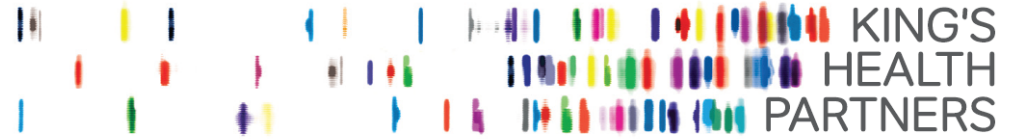


WORLD THROMBOSIS DAY

OCTOBER 13

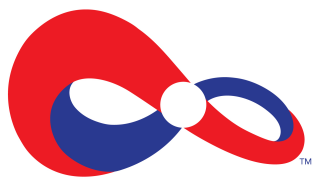
35



Pioneering better health for all

Mechanical methods for thromboprophylaxis May 2018

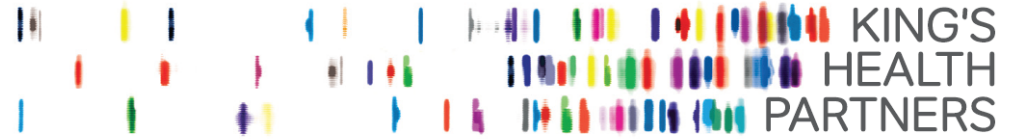
Prof Beverley Hunt,
Guy's & St Thomas' NHS Foundation Trust
Kings College, London
Medical Director of Thrombosis UK
Twitter @bhwords



WORLD THROMBOSIS DAY

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35



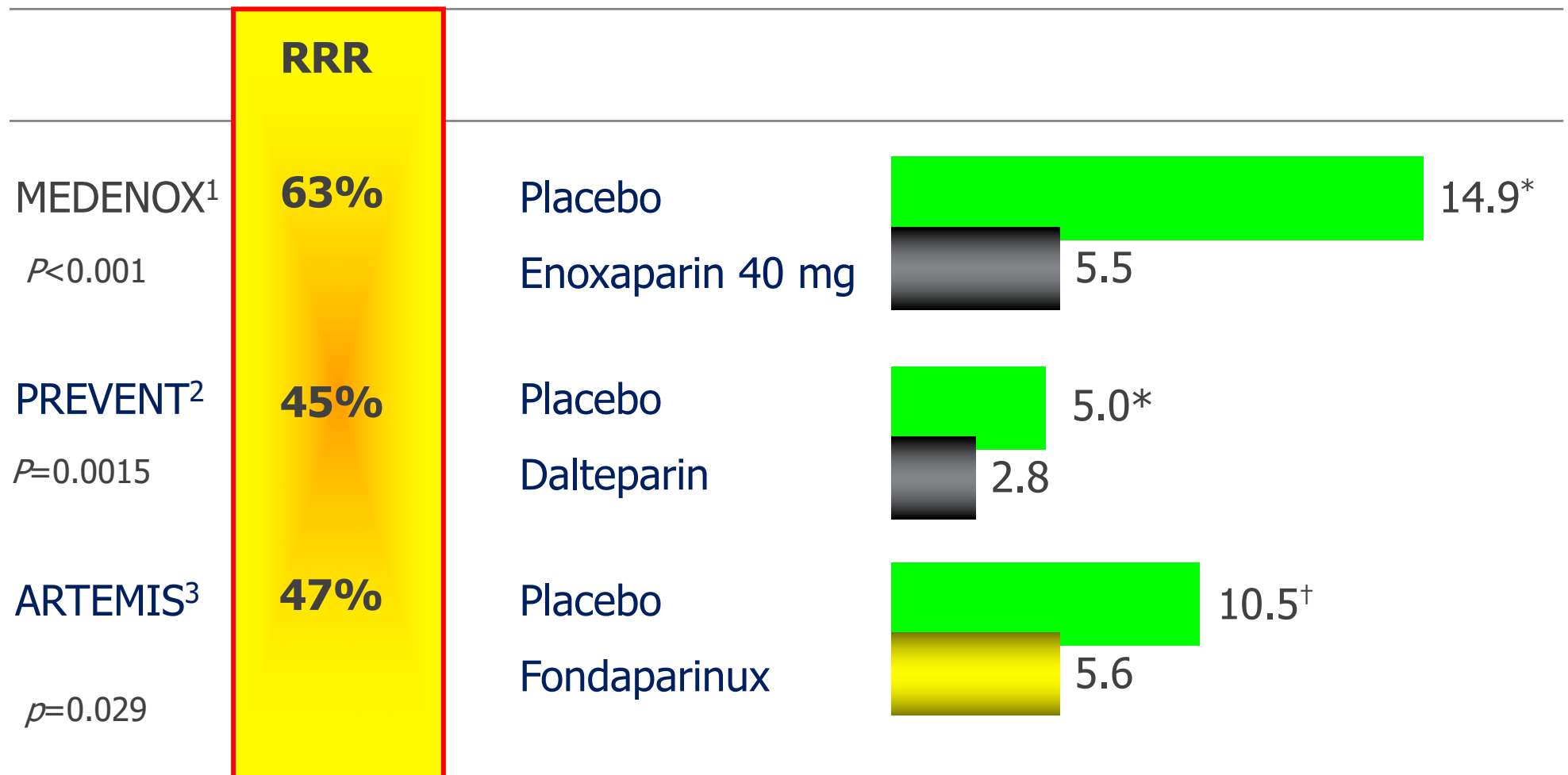
Pioneering better health for all

Mechanical methods for thromboprophylaxis

**Conflicts of interest: I take no monies from pharma
But I was a member of the NICE guideline committee**

Prof Beverley Hunt,
Guy's & St Thomas' NHS Foundation Trust
Kings College, London
Medical Director of Thrombosis UK
Twitter @bhwords

Clear Benefits of thromboprophylaxis over placebo in medical patients

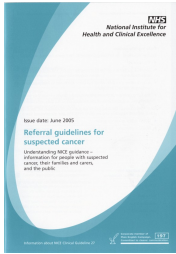


¹Samama MM *et al. N Engl J Med* 1999;341:793–800

²Leizorovicz A *et al. J Circulation* 2004;110:874–9

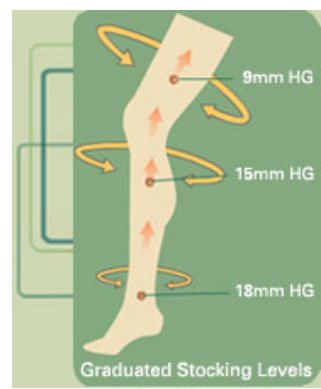
³Cohen AT *et al. J Thromb Haemost* 2003;1 (Suppl 1):P2046

