



VTE: Who's at risk?

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With special thanks to:

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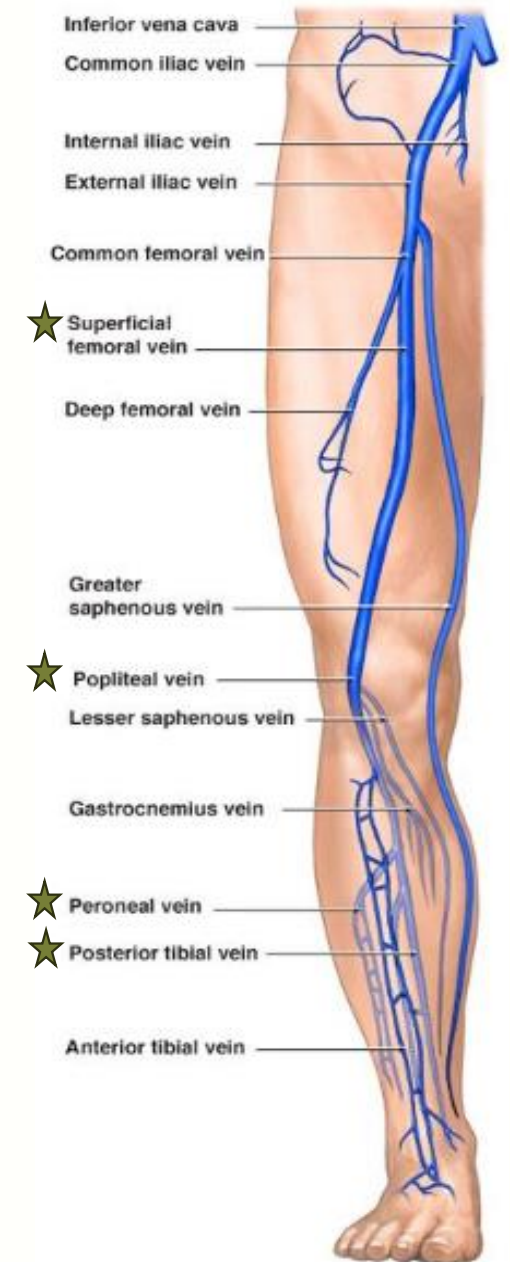
Anna Spedding, Sheffield Teaching Hospitals NHS Foundation Trust

Outline

- VTE summary
- Risk factors
- Prophylaxis measures
- Findings of a retrospective case -control study
- Conclusion

What is Venous Thromboembolism (VTE)?

- An umbrella term encompassing deep vein thrombosis and pulmonary embolism
 - **DVT:** formation of a thrombus within a deep vein, which partially or completely occludes venous flow in the affected vessel.
 - **PE:** a potentially fatal condition where a section of the deep thrombus detaches and is carried to the lung.
- Hospital acquired VTE - occurring within hospital or within 90 days following admission (55-60%) (NICE, 2019)
- Thought to be the primary cause of preventable deaths in UK hospitals (Thrombosis UK, 2020)
- £640 million





Aetiology: Virchow's triad

HYPERCOAGULABLE STATE

- Malignancy
- Pregnancy
- Oestrogen therapy
- Lower limb trauma/surgery
- Thrombophilia
- Sepsis
- Dehydration

VASCULAR WALL INJURY

- Trauma
- Surgery
- Venepuncture
- Atherosclerosis
- Indwelling catheters
- Heart valve disease/replacement

CIRCULATORY STASIS

- Venous insufficiency
- Immobilisation
- Paralysis
- Venous obstruction from tumour, obesity or pregnancy
- Atrial fibrillation
- ? Tourniquet use

Signs and symptoms

DVT

- Often asymptomatic
- Calf pain
- Calf swelling (unilateral, discrepancy >2cm)
- Venous distension
- Warmth
- Erythema



PE

- Shortness of breath
- Coughing +/- blood
- Chest pain
- Tachycardia
- Hypotension

