# Venous Thromboembolism Prophylaxis for Arthroplasty


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# Jason M. Hurst, MD Disclosure

- Consultant:
  - Zimmer Biomet
  - TJO
- Research Support:
  - Zimmer Biomet; Pacira Pharmaceuticals; Orthosensor; SPR Therapeutics

# Incidence of Symptomatic PE with No Prophylaxis

- THA: 20%
- TKA: 8%

*Comp et al., JBJS 2001*

# Incidence of Fatal PE following THA or TKA Regardless of Chemoprophylactic Agent

## 0.1% - 0.2%

*Brookenthal et al., J Arth 2001*
*Freedman et al., JBJS 2000*
*Larson et al., JSOA 2001*
*Nassif et al., J Arth 2000*
*Sarmiento & Goswami, JBJS 1999*
*Lieberman et al., JBJS 1997*

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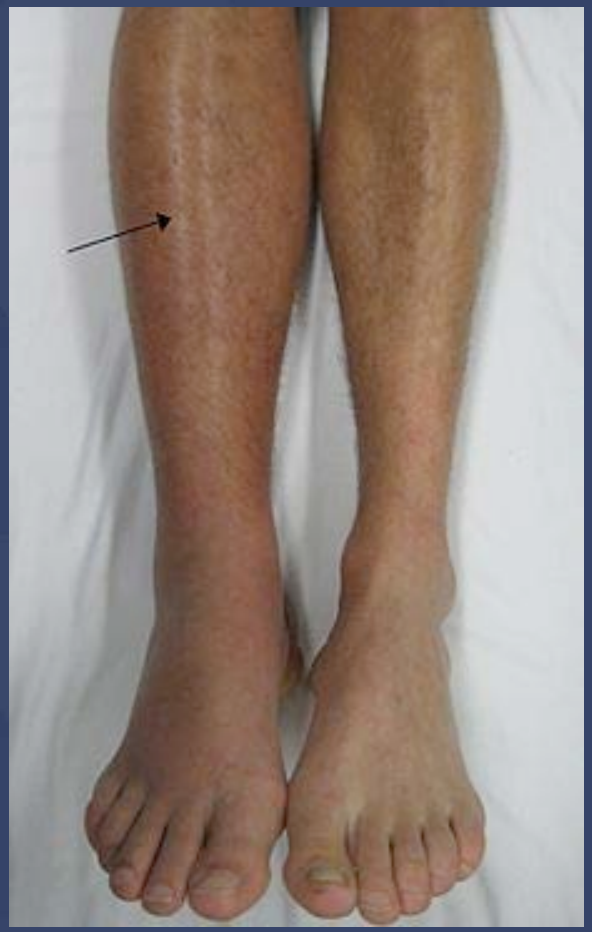
# What does it look like?

# DVT: Exam, Imaging

- Pain, swelling, erythema
- Homan's unreliable, nonspecific
- Venography = gold standard
- Venous duplex U/S
  - 96% sensitive, 98% specific
- Alternatives: CT, plethysmography



# PE: Exam

- Acute pleuritic pain
- Dyspnea
- Hypoxia
- Tachypnea
- Tachycardia
- EKG, ABG, vitals, pulse ox
- CXR
- Pulmonary angiogram
  - gold standard
- Helical chest CT
  - First line
- Nuclear med - V/Q scan

**It is IMPERATIVE to try and prevent this post-operative complication**

# What's the protocol?



AMERICAN COLLEGE OF

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# Chest 2012; 141(2 Suppl)

*Y Falck-Ytter; CW Francis; NA Johanson; C Curley; OE Dahl; S Schulman; TL Ortel; SG Pauker; CW Colwell Jr*

*ACCP Guidelines on Prevention of Venous Thromboembolism in Orthopedic Surgery Patients, 9th ed.*

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# ACCP Grading Recommendation Table

