Stop the Clot! – Making Sense of the Thrombosis Clinic Model and Protocols
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What is Vascular Medicine?

- Niche specialty with emphasis is on clinical approaches to vascular disorders by physicians with special expertise and training in treating vascular disease
- Includes the non-invasive treatment of medical issues involving the circulatory system outside the heart including arterial, venous, and lymphatic disorders
- Entails a collegial interaction with a community of vascular professionals including Vascular Surgery, IC, IR, Vascular Ultrasound, Primary Care Physicians and other disciplines

What is Vascular Medicine?

- Increased awareness last 20 years, ? Vascular Renaissance?
- Lead Public and Professional Educational Programs through the Society for Vascular Medicine
- Pioneer bench to bedside medical advances
- Educate health professionals about Vascular Medicine
- Team Based Vascular Care
- History of the Field/History of Interest
What is Vascular Medicine?

• Society of Vascular Medicine

• American Board of Vascular Medicine

What Makes Vascular Medicine Unique?
We Have A Unique Skill Set!

So What Do We Do?

• The goal of the Vascular Medicine specialist is to improve the care of the patient with undiagnosed or complicated vascular disease

• Non-operative specialty, not a lot of us out there

• We specifically try to manage vascular disease “comprehensively”, including before and after interventions
So What Do We Do?

• Medical Treatment of Vascular Disorders
• Follow Aneurysms and Stenosis
• Follow patients with unusual vascular disorders
• Focus on Primary/Secondary Prevention
• Optimize and prepare patients for vascular intervention procedures

So What Do We Do?

• Vasculitis and CTD
• Venous Thromboembolism and Thrombophilias
• Upper and Lower Extremity Venous and Arterial Disease
• Perioperative Management of Vascular Surgery
• Arterial and Venous Testing in the Vascular Lab
• Wound Care
• Atherosclerosis – Early Detection, Standardized Therapies, Surveillance and Outcomes
Common Vascular Medicine Consultations

- Carotid Artery Disease
- Peripheral Artery Disease
- Aneurysms
- The Swollen Limb
- VTE and Chronic Venous Insufficiency
- Thrombophilias
- Risk Factor Modification in Vascular Patients
- Diagnostic Testing Abnormalities
- Unusual Vascular Disorders

Unusual Vascular Disorders

- Hypercoagulable States/Thrombophilias
- Thermal Disorders including Frostbite, Pernio, Cryoglobulinemia, Raynauds, Erythromelalgia
- Non-Atherosclerotic Vascular Disorders such as Fibromuscular Dysplasia, Popliteal Artery Entrapment Syndrome, Cystic Adventitial Disease, External Iliac Artery Endofibrosis, TAO/Buerger’s disease (think of these disorders in young patients with no risk factors for ASO)
- Uncommon arteriopathies such as Vasculitis
What We Don’t Do!

Vascular Medicine at the UPMC Heart and Vascular Institute

- Comprehensive Program and Model
- Eclectic Outpatient Consultative Services
- Inpatient Consultations
- Multidisciplinary Comprehensive ASO Clinic
- Thrombosis Clinic and Coagulation Clinic
- Stroke Bridge Clinic/Post Stroke Risk Factor Management Clinic
- Centralized Outpatient Vascular Lab
- Screening Programs/Pilot Programs
UPMC Hamot Vascular Program

- Multidisciplinary
- Team Approach with Resources/Support
- Center of Excellence
- Vascular Medicine as the Front Door
- Complementary and Cooperative
- Screening
- Atherosclerosis Clinic Model
- RFM Model and Report Cards

Multidisciplinary Comprehensive Atherosclerosis Clinic

- Early Detection/Treatment
- Surveillance and Outcomes
- Screening Programs and Expos
- Data Mining Excursions with EMRs (Epic)
- Medical Nutrition/Smoking Cessation/NA
- Exercise Programs/Walking Programs
- Patient Education and Branded Handouts
- Report Cards/Outcomes
Vascular Lab