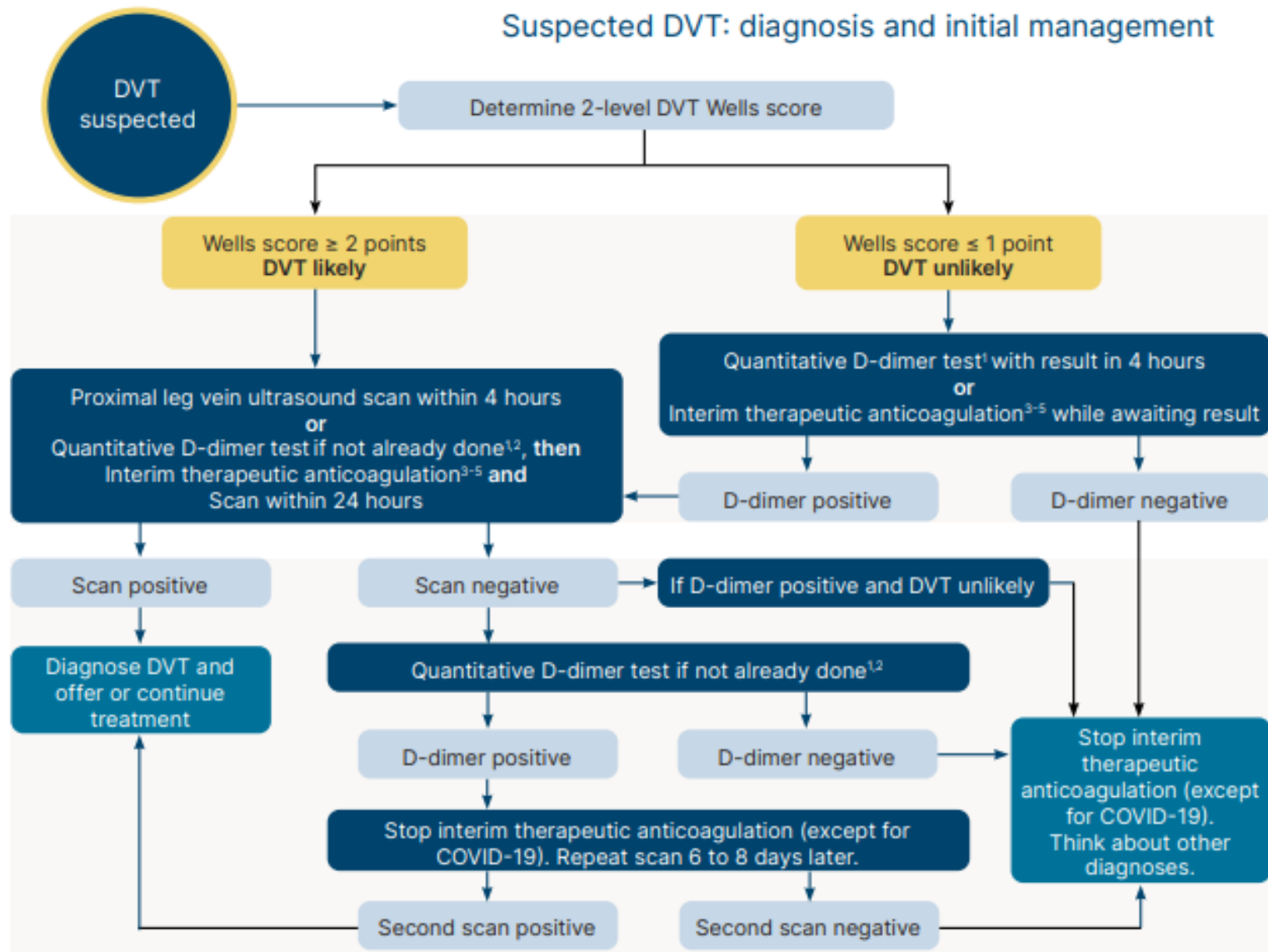


Complications of VTE

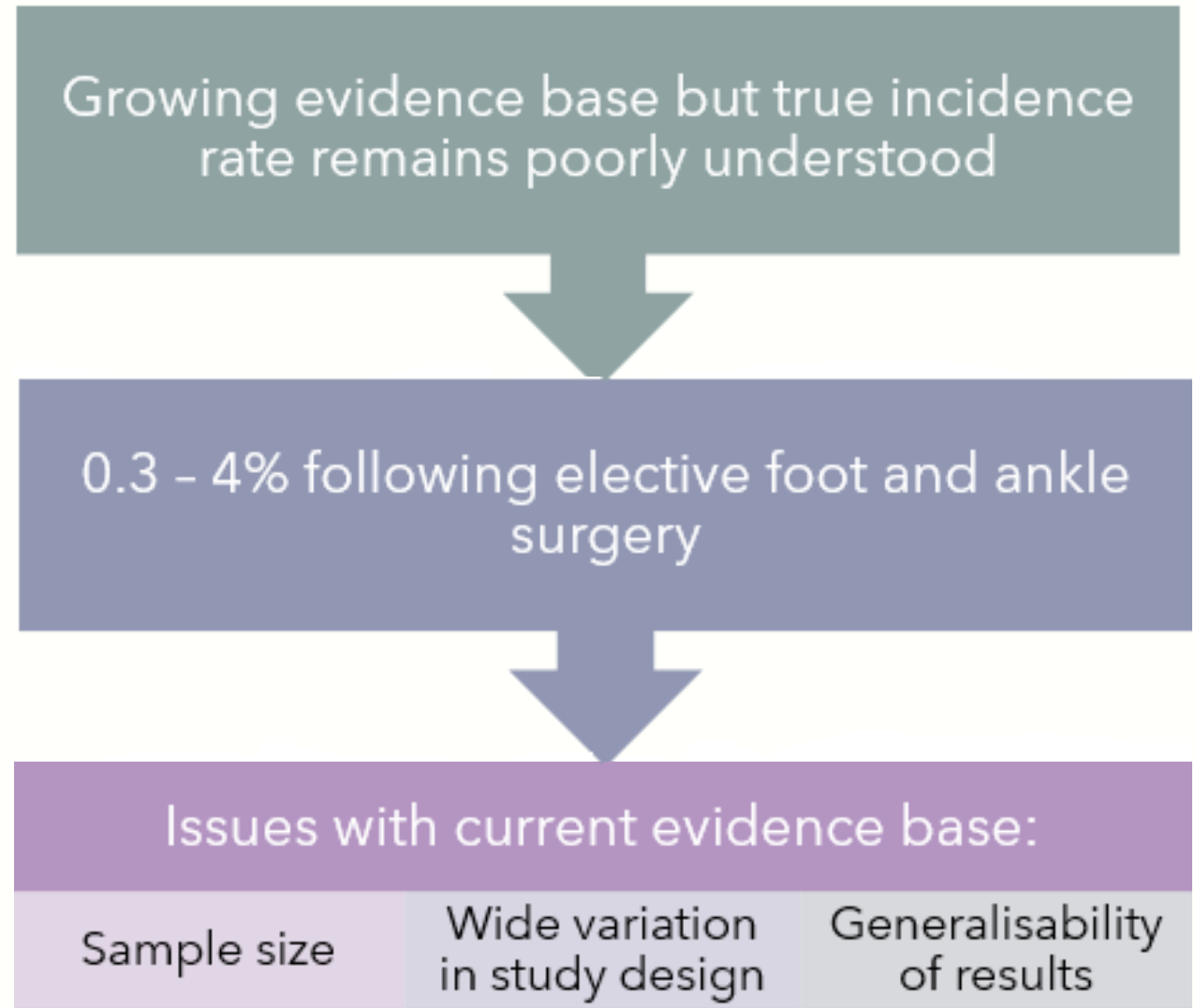
- Post-thrombotic syndrome (up to 50%) (Mangwani et al., 2023; Kahn, 2016)
- Chronic venous insufficiency
- Venous ulceration



Diagnosis of VTE



What is the risk of VTE after foot surgery?



How can we prevent VTE?

1. Risk assessment

2. Prophylaxis measures

Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism

NICE guideline

Published: 21 March 2018

Last updated: 13 August 2019

www.nice.org.uk/guidance/ng89

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BOFAS Position Statements


BOFAS Position Statement on VTE (2017)



Dynamic. Decisive. Dedicated.

POSITION STATEMENT
The Use of Venous Thromboembolic Disease
Prophylaxis in Foot and Ankle Surgery

Preventing VTE – Risk assessment

 **Department of Health**

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	
Dehydration		Hip fracture	
Known thrombophilias		Total anaesthetic + surgical time > 90 minutes	
Obesity (BMI >30 kg/m ²)		Surgery involving pelvis or lower limb with a total anaesthetic + surgical time > 60 minutes	
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)			

Bleeding risk			
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 < 75x10 ⁹ /l)			
Uncontrolled systolic hypertension (230/120 mmHg or higher)			
Untreated inherited bleeding disorders (such as haemophilia and von Willebrand's disease)			

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 each box that applies (more than one box can be ticked).

Any tick for thrombosis risk should prompt thromboprophylaxis according to NICE guidance

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 authorized by the Department of Health
Gateway reference no: 10278

Limitations

- Lack of stratification
- Are all risks equal?
- Does not state what form prophylaxis should take

Caprini risk assessment score

<https://www.mdcalc.com/caprini-score-venous-thromboembolism-2005>

Score	Risk level	Recommendation
0	Very low risk (<10%)	No prophylaxis required
1-2	Low risk (10-20%)	Consider early mobilisation/compression stockings
3-4	Moderate risk (20-40%)	Consider chemical prophylaxis +/- mechanical prophylaxis
5-7	High risk (40-80%)	Consider chemical prophylaxis + mechanical prophylaxis
8+	Very high risk	Consider extended prophylaxis

Each Risk Factor Represents 1 Point

- Age 41-60 years
- Minor surgery planned
- History of prior major surgery (< 1 month)
- Varicose veins
- History of inflammatory bowel disease
- Swollen legs (current)
- Obesity (BMI > 25)
- Acute myocardial infarction
- Congestive heart failure (< 1 month)
- Sepsis (< 1 month)
- Serious lung disease incl. pneumonia (< 1 month)
- Abnormal pulmonary function (COPD)
- Medical patient currently at bed rest
- Other risk factors _____

Each Risk Factor Represents 3 Points

- Age over 75 years
- History of DVT/PE
- Family history of thrombosis***
- Positive Factor V Leiden
- Positive Prothrombin 20210A
- Elevated serum homocysteine
- Positive lupus anticoagulant
- Elevated anticardiolipin antibodies
- Heparin-induced thrombocytopenia (HIT)
- Other congenital or acquired thrombophilia

If yes:
Type _____
*most frequently missed risk factor

Each Risk Factor Represents 2 Points

- Age 60-74 years
- Arthroscopic surgery
- Malignancy (present or previous)
- Major surgery (> 45 minutes)
- Laparoscopic surgery (> 45 minutes)
- Patient confined to bed (> 72 hours)
- Immobilizing plaster cast (< 1 month)
- Central venous access

