Venous Thromboembolic Prophylaxis

Javad Parvizi MD, FRCS

Professor

Rothman Institute, Philadelphia, PA

Disclosures

- Research support:
  - NIH
  - Department of Defense
  - OREF
  - 3M
  - Aesculap
  - AO Spine
  - Biomet
  - Cempra
  - CeramTec
  - DePuy
  - Integra
  - Lima
  - Myoscience
  - NDRI
  - Novartis
  - Pfizer
  - Rotation Medical
  - Simplify Medical
  - Smith and Nephew
  - Stelkast
  - Stryker Orthopedics
  - Synthes
  - TissueGene
  - Tornier
  - Orthospace
  - Zimmer Biomet

Disclosure

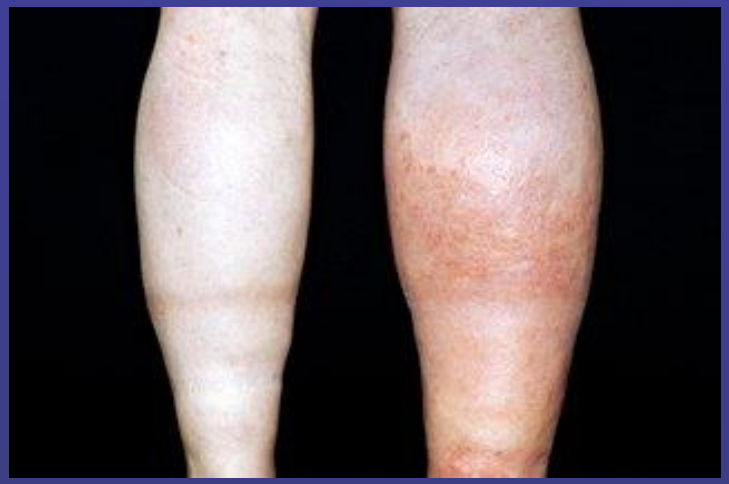
- **Consultant**
  - Zimmer Biomet
  - Corentec
  - Ethicon
  - Tenor
  - KCI / 3M (Acelity)
  - Heraus
  - MicrogenDx
  - Jointstem
  - Peptilogics
  - Cardinal Health
  - Fidia Pharm
- **Royalty**
  - Corentec
  - Datatrace
  - Elsevier
  - Jaypee publishers
  - Slack
  - Wolters Kluwer
  - Becton Dickenson

Intellectual Property/Ownership

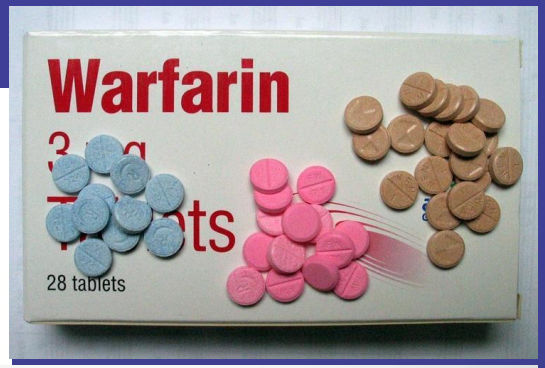
- Parvizi Surgical Innovations and subsidiaries
- Hip Innovation Technology
- Corentec
- Alphaeon/Strathsby Crown
- Joint Purification Systems
- Ceribell
- Acumed
- PRN-Veterinary
- MD-valuate
- Intellijoint
- MicroGenDx
- Nanooxygenic
- Sonata
- Molecular Surface Technologies

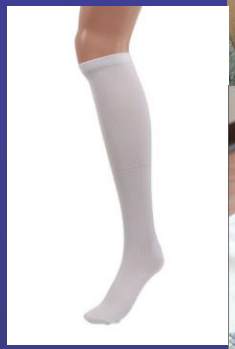
Venous Thromboembolism (VTE)

- Feared complication after (orthopaedic) surgery



What options do we have?





VTE Prevention
Fact

- Aspirin/mechanical prophylaxis are the best

ICM VTE Hip & Knee

3 - What is the most optimal VTE prophylaxis following TKA/THA?

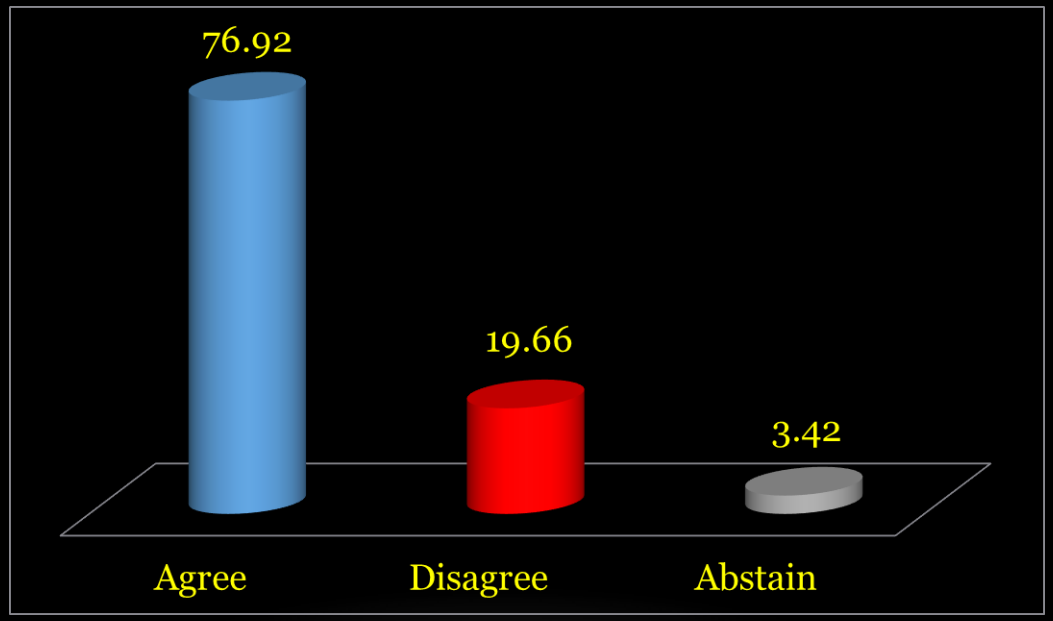
Response/Recommendation: Low-dose aspirin (ASA) is currently the most effective and safest method of prophylaxis against venous thromboembolism (VTE) in patients undergoing total joint arthroplasty (TJA). We recommend the use of low-dose ASA as the primary method of VTE prophylaxis in all patients undergoing TJA, including moderate-to high-risk patients.

