Content Description
The aging population, along with anti-thrombotic agents has presented a challenge to those in trauma care. The use of anticoagulation is a high-risk therapy sometimes needed for patients with a variety of medical and surgical issues. This lecture will address how to provide care to this unique patient population across the continuum of care. A rapid reversal protocol was developed and involves actions for geriatric neuro trauma patients who are on anticoagulation therapy. This protocol involves actions for pre-hospital personnel, non-trauma centers, trauma centers and the community at large.

Learning Objectives
At the end of this session, the participant will be able to:

1. Identify why anti-thrombotic agents have become such an issue with trauma care.

2. Identify the most common concerns for patients who are on anti-thrombotics.

3. Discuss the appropriate nursing assessment and interventions for trauma patients who require anti-thrombotics.

Summary of Key Points/Outline
See attached slides and two attachments.

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Generic Name</th>
<th>Half-life</th>
<th>Reversal Agent</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin</td>
<td>Unfractionated heparin</td>
<td>1.5 hr</td>
<td>DC heparin and give supportive care*. Protamine sulfate is an antidote. Every 1 mg of protamine neutralizes 100 units of heparin.</td>
<td>PRBCs</td>
</tr>
<tr>
<td>Arixtra®</td>
<td>Fondaparinux</td>
<td>17 – 21 hr</td>
<td>DC fondaparinux and give supportive care*. No known antidote at this time. Blood transfusions and rFVIIa has been used.</td>
<td>PRBCs</td>
</tr>
<tr>
<td>Lovenox®</td>
<td>Enoxaparin</td>
<td>7 – 12 hr</td>
<td>DC enoxaparin and give supportive care*. Protamine sulfate has been used to reverse effects. Monitor aPTT 2-4 hours after first infusion; consider</td>
<td>PRBCs</td>
</tr>
</tbody>
</table>

1. PRBCs
2. Protamine: Never exceed 50 mg in any 10 minute period or 100mg in 2 hours.
3. rFVIIa
4. (90 mcg/kg)
<table>
<thead>
<tr>
<th>Anticoagulant</th>
<th>Duration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lepirudin</td>
<td>~ 10 min</td>
<td>DC lepirudin and give supportive care*. No specific antidote for lepirudin is available. PRBCs</td>
</tr>
<tr>
<td>Argatroban</td>
<td>39 – 51 minutes; Hepatic impairment: ≤ 181 minutes</td>
<td>DC argatroban and give supportive care*. No specific antidote is available. Reversal of anticoagulant effects may be longer than 4 hours in patients with hepatic impairment. Hemodialysis may remove up to 20% of the drug; however, this is considered clinically insignificant. PRBCs</td>
</tr>
<tr>
<td>Warfarin</td>
<td>20 – 60 hr</td>
<td>DC warfarin and give supportive care*. Administer vitamin K(_1) (phytonadione). When hemorrhage occurs, supplement with fresh plasma transfusion or prothrombin complex concentrate (factor X complex) (Feba HV(^\text{®})): recombinant factor VIIa is an alternative to prothrombin complex concentrate. Vitamin K(_1) injection can be repeated every 12 hours. PRBCs</td>
</tr>
<tr>
<td>Abciximab</td>
<td>~ 30 min</td>
<td>DC abciximab and give supportive care*. The antiplatelet effects can be quickly reversed with the administration of platelets. Platelet transfusion</td>
</tr>
<tr>
<td>Eptifibatide</td>
<td>~ 2.5 hr</td>
<td>DC eptifibatide and give supportive care*. Dialysis may be beneficial. PRBCs</td>
</tr>
<tr>
<td>Bivalirudin</td>
<td>25 – 57 min</td>
<td>DC bivalirudin and give supportive care*. Bivalirudin is hemodialyzable (~25% removed). PRBCs</td>
</tr>
<tr>
<td>Dabigatran</td>
<td>12 – 17 hrs</td>
<td>DC dabigatran and give supportive care*. Maintain adequate diuresis, If life threatening bleed, dialysis removes 60% of medication over ≈3 hours. FFP PRBCs PCC(25 IU/kg)</td>
</tr>
<tr>
<td>Rivaroxaban</td>
<td>5 – 9 hrs</td>
<td>DC rivaroxaban and give supportive care*. Due to protein binding, hemodialysis will not help. Activated charcoal may be considered to reduce absorption. PRBCs PCC (50 IU/kg)</td>
</tr>
</tbody>
</table>