## Table 1: Grading Recommendations

| Grade of recommendation* | Benefit versus risk and burdens | Methodologic quality of supporting evidence | Implications |
|---|---|---|---|
| Strong recommendation, High quality evidence 1 A | Desirable effects clearly outweigh undesirable effects, or vice versa | Consistent evidence from randomized controlled trials without important limitations or exceptionally strong evidence from observational studies. | Recommendation can apply to most patients in most circumstances. Further research is very unlikely to change our confidence in the estimate of effect. |
| Strong recommendation, Moderate quality evidence 1 B | Desirable effects clearly outweigh undesirable effects, or vice versa | Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence from observational studies. | Recommendation can apply to most patients in most circumstances. Higher quality research may well have an important impact on our confidence in the estimate of effect and may change the estimate. |
| Strong recommendation, Low or very low quality evidence 1 C | Desirable effects clearly outweigh undesirable effects, or vice versa | Evidence for at least one critical outcome from observational studies, case series, or from randomized, controlled trials with serious flaws or indirect evidence. | Recommendation can apply to most patients in many circumstances. Higher quality research is likely to have an important impact on our confidence in the estimate of effect and may well change the estimate. |

* We use the wording 'we recommend' for strong (Grade 1) recommendations and 'we suggest' for weak (Grade 2) recommendations.

Table continued

# ACCP Grading Recommendation Table

## Table 1 continued: Grading Recommendations

| Grade of recommendation* | Benefit versus risk and burdens | Methodologic quality of supporting evidence | Implications |
|---|---|---|---|
| Weak recommendation, High quality evidence 2 A | Desirable effects closely balanced with undesirable effects | Consistent evidence from randomized controlled trials without important limitations or exceptionally strong evidence from observational studies. | The best action may differ depending on circumstances or patients' or societal values. Further research is very unlikely to change our confidence in the estimate of effect. |
| Weak recommendation, Moderate quality evidence 2 B | Desirable effects closely balanced with undesirable effects | Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence from observational studies. | Best action may differ depending on circumstances or patients' or societal values. Higher quality research may well have an important impact on our confidence in the estimate of effect and may change the estimate. |
| Weak recommendation, Low or very low quality evidence 2 C | Desirable effects closely balanced with undesirable effects | Evidence for at least one critical outcome from observational studies, case series, or from randomized, controlled trials with serious flaws or indirect evidence. | Other alternatives may be equally reasonable. Higher quality research is likely to have an important impact on our confidence in the estimate of effect and may well change the estimate. |

* We use the wording 'we recommend' for strong (Grade 1) recommendations and 'we suggest' for weak (Grade 2) recommendations.

# ACCP Guidelines on Prevention of VTE in Orthopedic Surgery Patients, 9th ed.

- 2.1.1 & 2.1.2. For THA or TKA recommend one of following rather than no prophylaxis for minimum of **10-14 days** (all Grade 1B):
  - Low molecular weight heparin (LMWH)
  - Fondaparinux, Dabigatran, or Apixaban
  - Rivaroxiban (THA or TKA but not hip fracture)
  - Low-dose unfractionated heparin (LDUH)
  - Adjusted-dose vitamin K antagonist (AD VKA)
  - **Aspirin**
  - Or (Grade 1C) intermittent pneumatic compression device (IPCD)

*Falck-Yetter et al., CHEST 2012*

# ACCP Guidelines on Prevention of VTE in Orthopedic Surgery Patients, 9th ed.

- 2.2. For THA/TKA and receiving LMWH, we recommend starting either ≥12 h preop or ≥12 h postop rather than within ≤4 h preop or ≤4 h postop (Grade 1B)
- 2.3.1 & 2.3.2. For THA/TKA, irrespective of concomitant use of ICPD or length of treatment, suggest use of LMWH in preference to other recommended alternative agents: ARIXTRA, ELIQUIS, PRADAXA, XARELTO (not HFS), LDUH (all Grade 2B), AD VKA, or aspirin (all Grade 2C)
- 2.4. Suggest extending prophylaxis in outpatient period for up to 35 days rather than only 10-14 days (Grade 2B)
- 2.5. Suggest using dual prophylaxis with antithrombotic agent and IPCD during hospital stay (Grade 2C)