- Centralized Outpatient Lab at the HHVI
- ICAVL Accredited
- SVU Signature Lab
- Reading Panel
- Expectations and Oversight
- Potential for Core Lab Research

Thrombosis Clinic

- VTE Usual and Unusual
- Low Risk DVT Disposition Program with Admit/Readmit Prevention
- PERT Program with CDT and mechanical thrombectomy
- Vascular Services Council and HHVI Leadership
- System Wide Anticoagulation Committees and Pathways
- Anticoagulation Clinic Model
The Burden of Vascular Disease

- Greater than 25 million people living in the US suffer from non coronary vascular disease
- Represents the single most important cause of death and disability in our nation and will remain so for decades ahead. Examples include:
  - PAD - affects 1 in 5 males, 1 in 6 females age greater than 65, > 8-11 million Americans
  - DVT/PE – most preventable cause of hospital death
  - Aneurysms
  - CVA - Unusual Vascular Disorders
  - “Orphan Disorders” – Lymphedema/CVI

Venous Thromboembolism (VTE)

- Deep Venous Thrombosis
- Pulmonary Embolism
- VTE in Unusual Sites
Venous Thromboembolism

- Pathophysiology
- Risk Factors
- Diagnosis/Clinical Prediction Rules
- Treatment and Recurrence Risk
- New and Emerging Therapies
- Updated ACCP Guidelines
- Outpatient VTE Therapies
- Hospital Outcomes

Virchow’s Triad
Rudolf Virchow c. 19th Century

Blood flow abnormalities
- Turbulent flow
- Venous stasis
- Ablation

Contact surface abnormalities
- Hypercoagulable states
- Venous thrombosis
- Protein C deficiency

Clotting component abnormalities
- Elevated factor VIII
- Hyperhomocysteinemia
- Factor V Leiden
- Prothrombin 20210
- Protein C deficiency
- Protein S deficiency
- Antithrombin deficiency
- Estrogen therapy, pregnancy
- Malignancy

FIGURE 2. Virchow’s triad
Virchow’s Triad

• Damage to the Lining of Vein
  – Permits clots to attaches themselves to the damaged portion (e.g. hip/knee surgery, CHF)

• Slowing of Blood Flow
  – Allows clumping of blood coagulation factors that would normally be washed away (e.g. bedrest)

• Increased Tendency to Clot
  – Encourages rapid clot formation (e.g. cancer/ID)

Epidemiology of DVT/PE

• At least 600,000 Americans suffer PE and over 1 million suffer DVT annually, some estimates 3X higher

• 100,000-180,000 US deaths per year, kills more people than traffic accidents, HIV and breast cancer per year

• PE is the #1 preventable cause of death among hospitalized patients

• Negative impact on QOL of survivors: CTEPH and PTS

• Health care costs over 10 billion dollars in 2011
Prevention

- Significant medical/financial impact of VTE
- System wide approach to Prevention
- Over 2 million people develop DVT annually
- DVT progress to PE in 600,000 cases with 60,000 fatalities
- Morbidity of the debilitating post thrombotic syndrome can arise in 1/3, esp. in patients with extensive or recurrent DVT

My Approach to VTE

- First Event or Recurrent
- Location Usual or Unusual
- Provoked or Unprovoked/Idiopathic
- Unusual Historical Features or Factors
- Site Confirmation – Distal/Proximal/Iliacs
- Massive/Submasssive/Low Risk for PE
- Pick Treatment
- Pick Duration
- Prevent Complications
My Approach to VTE

- Provoked vs Unprovoked Recurrence Risk
- DVT Cephalad Propagation Risk
- Renal/Hepatic Function
- Access to Laboratory Monitoring
- Patient Compliance
- Compression Regimens
- ACCP/CHEST 2016