*Supportive care – includes but is not limited to blood transfusions (PRBCs) 04/12/2012


9. Guidelines for Field Triage of Injured Patients Recommendations of the National Expert Panel on Field Triage, January 23, 2009 / 58(RR01);1-35

Speaker Contact Information

Cynthia Blank-Reid, RN, MSN, CEN
Work: Cindy.Blank-Reid@tuhs.temple.edu
Home: cpreat5@verizon.net
Known Warfarin Therapy with acute trauma above the clavicles

- History of Warfarin use and head trauma WITH CT evidence of intracranial bleeding.

**NO**

- Significant signs of head trauma.
  - GSC ≤ 14, positive loss of consciousness

  **YES-admit to Hospitalist**
  **NO-DC home**

  - Vitamin K (IM OR IV)
  - Start ASAP
  - If Vitamin K is given IV, then infuse over 1 hour to decrease the risk of anaphylaxis

  **INR < 1.4**
  - PT/PTT, fibrinogen CBC STAT
  - STAT bedside PT/INR and blood bank tube.
  - Consult Neurosurgery

  **INR > 1.8**
  - Vitamin K (IM OR IV) STAT
    - PCC per wt based dosing scale
    - 35-50 kg = 1500 IU
    - 51-65 kg = 2000 IU
    - 66-80 kg = 2500 IU
    - 81-95 kg = 3000 IU
    - 96-110 kg = 9600 IU
    - 111-125 kg = 11100 IU
    - >125 kg = 4500 IU
  - FFP 2 units stat type specific if possible, otherwise AB

  **Repeat Head CT in 3 hours or STAT with any signs/symptoms of increasing ICP.**
  **Repeat PT q 6 hours for 24 hours or as needed.**

  **CONSIDER**
  - Continue Vitamin K (IM/IV)

  **DC home with appropriate instructions and follow-up**

- Repeat Head CT in 4-6 hours or with any signs/symptoms of increasing intracranial pressure.
  - Repeat PT q 6 (six) hours for 24 hours or until INR < 1.4
  - PCC Repeat initial dose
  - If fibrinogen < 100mg/dl – 10 units Cryoprecipitate or 2 Unit(s) FFP
  - Use of retrievable IVC in patients w/ hx of DVT, PE, coagulopathies, valve replacement
Society of Trauma Nurses
Platelet Inhibitor Reversal Pathway

- History of Platelet Inhibitor use.
- Head injury with evidence of significant intracranial bleeding*
  *Consider in other life-threatening bleeding emergencies.

Final 6.22.11

NO

Patient stable for discharge (GCS 15, no LOC, no significant injury to head, face or neck)

YES

Discharge with instructions and follow-up as indicated

NO

Admit to Trauma Service

YES

• 2 units platelet transfusion
• Consult Neurosurgery
• Consider
  - DDAVP 0.3 ug/kg
  - rFVIIa 30-90 ug/kg
• Consider platelet aggregometry

YES

• Repeat Head CT in 4-6 hours or with any signs/symptoms of increasing intracranial pressure.
• PT q 6 (six) hours for 24 hours or as needed. (Plavix will not affect PT)

NO

Head CT evidence of intracranial bleeding

Discharge with instructions and follow-up as indicated

CAUTION

Hyponatremia, seizures, and elevated ICP with DDAVP
The All Too Common: Elderly Falls on Anticoagulants: How Do We Manage?

Cynthia Blank-Reid, RN, MSN, CEN
Trauma Clinical Nurse Specialist
Temple University Hospital
Philadelphia, PA

Where I Learned To Do Trauma Nursing

Where I Now Work and Learn
Objectives

- Identify why anti-thrombotic agents have become such an issue with trauma care.
- Identify the most common concerns for patients who are on anti-thrombotics.
- Discuss the appropriate nursing assessment and interventions for trauma patients who require anti-thrombotics.

Introduction

- Why am I here?
- What could I possibly have to say on this topic?
- Why should any of us care or worry about this topic?
The Issue

- Trauma is one of the leading causes of death in the United States.
- Every day traumatic injuries are sustained, individuals become disabled and death occurs.
- Many of those injured, are over the age of 65 years.

