*North American Thrombosis Forum*
*(adapted from a presentation to the American Society of Hematology Annual Meeting in New Orleans, December 5, 2009*

# Controversies in the Peri-Operative Prevention of VTE

**Bill Geerts**
**Thromboembolism Service, Sunnybrook HSC**
**Professor of Medicine, University of Toronto**

Sunnybrook HEALTH SCIENCES CENTRE

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## Objectives

### Prevention of VTE (in surgery):

1. What is the evidence?
2. Summary of thromboprophylaxis guidelines
3. Some of the controversies in thromboprophylaxis

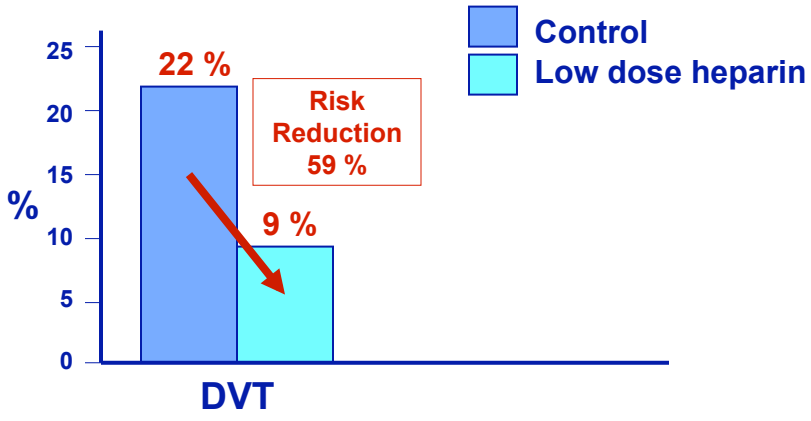
## Keep in mind that . . .

- ~70% of all VTE is **hospital-acquired**
- Several 100 **randomized trials** prove that thromboprophylaxis reduces:
  - DVT
  - PE, fatal PE
  - all-cause mortality
  - costs
- Thromboprophylaxis is the **number 1 ranked patient safety strategy** in hospitalized patients

*Making Health Care Safer: A Critical Analysis of Patient Safety Practices - Shojania (2001) - www.ahrq.gov/clinic/ptsafety/*

## Low Dose Heparin Reduced DVT in Surgical Patients

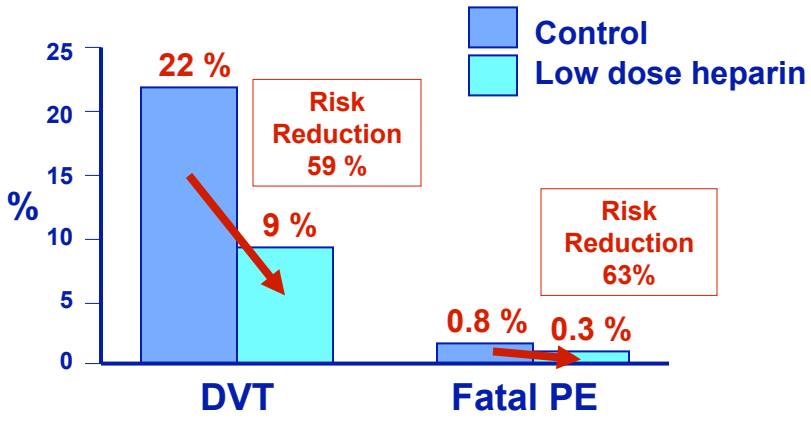
- 46 RCTs, N = 15,598




*Collins – NEJM 1988;318:1162*

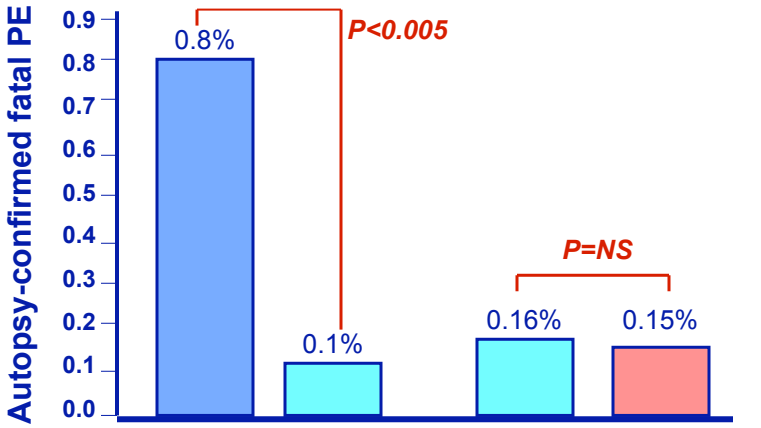
## Reduction in DVT Correlates with Reduction in Fatal PE