Strength of Recommendation: Strong.

Saad Tarabichi, Matthew B. Sherman, Kerri-Anne Ciesielka, Colin M. Baker, Javad Parvizi

ICM VTE Hip & Knee

3 - What is the most optimal VTE prophylaxis following TKA/THA?



(Strong Consensus)

ROTHMAN

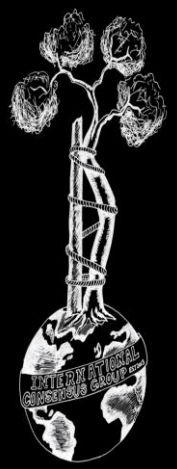
AAHKS®
AMERICAN ASSOCIATION OF HIP AND KNEE SURGEONS

Jefferson

(Values are percent of respondents)	Mechanical	ASA ± mechanical	LMWH ± mechanical	Coumadin ± mechanical	Other oral / injectable ± mechanical
2009		20	33	38	
2011		32	32	40	
2014	0	45	38	42	0
2016	0	60	21	18	1
2018	1	82	6	7	4
2020	4	93	1	0	2

Global Challenge

- Resistance from hematology, cardiology, internal medicine colleagues



VTE Prophylaxis After TJA

- Clouding issue

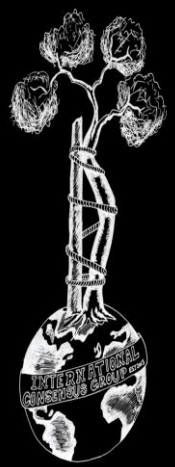
News

King obtains $1.5M settlement for husband and children in pulmonary embolism death

September 14, 2004 | Massachusetts Lawyers Weekly: Verdicts & Settlements

Guidelines

- Multiple guidelines
- Hip and knee mostly
- Other specialties not covered
- No global perspective
- Contradictory
- Outdated



Guidelines

CHEST Supplement

ANTITHROMBOTIC THERAPY AND PREVENTION OF THROMBOSIS, 9TH ED: ACCP GUIDELINES

Prevention of VTE in Orthopedic Surgery Patients

Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

AAOS
American Academy of Orthopaedic Surgeons

American Academy of Orthopaedic Surgeons Clinical Practice Guideline on

Prevention of Symptomatic Pulmonary Embolism in Patients Undergoing Total Hip or Knee Arthroplasty

CLINICAL GUIDELINES

blood advances

American Society of Hematology 2019 guidelines for management of venous thromboembolism: prevention of venous thromboembolism in surgical hospitalized patients

NICE National Institute for Health and Care Excellence

THE JOURNAL OF BONE AND JOINT SURGERY

Developing guidelines for venous thromboembolism for The National Institute for Clinical Excellence

INVOLVEMENT OF THE ORTHOPAEDIC SURGICAL PANEL

EJA

Eur J Anaesthesiol 2018; **35**:116–122

GUIDELINES

European guidelines on perioperative venous thromboembolism prophylaxis

SIGN

Guidelines

Anticoagulation

Aspirin for the Prophylaxis of Venous Thromboembolic Events in Orthopedic Surgery Patients: A Comparison of the AAOS and ACCP Guidelines with Review of the Evidence

David W Stewart, Jessica E Freshour

ORTHOPAEDICS

ANZJSurg.com

Are the national orthopaedic thromboprophylaxis guidelines appropriate?

Corinne Mirkazemi, Luke R. Bereznicki and Gregory M. Peterson
School of Pharmacy, University of Tasmania, Hobart, Tasmania, Australia

Journal of Thrombosis and Haemostasis, **8**: 675–677 DOI: 10.1111/j.1538-7836.2010.03776.x

COMMENTARY

How can we reduce disagreement among guidelines for venous thromboembolism prevention?

M. SOBIERAJ-TEAGUE,* J. W. EIKELBOOM† and J. HIRSH†
*Hamilton Health Sciences, Hamilton General Hospital, Hamilton, ON; and †Department of Medicine, McMaster University, Hamilton, ON, Canada

"Guidelines".

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The Surgical Care Improvement Project (SCIP): Advancing the Quality of Hospital Care

Hospitals are hastening to comply with SCIP measures now made mandatory by Medicare

Enrique Ginzburg, MD, and Mary E. Foscue, MD

SCIP is a national quality partnership of more than 40 organizations* focused on improving the safety of surgical care. The project's goal is a 25% reduction in surgical complications by 2010, and it has targeted 4 areas—surgical site infections, cardiovascular events, respiratory complications, and venous thromboembolism (VTE)—through a total of 17 measures.[1,2]

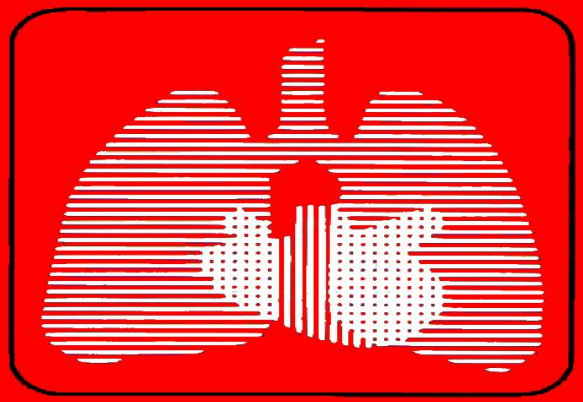
Until recently, implementation has been voluntary. But