RRR = relative risk reduction



Mechanical Compression

Graduated compression stockings



Never shown to reduce the risk of death due to PE



Do not offer stockings to patients who have:

- Suspected peripheral arterial disease
- Peripheral arterial bypass grafting
- Peripheral neuropathy or other causes of sensory impairment
- Any local condition in which stockings may cause damage
- Known allergy to material of manufacture
- Cardiac failure/severe leg oedema
- Unusual leg size or shape

If arterial disease suspected seek expert opinion

Encourage them to wear them day and night until they no longer have reduced mobility

Remove daily for hygiene purposes and to inspect skin 2-3 times a day for integrity or sensory impairment and discontinue if problems develop.

The CLOT Study

Dennis M et al, Lancet 2009; 373: 1958

2,500 stroke patients

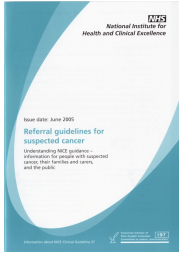
Thigh length anti-embolic stockings vs no stockings

Result

10% vs 9.5% VTE rate

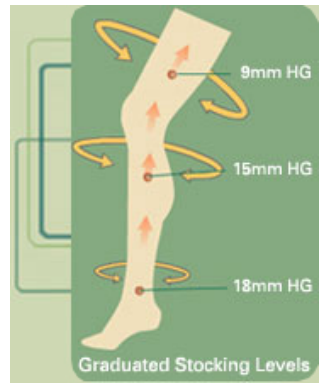
BUT

5% with stockings had skin problems



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Cost of purchasing and applying GCS to surgical inpatients in England estimated at £63.1 million per annum

9; 373: 1958

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Thigh length anti-embolic stockings vs no stockings

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A person with a beard, wearing a dark blue button-down shirt, is holding a large rectangular sign. The sign has a light green background with a yellow diagonal shape at the bottom. The text 'LACK OF EVIDENCE' is written in bold, black, sans-serif capital letters. There is a faint, semi-transparent watermark in the background that reads 'iStock by Getty Images'.

**LACK OF
EVIDENCE**



GAPS: Graduated compression as an Adjunct to Pharmacoprophylaxis in Surgery

3,250 moderate risk surgical patients receive LMWH +/-
stockings

Primary outcome: symptomatic & asymptomatic vTE

Intermittent Pneumatic Compression (IPC)

CLOTS 3 (Clots in legs after **stroke**)

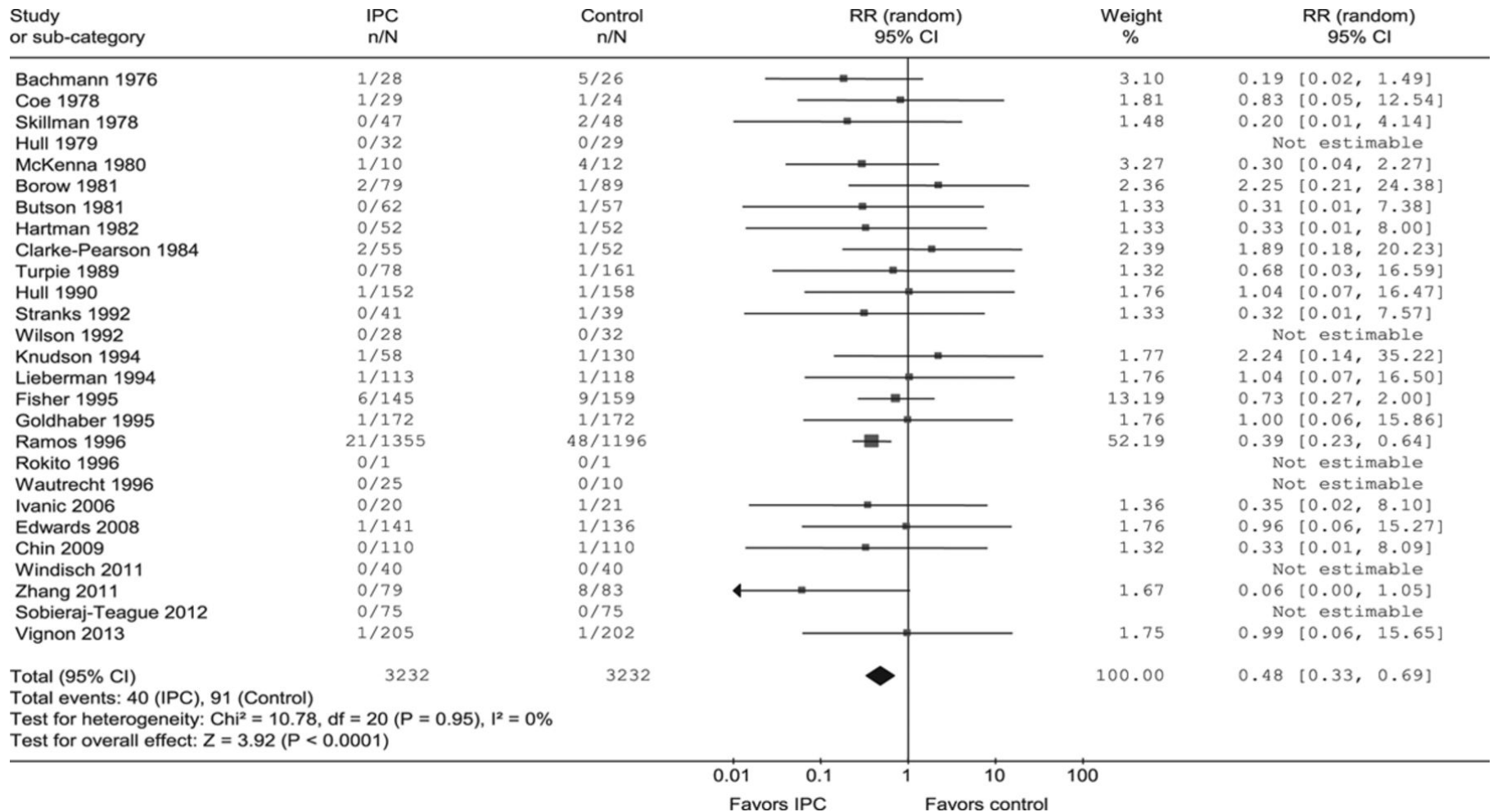
Dennis M et al, Lancet. 2013 Aug 10;382:516-24