Anticoagulation

- Anticoagulation is a high-risk therapy, which is sometimes needed for patients with a wide variety of medical and surgical issues.
- Can utilized on either an in or out-patient arena.
- It is a profitable business.

The Issue

- TBI is on the decline in younger individuals (> 15 years and < 65 years) due to preventative measures
  - seatbelt use
  - protective head gear worn in sporting or athletic activities
  - greater public education
- Falls in the elderly population are a leading cause of TBI and no decrease has not been seen in that age group.
Definitions

• **Anticoagulant** - anything that alters the ability of your body’s blood to coagulate

• **PT (Prothrombin Time)** - a blood test that measures the time it takes for plasma in your blood to clot. It measures the amount of time taken for clot formation after reagent tissue thromboplastin is added to the sample.
  – may be used to determine whether warfarin is therapeutic, should be 1.5-2x the control is considered therapeutic

• **PTT (Partial Prothrombin Time)** - measures intrinsic and common pathway. It looks at how well the coagulation sequence is functioning by measuring the amount of time it takes for clot formation after partial thromboplastin is added to the sample.
  – Heparin and ASA prolongs this
  – clotting should occur between 25 - 35 seconds. If a person is taking blood thinners, clotting takes up to two and a half times longer.

• **INR (International Normalized Ratio)** - measures the time it takes for blood to clot.
  – should have an INR of 2.0 to 3.0 for routine anti-coagulation needs; this is a therapeutic level of warfarin
  – For some patients who have a high risk of clot formation, the INR needs to be higher - about 2.5 to 3.5.

Definitions

• **The elderly** for this talk will be defined as those aged 65 and older.

• This is the definition utilized by the Commonwealth of Pennsylvania and the Pennsylvania Trauma Systems Foundation.
Definitions

• TBI can result in damage to the parenchyma of the brain.
• The initial insult occurs when force is transmitted to the brain tissue, which leads to cellular damage.
• The ensuing cascade of cellular changes can lead to cerebral edema and the secondary injury, which occurs over hours to days after the traumatic event.
• In addition to the direct parenchymal damage, there can be hemorrhage and elevations in ICP which can further secondary brain injury.

Epidemiology

• Those aged 65 and over are a rapidly growing population in the United States.
• The number of people age 65 and over is projected to increase from 35-39 million in 2010 to 53-69 million by the year 2020. This increase is attributed to the extended life expectancy of surviving baby boomers who will be over 65 years.
• About 20 percent of the United State’s total population will be over 65 in 2030, compared to approximately 13 percent now.

Epidemiology

• A very active generation
• Survived Great Depression, World War II, Korean War, Vietnam War
• Started the trend toward college
• Have more money, they travel, are philanthropic, own homes, volunteer, are religious and attend church
Risk Factors

- Poor visual acuity
- Poor visual attention
- Overload of information
- Impaired reaction time
- Slower gait
- Medication side effects and interactions
- Alcohol consumption

Centers for Disease Control and Prevention, 2010.
Anatomic and Physiologic Differences

• Higher mortality rate due to:
  – Age-related deterioration
  – Decreased stress tolerance and physiologic reserve
  – Greater complication risk
  – Pre-existing chronic disease
  – Pre-existing nutritional deficits

Mechanisms of Injury

• Falls
• Motor Vehicle Crashes
• Pedestrian-Automobile Crashes
• Violence

Geriatric Falls

• Most common unintentional injury for those over 75
• Mort rate increases dramatically with age
• 50% of elderly who fall do so repeatedly
• Most fall on a level surface and most suffer an isolated orthopedic injury.
• Many falls occur in nursing homes
Common Causes of Geriatric Falls

• Syncope due to:
  – dysrhythmias, venous pooling, orthostatic hypotension, hypoxia, anemia, or hypoglycemia.

• Other factors include:
  – alcohol and medications (antihypertensives, antidepressant, diuretic and hypoglycemia agents).