Risk Assessment for DVT and PE: Developing a Screening Program

Most surgical patients have one or more risk factors for DVT and/or PE. Surgery itself is a risk factor, as are immobility that follows surgery, cancer, advanced age, obesity, infection, and medical conditions such as heart attack and respiratory failure.[6]

SUPPLEMENT TO CHEST
VOLUME 126 / NUMBER 3 (SUPPL) / SEPTEMBER, 2004

www.chestjournal.org



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THE CARDIOPULMONARY
AND CRITICAL CARE JOURNAL

FOR PULMONOLOGISTS, CARDIOLOGISTS, CARDIOTHORACIC SURGEON
CRITICAL CARE PHYSICIANS, AND RELATED SPECIALISTS

1985

The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy
Evidence-Based Guidelines
Guest Editors: Jack Hirsh, MD, FCCP; Gordon Guya
MD, FCCP; Gregory Albers, MD, FCCP; and Holger
Schunemann, MD, FCCP

Financial Disclosures of ACCP Authors

Table 6. Financial Disclosures

Geerts	Pineo	Heit	Bergqvist	Lassen	Colwell	Ray
AstraZeneca Aventis Pharmacia Eli Lilly Sanofi-Synthelabo-Organon	Aventis Emisphere Technologies Leo Pharma Pharmacia AstraZeneca Bristol-Meyersa Squibb GlaxoSmithKline Pfizer-Pharmacia Sanofi-Synthelabo-Organon	AstraZeneca Aventis Corvas Pharmacia	AstraZeneca Aventis Boehringer Ingelheim Pharmacia/Pfizer Sanofi-Synthelabo	Sanofi-Synthelabo AstraZeneca Bayer Boehringer Ingelheim Bristol-Meyers Squibb GlaxoSmithKline Leo Pharma Mitsubishi Pharma Vivolution Inc Wyeth Yamanautchi	Amgen AstraZeneca Baxter Sanofi-Synthelabo Aventis Pharmacia	No Conflicts

J Arthroplasty. 2018 Jun 28. pii: S0883-5403(18)30595-3. doi: 10.1016/j.arth.2018.06.025. [Epub ahead of print]

Differences in Reported Outcomes in Industry-Funded vs Nonfunded Studies Assessing Thromboprophylaxis After Total Joint Arthroplasty.

Groff H[1], Azboy I[2], Parvizi J[1].

- Funded studies supported expensive drugs
- Minimized complications

Department of Justice

FOR IMMEDIATE RELEASE
MONDAY, SEPTEMBER 10, 2007
WWW.USDOJ.GOV

CIV
(202) 514-2007
TDD (202) 514-1888

Aventis Pays More Than $190 Million to Settle Drug Pricing Fraud Matters

WASHINGTON – Aventis Pharmaceuticals Inc. has paid the United States and a number of states, as well as the District of Columbia, over $190 million to resolve allegations that the company caused false claims to be filed with Medicare and other federal health programs as a result of the company's alleged fraudulent pricing and marketing of drugs, the Justice Department announced today. Aventis is now known as sanofi-aventis U.S. Inc. and sanofi-aventis U.S. LLC. Aventis, one of the world's largest pharmaceutical manufacturers, has agreed to settle False Claims Act allegations concerning its pricing and marketing of Anzemet, an antiemetic drug used primarily in conjunction with oncology and radiation treatment to prevent nausea and vomiting. The government alleged that the pharmaceutical company engaged in a scheme to set and maintain fraudulent and inflated prices for Anzemet knowing that federal health care programs established reimbursement rates based on those prices.

The United States alleged that Aventis used the difference between the inflated prices that it reported, which were used by federal programs to set reimbursement rates for health care providers, and the actual prices for the drugs charged to its customers in order to market, promote and sell Anzemet to existing and potential customers. The difference between the reimbursement rate of the federal health care programs and the actual price paid by health care providers is commonly known as the "spread." The larger the spread on a drug, the larger the profit or return on investment for the provider. Because reimbursement from federal programs was based on the fraudulent, inflated prices, the United States contended that Aventis caused false and fraudulent claims to be submitted to federal health care programs.

Prevention of DVT

- “Dirty Politics”

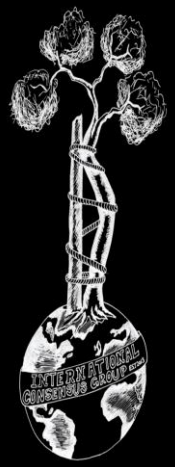
Thanks To Robert Barrack

International Consensus Group Discovery

Literature is not definitive on many issues

Challenges of Generating Evidence

- To do studies on VTE, large sample sizes are needed
- n=5,000, n= 22,000, n= 36,000



Challenges of Generating Evidence

NIH U.S. National Library of Medicine

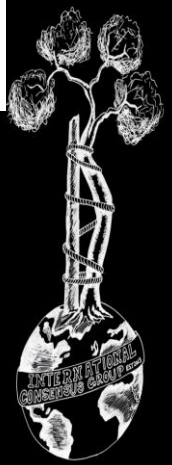
ClinicalTrials.gov

Find Studies ▾ About Studies ▾ Submit Studies ▾ Resource

Home > Search Results > Study Record Detail

Comparative Effectiveness of Pulmonary Embolism Prevention After Hip and Knee Replacement (PEPPER)

Study Type :	Interventional (Clinical Trial)
Estimated Enrollment :	20000 participants
Allocation:	Randomized
Intervention Model:	Parallel Assignment
Masking:	None (Open Label)
Primary Purpose:	Supportive Care
Official Title:	Comparative Effectiveness of Pulmonary Embolism Prevention After Hip and Knee Replacement:
Actual Study Start Date :	December 2016
Estimated Primary Completion Date :	August 2022