2,800+ randomised to IPC post-stroke. Follow up for 6 months

	IPC	No IPC
DVT rate	8.5%	12.1%
Death rate	11%	13% (p=0.057)
Skin breaks	3%	1% (p=0.002)



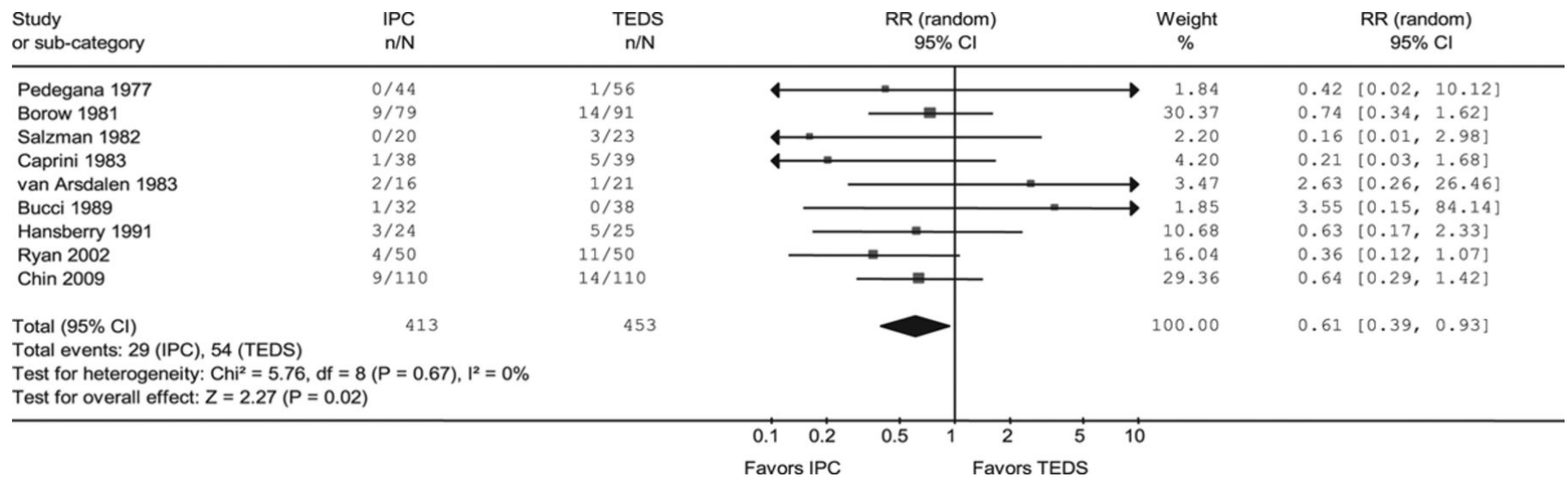
Forest plot showing the effect of intermittent pneumatic compression (IPC) on the risk of pulmonary embolism compared with placebo.



Kwok M. Ho, and Jen Aik Tan *Circulation*. 2013;128:1003-1020



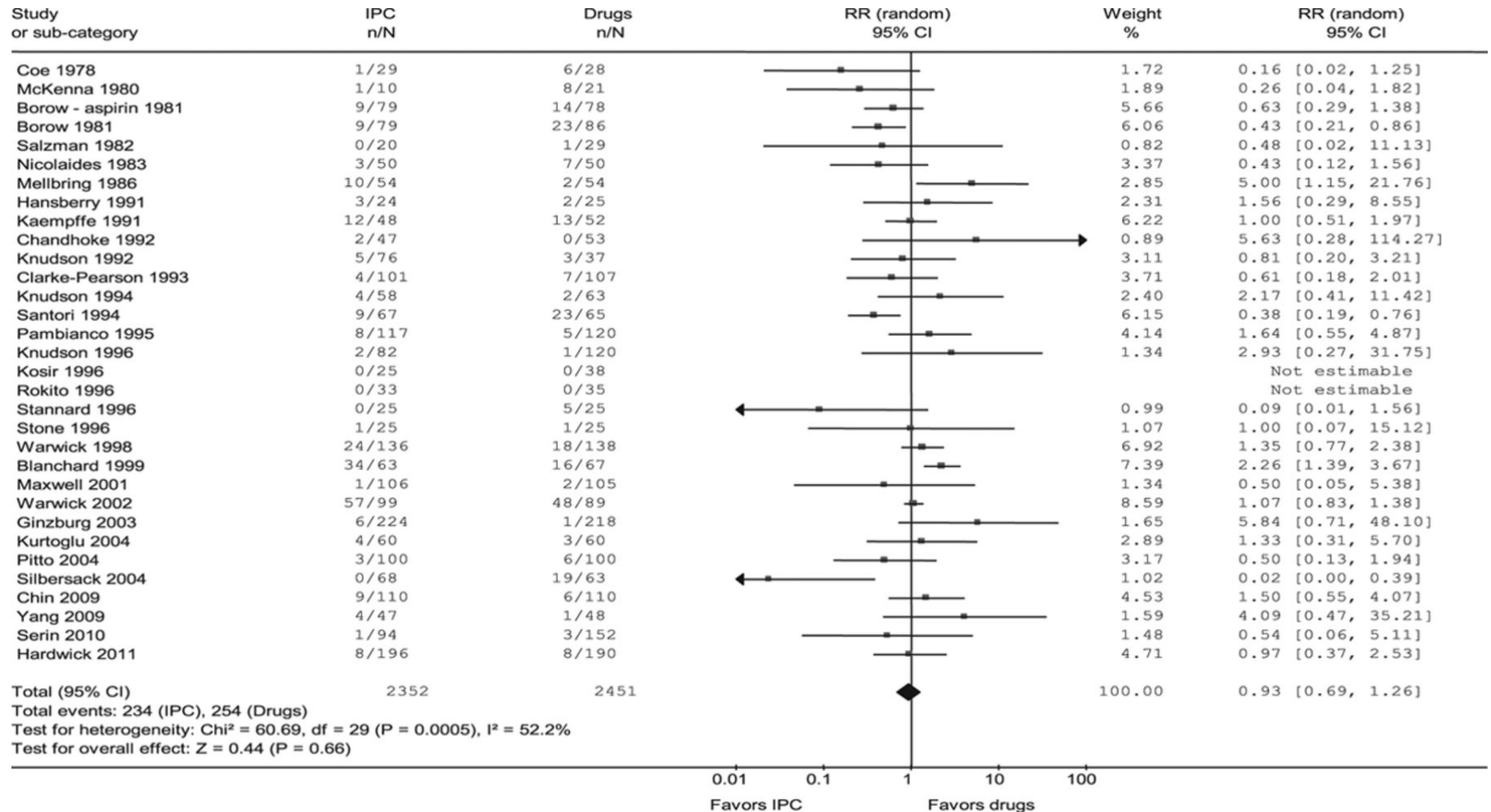
Forest plot showing the effect of intermittent pneumatic compression (IPC) on the risk of deep vein thrombosis compared with thromboembolic deterrent stockings (TEDS).