• Changes in postural stability, balance, motor strength, and coordination

Traumatic Brain Injury

• With aging, the brain undergoes progressive atrophy and decreases in size by 10% between ages 30 and 70
• Subtle changes in cognition and memory make evaluation of mental status difficult
• Lower incidence of epidural hematomas
• Higher incidence of subdural hematomas
• The increased “dead space” within the skull may delay symptoms of ICH
• Low threshold for Head CT

Geriatric Falls and Bleeding

• Anticoagulants
  – Heparin
  – Unfractionated heparin
  – Low-molecular weight heparin
  – Warfarin
  – Hirudin

• Antiplatelet Agents
  – Aspirin
  – ADP inhibitors
  – GP IIb/IIIa Antagonists
  – Phosphodiesterase (PDE) inhibitors

• Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)
  – Ibuprofen
  – COX-2 inhibitors

• Thrombolytics
  – Streptokinase
  – Urokinase
  – Tissue plasminogen activator (tPA)
Reasons Why People Are On Anticoagulants

- Atrial fibrillation
- Deep vein thrombosis
- Mechanical heart valves
- Stroke prevention
- Heart attacks
- Heart failure
- Pulmonary emboli
- Angina
- Stents
- Orthopedic procedures
- Wound care
- Just because….

So Who Is Old?

Cindy Blank-Reid

- Born: Sept 27, 1961
  Camden, NJ
  (51 years old)
- Trauma CNS at Temple University Hospital
- Author, lecturer, military spouse, mother of 3
- Med hx: adult onset asthma, latex allergy
Bruce Springsteen
• Born: Sept 23, 1949
  Long Branch, NJ
• 64 years old
• Accomplished musician, songwriter
• Med hx: Has not disclosed any health concerns

David Letterman
• Born: April 12, 1947
  Indianapolis, IN
• 65 years old
• Late night talk show host, comedian, writer, businessman
• Med hx: Jan. 1, 2000 had quintuple bypass surgery (52 years old)

Arnold Schwarzenegger
• Born: July 30, 1947
  Austria
• 65 years old
• Body builder, actor, business, Governor of CA
• Med hx: Born with bicuspid aortic valve (had 2 leaflets and not 3)
Arnold Schwarzenegger
• 1997 had replacement valve (made from his own transplanted tissue)
• Dec 9, 2001 – MCC with 6 fx ribs; spent 4 days in the hospital
• Jan 8, 2006 – MCC with 15 stitches in his lip
• Dec 23, 2006 – tripped over pole and broke R femur while skiing in Sun Valley, ID
• Dec 26, 2006 – 90 minute surgery to repair femur fx

Paul McCartney
• Born June 18, 1942
  England, 71 years old
• Singer, songwriter, activist
• Med hx: None

George H.W. Bush
• Born: June 12, 1924
  New Haven, CT
  (88 years old)
• War hero, pilot, oil man, statesman, Ambassador, CIA Director, Vice-President and President of the United States
• Med hx: Takes Coumadin for atrial fibrillation due to hypothyroidism
Nancy Davis Reagan

- Born: July 6, 1921
  NYC; 92 years old
- Actress, author, First Lady of California and the US
- Med hx: Oct 2008 – fell and broke sacrum and pelvis

Case Study # 1

- A 68 year old man is watching his grandchildren ice skate at an indoor rink. While leaving the bleachers, he slightly falls and slightly strikes his head on one of the side rails. He is fine, there is no bruising, bleeding and no one sees it happen other than his 12 year old grandson who is out on the ice.
- The rest of the day is uneventful and fun as the Saturday unwinds. The man lays down before dinner (like he always does) and he does not awaken. He is taken to the closest hospital where it is revealed that he has a massive SDH.

Case Study # 2

- An 84 year old widower who lives alone and is a WW II veteran (D-Day and Battle of the Bulge) stops at the local neighborhood convenience store to buy a lottery ticket and a loaf of bread. He is mugged as he walks home by some teenagers. He falls to the ground and strikes his head. He is then kicked in the head but is able to get up. The store clerk calls 911 and an ambulance takes him to the neighborhood hospital which is a Level I trauma center.
Case Study # 3

- A 66 year old widow who lives alone with a hx of a-fib is doing her laundry when she slips and falls on her steps going down to the basement. She hits the back of her head but is fine. She goes back upstairs and finishes watching her TV show. Her daughter finds her unresponsive on the couch the next morning when she comes to pick her up for Mass.

Case Study # 4

- An 82 yr old woman who was having a stroke and is on a TPA infusion is helped back into bed by her husband because the nursing staff is taking too long. She gets dizzy, falls and hits her head on the radiator in the room. She is unconscious for approx 3-5 minutes but then appears fine for 5 minutes until she seizes. The resident personally pushes the pt to CT within 10 minutes of the fall, orders FFP, cryo, etc. Pt arrests in the radiology hallway 12 minutes after the fall.