DVT

- Deep Veins of the arms and legs most common
- Legs
  - Proximal
  - Distal

- Definition
  - Venous thrombi typically form along the valve cusps
  - Propensity to embolize greatest in the first 7 days
LE Venous Anatomy

Venous Anatomy

Perforating veins connect the deep system with the superficial system.
LE Venous Nomenclature

UE Venous Anatomy
Definitions of Pulmonary Embolism via Guidelines

- Massive PE (5-10%): Sustained hypotension, pulselessness, or persistent bradycardia
- Submassive PE (20-25%): RV dysfunction or myocardial necrosis, without hypotension
- Low Risk PE (70%): no markers of adverse prognosis
  - (Circulation 2011; 123: 1788-1830)

Risk Stratification in PE Essential for Management

- Anticoagulation alone versus anticoagulation plus thrombolysis/pharmacomechanical catheter directed therapy/surgical embolectomy/IVC filter
- Triage ICU monitoring vs other
- Low Risk get A/C alone, High Risk get A/C plus lysis or embolectomy
- Submassive is the grey area
Risk Factors for VTE

- Surgery/Trauma/Acute Medical Illness
- Immobility/LE paresis/Stroke
- Cancer/Cancer Therapy/PNH/Myeloprolif d/o
- Previous VTE
- Increasing age/Obesity/Smoking
- Estrogens/Inherited/Acquired Thrombophilies
- Nephrotic Syndrome/Inflammatory Bowel Dis
- Central Venous Catheters
- Rheumatoid Arthritis
- Chronic Liver Disease (up to 1%)

Risk Factors for VTE

- Strong – Odds Ratio > 10
  - Fracture – hip/leg
  - Hip or knee replacement
  - Major general surgery
  - Major trauma
  - Spinal cord injury
Risk Factors for VTE

• Moderate – Odds Ratio 2-9
  – Arthroscopic knee surgery
  – CVL
  – Chemotherapy/Malignancy
  – CHF/Respiratory Failure
  – HRT/BCP/Pregnancy/Post Partum
  – Paralytic stroke
  – Thrombophilia/Previous VTE

Risk Factors for VTE

• Weak – Odds Ratio < 2
  – Bedrest > 3 days
  – Immobility due to sitting e.g. prolonged car or air travel
  – Increasing age
  – Laparoscopic surgery
  – Obesity
  – Varicose Veins
Aggressive Thrombophilias

- Homozygous/Double Heterozygous Mutations
  - Factor V Leiden
  - Prothrombin 20210A
- Antiphospholipid Antibody Syndrome
  - LA + - Confirm/Repeat
- Deficiencies:
  - Antithrombin
  - Protein C
  - Protein S

Clinical Features - DVT

- Non specific
- Clinical findings not reliable
- Pain/redness/warmth common symptoms
- Swelling and tenderness are common signs
- Venous distension/palpable cords not specific
- Homan’s sign not often found
- About a 42% chance of making diagnosis on physical exam
- About half of DVT patients are asymptomatic
Clinical Features - PE

- Unexplained shortness of breath
- Pleuritic chest pain
- Hemoptysis
- Tachycardia
- Hypotension
- Syncope
- Anxiety

Clinical DVT

![Clinical DVT images]

UPMC Hamot Heart and Vascular Institute
Phlegmasia Cerulea Dolens

Differential Diagnosis - DVT

- Muscle Strain or Tear
- Bakers Cyst
- Lymphangitis/Lymphatic Obstruction
- Venous Reflux
- Cellulitis
- Internal abnormality of the knee
Clinical Prediction Rules

- Integrate the results of a clinical index with the results of an ultrasound examination
- Enhance the predictive accuracy of a positive ultrasound to 100%, 96%, and 63% in high, moderate, and low probability groups
- Wells’ Prediction Index
- DVT and PE