Kwok M. Ho, and Jen Aik Tan *Circulation*. 2013;128:1003-1020



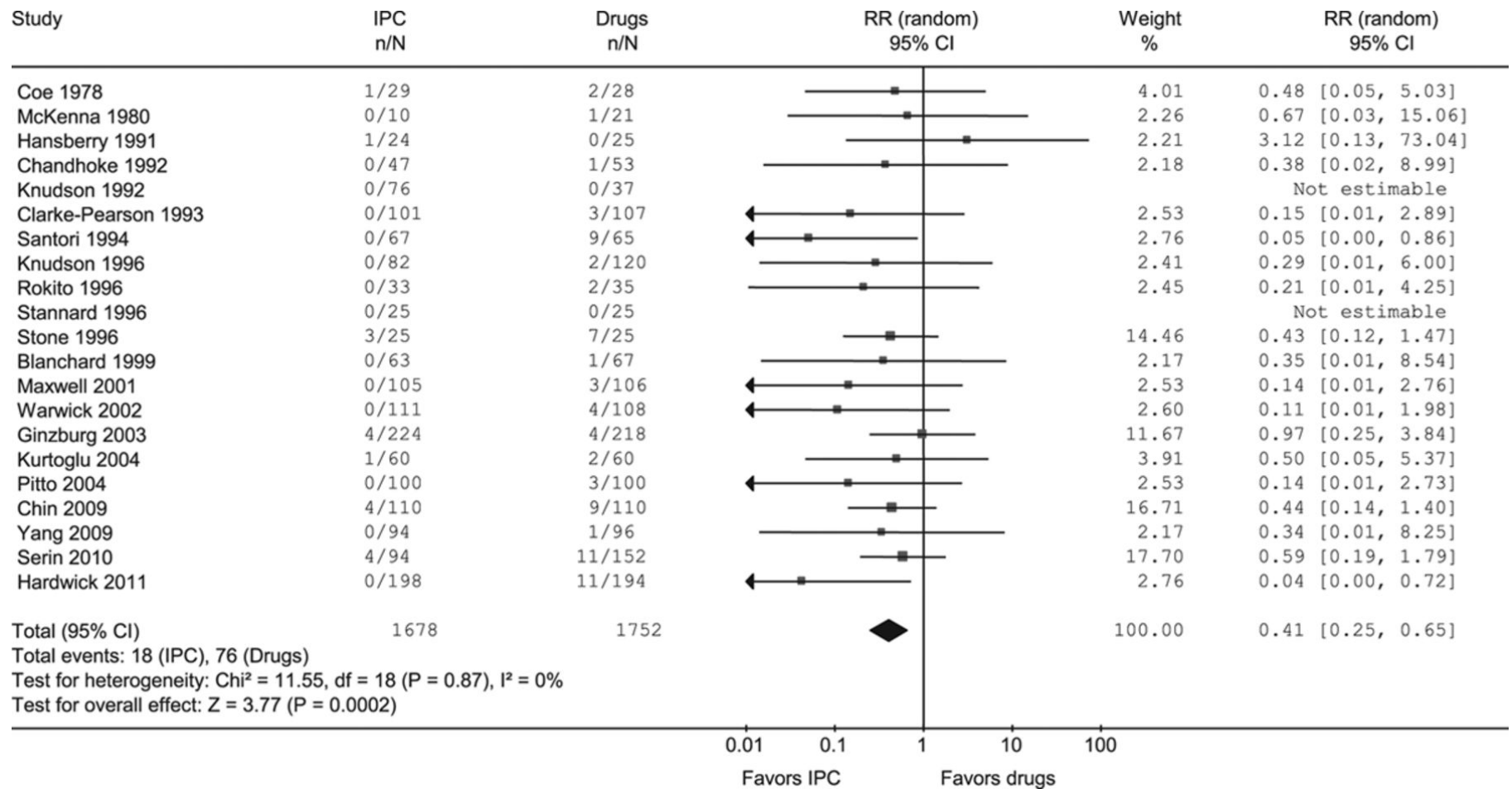
Forest plot showing the effect of intermittent pneumatic compression (IPC) on risk of deep vein thrombosis compared with pharmacological thromboprophylaxis.



Kwok M. Ho, and Jen Aik Tan *Circulation*. 2013;128:1003-1020



Forest plot showing the effect of intermittent pneumatic compression (IPC) on risk of systemic bleeding or bleeding complications from the wound compared with a pharmacological thromboprophylaxis.