Case Study # 5

- June 4-July 25, 2001, 932 pts on Coumadin had their blood tested
- July 25th in late afternoon a problem is discovered
- Aug 5, 2001 - Press conf held
- There were 5 deaths in those 6 weeks.
What Drugs Are We Talking About?

- Anticoagulants
  - Heparin
  - Unfractionated heparin
  - Low-molecular weight heparin
  - Warfarin
  - Hirudin
- Antiplatelet Agents
  - Aspirin
  - ADP inhibitors
  - GPIIb/IIIa Antagonists
  - Phosphodiesterase (PDE) inhibitors

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)
- Ibuprofen
- COX-2 inhibitors
- Thrombolytics
  - Streptokinase
  - Urokinase
  - Tissue plasminogen activator (tPA)

Heparin

- Commonly used polysaccharide anticoagulant that inactivates thrombin and thus inhibits the coagulation cascade from forming a fibrin thrombus
- The effect is a prolonged PTT.
- As heparin inhibits thrombus, PT should be prolonged too

Heparin overdose is a PTT in excess of 2-2.5 times control
- Antidote is protamine sulfate (50 mg) which can reverse the effects. Reasonable dose is 1 mg/kg.
Warfarin

- Most commonly used oral anticoagulant in North America
- Inhibits thrombin formation
- Best selling drug
- Underestimated drug

Unfractionated Heparin

- A glycosaminoglycan that exerts its anticoagulant effect through binding and potentiation of ATIII
- Given sub q, IV infusion
- Therapy gauged by PTT or INR which is prolonged
- Half-life is 1 hour
- Reversed by protamine sulfate

Low Molecular Weight Heparin (LMWH)

- Has 1/3 the molecular weight of heparin
- Has more antifactor Xa activity than inhibition of thrombin
- Does not prolong PTT (since it does not affect thrombin)
- Half-life is much longer than heparin and mainly cleared by the kidneys.
- Protamine is only able to neutralize 60% of LMWH activity
Plavix

• Is used to prevent strokes and heart attacks in patients at risk for these problems.
• In a class of medications called antiplatelet drugs.
• Works by keeping platelets from sticking together and preventing clots.

Aspirin

• Is in a group of medications called salicylates.
• Reduces the clumping action of platelets.
• It works by stopping the production of certain natural substances that cause fever, pain, swelling, and blood clots.

All the Others

• Natural herbs
• Drug interactions
• ?????
Guiding Principle

- Patients who sustain a TBI and are taking an anti-coagulant will require a rapid reversal of that agent.
- Anticoagulants are taken by many patients (especially geriatric patients) to avoid a life-threatening event. Unfortunately, once a traumatic injury occurs, these agents may increase their mortality due to the disruption of the clotting factors.

Pre-Hospital Arena

- EMS need to evaluate all trauma pts for:
  - any co-morbidities or significant medical hx which would be a predictor of anticoagulant use (i.e. A-fib, valvular replacement, DVT, stroke, etc.)

Pre-Hospital Arena

- EMS need to consider transport to a trauma center if any type of anticoagulant is being taken or the use of one is suspected.
Pre-Hospital Arena

- Undertriage
  - Often transported to a non-trauma center
  - Under recognition of beta blockers
  - Pre-hospital training on elderly changes
  - Resources
  - Patient often under triage themselves
  - “They look Good”

Undertriage of elderly trauma patients to state-designated trauma centers

- Even when trauma is recognized and acknowledged by EMS, providers are consistently less likely to consider transporting elderly patients to a trauma center.

- EAST Guidelines (level II) suggest that all patients > 70 y/o should be taken to a trauma center.

Emergency Dept Care

- If the patient is in a non-trauma center and it is determined that they take anti-coagulants, consider transfer
- Determine:
  - patient’s Glasgow Coma Scale (GCS)
  - patient’s age
  - pre-existing medical conditions (why they are on anti-coagulants)
Emergency Dept Arena

• All trauma patients should be asked about any pre-existing medical conditions or surgeries.
• Ask about any prescription or over the counter medications that they are taking.
• If anticoagulants are being taken by the patient, it is important to determine the reason for their use.

Emergency Dept Arena

• Evaluate for co-morbidities or significant medical hx which would be a predictor of anticoagulant use such as atrial fibrillation, valvular replacement, deep vein thrombosis, stroke, etc.