Wells DVT Criteria

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active cancer (treatment ongoing or within previous 6 months or palliative)</td>
<td>1</td>
</tr>
<tr>
<td>Paralysis, paresis or recent plaster immobilization of the lower extremities</td>
<td>1</td>
</tr>
<tr>
<td>Recently bedridden &gt; 3 days or major surgery within 4 weeks</td>
<td>1</td>
</tr>
<tr>
<td>Localized tenderness along the distribution of the deep venous system</td>
<td>1</td>
</tr>
<tr>
<td>Entire leg swollen</td>
<td>1</td>
</tr>
<tr>
<td>Calf swelling 3 cm &gt; asymptomatic side (measured 10 cm below tibial tuberosity)</td>
<td>1</td>
</tr>
<tr>
<td>Pitting oedema confined to the symptomatic leg</td>
<td>1</td>
</tr>
<tr>
<td>Collateral superficial veins (non-variocose)</td>
<td>1</td>
</tr>
<tr>
<td>Alternative diagnosis as likely or greater than that of DVT</td>
<td>2</td>
</tr>
</tbody>
</table>
Wells DVT Criteria

- Score of 3 or greater represents high probability
- Score of 1-2 represents moderate probability
- Score of less than or equal to 0 represents low probability
- Think “Low or Non-Low”

DVT Clinical Algorithm
DVT Flow Chart

The Vascular Lab
The Vascular Lab and Testing/Diagnosis

• Venous Testing – Venous Thrombosis
  – Venous Duplex Testing with DVT Protocol

• CTA Chest protocol for PE

Venous Compression Images
DVT CFV

Jugular Vein VTE
Treatment of VTE

• ACCP Guidelines Updated 2016
• UFH (1B)
  – Weight-based nomograms/HIT incidence 5-7%
• LMWH (1A)
  – Weight based/Avoid in RF/Preferred IA Rx
  – HIT incidence less than 1%
• Fondaparinux (1A)
  – Acceptable Rx/Avoid in RF/One case of HIT
• VKA/Warfarin/New Agents and New Recommendations
  – Acceptable Rx/Avoid in Pregnancy

Recurrence Rates after Anticoagulation Discontinuation

• Risk Factor                  Recurrence Rate 1/5 yr
• Surgery                         1%        3%
• Nonsurgical                   5%        15%
  Reversible/Transient Risk Factor
• Unprovoked                    10%       30%
Treatment of DVT

- Provoked
  - 3 months

- Recurrent/Unprovoked
  - 3 months then shared medical decision making discussion regarding recurrence risks, bleeding risks, etc.

- Thrombophilia-Related
  - Probably based on clinical factors, patients with APLAS should receive anticoagulation indefinitely

Unprovoked/Idiopathic DVT

- Occurs without a clearly identified risk factor i.e. surgery or transient risk factor
- Recurrent risk accumulates once anticoagulation is stopped
- Three historical strategies to identify high risk:
  - D-dimer testing
  - Evaluation for residual vein thrombosis
  - Clinical prediction rules
Treatment of DVT

• Idiopathic VTE
  – 3 month duration or more
  – Risk of recurrence 7-10% per year and 30-42% at 5 years
  – D-dimer predictor 3% negative and 10%/yr. +

• Cancer
  – Recurrence rate up to 30% per year
  – LWMH preferred treatment for at least 6 months or until cancer is no longer “active” (CLOT trial)

Who Get’s Secondary Prevention?

• First unprovoked VTE with low-moderate bleeding risk (2B)

• Second unprovoked VTE with low-moderate bleeding risk (1B)

• Therapy should be re-assessed annually!
Clinicians must often balance the long-term risks of recurrent VTE if anticoagulation is stopped against the burden and risks of ongoing therapy.

