VASCULAR SURGERY SERVICE GUIDE

Welcome to the Vascular Surgery rotation! This guide is intended to help orient you to how the service is structured, care for common issues, and offer a framework for selected readings to help you get the most out of this experience.

Last Updated Jun 19th, 2023

Service Setup

Attendings:
RED: John Carson, Sarah Deery, Anna Boniakowski
PURPLE: Paul Bloch, Kristina Giles, Kimberly Malka, Brian Nolan
Red pager 741-3627
Purple pager 741-0364
Consult Pager 914 0295
Aortic emergency pager 741 3557

APPS:
Office: Julianna Kenney
Vein Clinic: Julie Salvatelli, Rachel Tarmy
SMHC: Rachel Tarmy
Inpatient PA/NP: Usually work weekdays 6a-6p, Cover 2-3 weekends in a month (6a-6p Sat/Sun)
Rachel Hontz, PA; Danielle Wiggin, NP; Erica Lafferty, NP

Assignments:
- 2 residents per service
- Some months there will be a vascular resident covering vascular consults and transplant.
- The APP will be assigned to service with the higher census
- The Senior resident should text the APP in the morning to coordinate rounds

Attending Call:
Weekend Call and Night call: Friday 6pm - Monday 7am, then nights only 6pm-7am.
Day Call: different attending daily, 7am-6pm

Overnight Consults:
Overnight consults get assigned to the day team who is on call. For example, if Dr. Deery is on night call (Red Service) but Dr. Malka (Purple) is on day call the following day, the patient should be added to the purple list and the purple team should round on the patient in the morning. Exceptions: if the patient is already well known to a service/attending, assign it to the specific service.

Day Call:
The night intern leaves at 5:30 am. All signouts must be completed before this time. The consult team aligns with the attending who is on call. If Dr. Deery is on call, then the red service is on call for the day and sees all consults, admissions etc. If all residents from on-call service are in OR, then other team will see consults. When there is a consult resident on, they will primarily be managing consults. See details in "Consults" section below. If there are direct admits from office or other hospital, the patient should go to whoever is the primary surgeon of the patient.

Night Call (residents):
Get in line to sign out in the call room (ideally before) 5:30 pm, first come, first sign out. Covered by gen surg night float intern.

Back Up Call aka Aortic Call

- Vascular Residents will be on alternating back up call overnight.
- The back up resident will have the aortic emergency pager
- Aortic call entails
    - Scrubbing ongoing cases to relieve the resident (if the resident wants to be relieved)
    - You do not have to stay for the cases that are on the back but have not started. They are to be covered by the General surgery night team
    - If they are cases on your service and you would like to stay, that's up to you
    - If you do elect to stay, please manage the cases yourself. Do not ask general surgery team to bird dog patients, place pre/post op orders etcetera
    - Forwarding the aortic pager (741 3557)
    - Assist with Aortic rupture patients overnight
- Aortic Call doesn't entail
    - Seeing consults overnight, answering patient management questions overnight
    - Covering vascular cases overnight that are not rupture (ABFs, Acute limbs, Angios, etcetera). If they are cases on your service and you would like to stay, that's up to you. See above.

Weekend Call (Sat 6AM to Sun 6PM):

- The vascular residents are responsible for all vascular related issues (Consults, floor pages, OR coverage) from Sat 6a to Sun 6p.
- There will be APP coverage usually 2-3 weekends out of the month. They will cover sat/sun 6a-6p
- Vascular Residents will be on home call from Sat 6a to Sun 6p. Home call entails
    - Rounding on patients in the AM
    - Covering cases during the day and overnight
    - Covering Floor pager overnight (and during day if there is no APP)
    - Covering Consult pager from Sat 6a to Sun 6p
    - Residents may leave the hospital once the work is completed. They are not expected to stay in-house. They can manage nursing calls and floor issues from home.
- A 2nd vascular resident will be on back-up call. They may be called in by the primary resident to help manage in-patient issues, and consults.
    - The back up residents must stay within 90 minutes of Drive to Maine medical center.

Conference:

- Monday 7am-830: pre op conference
- Thursday 7am-10 am: variable, rotating between case conference, journal club, M&M, grand rounds, VSCORE, research
- The APPs will hold pagers during the conferences.
- Encouraged to complete as many notes as possible prior to the conference and finish up rest after conference. Conference time is protected educational time. Prioritize education during conference time.

M&M

- Keep track of all re-admission, complications, deaths, unexpected outcomes for M&M. The primary resident involved in the index surgery should be prepared to present the case.

Clinic

- It is an ACGME requirement that a vascular surgery resident attend one half day per week of clinic. The senior resident for each service should assign clinic time with the same priority as OR cases. AM clinic runs from 0830-1230 and PM clinic from 1300-1700, so transportation and inpatient coverage should be planned appropriately.