Kwok M. Ho, and Jen Aik Tan *Circulation*. 2013;128:1003-1020



Cochrane Review

IPC vs IPC + pharm in the prevention of DVT & PE

Kakkos et al, 2016

	IPC	IPC + pharm
Symptomatic PE	2.9%	1.2% OR 0.39 (95% CI 0.23-.64)
All DVT	6.2%	2.9% OR 0.42 (95% CI 0.18-1.03)
Bleeding	0.7%	4.1%

Problems

Although trials included >9,000 patients,

Trials overall of moderate quality

IPC used widely intraoperatively & immediately post op pre
Pharmacological thromboprophylaxis – no data on benefit

Pregnancy is a special case

VTE in 1/1000 pregnancies
>70% of DVT in left side
>70% ileofemoral
>70% post-phlebitic syndrome

Virchow's triad

Increased venous stasis

Endothelial changes

Hypercoagulable changes

↑ fibrinogen, Factor Vc, Factor VIIIc
and vWF*

↓ total and free Protein S

Activated Protein C sensitivity ratio ↓

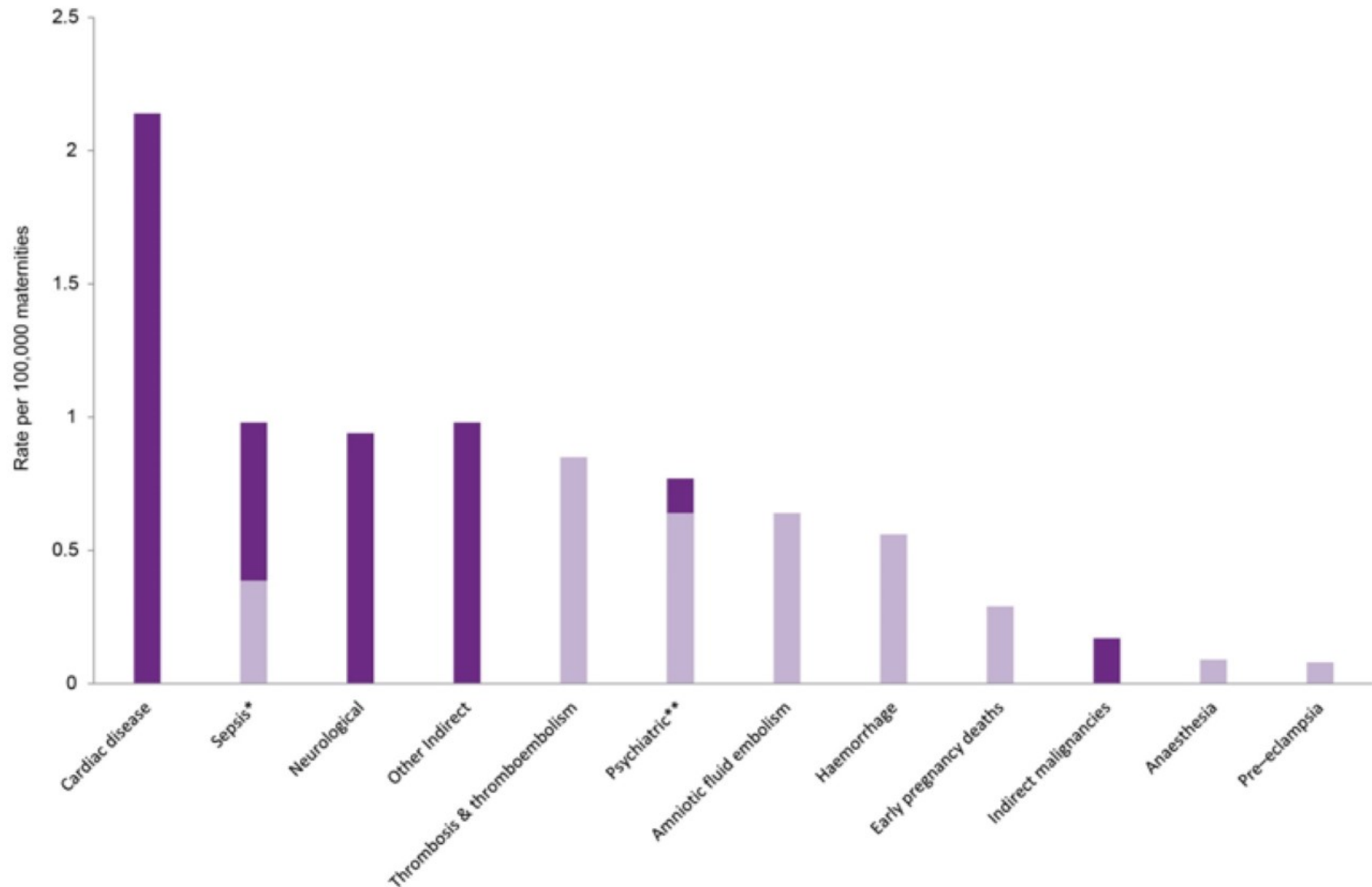
↑PAI-1 and PAI-2 from placenta

Gradual ↑ Prothrombin Factor 1 +2,
TAT‡ & D-dimers

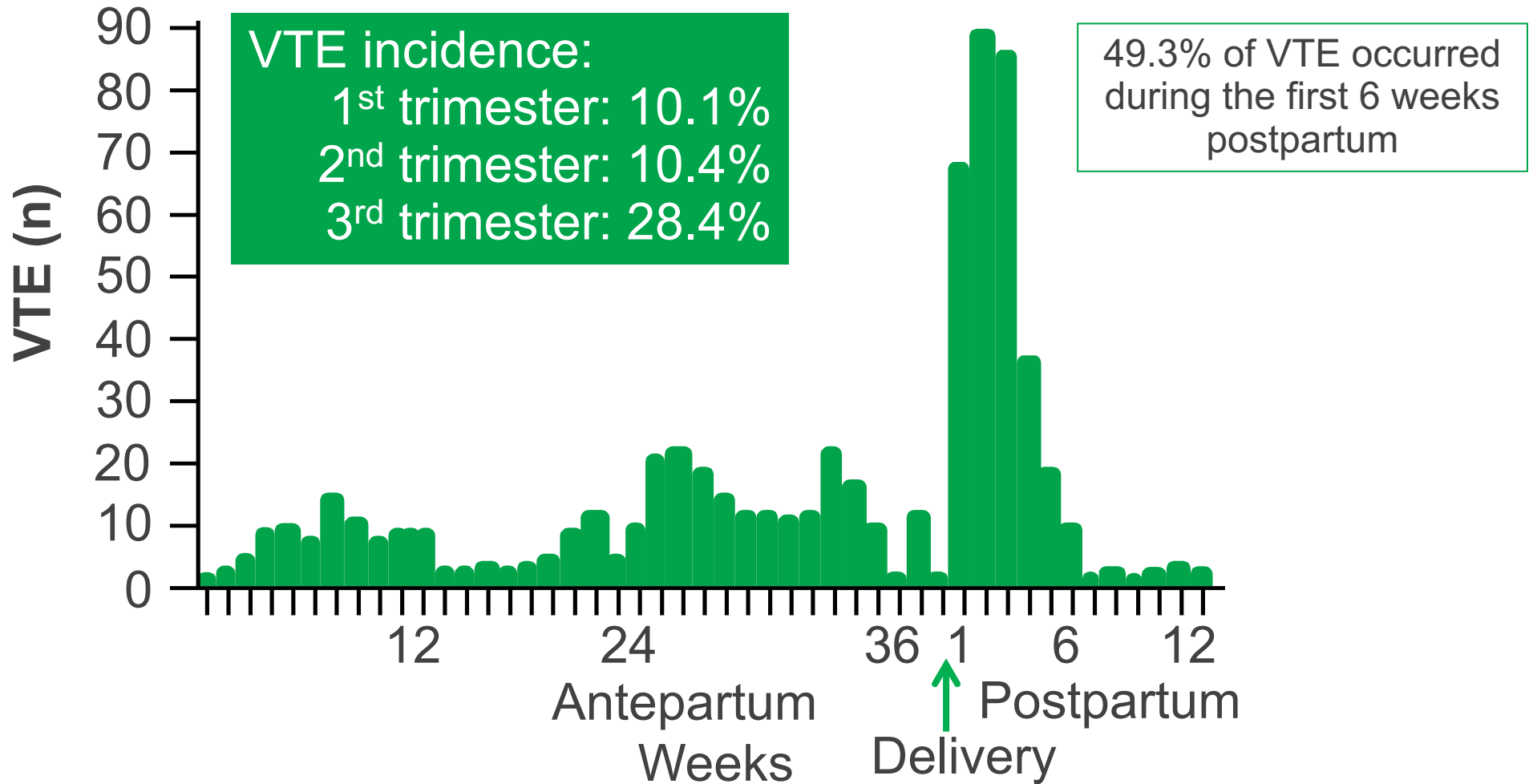
Persist for up to 6 weeks post-partum

*vWF = von Willebrand Factor; †PAI = plasminogen activator inhibitor; ‡TAT = thrombin antithrombin