- 46 RCTs, N = 25,598




*Collins – NEJM 1988;318:1162*

## Prevention of Postop Fatal PE in General Surgery




*Kakkar – Lancet 1975;2:45; Haas – Thromb Haemost 2005;94:814*

## The Specific Prophylaxis Matters!

- 3,497 American THR/TKR patients
- ALL of whom received thromboprophylaxis

| | non-ACCP (n=2,102) | | ACCP proph (n=1,395) | p |
|---|---|---|---|---|
| DVT ≤90 days | 3.8% | >> | 2.0% | *0.003* |
| PE ≤90 days | 1.2% | >>> | 0.1% | *0.001* |
| VTE cost/patient | $ 252 | > | $ 213 | |

*Selby et al – ISTH 2009;OC-MO-051 and OC-TU-020*

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**Adherence with prophylaxis guidelines was associated with REDUCED VTE AND REDUCED COSTS.**

*Selby et al – ISTH 2009;OC-MO-051 and OC-TU-020*

## Thromboprophylaxis . . .

- Reduces **VTE morbidity and mortality**
- Saves **money**
- Is **standard of care** for most hospital patients

## Objectives

**Prevention of VTE (in surgery):**

1. **What is the evidence?**
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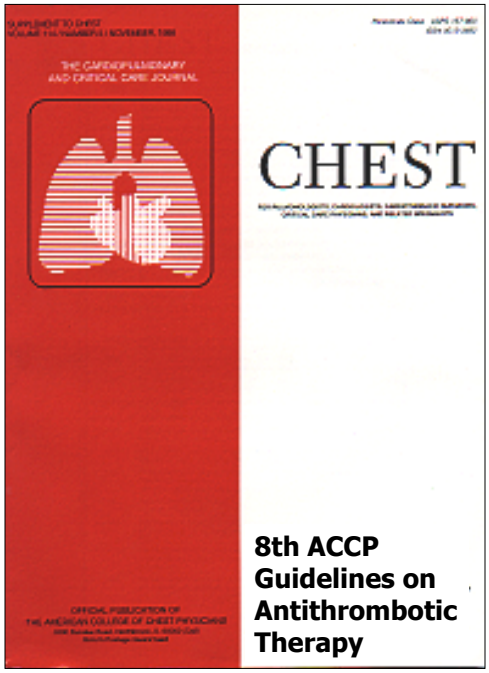


# Prevention of Venous Thromboembolism

W. Geerts
D. Bergqvist
G. Pineo
J. Heit
C.M. Samama
M. Lassen
C. Colwell

*1986, 1989, 1992, 1995, 1998, 2001, 2004, 2008*

*8th ACCP Guidelines on the Prevention of VTE*

## Thromboembolism Risk Groups

- General surgery
- Vascular surgery
- Gynecologic surgery
- Urologic surgery
- Thoracic surgery
- Bariatric surgery
- Laparoscopic surgery
- Coron. bypass surgery
- Hip arthroplasty
- Knee arthroplasty
- Knee arthroscopy
- Hip fracture surgery
- Spine surgery
- Lower extremity injuries
- Neurosurgery
- Major trauma
- Spinal cord injuries
- Burn patients
- Medical patients
- Cancer patients
- Central ven. catheters
- Critical care patients
- Long distance travel

*Geerts – Chest 2008;133:381S*

# 2010 Thromboprophylaxis Summary

| Patient Group | Options | Duration |
|---|---|---|
| Acute medical illness | ❖ LMWH<br>❖ low dose heparin<br>❖ fondaparinux | Discharge |
| Surgery: gen'l, gyne, urol | ❖ LMWH<br>❖ low dose heparin<br>❖ fondaparinux<br>❖ LMWH/LDH + mechan | Discharge |
| Major orthopedics | ❖ LMWH<br>❖ fondaparinux<br>❖ rivaroxaban, dabigatran<br>❖ ~~? obsessive warfarin~~ | 2-4 weeks |
| High bleeding risk | ❖ mechanical | Until anticoagulant can start |

# Objectives

## Prevention of VTE in surgery:

1. What is the evidence?
2. Summary of thromboprophylaxis guidelines
3. Some of the controversies in thromboprophylaxis

# 1. Should Mechanical Prophylaxis be Used Routinely?

# 1. Mechanical Methods of Prophylaxis

1. **Graduated compression stockings (TEDS™, elastic stockings)**
2. **Intermittent pneumatic compression devices (SCDs™, leg squeezers)**
3. **Foot pumps**

- **Much less evidence** than for anticoagulants.
- If used properly, **these methods work in some patient groups**, but
- They generally **don't work as well as anticoagulants,** and
- They require a **big effort to work** at all.