Activation or Not?

• Do you make your elderly an activation?
  – What’s the criteria?
    • Age
    • Mechanism
    • Physiology
    • Personal Medical Hx
    • Medications
The impact of advanced age on trauma triage decisions and outcomes: a statewide analysis

- 13,820 (27%) elderly patients.
- Significantly less likely trauma team activation despite similar severity
- More often required urgent craniotomy and orthopedic procedures
- Undertriaged elderly patients had 4 times the mortality rate


Emergency Dept Care

- Obtain a GCS and vital signs at time of triage:
  - Initial GCS and a complete neurological examination should be done at time of triage then reevaluated at a minimum of every hour or more frequently as warranted.
  - Clinical signs of increased ICP include declining mental status, headache, vomiting, varying respirations, and bradycardia.
  - Changes in the pupillary response or in the components of the GCS score usually signals worsening brain injury.
  - Medical management of TBI is focused on preventing secondary insult.

- Send trauma panel blood off and include PT, PTT, INR
- Obtain a CT scan of the head.
- A NS consult should be obtained if the scan is positive for blood as there will be a reversal of the anticoagulant initiated in those patients diagnosed with intracranial hemorrhage.
- Begin to reverse the agent if needed and not already initiated.
- Repeat head CT scan in 4-6 hours unless a decreasing neuro exam requires it be sooner.
Vitamin K Antagonists

- Warfarin/Coumadin
  - Suggestive reversals
    - Vitamin K (10mg IV)
    - FFP: At least 2 to start
    - Some data supports rFVIIa but caution is advised
    - Tranexamin Acid (Anyone using yet?)

Unfractionated Heparin (UHF)

- Half life of IV Heparin is 60 minutes
- Reversal agent = Protamine
  - Time since last dose | Dose of Protamine
  - < 30 min           | 1.5mg/100units
  - 30 – 60 min        | 0.5 to 0.75mg/100 units
  - 60 – 120 min       | 0.375 to 0.5mg/100units
  - >120               | 0.25 to 0.375mg/100 units
- Sub-Q Heparin may require a longer infusion of Protamine

Low Molecular Weight Heparins (LMWH)

- No proven antidote, Protamine is suggested but it may only neutralize 60% of the anti-factor Xa activity in LMWH

- Enoxaparin and Dalteparin
  - < 8 hours           | 1mg Protamine/100 anti-factor Xa units LMWH followed by 0.5mg/100 if bleeding continues
  - > 8 hours           | Smaller doses are needed
**Low Molecular Weight Heparin**

- The duration of action of either Enoxaparin and Dalteparin should dissipate within 24 hours of a therapeutic dose or 12 hours of a prophylactic dose.
- The duration of action of Enoxaparin may be significantly prolonged in renal insufficiency.

**Antiplatelet Agents**

- Aspirin, Ticlid, Plavix, Effient
  - Platelet transfusion may be useful
  - DDAVP can be considered

**IIb/IIIa Inhibitors**

- Reopro Give Platelets
- Aggrastat or Integrillin Platelets, can transfuse Cryo and could also use DDAVP if needed.
Anti-Factor Xa Agents

- Fondaparinux (Arixtra)
  - No specific antidote
  - Limited data supports rFVIIa
  - Half life = 18 hours
  - Peak is 3 hours after administration
- Apixaban and Rivaroxaban
  - No specific antidote
  - rFVIIa may be useful

Direct Thrombin Inhibitors

- Argatroban and Bivalirudin
  - No specific antidote
  - Rapidly eliminated upon cessation of the therapy
    - Argatroban
      - Half life 30 – 51 minutes
    - Bivalirudin
      - Half life dependent upon renal status

Direct Thrombin Inhibitors

- Dabigatran
  - NO REVERSAL
  - Half life 12 to 17 hours (renalily cleared)
  - Hemodialysis
  - Activated Charcoal
  - PCC’s or activated PCCs?
  - FFP?
  - rFVIIa?
ED/Critical Care Arena

- Once reversal of the anticoagulant has started, the pt will need to be closely monitored for neurological changes and potential complications from the reversal (i.e. emboli phenomenon).
- Elderly pts anticoagulated with mild TBI, including those with a normal neurological examination and CT scan should be hospitalized for at least 24 hours for observation by either a trauma surgeon or a NS.