ABC’s of Bleeding Risk Assessment

- Age > 65, Antiplatelet Therapy, Alcoholism
- Bleed History
- Cancer
- Diabetes
- Anemia
- Falls
- GFR Decrease
- Hepatic Disease
- Stroke
- Surgery (recent)
- Thrombocytopenia

Low 0 RF
Mod 1 RF
High 2 or more RF
Bleeding Risk Assessment

- Risk Category
  - Low: 2.4/100 pt. years (3 fatal)
  - Moderate: 4.9/100 pt. years (5 fatal)
  - High: 9.8/100 pt. year (11 fatal)

HAS-BLED Score

- Hypertension
- Abnormal Liver/Renal Function
- Stroke History
- Bleeding Presentation/History
- Labile INRs
- “Elderly” Age 65 or greater
- Drugs/Alcohol Use
HAS-BLED Score

• Score of 0 is 0.9% risk of bleeding in one validation study and 1.3 bleeds per 100 patient/years in another validation study

• Score of 5 is 9.1% risk of bleeding in one validation study and 12.5 bleeds per 100 patient/years in another validation study

MEN and HERDOO2

• Risk Factors for Recurrent VTE
• MEN and signs of post thrombotic syndrome:
• Hyperpigmentation of the lower extremities
• Erythema or Redness of the LE
• D-dimer level greater than 250 mcg/L
• Obesity with BMI greater than 30 kg/m2
• Older age > 65 years
• Two or more risk factors at higher risk
• Recent paper regarding women with scores of 0 and 1
ACCP 2016 Updates

- For VTE and no cancer, DOACs over VKA, and VKA over LMWH
- For VTE and cancer, LMWH or VKA and DOACs
- No changes in duration
- Recommend against IVC filters if on A/C
- Recommend thrombolytic therapy with PE and hypotension, and systemic therapy over CDT
- For recurrent VTE on a non-LMWH anticoagulant, recommend LMWH, if on LMWH, then increase dose

Preventing Post thrombotic Syndrome

- Chronic burdensome consequence of DVT that occurs despite anticoagulation therapy
- 23-50% of patients and manifests typically in first 2 years
- Leg pain, heaviness, swelling, and cramping
- Severe cases include venous ulcers
- Villalta scale categorizes into mild, moderate or severe – wait 3 months to attribute the diagnosis
Post thrombotic Syndrome

- Compression stockings may reduce risk (of any severity) from 43% to 20% and severe post thrombotic syndrome from 15% to 7%
- 30-40 mmHg and consider continuing for a minimum of two years if patient has swelling or discomfort
- Start as soon as possible after starting anticoagulation therapy

Anticoagulants and Antiplatelets

- Aspirin - Oral
- Warfarin - Oral
- UFH/LMWH - Parenteral
- Fondaparinux - Parenteral
- NOAC/NOAC/TSOAC/DOAC - Oral
- Dabigatran – Direct Thrombin Inhibitor
- Rivaroxaban – Xa Inhibitor
- Apixiban – Xa Inhibitor
- Edoxaban – Xa Inhibitor
Treatment of VTE

- Initial anticoagulation used to require overlap “bridging” of a parenteral anticoagulant (UFH, LMWH or fondaparinux) with VKA for a minimum of 5 days and until INR above 2 for at least 24-48 hours
- New agents are now a recommended option
- Determine length of anticoagulation
- Prevent post thrombotic syndrome
- Appropriate screening for occult malignancy prn

Treatment of VTE

- Idiopathic/Unprovoked VTE
  - 3 month duration, then decide on more
  - Risk of recurrence 6-10% per year
  - D-dimer predictor 3% negative and 10%/yr +
- Cancer
  - Recurrence rate up to 30% per year
  - LWMH preferred treatment for at least 6 months or until cancer is no longer “active” (CLOT trial)
Treatment of VTE

- Rapid initiation of anticoagulation prevents thrombus extension and PE
- Extended anticoagulation reduces the risk of recurrent VTE
- Don’t forget compression stockings if indicated for discomfort and prevention of post thrombotic syndrome
  - 30-40 mmHg for at least 2 years

Direct Oral Anticoagulants (aka NOACs/DOACs)