## 1b. Should mechanical prophylaxis be combined with anticoagulant prophylaxis?

- **Disadvantages** of combined prophylaxis:
  1. additional benefit largely unknown
  2. possibility that both will be used suboptimally
  3. significant additional cost

## 1b. Should mechanical prophylaxis be combined with anticoagulant prophylaxis?

- **Generally NOT**
- **Consider** combined prophylaxis for:

**1) very high risk patient for TE**

e.g. major cancer surgery + previous DVT

**2) initially in patients with high bleeding risk**

e.g. neurosurgery, major head injury

# 1. Should Mechanical Prophylaxis be Used Routinely?

1.4.3 **Mechanical prophylaxis** used:

- primarily in **patients at high risk of bleeding** [Grade 1A],
- or possibly in addition to anticoagulant prophylaxis [Grade 2A]

Recommend **careful attention to proper use of and optimal compliance** with mechanical prophylaxis [Grade 1A]


*Geerts (8th ACCP Guidelines) – Chest 2008;133:381S*

# 2. Should LMWH Replace LDH as Routine Thromboprophylaxis?

# 2. LDH vs LMWH

| Factor | LDH | LMWH |
|---|---|---|
| efficacy | ++ - +++ | +++ |
| safety | +++ | +++ |
| dosing | 2-3 x/day | once daily |
| accum in renal insuff | no | ? - no |
| HIT potential | low | very low |
| cost | $ | $ - $$ |
| applicable in all pts | no * | yes |

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| Major orthopedics | ❖ LMWH<br>❖ fondaparinux<br>❖ rivaroxaban, dabigatran<br>❖ ~~? obsessive warfarin~~ | 2-4 weeks<br>Not low dose heparin |
| High bleeding risk | ❖ mechanical | Until anticoagulant can start |

## ACCP Thromboprophylaxis Recommendations

| | LDH | LMWH | Fonda | Warfarin |
|---|---|---|---|---|
| General surgery | 1A | 1A | 1A | no |
| Gynecologic surgery | 1A | 1A | 1C | no |
| Urologic surgery | 1B | 1C | 1C | no |
| Coronary art bypass surg | 1C | 1C | no | no |
| Hip replacement | no | 1A | 1A | 1A |
| Knee replacement | no | 1A | 1A | 1A |
| Hip fracture surgery | 1B | 1B | 1A | 1B |
| Neurosurgery | 2B | 2A | no | no |
| Major trauma | no | 1A | no | no |
| Medical patients | 1A | 1A | 1A | no |
| Critical care patients | 1A | 1A | no | no |

*Geerts – Chest 2008;133:381S*

## 2. Should LMWH Replace LDH as Routine Thromboprophylaxis?

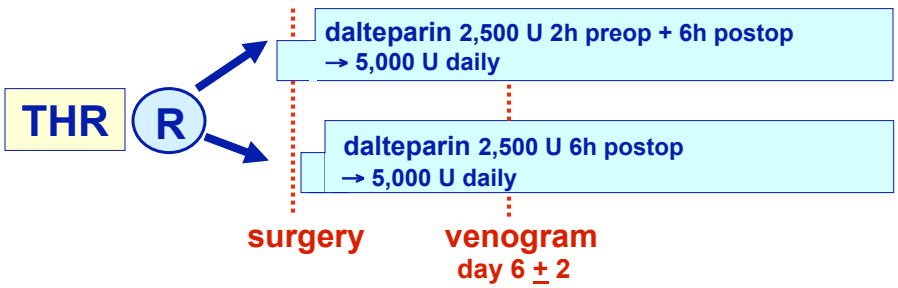
**Yes:**

- if the cost difference between LMWH and LDH is not too great
- and for patients at high risk of HIT (CVS)