Daily Work Flow

Morning Rounds

- Get signout from night intern (between 5:15-5:30). They need to be out by 5:30AM

- Sign in to EPIC (Sign in for all patients we are actively managing/following). (From 530am to 530pm)
    - Use Service Pager as the contact pager.
    - Provide Details in Comments section "Will be in OR much of the day" etcetera
- Review patient charts
    - Vitals
    - I&Os (PO, IV, UOP, Net 24hrs, Net since admission, Weight), Diet and Fluid Status
    - Labs (CBC, BMP, Blood Glucose, Micro results,)
    - Imaging (Any CXR, EKG, Abd films, CTs)
    - Important Medication: Antibiotics, Anti-coag, Antiplatelets,
    - Review notes from last 24 hrs (PT/OT, Consultants, Care Management, Nursing Notes)
- We round as a team. Be ready to start by 6AM. The senior resident will usually text team where and when to start
- Text the APP your location when you start rounds so they can join you
- Be ready with supplies or gather them during rounds as the need arises
    - 4x4s, Tape, Tegaderms, Kerlix rolls, Ace wrap, Tubigrips, aquacel, xeroform, hydrogel, small lubricant packet (for doppler)

Table Rounds:

- Morning Rounds should be done by 7 am.
- Go to ASU to check in patients coming in for surgery (see below)
- Meet in hole to discuss patients with attendings
- The seniors will staff patients with attendings.
- Split up morning notes with APPs and Seniors. Aim to have all morning notes done prior to start of OR ~8AM.
- Bring breakfast, people usually eat as they are writing notes

Notes and Templates (All found in farooq's smart phrases)

- Morning Note FUVPRONEW
- Consult note Template: FUVCON
- DC Summary: FUDCSUM
- Order Sets -ask your senior
- Discharge Instructions (See FUDC…)Angio/EVAR/CEA/AMP/TCAR etcetera)

Progress notes

- Use standardized note template
    - Include: Vitals, UOP, PO intake, Mobility (PT/OT notes), vascular exam, Labs, BG in your Assessment
- Some points about progress Notes
    - Update and review plans for Antibiotics, Anti-coag, antiplatelets, diet status and activity status in your progress notes DAILY
    - Keep notes concise and address relevant comorbidites that you are actively managing during the hospitalization
        - Example: HTN/A-Fib/CAD/DM/COPD/CKD usually ends up becoming important for our patients . worth address it in your note

        - GERD/Hypothyroidism/Gout/Colonic polyps etcetera are not important in daily management of surgical patient and do not need to be included in your daily note.

Suggested Work Flow

- When you are writing progress notes, follow a routine. Here is one suggested:
    1. Review vitals, labs, etcetera (see above under morning rounds section)
    2. call consults (Most consultants start ~ 7am)
    3. Start writing the progress note as you wait for consults to call back
    4. Epic chat or call Nurses regarding things you want to get done promptly
    5. Orders labs for the following day
    6. Update the Sticky tab (more on stickies below)
    7. Jot down to do list on your paper list
- Develop good habits. If you have consistent habits, you are less likely to forget and miss stuff.
    1. Try to minimize the time spent shuffling between charts and opening/closing epic
    2. Your goal should be to complete all important tasks for the patient (consults, orders, nursing, and Care management chats, update stickies) as you are writing a progress note

Afternoon Rounds

- Need to happen for every patient (unless seeing peripherally or going home that day)
    - Review vitals, Is&Os, PT/OT notes, Consult Notes, Care Management input
- Text the team and split up PM rounds (you might have to do them on your own if senior is in the OR)

Communication

- Vascular is a busy service with lots of active and critically sick patients. We all work together to take care of patients
- Frequent and closed loop communication is the key to an efficient and well run service.
- Start a text thread every morning as you are starting rounds: include Senior, Junior, Med student and APPs (if they are assigned to your service)
- The text thread is important to keep everyone on the same page even if the information appears mundane and straight forward. This is to ensure there are no open holes and the entire team is aware of what is happening on the service.
    - Text all relevant updates to plans/questions to team
    - You hold the pager. You will be the first one to find out all issues. Text any questions/concerns you have. If you don't hear back within 5-10 minutes, call in to OR or go to the OR to find your Senior resident.
- EPIC Chats
    - Ideally, there really should be only one person from our team on an epic chat. That person should communicate to rest of the team via text thread. If key clinical decisions need to be made, feel free to add others to epic

- If you are going to OR or going to be unavailable, then add someone else from the team to epic chat so they can follow up on the convo.