Diagnostic Testing

- Need to be taken to CT quickly
- Need to have scan read quickly
- Need to be able to repeat scan quickly over the next few hours - days

Those Who Take....

- Patients on warfarin may present with small intracranial bleeds that ultimately progress to a larger hemorrhage.
- Patients taking ASA on a daily basis will usually have small bleeds and other comorbid conditions.
- The risks and benefits of anticoagulant use must be reevaluated once a traumatic intracranial hemorrhage occurs.
  - For those patients on anticoagulants for atrial fibrillation the rates of a thrombotic event are 1 in 500 and 1 in 1300 as compared to 1 in 2 risk of death following an intracranial hemorrhage.
- Patients on Plavix are at risk for a thrombotic event somewhere between the ASA group and the warfarin group with regards to progression of their bleed.
Medical Interventions

• Reversal agents should be given.
• Therapeutic and supratherapeutic INRs should be treated with fresh frozen plasma (FFP) and vitamin K or Factor VIIa in any patient with TBI. The INR should be maintained less than 1.4.

Surgical Interventions

• There is little point going to the OR or to IRAD if the bleeding cannot be controlled
• The faster the patient is reversed, the sooner you can go to the OR (if you need to)

Common Concerns for Patients on Anti-Thrombotics

• Principle complication is spontaneous bleeding anywhere in the body
• Thrombocytopenia
• Heparin induced thrombocytopenia (HIT)
• Death
Guiding Principle

- Patients who sustain a TBI and are taking an anti-coagulant will require a rapid reversal of that agent.
- Anticoagulants are taken by many patients (especially geriatric patients) to avoid a life-threatening event. Unfortunately, once a traumatic injury occurs, these agents may increase their mortality due to the disruption of the clotting factors.
- STN developed a protocol that they believe will assist trauma providers by decreasing the risk of a life-threatening hemorrhage in geriatric trauma patients who are on anticoagulation therapy.

The Society of Trauma Nurses and The Hartford Institute of New York University

Reversal of Anti-Coagulation for Elderly Patients Taking Anti-Coagulation Medication Who Sustain a Head Injury

STN Taskforce Members

**Taskforce Chair:**
Cynthia Blank-Reid, RN, MSN, CEN

**Taskforce Members:**
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Julia N. Senn-Reeves, RN, MSN, CNS, CCRN, CCNS
Deborah M. Stein, M.D., MPH
Brad Von Bergen, RN, CEN
Issues and Concerns

- Follow-up
  - is there a clinic near by
  - do they have health insurance
  - do they have a doctor
  - will they participate in follow-up
Issues and Concerns

• Medications
  – Will they fill the prescriptions
  – Will they take the medication
  – Can they pay for the medications

Issues and Concerns

• Laboratory testing
  – Is there a convenient location
  – Are the hours convenient
  – Do they have health insurance to pay for it
  – Will they go have the lab work done

Issues and Concerns

• Potential for injury
  – Trauma can happen at any time and any place
• Even when excising care, taking precautions, etc – things can happen
Issues and Concerns

• Potential for complications –
  – There are so many co-morbidities that need to be addressed when someone is anti-coagulated
  – Polypharmacy (these are not benign drugs)
  – Geriatric team and specialists

Complication Specifics

• The risks and benefits of anticoagulant use must be reevaluated once a traumatic intracranial hemorrhage occurs.
  – For patients with a-fib on anticoagulants, the rates of a thrombotic event are 1 in 500 and 1 in 1300 as compared to a 1 in 2 risk of death following an intracranial hemorrhage.
• What do you do when they throw clots
  – IVC, recoagulate, pray

Stopping the Anticoagulant

• Why were they on it
• What caused the trauma (syncope, clot, etc)
• How long do you think that they will need to be off of it
• How safe and effective is the alternative
Restarting the Anticoagulant

• Needs to be in a monitored setting
• Does the team agree with the plan?
• What is the worst that could happen?

