Vascular Access Assessment, Monitoring, and Surveillance

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Session Objectives

- Project Description
- Increase understanding of vascular access monitoring and surveillance and new CFC requirements
- Learn something new
Vascular Access Challenges in the US.

- Major cause of morbidity
- Many lost HD hours
- Most Hospitalizations for HD patients
- High $ Cost to Health Care System
- Current Medicare expenditures for ESRD are in excess of $21 billion annually (5-7% of total Medicare expenditures, for only 1% of Medicare beneficiaries)
- Best type least used in the US – AV Fistula
V551: Vascular Access Monitoring

- “The patient’s vascular access must be monitored to prevent access failure, including monitoring of arteriovenous grafts and fistulae so symptoms of stenosis”
- “The facility must have an on-going program for vascular access monitoring and surveillance for early detection of failure to allow timely referral of patients for intervention when indications of significant stenosis are present.”
Patient education should address self-monitoring of the vascular access”
Physical examination

Observance of changes in adequacy or in pressures measured during dialysis, difficulties in cannulation or in achieving hemostasis

Precipitating events should also be noted, such as hypotension and hypovolemia
V 551: Surveillance Strategies

- Include devise-based methods such as access flow measurement
- Direct or derived static venous pressure ratios
- Duplex ultrasound, etc
Documentation Requirements:

- Medical record should show evidence of periodic monitoring and surveillance of AVG or AVF
- Could be dialysis treatment record, progress notes, or a separate log
- A member of the facility staff must review the VA monitoring/surveillance documentation to identify adverse trends and take action if indicated
Additional Vascular Access Related V-Tags:

- V 147 & V 148 – Infection Control
- V 551 – Patient assessment – evaluation of dialysis access type for maintenance
- V 633 – QAPI condition addressing vascular access monitoring and surveillance
The dialysis facility must develop, implement, maintain and evaluate an effective, data driven, quality assessment and performance improvement program with participation by the professional members of the interdisciplinary team...

...The dialysis facility must maintain and demonstrate evidence of its quality improvement and performance improvement program for review by CMS
Interdisciplinary Team:

Show Me The Progress:
Stenosis Monitoring Project: Inclusion Criteria for Participating Facilities:

- Based on the results of the 2008 Stenosis Monitoring Scan
- Facilities that either do not perform monitoring and surveillance or perform dynamic venous pressure only (N=15)
- Facilities that did not respond to the scan
Are all patients with AVF/AVG monitored for stenosis on a routine basis?

- Yes: 89.0%
- No: 6.6%

Is a physical assessment of the access - including inspection, auscultation for bruit, & palpation for thrill performed at every treatment?

- Yes: 91.2%
- No: 8.8%

Does your facility have a P&P in place for monitoring & surveillance of vascular access?

- Yes: 83.5%
- No: 11.4%

Does your facility maintain a patient tracking log for monitoring & surveillance and evidence of referrals?

- Yes: 82.1%
- No: 13.2%
Stenosis Surveillance Methods Used by Network 18 Facilities

- Duplex Doppler Ultrasound
- Transonics
- Crit Line
- On Line Clearance
- Access Flow
- Vase-Alert
- Dynamic Venous Pressure
- Recirculation Studies
- Other
Routine Stenosis Surveillance Frequency per Method

- Duplex Doppler Ultrasound
- Transsonics
- Crit Line
- On Line Clearance
- Access Flow
- Vase-Alert
- Dynamic Venous Pressure
- Recirculation Studies
- Other

Frequency:
- Every Treatment
- Weekly
- Monthly
- Quarterly
- Other
- Didn't Specify
Monitoring and Surveillance:

- Access Development
- Infection rate
- Thrombosis
- Other Complications
**Benefits of Access Monitoring and Surveillance**

- Reduce incidence of thrombosis
- Extended access use-life
- Reduce time lost from Hemodialysis
- Reduce patient morbidity/hospitalizations
- Improve quality of life
- Reduce health care costs
Surveillance Technology

- Intra Access Flow
- Transonics
- Static Venous HD Pressure
- Dynamic Venous HD Pressure
- Access recirculation
- Unexplained Decrease Delivered HD
- Doppler Ultrasound
- Physical Exam of Access (arm swelling, prolonged bleeding, increased + venous pressure or – arterial pressure)
Schedule

- Infection Incidence – daily
- Developing Access – every week
- Vascular Access Conference – every month
- Transonics Flow – each 1-2 months
- Team Meeting – every 2-3 months
- External expertise - periodic
Action points:

- Decreased Transonics Flow – Fistulogram
- Access Infections?
- Increased Attention to Detail by all HD staff !!!!
- Identify Needs for More Training
- Identify Potential Physician Trends
- Identify Potential HD Facility Trends
- Allow Objective comparison with Regional and National Averages
**K-DOQI Guidelines**

- Kidney Disease Outcomes Quality Initiative launched in 1995
- Evidence-Based Clinical Practice Guidelines for patients and health care providers
- First Guidelines – 1997
- Currently 22 topics
- Three-stage review process
Guideline 2: Selection and Placement of Hemodialysis Access

- 2.1.1- Preferred: AV Fistulae (AVF)
- 2.1.2- Accepted – AV Graft (AVG)
- 2.1.3- Avoid if possible: Long-Term Catheters

- Fistula First Breakthrough Initiative (FFBI) goal: 66% of hemodialysis patients utilizing AVF by June 30, 2009

- 4.1. Physical examination (monitoring)
- 4.2. Surveillance of grafts (preferred)
  - Intra-access flow
  - Static venous pressure
  - Duplex ultrasound
- Surveillance of grafts (acceptable)
  - Physical findings
- Unacceptable:
  - Unstandardized dynamic venous pressure (DPVs) should not be used

- Surveillance of fistulae (preferred)
  - Direct Flow Measurements
  - Physical findings
  - Duplex Ultrasound
- Surveillance of fistulae (acceptable)
  - Recirculation (using non-urea based dilutional method)
  - Static pressure, direct or derived
Continuum of Vascular Access Care

Assessment

Every day, every shift, every patient

Monitoring and Surveillance

Vascular Access Program

Documentation

Interventions

QI
Static pressure
DVP
Recirculation

Angioplasty
Fistulagram
Thrombectomy

Look, Listen, Feel
Physical Assessment

- Inspection (look)
- Auscultation (listen)
- Palpation (feel)

*Use all of your senses for assessment and then use your memory to compare and contrast the condition of the access to previous assessments*
**Inspection**

- Redness
- Drainage
- Abscess

**Infection**

- Hands: cold, painful, numb
- Fingers: discolored

**Skin Color**

- Edema
- Small blue Purple veins

**Central or Outflow Vein Stenosis**

**Steal Syndrome**
Is the Access Working Properly?

- Clearances (URR) greater than 65
- Access flow greater than 600
- Venous pressure at 200 BRF less than 125
- Able to run prescription
- Other signs and symptoms of access pathology
  - Recirculation
  - Difficulty cannulating and pain in the access
  - Changes in thrill and bruit
  - Prolonged bleeding post-dialysis
Is New AVF Mature? Use the KDOQI “RULE of 6’s”

Vein MUST Mature PRIOR to the FIRST cannulation

- 6 cm of straight segment
- 6 - 8 week Post Op Check AVF Maturation
- "Rule of 6's"
- Depth below skin Approximately 6 mm
- Access Blood Flow Greater than 600 mL/Min
- Diameter Greater than 6 mm
Central Stenosis and Occluded Veins

- Arm swelling
- Prominent veins in the upper chest
- Prominent veins in the arm
- Swollen neck and face
- Look for signs of catheter on access side
- Look for pacemaker or defibrillator
What Causes the Stenosis?

- Scaring at the cannulation sites from poor needle rotation
- Scaring the vein from the high arterial flows
- Scaring from implanted devices
- Aneurysm and pseudoaneurism formation
- Manipulation of veins
  - Transpositions, translocation
### Physical Findings of Venous Stenosis

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>NORMAL</th>
<th>STENOSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrill</td>
<td>Only at the arterial anastomosis</td>
<td>At the site of stenotic lesion</td>
</tr>
<tr>
<td>Pulse</td>
<td>Soft, easily compressible</td>
<td>Water-hummer</td>
</tr>
<tr>
<td>Bruit</td>
<td>Low pitch, continuous, diastolic &amp; systolic</td>
<td>High-pitch, discontinuous, systolic only</td>
</tr>
</tbody>
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Clinical Indicators of Stenosis

- Clotting the system 2 or more times/month
- Difficult needle placement
- Persistently swollen arm
- Increased machine pressures
- Difficult achieving hemostasis at the end of treatment
- Decreased blood pump speeds
- Decreased Kt/V or URR (due to recirculation)
What is Steal Syndrome?

- Access “steals” blood from the hand
- Decreased blood supply to the hand
- Causes hypoxia (lack of oxygen) to the tissues of the hand resulting in severe pain
- Neurotic damage to the hand can occur
- Without oxygen tissue dies and necrosis occurs
Is Steal Syndrome Serious?