Sticky Notes

- This is one of the most important way to ensure that the service flows smoothly.
- Here is format for STICKY notes: FUNEWPT
- Here is the usual format for our stickies
  Date1: Attending Name, Procedure
  Date2: additional interventions this admission
  PMH: COPD (no home O2), CAD, CHF (last Echo Mar 2021, Normal LV/RV, Valves), HTN, HLD, A Fib (on Eliquis), PAD (prior Fem-Pop bypass)
  Vasc: (Vascular exam) femoral, DP/PT (right and left)
  Coag: ASA (NOAC/Warfarin, Heparin etc)
  Wound Plan:
  Anti-biotics Plan:
  [ ] Task 1
  [ ] task 2
  [ ] task 3 etcetera
- Update at minimum in the morning and prior to Signout ~ 5pm

Getting Patient Ready for Weekend

- **Daily labs:** Order as appropriate
- **Update DC instructions** and DC Summary
  - if they have had a procedure - don't forget to add this on consults if we operated on them
  - For complex patients better to split up summary by problem rather than a chronological summary
- **Complete med rec**
  - Reconcile meds that won't be changed at discharge (ASA, thyroid, psychiatric meds)
  - Meds that may change: leave unreconciled (HTN, DM, anticoagulation, etc)
- **Office follow up**
  - Check the AVS to make sure no appointment is scheduled already
  - Message vasc office admin pool via Epic inbasket
    - P MP VASCULAR Access and SURGERY COORDINATOR POOL
    - "Patient had xyz, please schedule follow up"
    - The office staff has protocol for each problem and the know when to schedule follow up for each procedure/pathology
- **Update Sticky for Weekend**
  - Things to follow up on
  - Exam/labs to monitor
  - Format:
    - WKND
      [ ] start Diuresis
      [ ] Wean O2 [ ] Dc abx on Sunday

Consult Resident

- Consult Resident ("CR") will hold the vascular consult pager (pager 914-0295) M-F 530a-530pm and see and staff all new consults with the attending on call. Questions or concerns prior to staffing can be run by one of the vascular seniors on a PRN basis before staffing, but this should be your opportunity to start assessment and plan formulation on your own.
- If the CR is unavailable because of clinic or surgery, an APP or resident will be responsible for seeing consults in a timely fashion (other residents, APPs). They will review the consult with a senior resident prior to staffing with an attending
- Round daily and maintain a separate Vascular Consult list in Epic, staff with the appropriate attendings each morning, write progress notes and communicate to the primary teams our recommendations and plans.
- On Tuesdays, participate in any transplants. They can be involved in any off hours donors/transplants PRN
- On Wednesdays, participate in the Transplant multidisciplinary rounds.
- Be in regular communication with the Red and Purple teams to assist with rounding if the consult list is light
- Cases that come as inpatient consults seen by the CR should preferentially involve the CR. More complex cases (i.e. bypasses, AAA) should allow for the CR and a senior to double scrub. Conversely, more straightforward cases can involve the CR taking an intern through a case (i.e debridements).
- CR is also available for assigned outpatient cases PRN.
- If a patient transfers from the consult list to a vascular primary list, the consult resident should give appropriate signout/update discharge summary to the vascular team. The CR may want to continue to round on a patient they were involved with even after they transfer to the Red/Purple team (this should be worked out on a case by case basis between the CR and vascular senior on service). Conversely, a patient that transfers to a medical service from vascular should then be signed out to the CR from the Red/Purple team
- Participate in clinic one half day a week, in discussion with the senior doing case assignments (same as other residents, though taking into consideration Transplants. The CR should discuss with the assigning senior when they would like to do clinic based on their anticipated workload). This can involve transplant clinic.
- Fill in as needed on Red or Purple when there are vacations, at which point consult patients will need to be absorbed back into the Red/Purple list by attendings as they are now

Operating Room

Pre-op Patients

Prepping patients for monday conferences as well as in-patients awaiting surgery is important. There are pre-op checklists established for various procedures that we perform commonly. Please utilize them to pre-op patients. They can be found in Farooq's smart phrases. FUPREOP …/OPENAORTIC/BYPASS/ANGIO etcetera

Pre op:

- **Checklist for inpatient**
    - Make sure anticoagulation has been reversed/washed out
        - If on heparin confirm when this should be held (usually "On call to OR"); put nursing communication in
    - Labs
        - Recent CBC, BMP, T&S (good for 72 hours)
    - Recent EKG or Echo (if major/open case)
    - Book the case
        - For Same Day/emergent/urgent cases: OR Front Desk: 662 2411
        - If want scheduled time for following day: central booking 622-2665
    - Consent patient/family (need paper consent in chart)/Mark
    - SSI protocol if infrainguinal incision
    - Everyone should get chlorhexidine bath night before and morning of
    - NPO at Midnight
        - (for non emergent cases anesthesia likes people NPO for 8 hours)
        - Usually DO NOT need to start IVF on Vascular patients when they are NPO.
    - If consult: update primary about OR plans/timing
    - If they have a pacemaker/ICD make sure anesthesia aware
- **Checking patient in ASU - elective**
    - Do an "IPHR" note for patient (pre-populated template)
    - Do a through Upper and Lower extremity pulse exam (Radial, Brachial, Femoral, Pop, DP/PT (peroneal in rare cases)
    - Note any wounds, take a picture for chart
    - Mark surgical site (Carotids, Endarterectomies, Leg Bypasses, Fistula Sites, amputations, debridements)
    - Angios do not need to be marked