Each Risk Factor Represents 5 Points

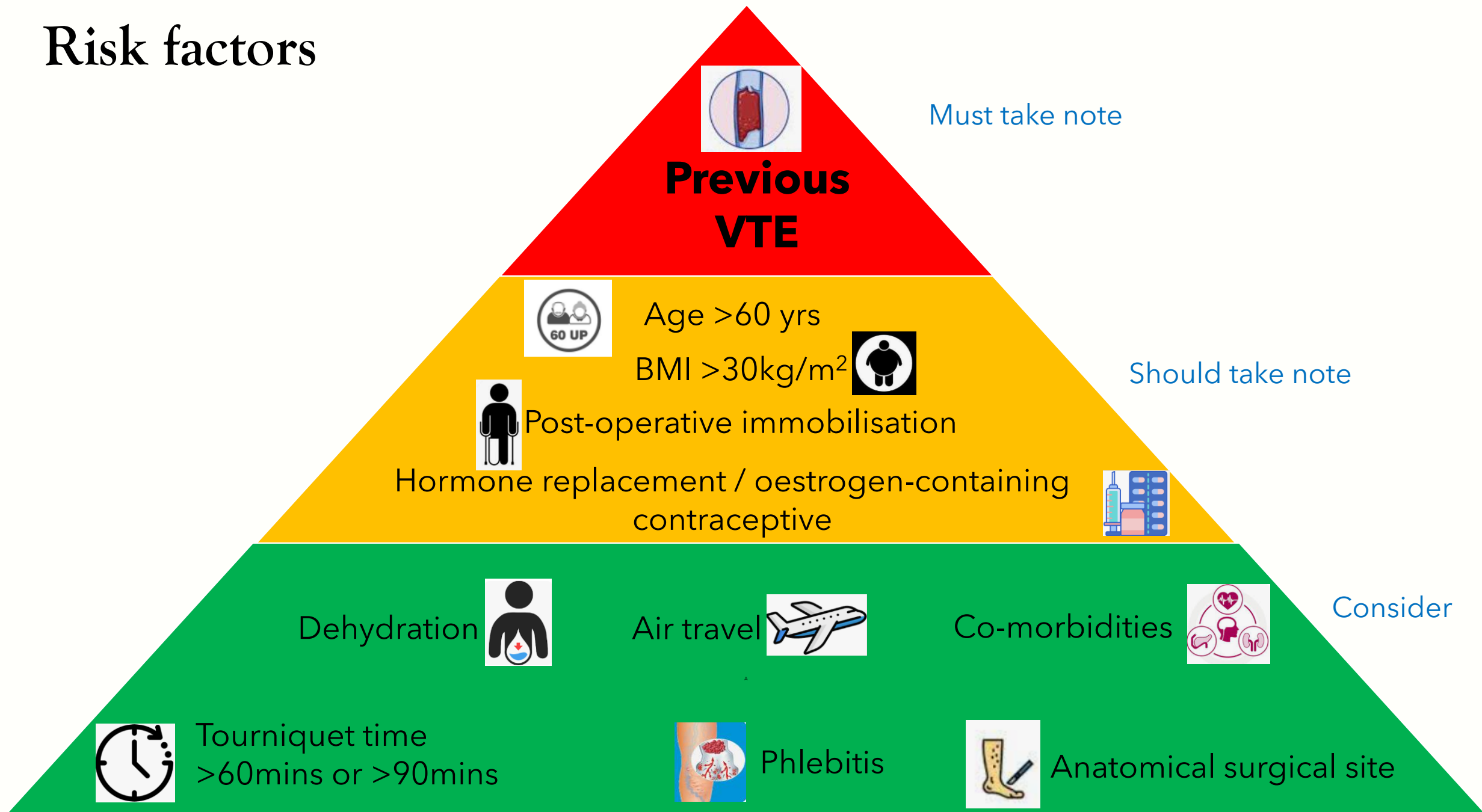
- Elective major lower extremity arthroplasty
- Hip, pelvis or leg fracture (< 1 month)
- Stroke (< 1 month)
- Multiple trauma (< 1 month)
- Acute spinal cord injury (paralysis)(< 1 month)

For Women Only (Each Represents 1 Point)

- Oral contraceptives or hormone replacement therapy
- Pregnancy or postpartum (<1 month)
- History of unexplained stillborn infant, recurrent spontaneous abortion (≥ 3), premature birth with toxemia or growth-restricted infant

Total Risk Factor Score

Risk factors

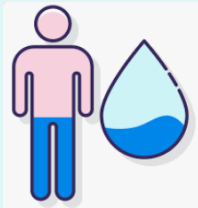


VTE prophylaxis – what are the options?

- Early Mobilisation



- Hydration Advice



- Address modifiable risk factors



Mechanical prophylaxis:

- Compression stockings



- Intermittent compression devices



Chemical prophylaxis:

- LMWH



- DOACS



- Aspirin



What do the NICE guidelines say?

Foot and Ankle orthopaedic surgery:

- Consider pharmacological prophylaxis for people undergoing foot or ankle surgery:
 - that requires immobilisation - consider stopping prophylaxis if immobilisation continues beyond 42 days
 - or**
 - when total anaesthesia time is >90mins
 - or**
 - the individual's risk of VTE outweighs their bleeding risk.
- Advise patients to consider stopping OCP/HRT 4 weeks prior to elective surgery.

Preventing VTE – Prophylaxis measures

vol. 8 / no. 2 Foot & Ankle Specialist 101

< **Clinical Research** >

Deep-Vein Thrombosis Prophylaxis in Foot and Ankle Surgery

What Is the Current State of Practice?

Kalpesh Shah, MS (Orth), FRCS (Tr Orth),
Gowreeson Thevendran, MFSEM (UK),
FRCS (Tr Orth), Alastair Younger, MB,
ChB, FRCS, and Stephen J. Dizon, MD

Foot and Ankle Surgery 17 (2011) 89–93

Contents lists available at ScienceDirect

Foot and Ankle Surgery

journal homepage: www.elsevier.com/locate/fas



Thromboprophylaxis in elective foot and ankle patients—Current practice in the United Kingdom

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Stroke, Systemic or Venous Thromboembolism

Use of Prophylaxis for Prevention of Venous Thromboembolism in Patients with Isolated Foot or Ankle Surgery: A Systematic Review and Meta-Analysis



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Samuel Z. Goldhaber⁷ Behnood Bikdeli^{5,8,9}

