% discontinued treatment.

PREVENT study: Adjunctive intermittent pneumatic compression for thromboprophylaxis

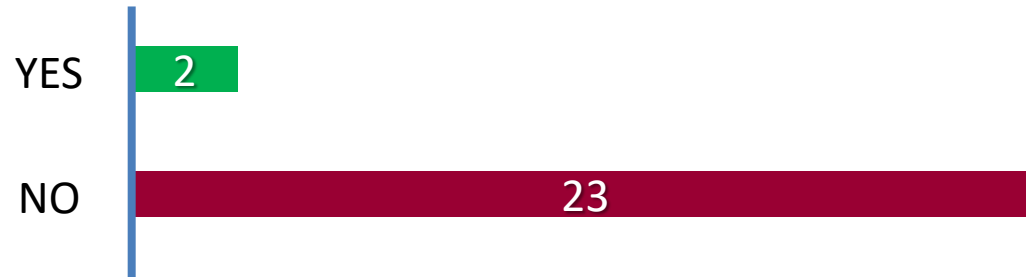


Among critically ill patients receiving pharmacologic thromboprophylaxis, adjunctive IPC did not lower incidence of proximal DVT vs pharmacologic thromboprophylaxis alone.

NICE GC92 → NG89

➔ NICE recommends risk assessment using a tool published by a national UK body, professional network or peer-reviewed journal

- Are you planning to change the VTE risk assessment tool used?



➔ Acutely ill medical patients and majority of surgical patients offer pharmacological prophylaxis for a minimum of 7 days

- Do you routinely give 7 days pharmacological prophylaxis as indicated in NG89?



2018 American Society of Hematology Guidelines on VTE

Prophylaxis for Medical Patients

- Strong recommendations included
 - pharmacological VTE prophylaxis in acutely or critically ill inpatients at acceptable bleeding risk
 - use of mechanical prophylaxis when bleeding risk is unacceptable
 - against the use of DOACs during hospitalization
 - against extending pharmacological prophylaxis after hospital discharge.
- Conditional recommendations included
 - not to use VTE prophylaxis routinely in long-term care patients or outpatients with minor VTE risk factors.
 - use of graduated compression stockings or LMWH in long-distance travelers only if they are at high risk for VTE

VTE prevention in England: where we are now

- VTE prevention is 'business as usual' in the NHS in England and remains a priority within hospitals
- VTE risk assessment remains ~95%
- Linked to NICE NG89
- Audit and RCA of HAT cases are not universally performed
- Post-discharge VTE deaths continue to fall
- National VTE Exemplar Centres Network continues to grow

What we could have done differently...

- Design risk assessment tool to enable subsequent validation
- Better understand outcomes at outset
- National standardised audit process
- National registry for hospital-associated thrombosis

Feasibility study for a NCA for VTE prevention

The Healthcare Quality Improvement Partnership (HQIP) commissioned the Health Innovation Network (HIN) to complete a one year feasibility study for a *National Clinical Audit for Venous Thromboembolism (VTE) Prevention* in adult hospital inpatients



More research required!

- Risk assessment models
- Thromboprophylaxis choice and duration
- Real world outcomes
- Patient-centred approaches
- Focus on special patient populations:
pregnancy, obesity, cancer, trauma

Preventing HAT

- National VTE prevention programme has developed a comprehensive systems-based approach to VTE prevention
- There have been demonstrable improvements in process measures and VTE outcomes
- Substantial burden of HAT remains
- Sustaining and improving best practice in VTE prevention is a continuing challenge



VTE Exemplar Centres

Providing leadership in thrombosis care



VTE Exemplar Centres
Providing leadership in thrombosis care

Roopen Arya

**King's Thrombosis Centre
King's College Hospital**

roopen.arya@nhs.net

www.kingsthrombosiscentre.org.uk