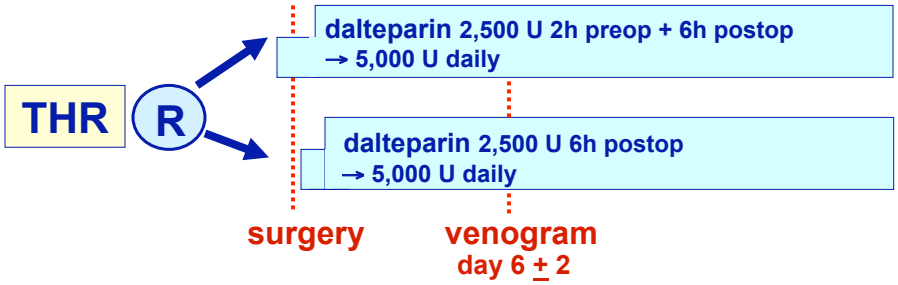
**Why:**

- Simplifies thromboprophylaxis and makes it consistent for most patients

# 3. Is preop anticoagulant thromboprophylaxis necessary?




*Hull - Arch Intern Med (2000)*




| | Pre-op dalteparin (n=413) | | Post-op dalteparin (n=414) |
|---|---|---|---|
| Total DVT | 10.7 % | < | 13.1 % |
| Proximal DVT | 0.8 % | = | 0.8 % |
| Major bleeding | 8.9 % | | 6.5 % |

*Hull - Arch Intern Med (2000)*

## 3. Is preop anticoagulant thromboprophylaxis necessary?

- **NOT if it affects:**
  - use of regional anesthesia
  - concerns about intra-operative bleeding

  AND if effective prophylaxis is used postop:
  - *an efficacious drug*
  - *an appropriate dose*
  - *don't wait too long to start*
  - *continue long enough*
- **But continue with a preop start if no disadvantage - this is surgical "tradition"**

## 4. How long should thromboprophylaxis be given?

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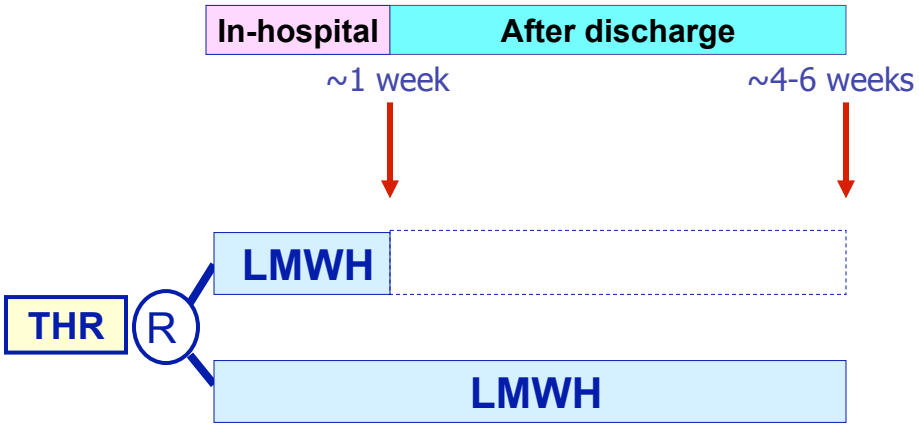
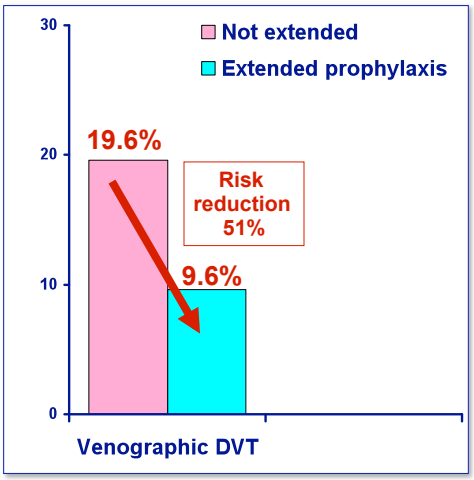
- Considerable **uncertainty** for most patient groups
- **Few studies** outside of major orthopedic surgery
- Concerns with **shorter hospital stays** and greater comorbidity