Delphi


Argentina
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India
Iran
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Australia
Bulgaria
Ecuador
France
Greece
Hungary
Indonesia
Ireland
Italy
Jordan
Austria
Canada
Spain
Sweden
Taiwan
Kenya
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Oman
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Saudi Arabia
Azerbaijan
Chile
Thailand
Tunisia
Turkey
Kuwait
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Pakistan
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Slovenia
Bahrain
China
Ukraine
United Arab
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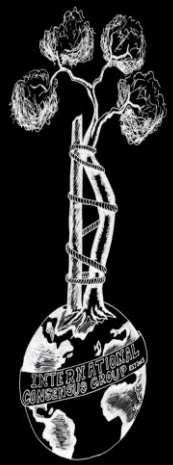
Venezuela
Lithuania
New Zealand
Perú
Poland
South Africa
Bolivia
Croatia
Vietnam
Malaysia
Norway
Portugal
Russia
South Korea

Step I: Selection of Delegates

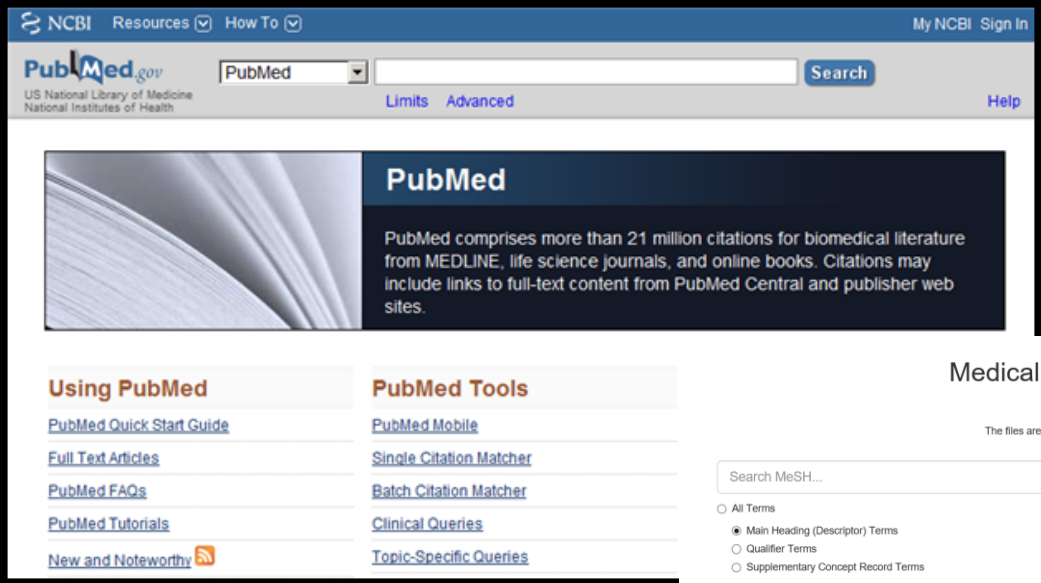
- Orthopedics
- Hematology
- Cardiology
- Anesthesia
- Vascular Medicine

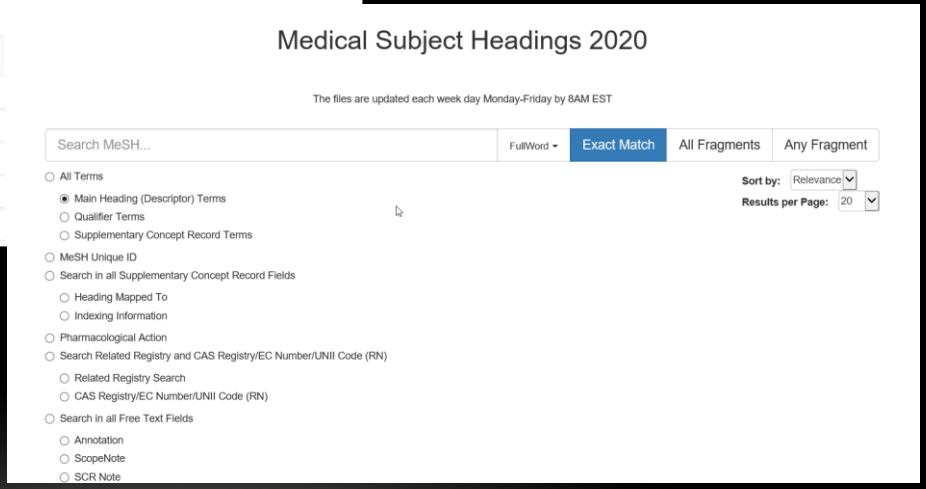
Step VI: Systematic Review

- Cochrane group
- Thomas Jefferson University Library



Step VI: Systematic Review





Step XIII

Dissemination of Information

The App

- VTE Risk Calculator

Aspirin

Fiction

- ASA is not accepted by any guidelines

CHEST

Official publication of the American College of Chest Physicians

Prevention of VTE in Orthopedic Surgery Patients : Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

Yngve Falck-Ytter, Charles W. Francis, Norman A. Johanson, Catherine Curley, Ola E. Dahl, Sam Schulman, Thomas L. Ortel, Stephen G. Pauker and Clifford W. Colwell, Jr

Chest 2012;141;e278S-e325S
DOI 10.1378/chest.11-2404

ISSN:0012-3692

Grade 1B or 1C

- 2.1.1 In patients undergoing THA or TKA we recommend the use of one of the following for minimum of 10 to 14 days: LMWH,fondaparinux, apixaban, dabigatran, rivoroxaban, unfractionated heparin, coumadin, **ASA (1B)**, or intermittent pneumatic compression (1C)