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Original Research

Venous Thromboembolism Prophylaxis in Foot and Ankle Surgery: A Worldwide Survey

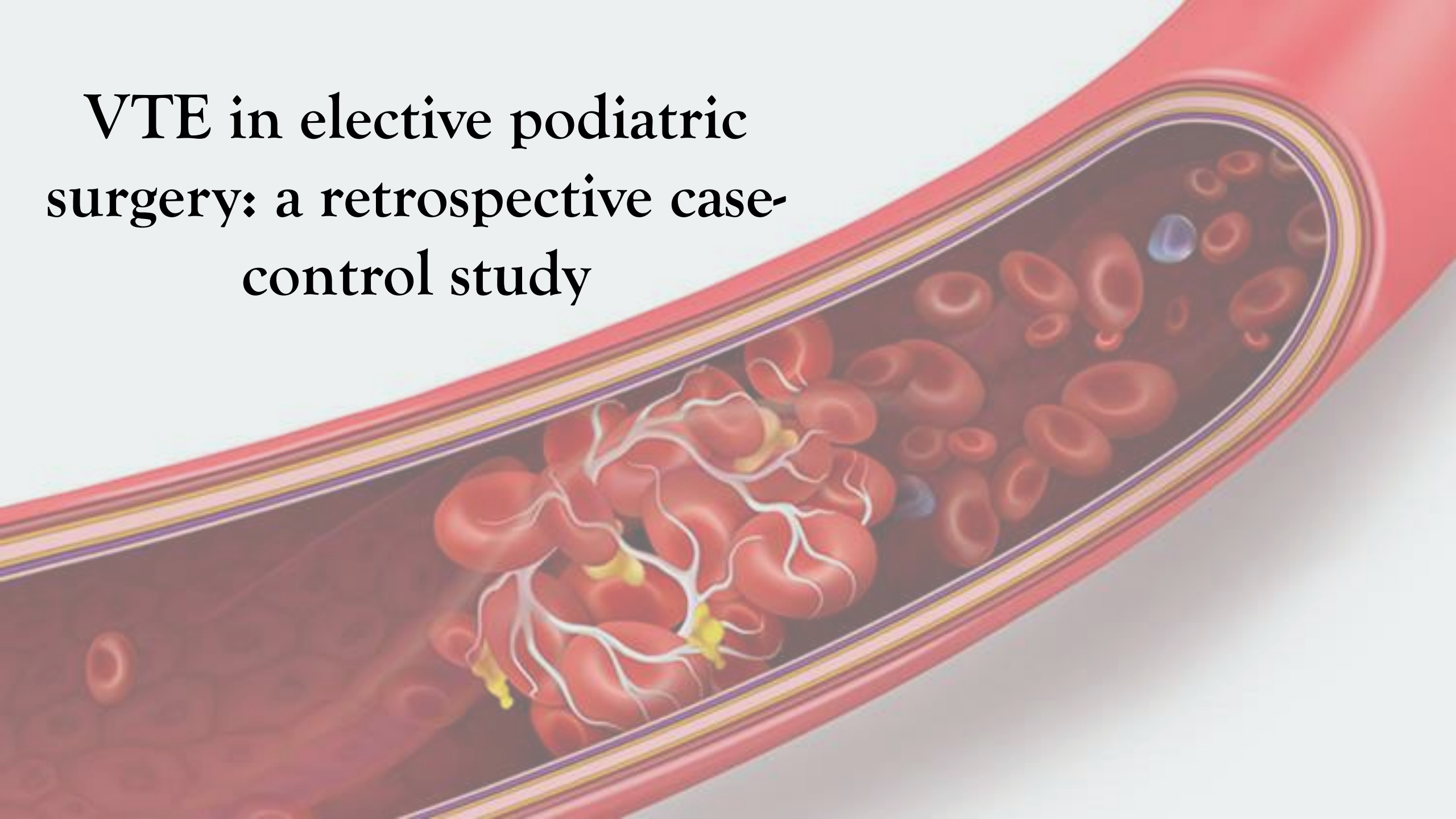
Roberto Zambelli, MD^{1,2,9}, Sophie Frölke, BSc³, Caio Nery, MD, PhD⁴, Daniel Baumfeld, MD, PhD⁵,
Cristian Ortiz, MD⁶, Suzanne Cannegieter, MD, PhD⁷, Banne Nemeth, MD, PhD^{7,8},
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Venous Thromboembolic Prophylaxis in Foot and Ankle Surgery

A Review of Current Literature and Practice

Martin H. S. Weisman, MD, James R. Holmes, MD, Todd A. Irwin, MD, and Paul G. Talusan, MD

**VTE in elective podiatric
surgery: a retrospective case-
control study**



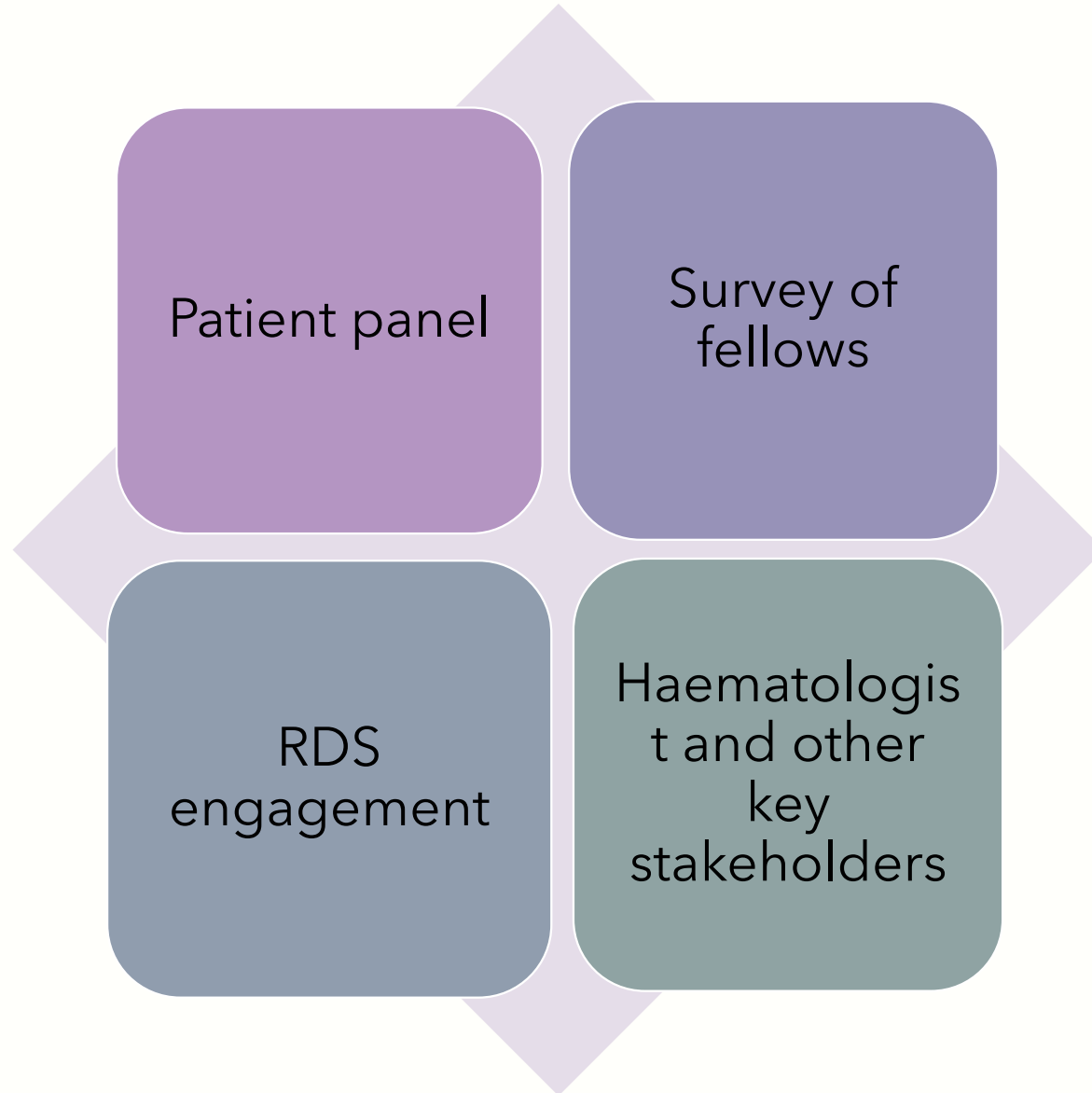
Aims

To investigate how common venous thromboembolism (VTE) events are after elective foot surgery in the study population.