- Non-Bridged
  - Rivaroxaban/Xarelto
    - Once a day dosing
    - Starter Pack Available with Free Voucher
  - Apixaban/Eliquis
    - Twice a day dosing

- Bridged with LMWH or UFH
  - Edoxaban/Savaysa
  - Dabigatran/Pradaxa
Practical Management Issues with Anticoagulants including New Oral Anticoagulants (DOACs)

- Starting
- Switching
- Monitoring
- Stopping/Reversal/Procedural Considerations

ASA for Preventing VTE Recurrence

- VTE Recurrence
  - ASA 6.6% per year vs.
  - Placebo 11.2% per year
- Major bleeding (100 mg/d)
  - One patient per group

ASA more effective than placebo for decreasing the risk of recurrent VTE in patients after VKA therapy following first idiopathic VTE

NEJM 2012:366:1959
Aspirin for VTE Recurrence Prevention - ASPIRE

• 100 mg dose of ASA reduced by one third the rate of recurrent major vascular events for patients inc VTE, MI, stroke or CV death
• Enrolled patients who had one acute unprovoked VTE and were switched after 3 months of anticoagulant therapy to either ASA or placebo
• Low numbers and power for prediction
• Reasonable “intermediate option”

SVM/ABIM Choosing Wisely Campaign

• Don’t do a work up for a clotting disorder for patients who develop first episode of DVT in the setting of a known cause
  – Increased testing with no proven benefit
• Don’t reimage DVT in the absence of a clinical change
  – Repeat ultrasound images to evaluate the “response” of a venous clot to therapy does not alter treatment
Vena Cava Filters

- Two primary indications
  - Absolute contraindication to anticoagulation
  - Failed anticoagulation – i.e. recurrent thromboembolism while receiving therapeutic doses of anticoagulation
- Do not afford protection from further DVT, rather increase the risk of secondary DVT
- Permanent vs Retrievable

New/Emerging Therapies

- Catheter Directed Thrombolysis
- Mechanical Thrombectomy
- Treatment of Ilio-Femoral DVT
- Anticoagulants and Antiplatelets
  - DOACs/NOACs
  - Reversal Agents
Catheter Directed Thrombolysis

- Delivers thrombolytic agent locally into thrombus using infusion catheters
- Accelerates thrombolysis, reduces dose/duration and decreased bleeding complications as compared to systemic thrombolysis
- EKOS program
- Urokinase and rt-PA have been studied
- Ileofemoral segment DVT results promising for lysis, preservation of valve function and decreased post thrombotic syndrome

Percutaneous Mechanical Thrombectomy

- Can be used in combination with CDT
- AngioJet System directs saline jets to macerate and remove thrombus
- Trellis device uses occlusive balloons and dispersion wire to remove thrombus
- Combined with CDT has potential to remove more clot as well as decrease the dose and duration of thrombolytic therapy
VTE Prophylaxis in Hospitalized Medical Patients

- MEDENOX
- PREVENT All q day dosing
- ARTEMIS

- Once daily injected low-dose anticoagulant prophylaxis placebo-controlled trials
  - Reduced DVT greater than 50% without increasing major bleeding

VTE as the First Manifestation of Cancer

- Strong consideration should be given regarding cancer screening for an idiopathic VTE event
- Patients with idiopathic VTE have a significant risk of occult cancer within the first year after diagnosis
- History/Physical
- Up to date with general health maintenance issues
Outpatient Treatment of DVT and PE

- **ACCP Guidelines 1B for Acute DVT**
  - Initial therapy at home over treatment in the hospital

- **ACCP Guidelines 2B for Low-Risk PE**
  - Initial treatment at home or early discharge over standard discharge (PE is a tougher call due to litigious culture)

- Contingent on adequate home circumstances
  - Well maintained living conditions/phone access
  - Strong support network/patient feels well enough
  - Patient has ability to promptly hospitalized if necessary