AAOS

AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

PREVENTING VENOUS THROMBOEMBOLIC DISEASE IN PATIENTS UNDERGOING ELECTIVE HIP AND KNEE ARTHROPLASTY

EVIDENCE-BASED GUIDELINE AND EVIDENCE REPORT

SIGN

- Aspirin is endorsed

NICE National Institute for Health and Care Excellence

- Aspirin for TKA is endorsed

Prevention of DVT

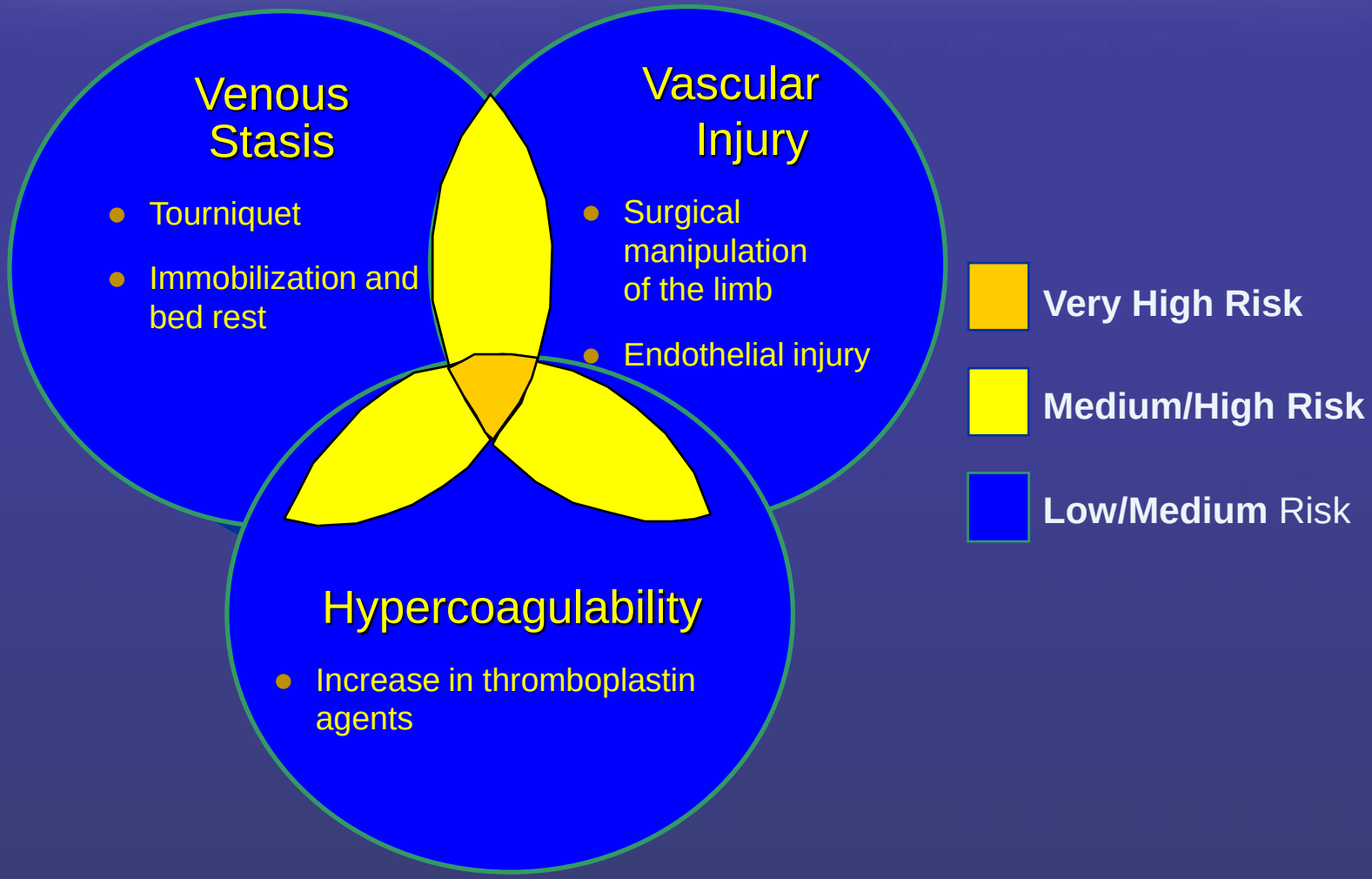
- No data on efficacy of aspirin

Aspirin

Fiction

- Works on red clots and not black clots

Virchow's Triad



Articles

Prevention of pulmonary embolism and deep vein thrombosis with low dose aspirin: Pulmonary Embolism Prevention (PEP) trial

*Pulmonary Embolism Prevention (PEP) Trial Collaborative Group**

- 1992-1998
- New Zealand, South Africa, Sweden, UK
- 13,356 Hip fracture
- 4.088 TJA
- 160 mg ASA or placebo

PEP Trial Collaborative Group, Lancet 2000

VTE Prophylaxis
Aspirin

- ASA reduced risk of PE by 43% and DVT by 29%
- Aspirin prevented 4 fatal PE per 1000

PEP Trial Collaborative Group, Lancet 2000

VTE Prophylaxis
Aspirin

- ..... there is good evidence for considering aspirin routinely in a wide range of surgical and medical groups at high risk of VTE...

PEP Trial Collaborative Group, Lancet 2000

Aspirin is Effective

Clin Orthop Relat Res (2014) 472:482–488
DOI 10.1007/s11999-013-3135-z

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

SYMPOSIUM: 2013 HIP SOCIETY PROCEEDINGS

Aspirin

An Alternative for Pulmonary Embolism Prophylaxis After Arthroplasty?

Ibrahim J. Raphael MD, Eric H. Tischler BA,
Ronald Huang MD, Richard H. Rothman MD, PhD,
William J. Hozack MD, Javad Parvizi MD, FRCS

L. Ogonda,
J. Hill,
E. Doran,
J. Dennison,
M. Stevenson,
D. Beverland

From Musgrave Park Hospital, Belfast, United Kingdom

THE BONE & JOINT JOURNAL

■ ARTHROPLASTY

Aspirin for thromboprophylaxis after primary lower limb arthroplasty

EARLY THROMBOEMBOLIC EVENTS AND 90 DAY MORTALITY IN 11 459 PATIENTS

- 11,459 TJA patients
- PE (0.6% THA, 1.47% TKA)
- 90 day mortality = declined over time

Take home message: With individualised risk assessment and as part of a multimodal approach, Aspirin is safe to use as the main thromboprophylactic agent in primary arthroplasty. It is not associated with an increased incidence of symptomatic DVT, PE or death.