To explore the association of thromboprophylaxis and VTE in elective foot surgery.

To describe the VTE risk profiles in this sample to inform future work

Pre-study phase



Method

Ethical approval obtained

19 centres met eligibility criteria

- 10 expressed continued interest in participating following formal invitation
- 9 achieved ethical approval within specified timeframe

PASCOM-10 report completed to identify VTE sequelae between 1st May 2010 - 1st May 2022

Case controls randomly selected using survivor sampling and a random number generator (1:7)

Standardised spreadsheet used to collate identified cases and controls following strict instructions

Data collection completed at local units and returned to key researcher

Inclusion/exclusion criteria

Inclusion criteria

- A full surgical episode recorded on PASCOM-10 to include post-operative sequela
- Episodes relating to patients aged over 16 years of age at the time of elective surgery
- Centre identified as PASCOM-10 user and consents to participate

Exclusion criteria

- Incomplete episode on PASCOM-10 (unable to ascertain if VTE was experienced)
- Nail surgery
- Steroid injections
- Those aged under 16 years old at the time of surgery
- Centres that did not respond to invitation to participate or where ethics approval passed the deadline

Preliminary Results

- **31,686** episodes were identified by the PASCUM-10 which met the inclusion criteria
- **64 VTE** events reported in **62 patients**

Total VTE
incidence =
0.2%
(n=64)

DVT incidence
= 0.15%
(n=49)

PE incidence
= 0.05%
(n=15)

- Timing of VTE
 - DVT + PE most commonly occurred within 6 weeks of surgery
 - PE range = 5 days - 12 weeks
 - DVT range = 11 days - 15 weeks