# Post-Discharge Prophylaxis




# Extended Thromboprophylaxis Reduces DVT after THR

**Meta-analysis:**
**9 studies**
**N=3,999**

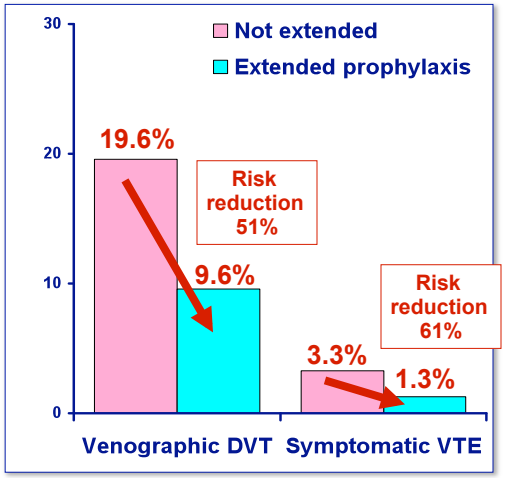



*Eikelboom - Lancet 2001;358:9*

# Extended Thromboprophylaxis Reduces DVT and Symptomatic VTE

**Meta-analysis:**
**9 studies (THR)**
**N=3,999**

No post-discharge major bleeding




*Eikelboom - Lancet 2001;358:9*

# 4. How long should thromboprophylaxis be given?

**Until ambulating = *NO!***

**Until discharge**

- for most medical/surgical patients

**After discharge**

- THR
- TKR
- hip fracture surgery

*2-4 weeks*

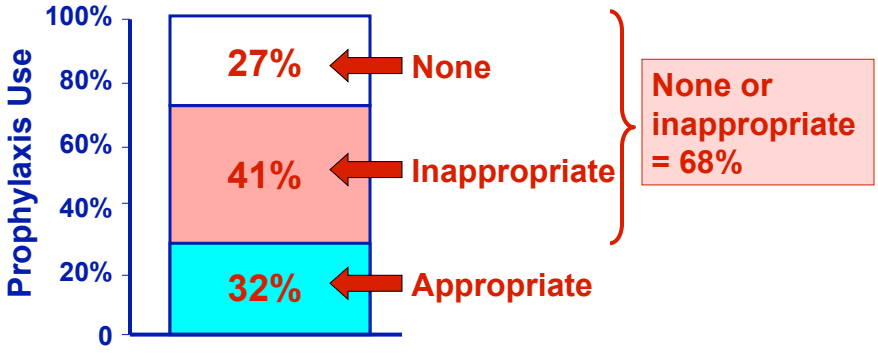
- possibly some cancer surgery patients

# 5. How can implementation of prophylaxis be increased?

# VTE Prophylaxis in Surgical Patients

***(n=85,970 in 225 US hospitals)***

- Age ≥40; hospitalized ≥6 days
- Thromboprophylaxis indicated + no contraindic



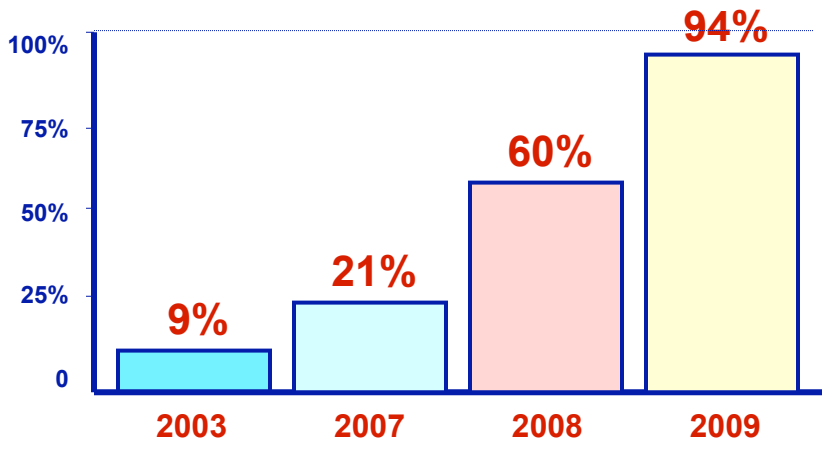

*Amin – Thromb Haemost 2008;99:796*

## Strategies to Improve Thromboprophylaxis Success

- Have a **written hospital policy** on prophylaxis
- Keep it **simple** (patient groups, options)
- Use **order sets, computer order entry**
- Make a prophylaxis **decision mandatory**
- **Involve everyone** – MD, RN, pharm, patients
- **Audit adherence,** provide feedback and implement quality improvement if not at 100%

## Appropriate Prophylaxis* Use in General IM Patients at Sunnybrook

*based on direct chart audit

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*Quality improvement in action!*

## 5. What can physicians do to reduce the burden of VTE?

- Be thrombosis **experts** – Dx, Rx, prevention
- Assess your patients for VTE risk and use evidence-based **thromboprophylaxis routinely**
- Include thromboprophylaxis when you consult on **surgical patients**
- Be **local advocates** for optimal prophylaxis
- Lead an **institution-wide** prophylaxis program

## Making the Hospital Safer for Patients: *Optimal Prevention of VTE*

- Give prophylaxis
- Mostly anticoagulant
- Long enough