ASA and VTE Prevention

CURRENT CONCEPTS REVIEW

Venous Thromboembolism Following Hip and Knee Arthroplasty

The Role of Aspirin

Javad Parvizi, MD, FRCS, Hasan H. Ceylan, MD, Fatih Kucukdurmaz, MD, Geno Merli, MD, Ibrahim Tuncay, MD, and David Beverland, MD

Investigation performed at the Rothman Institute at Thomas Jefferson University, Philadelphia, Pennsylvania

VTE Prophylaxis
Aspirin

- Meta-analysis
- Aspirin reduced DVT by 20% and PE by 69%

Antiplatelet Trialists' Collaborative, BMJ 1994

VTE Prophylaxis
Aspirin

- ASA reduced risk of PE by 43% and DVT by 29%
- Aspirin prevented 4 fatal PE per 1000

PEP Trial Collaborative Group, Lancet 2000

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 24, 2012 VOL. 366 NO. 21

Aspirin for Preventing the Recurrence of Venous Thromboembolism

Cecilia Becattini, M.D., Ph.D., Giancarlo Agnelli, M.D., Alessandro Schenone, M.D., Sabine Eichinger, M.D., Eugenio Bucherini, M.D., Mauro Silingardi, M.D., Marina Bianchi, M.D., Marco Moia, M.D., Walter Ageno, M.D., Maria Rita Vandelli, M.D., Elvira Grandone, M.D., and Paolo Prandoni, M.D., Ph.D., for the WARFASA Investigators*

- 402 patients
- 42% reduction in incidence of recurrent VTE (ASA vs Placebo) (p=0.02)

Becattini C et al NEJM 2012

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 NOVEMBER 22, 2012 VOL. 367 NO. 21

Low-Dose Aspirin for Preventing Recurrent Venous Thromboembolism

Timothy A. Brighton, M.B., B.S., John W. Eikelboom, M.B., B.S., Kristy Mann, M.Biostat., Rebecca Mister, M.Sc., Alexander Gallus, M.B., B.S., Paul Ockelford, M.B., Harry Gibbs, M.B., Wendy Hague, Ph.D., Denis Xavier, M.Sc., Rafael Diaz, M.D., Adrienne Kirby, M.Sc., and John Simes, M.D., for the ASPIRE Investigators*

- 822 patients
- VTE 4.8% ASA vs 6.5% (p=0.09)
- Significant reduction in incidence of major vascular events (0.01)

INSPIRE Study (Aspirin)

Vascular Medicine

Aspirin for the Prevention of Recurrent Venous Thromboembolism

The INSPIRE Collaboration

John Simes, MD; Cecilia Becattini, MD; Giancarlo Agnelli, MD;
John W. Eikelboom, MB, BS; Adrienne C. Kirby, MSc; Rebecca Mister, MSc;
Paolo Prandoni, MD; Timothy A. Brighton, MB, BS;
for the INSPIRE Study Investigators* (International Collaboration of Aspirin Trials for Recurrent Venous Thromboembolism)

analyses indicate similar relative, but larger absolute, risk reductions in men and older patients.

Conclusions—Aspirin after anticoagulant treatment reduces the overall risk of recurrence by more than a third in a broad cross-section of patients with a first unprovoked VTE, without significantly increasing the risk of bleeding.

Clinical Trial Registration—URL: www.anzctr.org.au. Unique identifier: ACTRN12611000684921.

(***Circulation***. **2014;130:1062-1071.**)

Aspirin is Effective

Research

JAMA Surgery | Original Investigation

Association of Aspirin With Prevention of Venous Thromboembolism in Patients After Total Knee Arthroplasty Compared With Other Anticoagulants

A Noninferiority Analysis

Brandon R. Hood, MD; Mark E. Cowen, MD, SM; Huiyong T. Zheng, PhD; Richard E. Hughes, PhD; Bonita Singal, MD, PhD; Brian R. Hallstrom, MD

CONCLUSIONS AND RELEVANCE In this study of patients undergoing TKA, aspirin was not inferior to other anticoagulants in the postoperative rate of VTE or death. Aspirin alone may provide similar protection from postoperative VTE compared with other anticoagulation treatments.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 22, 2018 VOL. 378 NO. 8

Aspirin or Rivaroxaban for VTE Prophylaxis after Hip or Knee Arthroplasty

D.R. Anderson, M. Dunbar, J. Murnaghan, S.R. Kahn, P. Gross, M. Forsythe, S. Pelet, W. Fisher, E. Belzile, S. Dolan, M. Crowther, E. Bohm, S.J. MacDonald, W. Gofton, P. Kim, D. Zukor, S. Pleasance, P. Andreou, S. Doucette, C. Theriault, A. Abianui, M. Carrier, M.J. Kovacs, M.A. Rodger, D. Coyle, P.S. Wells, and P.-A. Vendittoli

ABSTRACT

CONCLUSIONS

Among patients who received 5 days of rivaroxaban prophylaxis after total hip or total knee arthroplasty, extended prophylaxis with aspirin was not significantly different from rivaroxaban in the prevention of symptomatic venous thromboembolism. (Funded by the Canadian Institutes of Health Research; ClinicalTrials.gov number, NCT01720108.)

Meta-Analysis
Aspirin is Effective

Research

JAMA Internal Medicine | Original Investigation

Clinical Effectiveness and Safety of Aspirin for Venous Thromboembolism Prophylaxis After Total Hip and Knee Replacement

A Systematic Review and Meta-analysis of Randomized Clinical Trials

Gulraj S. Matharu, DPhil; Setor K. Kunutsor, PhD; Andrew Judge, PhD; Ashley W. Blom, PhD; Michael R. Whitehouse, PhD

Supplemental content

of the evidence ranged from low to high.