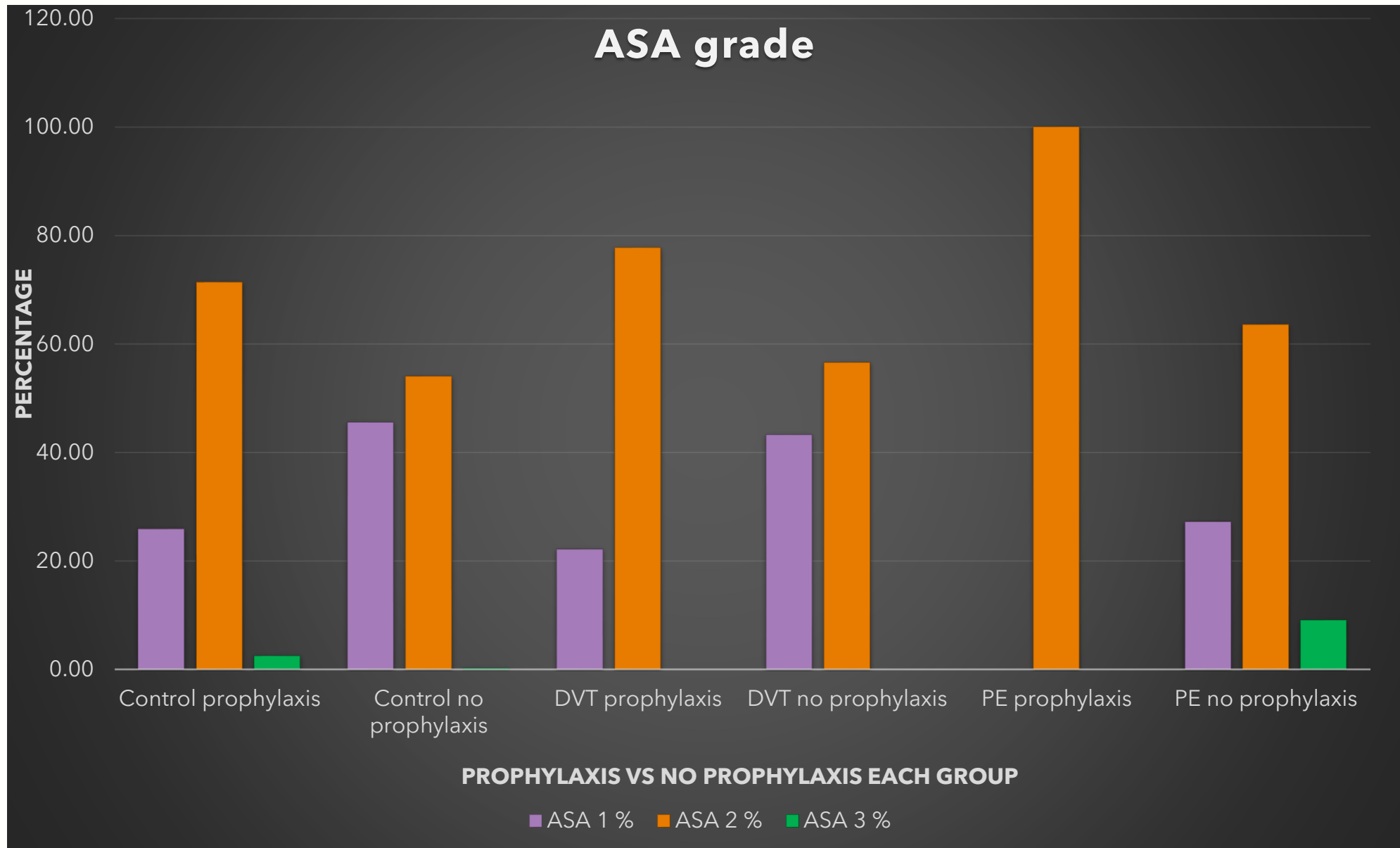
Demographics - sex



Demographics - age

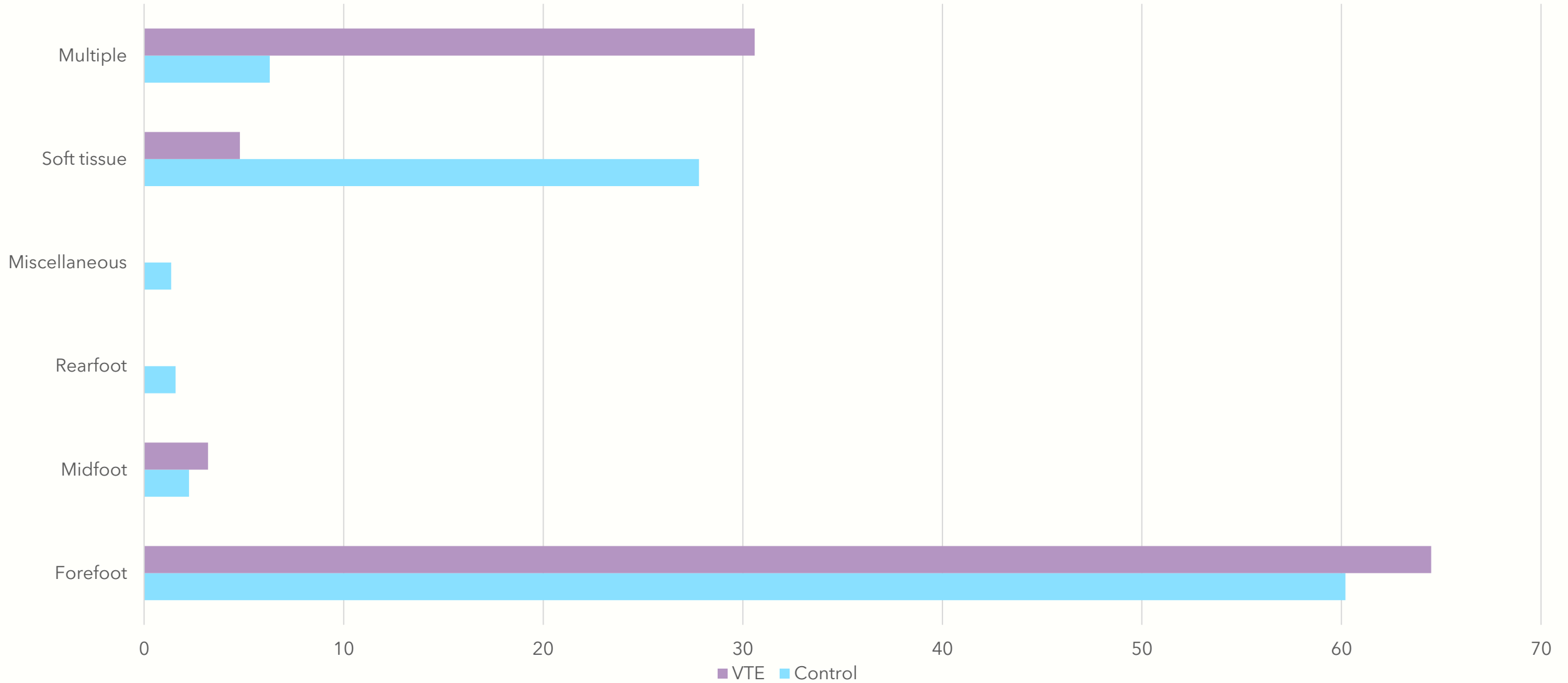
Group	Mean Age (yrs)	Lower Range (yrs)	Upper Range (yrs)
Control	57.7	16	92
Total VTE	59.14	23	83
DVT	57.9	23	81
PE	63.1	42	83

Demographics - ASA grade



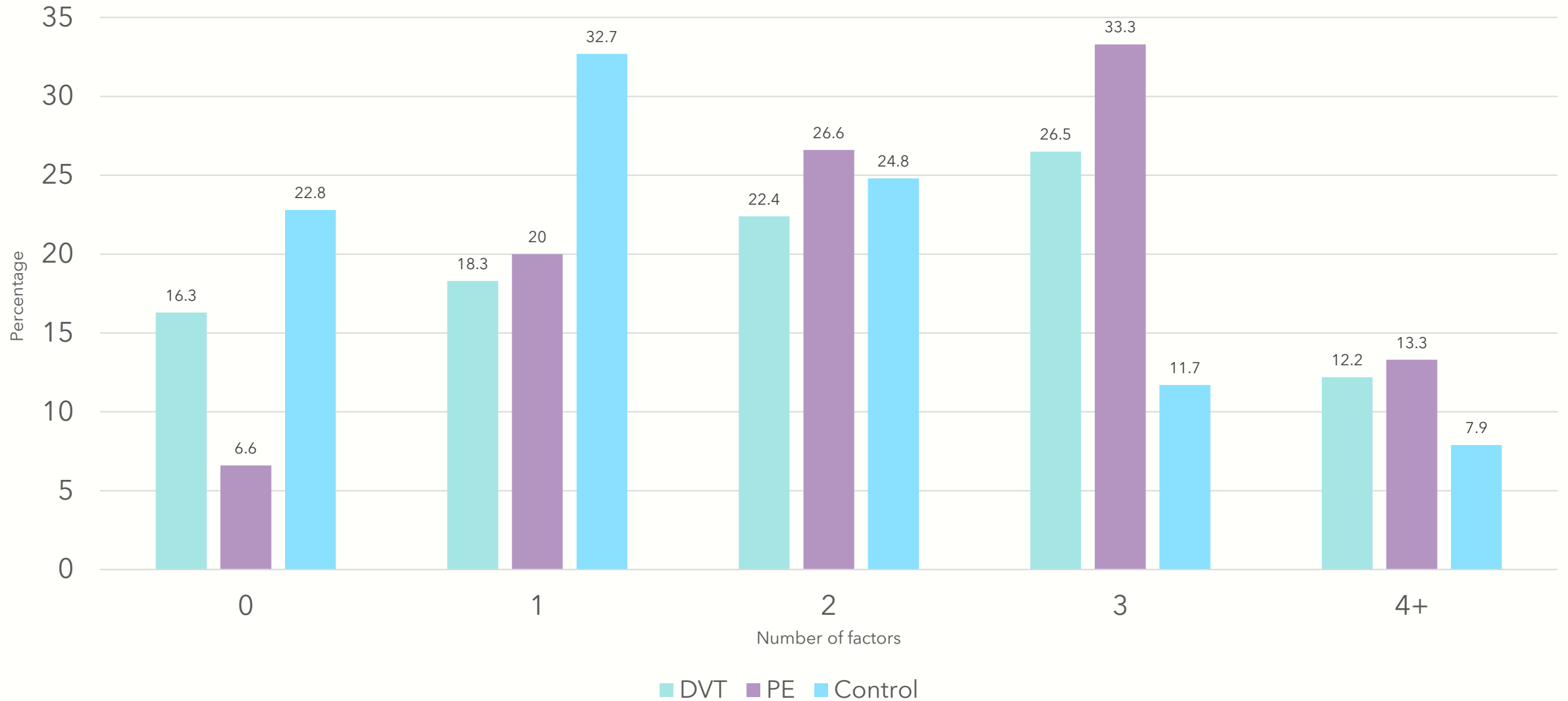
Demographics

Location of surgery (% of cohort)



Risk factor analysis

Number of risk factors per group (%)



	DVT (n)	PE (n)	VTE total % (n)	Control group % (n)
Cast immobilisation ★	5	1	9.4 (6)	2.9 (13)
Active cancer or cancer treatment	0	0	0 (0)	0.45 (2)
Age >60	20	8	43.8 (28)	43.1 (191)
Dehydration	0	0	0 (0)	0.2 (1)
Known thrombophilia	0	0	0 (0)	0.4 (2)
Obesity (BMI >30) ★	12	7	29.7 (19)	22 (98)
One or more significant comorbidities (e.g., heart disease; metabolic, endocrine, or respiratory pathologies; acute infectious diseases; inflammatory conditions)	15	5	31.3 (20)	32.5 (144)
Personal history of VTE ★	5	1	9.4 (6)	2.25 (10)
First degree relative with history of VTE ★	4	2	9.4 (6)	6.3 (28)
Use of hormone replacement therapy ★	2	1	4.7 (3)	1.35 (6)
Use of oestrogen-containing contraceptive therapy ★	3	1	6.3 (4)	0.4 (2)
Varicose veins with phlebitis ★	2	1	4.7 (3)	1.8 (8)
Pregnancy <6 weeks post-partum	0	0	0 (0)	0.2 (2)
Significantly reduced mobility for 3 days or more ★	10	2	18.8 (12)	11.7 (52)
Total anaesthetic + surgical time >90 mins ★	3	0	4.7 (3)	2 (9)
Surgery involving pelvis or lower limb with anaesthetic + surgical time >60 mins ★	3	2	7.8 (5)	4.7 (21)
Surgery with significant reduction in mobility	12	2	21.9 (14)	18.5 (82)