*Falck-Yetter et al., CHEST 2012*

# ACCP Guidelines on Prevention of VTE in Orthopedic Surgery Patients, 9th ed.

- 2.6. In patients with major bleeding risk, suggest using IPCD or no prophylaxis rather than pharmacologic treatment (Grade 2C)
- 2.7. In patients who decline or are uncooperative with injections or/and IPCD, recommend apixaban or dabigatran (if unavailable then alternatively rivaroxaban or AD VKA) rather than alternate forms of prophylaxis (all Grade 1B)
- 2.8. Suggest **against using IVC filter for primary prevention** over no prevention in patients with increased bleeding risk or contraindications to both pharmacologic and mechanical thromboprophylaxis

*Falck-Yetter et al., CHEST 2012*

# ACCP Guidelines on Prevention of VTE in Orthopedic Surgery Patients, 9th ed.

- 2.9. For asymptomatic patients we recommend against Doppler or duplex ultrasound (DUS) screening before hospital discharge (Grade 1B)
- 3.0 Suggest no prophylaxis rather than pharmacologic thromboprophylaxis in patient with isolated lower-leg injuries requiring immobilization (Grade 2C)
- 4.0. For patients undergoing knee arthroscopy without a history of prior VTE, suggest no thromboprophylaxis rather than prophylaxis (Grade 2B)

*Falck-Yetter et al., CHEST 2012*

# ACCP Guidelines for Duration of Prophylaxis

- **Basic Summary for TKA and THA:**
- **Prophylaxis for minimum 10-14 days (all Grade 1B) :**
  - **Low molecular weight heparin (LMWH)**
  - **Fondaparinux**
  - **Dabigatran, Apixaban, Rivaroxiban**
  - **Low-dose unfractionated heparin (LDUH)**
  - **Adjusted-dose vitamin K antagonist (AD VKA)**
  - **Aspirin (Grade 1B)**
  - **Intermittent pneumatic compression device (IPCD) (Grade 1C)**

AAOS American Academy of Orthopaedic Surgeons

# Clinical Guideline on Prevention of Symptomatic Pulmonary Embolism in Patients Undergoing THA or TKA

- Disclaimer: … educational tool … not intended to be a fixed protocol … clinician's independent medical judgment
- No mention of UKA

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AAOS American Academy of Orthopaedic Surgeons

# Prevention of Venous Thromboembolism for THA & TKA

- Standard risk PE; Standard risk bleeding
  - ASA, LMWH, Pentasaccharides, Warfarin
- Elevated risk of PE; Standard risk bleeding
  - LMWH, Pentasaccharides, Warfarin
- Standard risk of PE; Elevated risk bleeding
  - Aspirin, Warfarin, None
- Elevated Risk PE; Elevated risk bleeding
  - Aspirin, Warfarin, None

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# AAOS Recommendations, THA & TKA

- Assess risk: PE & major bleeding
- Known contraindications to anticoagulation: consider vena cava filter
- Intraoperative and IPO mechanical prophylaxis
- With anesthesiologist, consider regional
- Postop, continue mechanical prophylaxis until discharge to home
- Mobilize as soon as feasible
- Routine postop screening in asymptomatic patients is not recommended
- Encourage progressively ↑ mobility after discharge
- Educate patient re: common symptoms of VTE

# SCIP

- Hospital inpatient quality process measures
  - For total joint surgery, recommend the use of LMWH, fondaparinux, or warfarin
  - For hip factures, allow above plus LDUH
- Do not address dosages or appropriate INR level for patients treated with warfarin
- Recommend mechanical prophylaxis only for hip patients at high bleeding risk
- Knee patients whose surgeries lasted ≤60 minutes or whose hospital stays were ≤3 days are excluded from SCIP-VTE-1 and 2

*Haralson, AAOS Now*

# Surgical Care Improvement Project (SCIP) Guidelines

- Recommend for THA and TKA:
  - LMWH
  - Fondaparinux
  - Warfarin
- Pneumatic compression devices with or without aspirin for TKA only