Causes of maternal death 2012-14



Distribution of VTE in pregnancy & puerperium



ORIGINAL ARTICLE

Risk of a Thrombotic Event after the 6-Week Postpartum Period

Hooman Kamel, M.D., Babak B. Navi, M.D., Nandita Sriram, B.S.,
 Dominic A. Hovsepian, B.S., Richard B. Devereux, M.D.,
 and Mitchell S.V. Elkind, M.D.

Weeks Post partum	VTE OR	95% CI
0-6	12.1	7.9 to 18.6
7-12	2.2	1.4 to 3.3
13-18	1.6	1.0 to 2.5
18-24	0.9	0.5 to 1.4

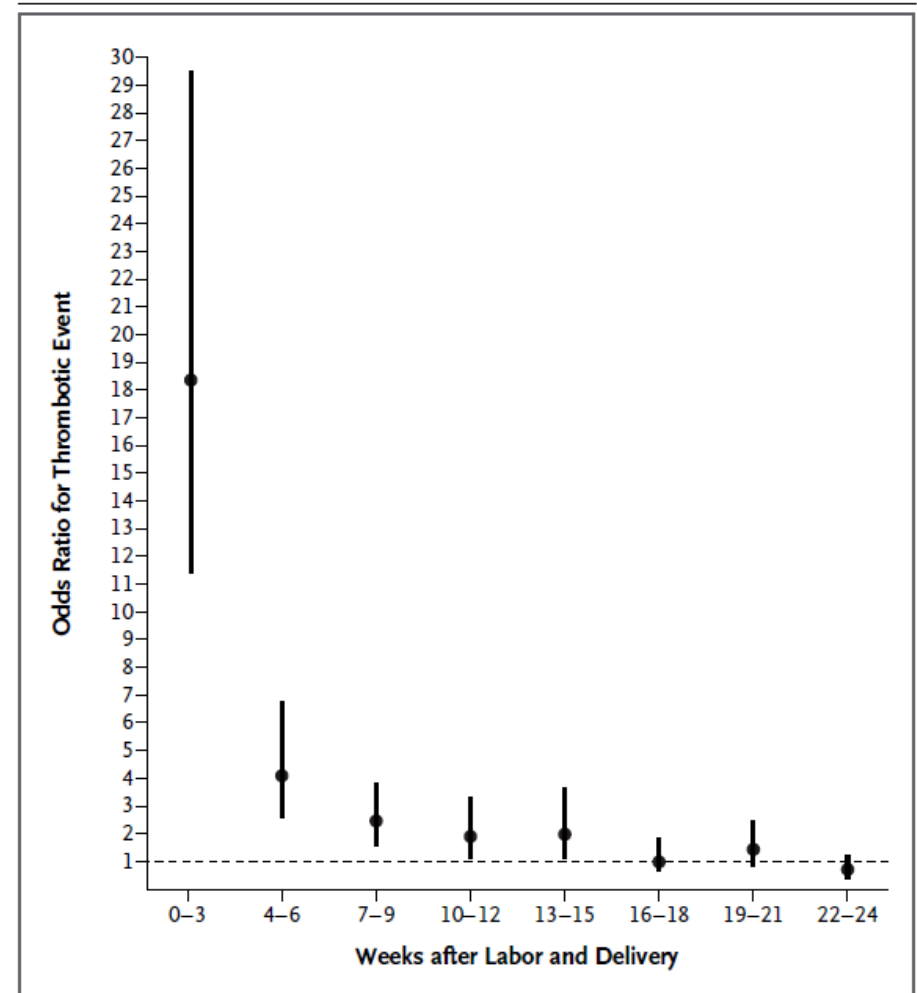


Figure 1. Risk of a Thrombotic Event, According to the Interval after Delivery. Shown are the results of a post hoc exploratory analysis of the risk of a composite primary outcome of ischemic stroke, acute myocardial infarction, or venous thromboembolism across sequential 3-week periods after labor and delivery, as compared with each patient's risk during the same period 1 year later. The thrombotic risk was still increased during the period of 13 to 15 weeks after delivery (odds ratio, 2.0; 95% CI, 1.1 to 3.6) but was no longer elevated in the period of 16 to 18 weeks after delivery (odds ratio, 1.0; 95% CI, 0.6 to 1.8). The vertical lines indicate 95% confidence intervals.