CONCLUSIONS AND RELEVANCE In terms of clinical effectiveness and safety profile, aspirin did not differ statistically significantly from other anticoagulants used for VTE prophylaxis after THR and TKR. Future trials should focus on noninferiority analysis of aspirin compared with alternative anticoagulants and cost-effectiveness.

The Journal of Arthroplasty 30 Suppl. 1 (2015) 39–41

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Administration of Aspirin as a Prophylaxis Agent Against Venous Thromboembolism Results in Lower Incidence of Periprosthetic Joint Infection

Ronald Huang, MD, Patrick S. Buckley, MD, Benjamin Scott, BS, Javad Parvizi, MD, FRCS, James J. Purtill, MD

The Rothman Institute at Thomas Jefferson University, Philadelphia, Pennsylvania

Aggressive anticoagulation following primary TJA has been identified as an important risk factor for developing PJI. The higher incidence of hematoma formation, wound drainage, and the need for reoperation may explain the latter. Patients receiving ASA prophylaxis have fewer wound related complications following primary TJA, which theoretically explains its added benefits in reducing the incidence of PJI. Our research suggests that the use of ASA compared to warfarin for VTE prophylaxis provides adequate protection against postoperative VTE while reducing the risk of PJI following TJA.

The Journal of Arthroplasty 31 (2016) S83–S86

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Primary Arthroplasty

Aspirin Is as Effective as and Safer Than Warfarin for Patients at Higher Risk of Venous Thromboembolism Undergoing Total Joint Arthroplasty

Ronald C. Huang, MD, Javad Parvizi, MD, FRCS, William J. Hozack, MD, Antonia F. Chen, MD, MBA, Matthew S. Austin, MD *

Department of Orthopaedic Surgery, The Rothman Institute at Thomas Jefferson University, Philadelphia, Pennsylvania

- Retrospective review of 30,270 patients with TJA who received Aspirin or Warfarin.
- warfarin was an independent risk factor for 90-days VTE, PJI, and mortality in the higher risk VTE patients

Prevention of VTE

- Need to individualize VTE prophylaxis

ICM VTE General

1 - Are certain patients identified to be at greater risk for venous thromboembolism than others?

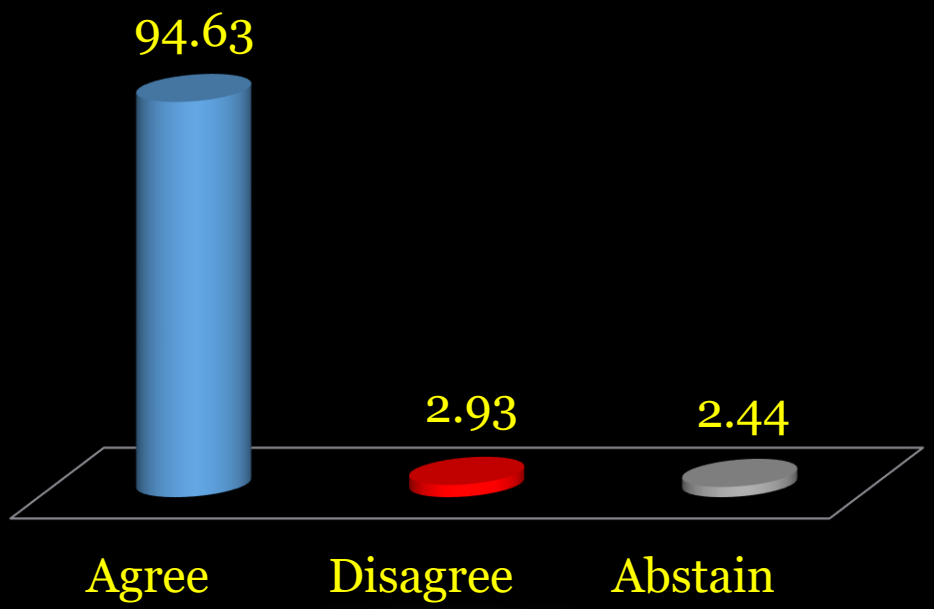
Response/Recommendation: Certain patient populations have been identified to be at greater risk for venous thromboembolism (VTE).

Strength of Recommendation: Limited.

Jeremiah Taylor, William Jiranek, Jerzy Bialecki, Ronald Navarro

ICM VTE General

1 - Are certain patients identified to be at greater risk for venous thromboembolism than others?



(Strong Consensus)

PE risk stratification

Clin Orthop Relat Res (2014) 472:903–912
DOI 10.1007/s11999-013-3358-z

Clinical Orthopaedics and Related Research®
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CLINICAL RESEARCH

Symptomatic Pulmonary Embolus After Joint Arthroplasty: Stratification of Risk Factors

Javad Parvizi MD, Ronald Huang MD, Ibrahim J. Raphael MD, William V. Arnold MD, PhD, Richard H. Rothman MD, PhD

Received: 18 June 2013 / Accepted: 21 October 2013 / Published online: 22 November 2013

VTE Prevention

Rothman Institute Protocol

- Aspirin (low-medium risk)
  - 81 mg bid (4 weeks)
  - Day of surgery
  - OK to stop after 14 days (select)
  - OK to combine with plavix

Raphael et al CORR 2013

A commentary by James A. Shaw, MD, is linked to the online version of this article at jbjs.org.