# *Complications of VTE Guidelines?*

# 10 Days of LMWH after TJA

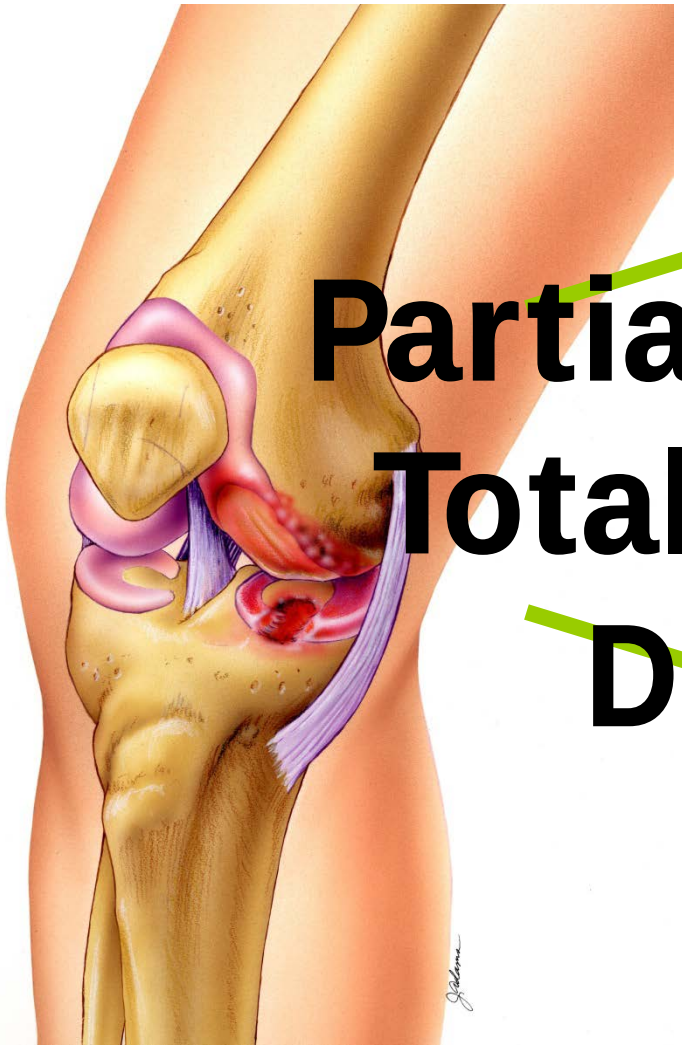
- 4.7% Readmission rate
- 3.4% I&D rate
- 5.1% Prolonged hospitalization

*Burnett et al., J Arth 2007*

# Does "Excessive" Anticoagulation Predispose to Periprosthetic Infection?

- 2-to-1 case control study
  - Study Group: 78 Septic failures
  - Control: Same index procedures
- Hematoma and wound drainage were significant risk factors for infection
- INR greater than 1.5 was a risk for infection