Acute DVT May Be Managed in the Outpatient Setting

- Controlled clinical trials suggest that outpatient management is at least as effective as inpatient management for acute DVT

<table>
<thead>
<tr>
<th>Study</th>
<th>VTE Recurrence (%)</th>
<th>Major Bleeding (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramacciotti et al, 2004</td>
<td>2/201</td>
<td>2/201</td>
</tr>
<tr>
<td>Chong et al, 2005</td>
<td>1/298</td>
<td>2/298</td>
</tr>
<tr>
<td>Boccalon et al, 2000</td>
<td>2/201</td>
<td>2/201</td>
</tr>
</tbody>
</table>
• 60%-95% of patients with acute, proximal DVT may be eligible for outpatient therapy

• Exclusion criteria on institutional protocols include:
  – Comorbid illness requiring hospitalization
  – Active or high risk for bleeding
  – Severe hypertension
  – Catheter-associated DVT
  – Recent surgery
  – Morbid obesity
  – Hypercoagulable state
  – Pregnancy

Considerations for Patient Selection for Outpatient Therapy

♦ Risk stratification tools may help to identify patients with low-risk PE who may be candidates for outpatient therapy

♦ Potential candidates include patients with acute PE who are:
  – Clinically stable with good cardiopulmonary reserve
  – No recent bleeding
  – No severe thrombocytopenia (ie, platelet count $\geq$70,000/mm$^3$)
  – No severe liver or renal disease
  – Expected to be compliant with treatment
  – Feeling well enough to be treated at home
The PESI and Simplified PESI Are Validated Tools Used to Identify Low-Risk Patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score</th>
<th>CLASSIFICATION BY TOTAL SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;80 years</td>
<td>1</td>
<td>Class I ≤ 65</td>
</tr>
<tr>
<td>Male sex</td>
<td>10</td>
<td>Class II 66-85, Low risk=0</td>
</tr>
<tr>
<td>History of cancer</td>
<td>30</td>
<td>Class III 86-105</td>
</tr>
<tr>
<td>History of heart failure</td>
<td>10</td>
<td>Class IV 106-125, High risk≥1</td>
</tr>
<tr>
<td>History of chronic lung disease</td>
<td>10</td>
<td>Class V &gt;125</td>
</tr>
<tr>
<td>Pulse ≥110 bpm</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Systolic BP &lt;100 mm Hg</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate ≥30 breaths/min</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Temperature &lt;36 ° C</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Altered mental status†</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>SaO₂ &lt;90%‡</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

*Heart failure or history of chronic lung disease combined into a single category of chronic cardiopulmonary disease.
†Disorientation, lethargy, stupor, or coma.
‡With or without the administration of supplemental oxygen.

Who May Be Candidates for Outpatient Therapy?

- The decision to treat a patient with DVT or low-risk PE in the outpatient setting is based on numerous factors:
  - Adequate home circumstances
  - Risk factors for recurrence and/or bleeding
- Risk stratification tools may aid in patient selection
- The actual decision depends on the clinical judgment of the treating clinician
Outpatient Treatment of VTE

• Despite outpatient options for DVT and low-risk PE, hospital admissions for VTE remain high
• Average cost in 2005 for admitted DVT was $10K and for PE about $15K
• If you aren’t admitted, you can’t be readmitted!
• Hospital admissions can lead to complications
• New oral drugs can decrease LOS, in one study with Xarelto resulted in 3 day decrease in LOS

UPMC System Wide Approach

• System Wide Anticoagulation Committee
• System Wide P&T Committee
• Pilot Programs including Xarelto To Go
• Trifold Handouts for Clinicians
• Xa level (rather than aPTT) monitoring for UFH
• HIT protocols
The Real Value of Vascular Medicine?

100 BILLION DOLLARS

Thank You!

Okay, Mr. Smith. Just stick it in between those two devices.

If Women Ran the World