The RCOG guidelines



Royal College of
Obstetricians &
Gynaecologists

Treatment

Prevention

Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium

Green-top Guideline No. 37a

Thromboembolic Disease in Pregnancy and the Puerperium: Acute Management

Green-top Guideline No. 37b

April 2015

Major gaps in evidence base for obstetric thromboprophylaxis

Inadequate/no evidence in obstetrics for

- mechanical methods
- pharmacological thromboprophylaxis vs placebo
- Empirical dose vs weight adjusted doses
- Length of thromboprophylaxis? especially post partum

What is the new NICE NG89 guideline addressing in obstetrics??

The screenshot shows a web browser window with the URL <https://www.nice.org.uk/guidance/ng89>. The NICE logo and navigation menu are visible at the top. The main heading of the page is "Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism". Below the heading, it states "NICE guideline [NG89] Published date: March 2018". A navigation bar includes "Guidance", "Tools and resources", "Information for the public", "Evidence", and "History". The "Guidance" section is expanded to show "Overview", "Recommendations", and "Putting this guideline into...". A "NICE interactive flowchart - Venous thromboembolism" is also visible.

Home > NICE Guidance > Conditions and diseases > Cardiovascular conditions > Embolism and thrombosis

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

NICE guideline [NG89] Published date: March 2018

Guidance Tools and resources Information for the public Evidence History

Overview Recommendations Putting this guideline into ...

Guidance [Share](#) [Download](#)

NICE interactive flowchart - Venous thromboembolism

What is the new NICE NG89 guideline addressing in obstetrics??

The image is a screenshot of a web browser displaying the NICE (National Institute for Health and Care Excellence) website. The browser's address bar shows the URL <https://www.nice.org.uk/guidance/ng89>. The NICE logo and name are visible at the top left. A navigation menu at the top right includes links for 'NICE Pathways', 'NICE Guidance' (which is highlighted), 'Standards and indicators', 'Evidence services', and a 'Sign in' button. A prominent yellow banner with purple text reads 'ONLY HOSPITAL ADMISSION IN OBSTETRICS!'. Below this, a breadcrumb trail shows the path: Home > NICE Guidance > Conditions and diseases > Cardiovascular conditions > Embolism and thrombosis. The main heading of the page is 'Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism'. Below the heading, it states 'NICE guideline [NG89] Published date: March 2018'. A secondary navigation bar includes 'Guidance' (selected), 'Tools and resources', 'Information for the public', 'Evidence', and 'History'. On the left, a sub-menu shows 'Overview' (selected), 'Recommendations', and 'Putting this guideline into...'. On the right, there are 'Share' and 'Download' links. At the bottom, a link for 'NICE interactive flowchart - Venous thromboembolism' is visible.

ONLY HOSPITAL ADMISSION IN OBSTETRICS!

Home > NICE Guidance > Conditions and diseases > Cardiovascular conditions > Embolism and thrombosis

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

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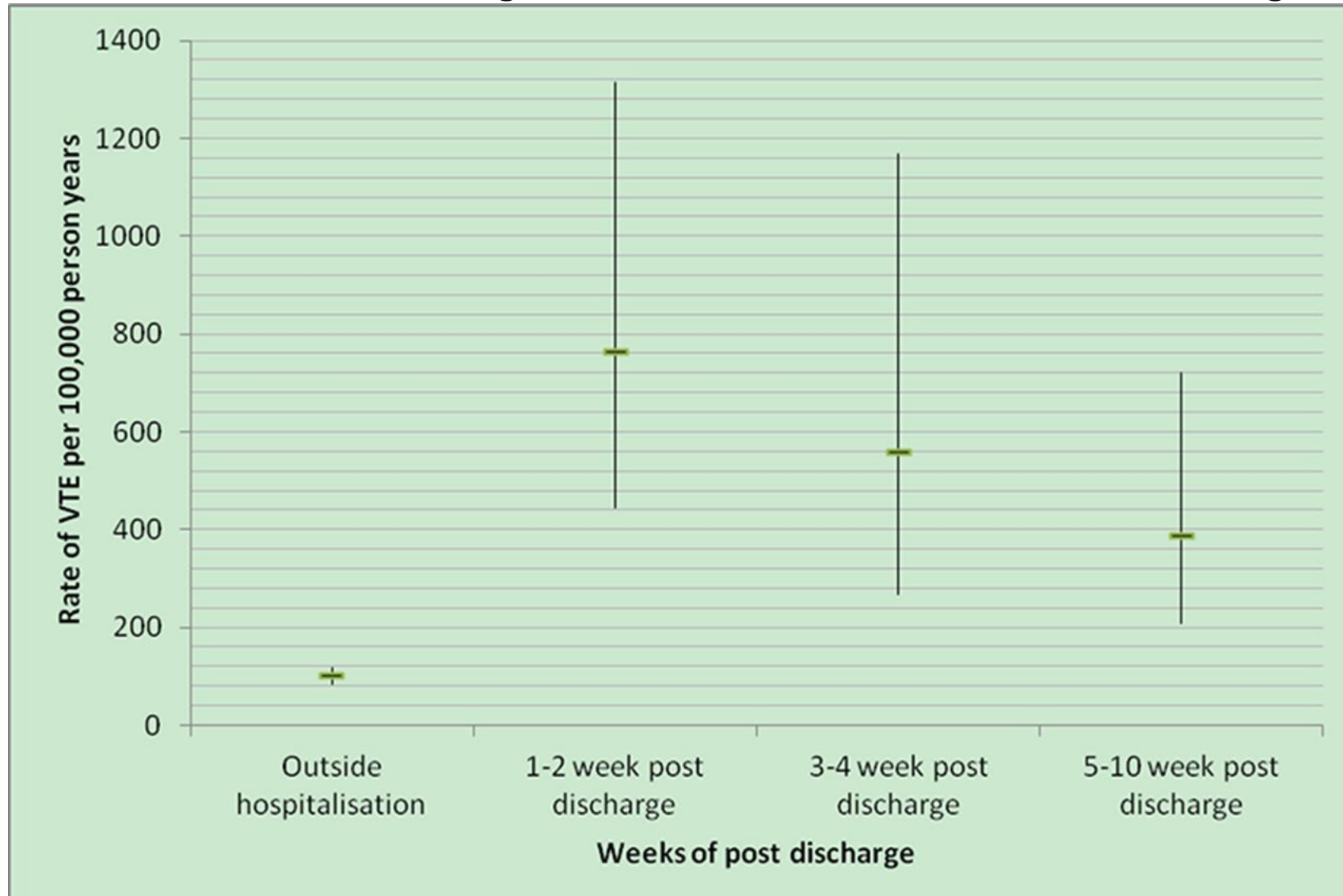
Overview | Recommendations | Putting this guideline into...