Redosing Issues

• Too much
• Too little
• Interaction with other medications, herbal and nutritional supplements drugs which either increase or decrease them

Nursing and Medical Assessments and Interventions

• Assessments
  – neuro, CV, body systems, etc
  – safe to be OOB, ambulating
  – Safe to be making decisions
  – Safe to go home
Nursing and Medical Assessments and Interventions

- Interventions – safety alarms, restraints, padded side rails
- Reduce bruising and edema
- Comfort measures including pain control
- PT/OT
- DVT precautions
- Resp tx for cough and deep breathing
- Special mattresses, skin care

Nursing and Medical Assessments and Interventions

- Diagnostic studies – repeat CT scans
- Laboratory Studies
  - Electrolytes
  - Magnesium
  - Calcium
  - Cardiac isoenzymes
- Other
  - 12-lead EKG

With the CT Scans

- Impaired ability to concentrate urine
- Decreased glomerular filtration rate
- Slight increases in blood urea nitrogen and creatinine expected; changes considered when using contrast media and certain drugs
Nursing and Medical Assessments and Interventions

• End-of-life decisions
• Specific directions for withholding or withdrawing treatments
• Guidelines for making treatment decisions
  – Patient’s right to self-determination
  – Patient’s best interest
  – Benefits of treatment outweigh adverse outcomes

Nursing and Medical Assessments and Interventions

• Advanced directives
  – Do they have one?
  – Is it with them?
  – Does the family know their wishes?
  – Is there a medical decision maker who can deal with a dynamic process?

Nursing and Medical Assessments and Interventions

• Long and short term goals:
  – Do they need rehab?
  – Can they get rehab?
  – Does the family know their wishes?
  – Is there a medical decision maker who can deal with a dynamic process?
Outcome Criteria
If the sending facility is able to calculate an Injury Severity Score (ISS) then utilize that information.
• For minor injury and an ISS < 9, the mortality for 65 years and older is increased
• For moderate injury and an ISS 9-24, the mortality for 45 years and older is increased

Outcome Criteria
• Markers for poor prognosis at admission:
  - Age > 75
  - GCS of 7 or less
  - Presence of shock on admission
  - Severe head injury
  - On anticoagulants
  - Development of Sepsis

Outcome Criteria
• Consider the potential morbidity and mortality of anticoagulation reversal if it is decided to not reinitiate an anti-coagulate or alternative therapy within 24 hours.
• Anticoagulation should not be reinitiated in a pt with an ICH until it is deemed appropriate by a NS. Typically, ASA and Plavix can be restarted sooner than warfarin, but the plan needs to be initiated in consultation with a NS.
Prevention

• Wear a Medic Alert bracelet
• Tape your name and contact info inside your phone, helmet, etc.
• Utilize appropriate safety equipment

Prevention

• Rugs
  – Use nonskid tape or backing on throw rugs
  – Tack down all carpet edges

• Stairs
  – Need good lighting
  – Solid easy to grasp handrail that is rounded or knobbled at the end
  – Consider painting or taping the top and bottom steps so they are easily noticed
  – Don’t rush when climbing up or down stairs

• Bathroom
  – Be sure mats are non-skid and there are treads in the tub and shower to prevent slips
  – “Grab bars” should be in the tub area and next to the toilet if possible

• Traffic Lanes
  – Clear walkways thru every room
  – Don’t use doorway, hall or stairs for storage

Prevention

• Floors
  – Do not walk on freshly washed or waxed floors.
  – Wipe up any spills immediately
  – Avoid wearing only socks, smooth soled shoes or slippers on uncarpeted floors

• Outdoors
  – Keep stairs, porches, and walkways free of wet leaves, snow and ice
  – Be sure stairs and walkways are in good repair. Use a handrail on stairs.
Prevention

- Carrying Objects
  - Make sure your view isn’t blocked
  - Get a firm grip. Lift with your legs (knees bent, back straight) and walk slowly
  - Get help for heavy or awkward objects

- Reaching High Places
  - Use a solid step stool or ladder, not a chair or box
  - Avoid using the highest step on a ladder
  - Get help if you need it

Prevention

- Use crosswalks or cross at corners
- Wait for the signal and cross with the light and give yourself enough time to cross
- Always look both ways
- Carry a flashlight at night
- Always wear a seatbelt, helmet and other safety equipment

- If no sidewalk, walk facing traffic so you can see it coming toward you

- Buses
  - Take your time getting on and off
  - Brace yourself whenever it starts or slows down
  - Have your fare ready so you are not standing when the bus begins to move
  - Keep one hand free to hold the railings and brace yourself.

Everyone deserves to have a healthy Grandma and Grandpa to love them!
Questions???

References

2. Daithi S. et al. (J Trauma. 2010;69: 813–820)