- Necrotic tissue can not be “fixed” – it must be removed (amputated)
- = Risk for infection
- = Risk for hospitalization
- = Risk for death!

- The Allen Test (within 3 seconds you should see capillary refill)
Flow Methods in Dialysis Access

- Duplex Doppler Ultrasound (DDU)
- Magnetic Resonance Angiography (MRA)
- Variable Flow Doppler Ultrasound
- Ultrasound Dilution (Transonics): UDT
- Crit-Line III or Crit-Line II
- Glucose Pump Infusion
- Urea Dilution
- Differential Conductivity
- In-line Dialysate (FMC) - DD
Color-Flow Doppler

- Outpatient radiological procedure done quarterly
- Also called duplex ultrasound or duplex Doppler study
- Evaluates access flow patterns as well as areas of access stenosis
Ultrasound Dilution Technique *(Transonics)*

- Conducted quarterly or as necessary
- AKA Crit-Line III or Crit-line TKA
- Very popular, but not all facilities have transonics on-site
Transonics Flow:

- AV Graft – once a month, if stable – every 2-3 months.
- AV Fistula – every 2-3 months
- Flow:
  - < 600 ml/min every month with 15% - fistulogram
  - > 1000 ml/min
  - 25% decrease
Dynamic Venous Pressure (DVP)

- Conducted and recorded at the beginning of each treatment at a specified blood flow rate using specified/consistent needle size
- Non-standardized dynamic venous pressure are considered as unacceptable monitoring method by the K/DOQI workgroup
- Acceptable method for AVFs only! (KDOQI 2006)
Static Venous Pressure (SVP)

- Following a unit-specific procedure for measurement of venous and arterial measures at zero blood flow
- Conducted at least every 2 weeks
- Measurements plugged into mathematical formula
- Ratio > 0.5 is considered abnormal
- Refer for fistulagram after 3 abnormal readings
Other Methods

- On-Line-Clearance (OLC) – conducted quarterly – Fresenious technology
- Magnetic Resonance Angiography
**KDOQI Guideline 4: When to refer for evaluation (diagnosis) and treatment:**

- Do not respond to a single isolated episode
- Look for persistent abnormalities
- Access flow rate <600 mL.min for AVG and 400 to 500 mL/min in AVF
- A venous segment static pressure (mean pressures) ratio > 0.5 in AVG or AVF
- An arterial segment static pressure ratio > 0.75 in AVG
Medicare Guidelines for Referral

- Venous outflow
  - Elevated venous pressure
  - Prolonged bleeding
  - Decreased URR
  - Decreased Kt/V
  - Recirculation
  - Swelling of the extremity
  - Pulsatile graft
  - Loss of thrill
  - Aneurysms
  - Difficult or painful cannulation

- Arterial inflow
  - Low pressure in graft when outflow is occluded
  - Ischemic changes in extremity
  - Diminished intra-access flow (AKA: arterial pulling negative)
How often for Angioplasty?

- Some lesions are elastic
- Once scar starts to grow, it continues
- Scar grows at a different pace
- Acceptable interval is approximately 6 months
- May be more often, depending on the case
Why Angioplasty?

- Improves blood flow for better dialysis
- Decreased the rate of thrombosis of the access
- Prevents the need for surgery
- Extend the life of the access (from 2 to 7 years)
- There is a finite number of sites for an access
All Patient should be taught how to:

- Compress a bleeding access
- Wash skin over access with soap and water daily and before HD
- Recognize s/s of infection
- Select proper methods for exercising fistula arm with some resistance to venous flow
- Palpate for thrill/pulse daily
- Listen for bruit with ear opposite access if can’t palpate for any reason
All patients should know to:

- Avoid carrying heavy items and wearing occlusive closing over access
- Avoid sleeping on the access arm
- Be aware of site rotation (unless buttonhole cannulation method is used)
- Be aware of proper skin preparation and importance of staff wearing masks
- Report and s/s of infection and absence of bruit/thrill to staff immediately
In Closing

- The patient’s dialysis access is his or her lifeline; it is the job of the entire team to try to maintain it through routine monitoring and surveillance
- Team education is key
- Patients who are able to should be taught how to assess their own access
- Listen to the patient
- Follow up on the procedure report
Project Timelines:

- To implement accepted monitoring and surveillance procedures by April 1, 2009.
- To submit Policy & Procedure to the Network by April 15, 2009
QUESTIONS?