Guidance [Share](#) [Download](#)

NICE interactive flowchart - Venous thromboembolism

HOSPITAL ACQUIRED VTE & PREGNANCY

Rate of venous thromboembolism per 100 000 person years by weeks after discharge during antepartum period: 12 events in weeks 1-2 after discharge, 7 events in weeks 3-4 after discharge, and 12 events in weeks 5-10 after discharge.



Sultan A et al. BMJ 2013;347:bmj.f6099

BMJ

Evidence for thromboprophylaxis in obstetrics is derived from non-pregnant studies

A person in a dark blue shirt is holding a large, light green sign with a yellow diagonal stripe. The sign has the text 'LACK OF EVIDENCE' written in bold, black, sans-serif capital letters. The background is a plain, light grey wall.

**LACK OF
EVIDENCE**

Evidence of pregnancy on the effect of graduated compression stockings: on blood velocity in the deep venous system of the lower limb in the postnatal period.

Jamieson R1, Calderwood CJ, Greer IA. BJOG. 2007 Oct;114(10):1292-4.

This study of 17 women examined the effects of GCS on the deep venous system in the immediate postpartum period and found a statistically significant reduction in the diameter of the common femoral vein (CFV) (pre- versus post stocking diameter: mean 10.39 mm [SD 2.09] versus mean 9.69 mm [SD 1.99]) and an increase in the rate of blood velocity in the CFV (pre- versus post stocking velocity: mean 10.0 cm/s [SD 2.7] versus 13.9 cm/s [SD 4.2]) 30 minutes after application of thigh length GCS in women 1 or 2 days following a singleton vaginal delivery at term.

This confirms reduction in venous stasis in the deep venous system in the immediate postpartum woman by the use of GCS, supporting their use in improving venous function in this context.

RCOG PREVENTION OF VTE 37b 2015

Anti-embolism stockings

The use of properly applied anti-embolism stockings (AES) of appropriate size and providing graduated compression with a calf pressure of 14–15 mmHg is recommended in pregnancy and the puerperium for women who are hospitalised and have a contraindication to LMWH. These include women who are hospitalised post-caesarean section (combined with LMWH) and considered to be at particularly high risk of VTE (e.g. previous VTE, more than four risk factors antenatally or more than two risk factors postnatally) and women travelling long distance for more than 4 hours. [New 2015]

There are few data regarding the most efficacious length of AES to use in pregnancy and advice in the non pregnant population is contradictory. More DVTs in pregnant women are iliofemoral compared to the non pregnant population where calf vein DVTs are more common. Studies of AES in pregnancy have only concerned full-length stockings.¹⁶² However, in the obstetric population, there is the added problem of full-length stockings becoming bloodstained. Therefore, on balance, properly applied full-length AES are advocated for pregnant women but knee-length AES should be considered if (as is often the case) full-length AES are ill-fitting or compliance is poor.

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

NICE guideline [NG89] Published date: March 2018

1.16 Interventions for pregnant women and women who gave birth or had a miscarriage or termination of pregnancy in the past 6 weeks

- 1.16.1 Consider LMWH for all women who are admitted to hospital or a midwife-led unit if they are pregnant or gave birth, had a miscarriage or had a termination of pregnancy in the past 6 weeks, and whose risk of VTE outweighs their risk of bleeding. **[2018]**
- 1.16.2 Do not offer VTE prophylaxis to women admitted to hospital or a midwife-led unit who are in active labour. **[2018]**
- 1.16.3 Stop pharmacological VTE prophylaxis when women are in labour. **[2018]**
- 1.16.4 If using LMWH^l in pregnant women, start it as soon as possible and within 14 hours of the risk assessment being completed and continue until the woman is no longer at increased risk of VTE or until discharge from hospital or the midwife-led unit. **[2018]**

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

NICE guideline [NG89] Published date: March 2018

1.16.5 If using LMWH in women who gave birth or had a miscarriage or termination of pregnancy, start 4–8 hours after the event unless contraindicated and continue for a minimum of 7 days. **[2018]**

1.16.6 Consider combined prophylaxis with LMWH^l plus mechanical prophylaxis for pregnant women or women who gave birth or had a miscarriage or termination of pregnancy in the past 6 weeks and who are likely to be immobilised, or have significantly reduced mobility relative to their normal or anticipated mobility for 3 or more days after surgery, including caesarean section:

Use intermittent pneumatic compression as first-line treatment.

If intermittent pneumatic compression is contraindicated, use anti-embolism stockings.

Continue until the woman no longer has significantly reduced mobility relative to her normal or anticipated mobility or until discharge from hospital. **[2018]**

A person with a beard, wearing a dark blue button-down shirt, is holding a large rectangular sign. The sign has a light green background with a yellow diagonal shape at the bottom. The text 'LACK OF EVIDENCE' is written in bold, black, sans-serif capital letters. There is a faint, semi-transparent watermark in the background of the sign that reads 'iStock by Getty Images'.

**LACK OF
EVIDENCE**

VTE in pregnancy

Still a major modern problem in pregnancy,
many had to predict

Can we do trials of LMWH in pregnancy?

To late to do placebo vs LMWH BUT

? length of use?

? empirical dose vs wt. adjusted dose but
would need to be v large due to low event
rate

Can we trial IPC in pregnancy?



WORLD THROMBOSIS DAY
OCTOBER 13



Beware of Blood Clots!

Did you know that blood clots are more common in the first few weeks after giving birth?

Stop the Clot!

“Have you asked about your anti-clot injection?”

Check with your midwife or with your doctor whether you need one.

LIFE BLOOD Thrombosis CHARITY

For more info on blood clots, visit www.bloodclotscharity.org

Mechanical methods summary

Poor evidence base for using stockings

Much better evidence base for intermittent
pneumatic compression but

-how useful is it perioperatively

-for short periods?

MORE RESEARCH REQUIRED!



WORLD THROMBOSIS DAY
OCTOBER 13