★ = >6 x

★ = 3-6 x

★ = 1.3-3 x

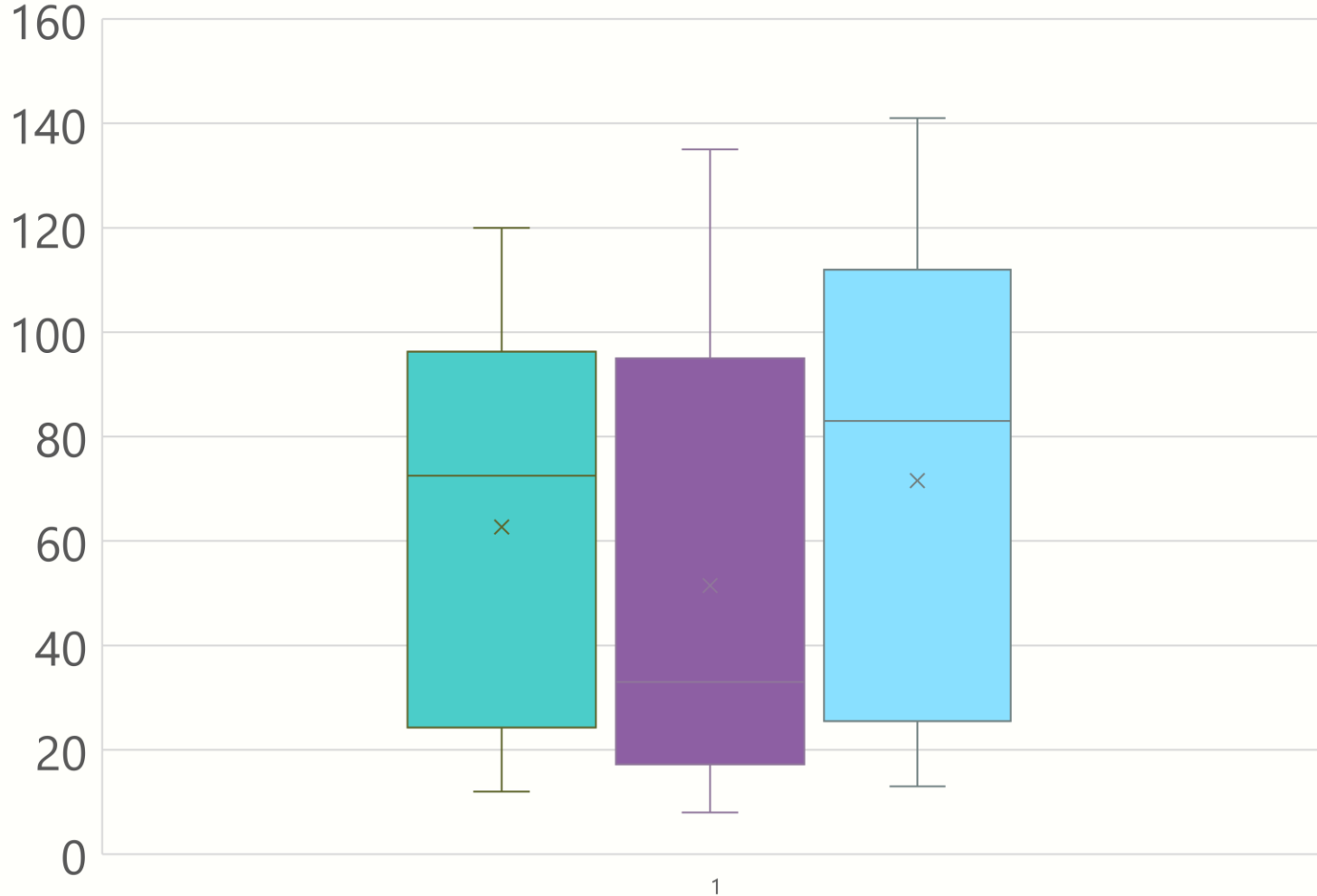
Risk factors analysis - BMI

	Average BMI	Lower range	Upper range
Control	27.37	15	47.9
DVT	29.2	18	40.7
PE	30.7	24.6	38.4

Risk factors analysis – Tourniquet time

Tourniquet time (mins)

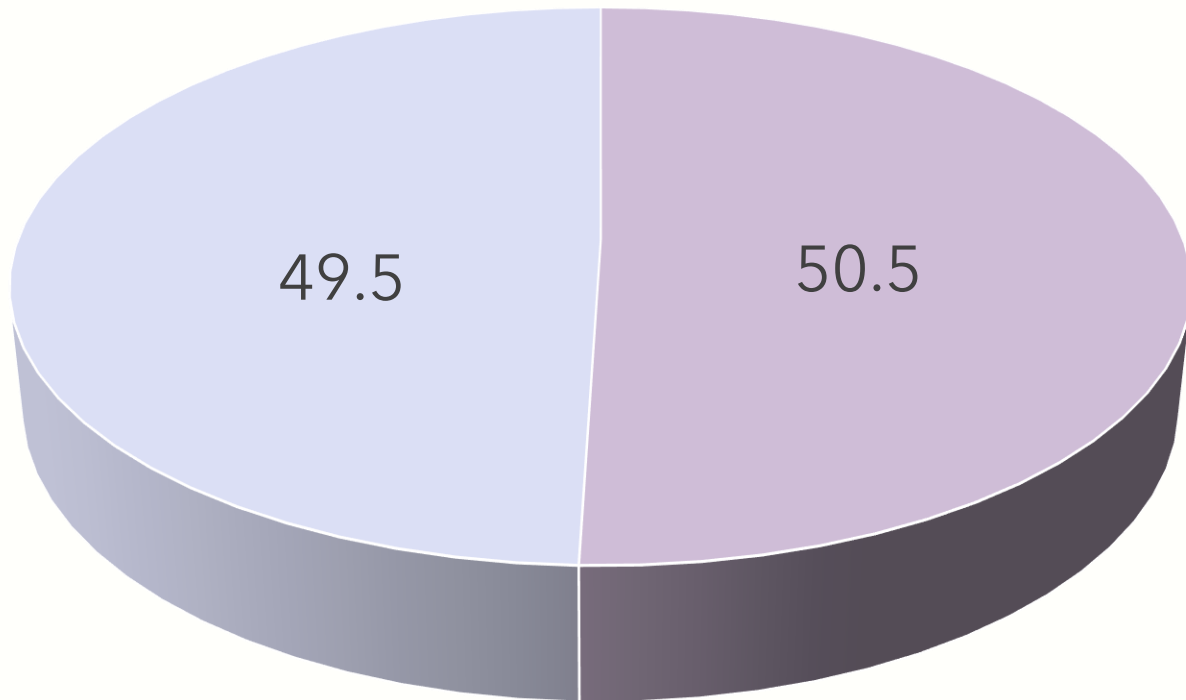
■ PE ■ DVT ■ Control



	Avg (mins)	Min (mins)	Max (mins)
Control	40.4	6	141
DVT	45.14	8	135
PE	52.2	12	120