*Parvizi et al., J Arthroplasty 2007*



# Partial Knees and Total Knees are Different

# The Incidence and Prevention of Symptomatic VTD following UKA

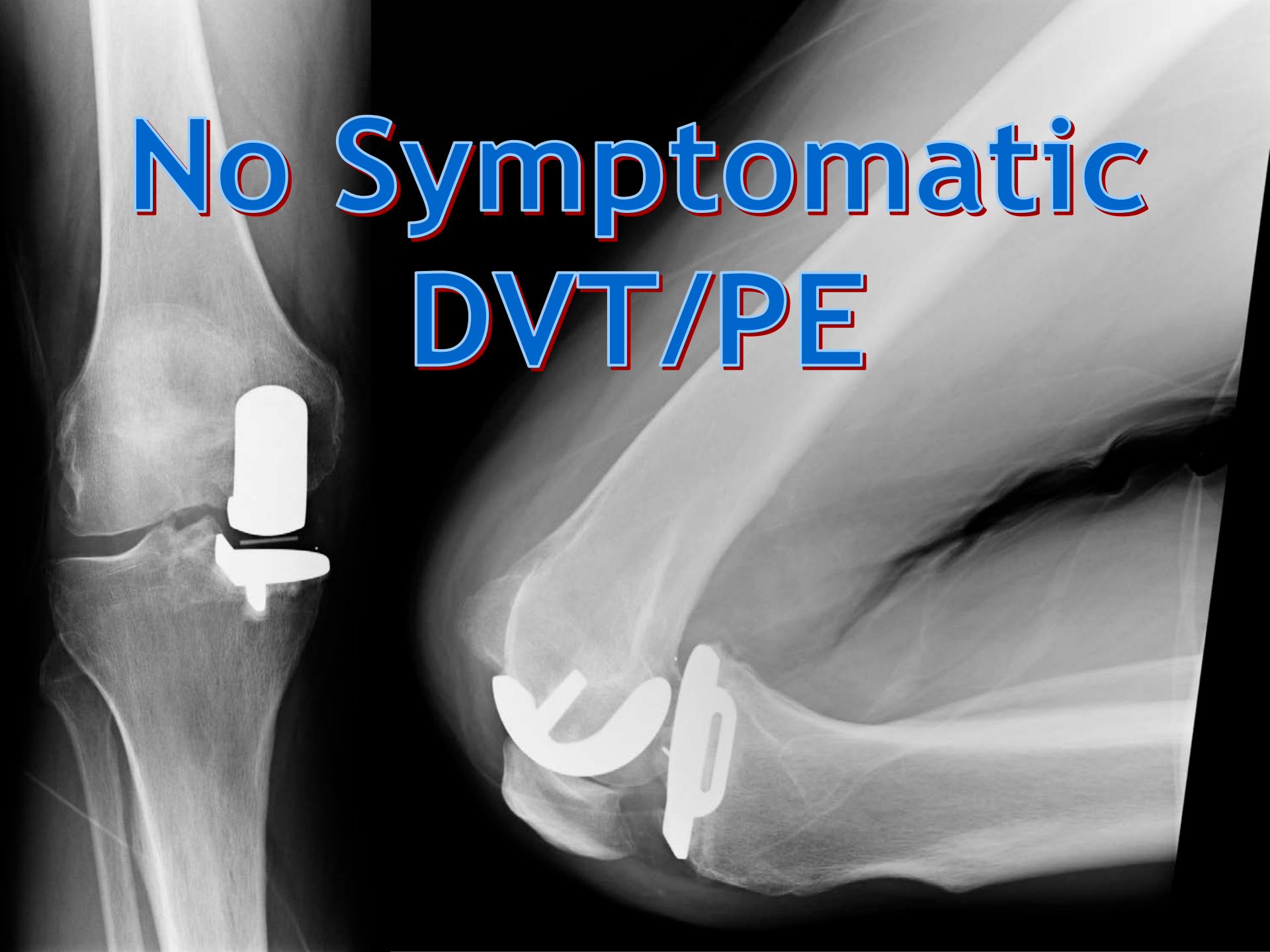
- 432 UKA in 362 Patients
  - 8 lateral fixed bearing
  - 424 medial UKA
    - 34 inlay fixed bearing
    - 49 fixed bearing
    - 341 mobile bearing

*Lombardi et al., Orthopedics 2007*

# Multimodal VTD Prophylaxis

- Without significant risk factors
  - ECASA 325 BID x 6 weeks
    - 83% of UKA
- With significant risk factors
  - Warfarin resumed
    - 1.6%
  - LMWH for 2 weeks; ECASA 4 weeks
    - 8.1%
  - LMWH Bridge; Warfarin 6 weeks
    - 6.4%

*Lombardi et al., Orthopedics 2007*


No Symptomatic
DVT/PE

# Review of 1000 Consecutive UKA

- 1000 consecutive UKA (828 patients)
  - Rapid recovery protocol
  - Multimodal VTE prophylaxis
- Results:
  - 5 (0.5%) transfusion for postop anemia
  - 1 (0.01%) symptomatic DVT within 90 days
  - No symptomatic PE
  - Average hospital LOS: 1.4 days

*Berend et al., Orthopedics 2010*

# Take Home Message

- ACCP, AAOS, & SCIP Guidelines vary
- AAOS Guidelines support risk stratification based on bleeding vs. PE
- SCIP Guidelines approve of pneumatic compression devices with or without aspirin for TKA
  - With High Bleeding risk!

# Take Home Message

- Basic Protocol Options
  - High Risk for DVT
    - Chemoproph for 2 weeks
    - SCDs for 2 weeks
  - Moderate Risk for DVT
    - ASA for 6 weeks
    - SCDs for 2 weeks

# Take Home Message

- UKA has a lower risk of venous thromboembolic disease than TKA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