Low-Dose Aspirin Is Effective Chemoprophylaxis Against Clinically Important Venous Thromboembolism Following Total Joint Arthroplasty

A Preliminary Analysis

Javad Parvizi, MD, FRCS, Ronald Huang, MD, Camilo Restrepo, MD, Antonia F. Chen, MD, MBA, Matthew S. Austin, MD, William J. Hozack, MD, and Jess H. Lonner, MD

Investigation performed at the Rothman Institute at Thomas Jefferson University Hospital, Philadelphia, Pennsylvania

- Cross over study
- Low dose was better

VTE Prevention

Rothman Institute Protocol

- High risk
  - Internists/hematologists
  - LMWH/oral agent
  - Duration by internists
  - May receive IVC filter

VTE Prophylaxis After TJA

Fact

- No absolute prophylaxis exists

VTE Prophylaxis After TJA

Fact

- One or more of your patients will die regardless of what prophylaxis you administer

Aggressive Agents Kill

- Articles published 1998-2007 that included all cause mortality and PE
- 20 studies:
- 28,000 patients

- Conclusion: Mortality higher with potent anticogulation agents

Sharrock, Salvati et al, Clin Othop 2008

The Bone & Joint Journal
Formerly known as *JBJS (Br)*

Fatal pulmonary embolism following elective total hip arthroplasty

a 12-year study

E. Bayley, S. Brown, N. S. Bhamber, P. W. Howard

DOI: 10.1302/0301-620X.98B5.34996 Published 3 May 2016

Mortality was higher with the use of LMWH

Rothman Institute of Orthopaedics at
Thomas Jefferson University





Dangers of Anticoagulation

- Burnette S et al JOA 2010
  - Bleeding/reoperation
- Parvizi et al JOA 2009
  - Periprosthetic infection
- Dorr et al JBJS 2007
  - Hematoma formation
- Sharrock N et al JBJS 2010
  - All time mortality

VTE Prevention

- Despite administration of toxic drugs we have not made any difference to the incidence of PE

Has the VTE rate changed?

- No change in symptomatic or fatal PE rate over the past 10-15 years

Lie et al	**Acta Ortho Scan 2002**
Howie et al	**JBJS(B) 2005**
Cote MP	**JOA 2017**

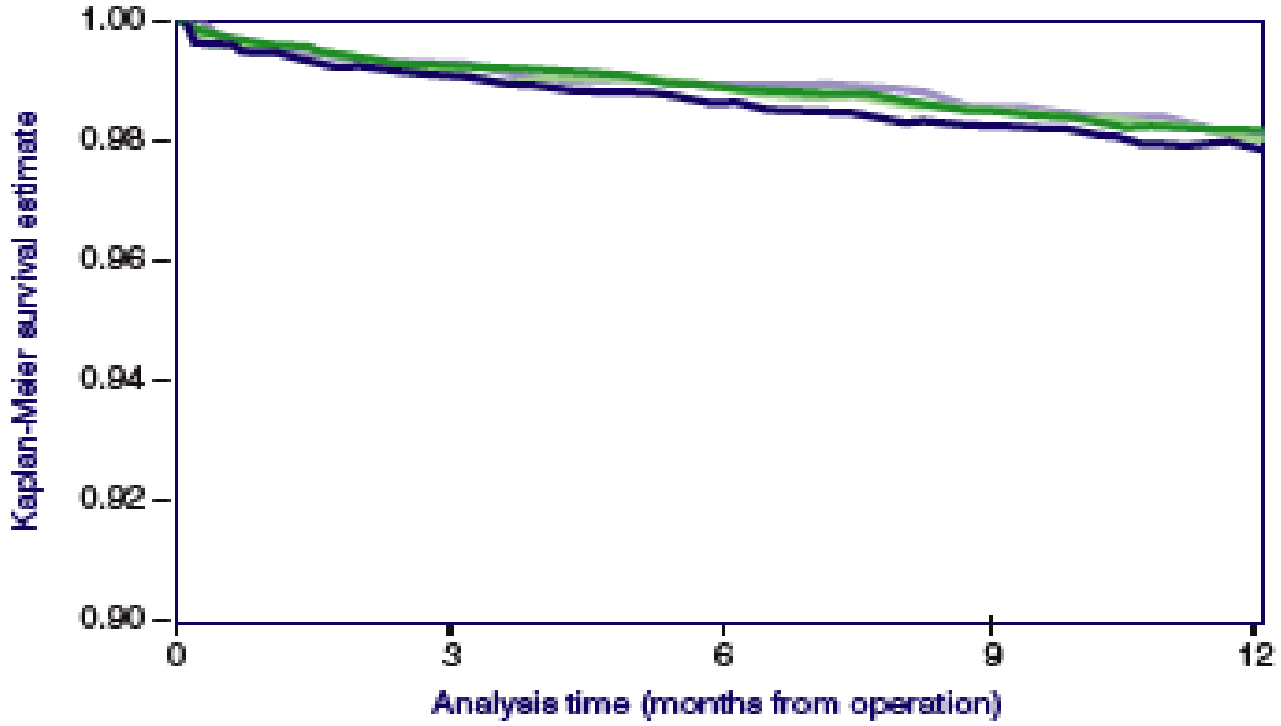

Figure 4.11

Mortality for patients with and those without any thromboprophylaxis prescribed at the time of primary hip replacement, 2003 – 2006

Mortality rate (95% CI)

	3 months	6 months	1 year
None prescribed [n=1,446]	0.7% (0.4% - 1.3%)	1.1% (0.6% - 1.7%)	1.9% (1.3% - 2.8%)
Chemical only [n=19,484]	0.7% (0.6% - 0.9%)	1.2% (1.0% - 1.3%)	1.9% (1.7% - 2.1%)
Mechanical only [n=13,183]	0.8% (0.6% - 1.0%)	1.2% (1.0% - 1.4%)	2.0% (1.8% - 2.3%)
Both types [n=42,204]	0.7% (0.6% - 0.8%)	1.1% (1.0% - 1.2%)	1.8% (1.7% - 2.0%)

None prescribed
Mechanical only
Chemical only
Both types

Risk Factors for VTE

Genetic

- Prothrombin promoter G20210A (x20 risk)
- Factor V Leiden (x7 in hetero and x80 in homo)

Balasa et al, Thromb Haemost, 1999

Price et al, Ann Intern Med, 1998

Thank You

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The VTE Guide was developed using machine learning and data from over 20,000 patients to accurately predict VTE and mayor bleeding events (MBE) following TJA