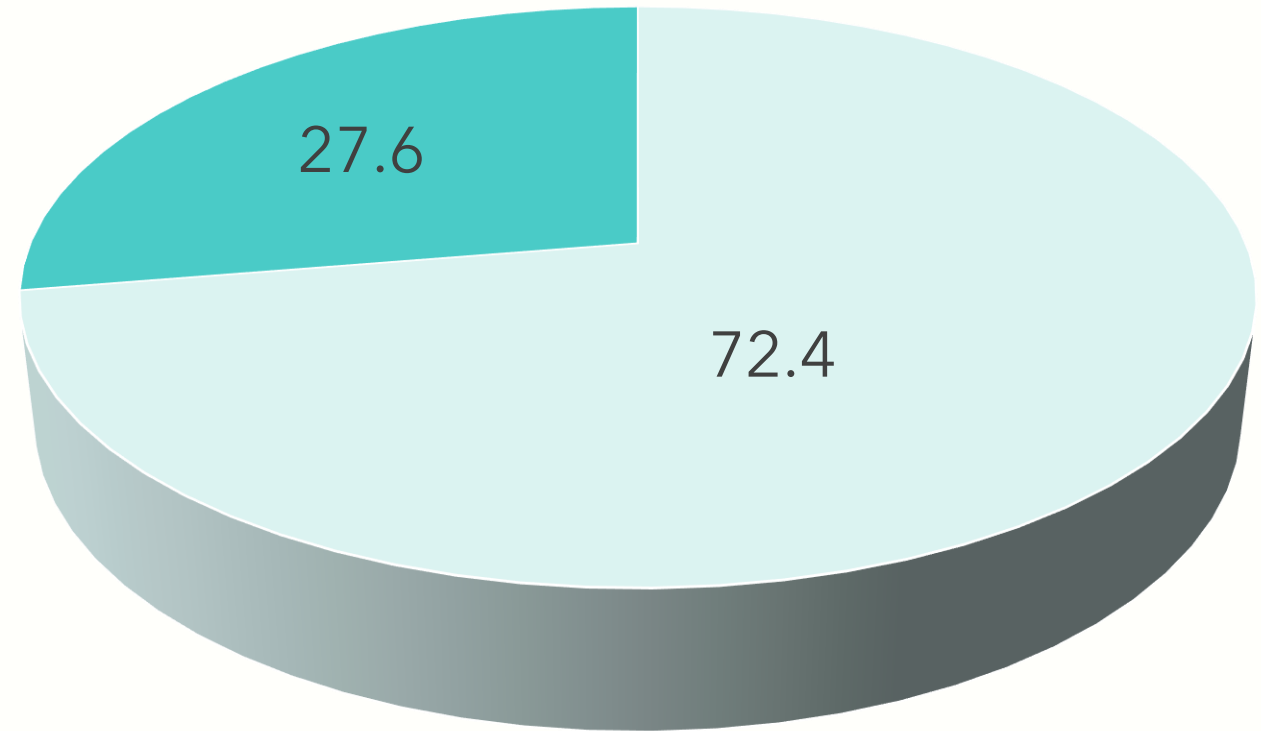
Prophylaxis patterns – mechanical

Control group - stockings use %



■ Stockings ■ No stockings

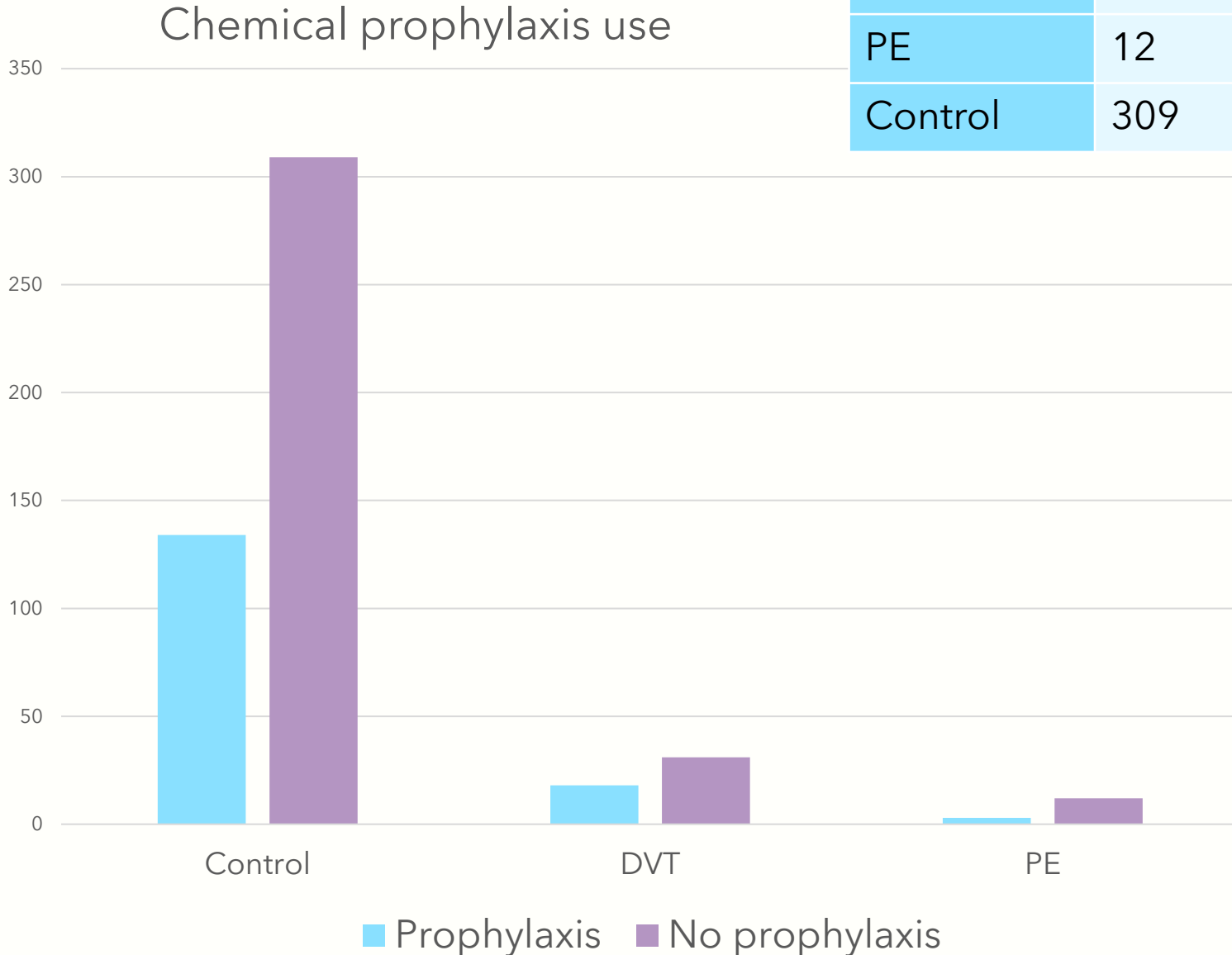
VTE group - stockings use %



■ Stockings ■ No stockings

Prophylaxis patterns

	No prophylaxis (n=)	No prophylaxis (%)	Chemical prophylaxis (n=)	Chemical prophylaxis %
DVT	31	63	18	37
PE	12	80	3	20
Control	309	70	134	30



- 30% of total study cohort received chemoprophylaxis
- Low molecular weight heparin was the most frequently used
- Significant variation in duration of prophylaxis

Limitations

Retrospective
design

PASCOM-10

Did not identify:

- Length of cast immobilisation/ NWB
- HRT details for all cases
- Asymptomatic VTE

Summary

- VTE incidence following foot and ankle surgery is low 0.2 - 4%
- Evidence base increasing but guidelines pertaining to foot and ankle surgery continue to be lacking
- Key risk factors from appear to include:
 - Prior VTE
 - Hormone replacement therapy / oestrogen containing contraceptives
 - Obesity
 - Immobilisation
- Next steps for this project

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