- **Surgical Site Infection Protocol**
    - SSI order set
    - Make sure the time and date are correct for the sage wipes/iodine nose swab (morning of surgery)
    - Mupiorcin is 5 days before surgery or as soon as possible
- **Pager**
    - Primary responsibility of residents. Should give to APP or other resident, if going to OR. May have to hold it all residents from your team are in OR and there is no APP
    - Do not take pager to clinic. Hand it off to the other residents. If all residents on your service are in OR, they will have to hold it in OR.

Post op:

- **Ask attending**
    - Anticoagulation, Anti-platelet, Antibiotics, activity, dispo plan (Home, Medsurg, IMC, ICU)
- **Workflow Post-op**
    - Drop off Patient in PACU, signout to PACU RN
        i. If on PACU hold, okay to ask OR RN to drop off the patient but always make sure you return to PACU to signout ot PACU RN
    - See next patient in ASU
    - Then Do notes/orders
        i. Before opening EPIC, Take notes:
            1. Figure out 1-3 things you learnt from the procedure. Make it a habit to take notes after every SINGLE operation. This is CRITICAL for your education
        ii. Text signout page to the team, for example:
            1. Attending, Procedure, EBL, fluids, Brief sentence how the case went (Went fine/tough dissection/unstable during case etcetera), Pulse exam, Plans for ANti-coag, Anti-platelets, Activity, ANti-biotics
            Example:
            Boniakowski, Fem-Pop bypass, EBL 1.5L, 3L crystalloid, Case went fine. 2+ femorals,graft pulse on medial knee, 2+ DP/PT on R, doppler DP/PT on Left, on DAPT for 90 days, Bedrest today, OOB tomorrow, WABT on left foot, ABx to time out 48hrs Post-op Labs to follow up,
        iii. Notes/Orders
            1. IPHR for next patient
            2. Brief Op Note
            3. Order set relevant to surgery
            4. Home Meds
        iv. Update surgical history
        v. Update sticky note
        vi. Prepare post op check note (same as daily progress note)
            1. All vascular patients (Even if same day surgery), need post-op checks
        vii. Start DC Summary — if a same day cases (angios and dialysis access most common), their brief op note services as their DC note as it has the required docuementation
        viii. Update primary team if consult
        ix. Log Cases or keep track to log later
    - If no more OR for day - take the pager back and run list with team

Reference Section

Diabetes management

- Place consult to "Endocrinology Diabetes Team" only searchable through admission order set. Criteria for consult:
    - any glucose <70 or 2 readings >200, or A1c > 9%
    - If patient is on concentrated insulin - tresiba or U500 or on a pump or 70/30 to assist in transition to basal.
- On admission reduce basal insulin by 20% unless severely.
- If glucose >300 on admission consider insulin drip.
- Hold home antihyperglycemics . Order sliding scale (SSI), most people will need prandial coverage
- If Type 1: never discontinue basal insulin

Anticoagulation

- **Clopidogrel /ticagrelor:**
    - Needs 5-7 days for washout but generally can be continued through most vascular procedures. Consider holding for larger open cases (aortic, bypasses), attending discretion.
    - Plavix needs to be taken before carotid stenting or case will be cancelled.
    - All symptomatic Carotids need to take ASA/Plavix (day off or night before surgery)
- **ASA**
    - Every vascular should be on antiplatelet agent. Usually Aspirin. Plavix is preferred by some.
    - Need 5-7 days to washout. Continued through most vascular procedures.
- **Coumadin:**
    - Generally held or reversed prior to procedures (Usually INR <1.5-2). Reveral options for urgent cases: PCC4 and FFP (immediate), vitamin K hours
    - If new medication for patient, make sure PCP is aware for INR checks before discharge as they will be following and adjusting going forward.
- **Direct Oral Anticoagulant (DOAC):**
    - Commonly used apixaban (Eliquis®), dabigatran (Pradaxa®), and rivaroxaban (Xarelto®).
    - Usually take 48-72 hours to be cleared
    - Some have reversal agents which are prohibitively expensive and only indicated for small number of situations (life threatening hemorrhage).
    - Can be expensive. If initiated post op, Send a test script to the pharmacy for pricing.
- **Lovenox:**
    - Therapeutic bridge dose should be held 24 hours before surgery
    - Caution with renal impairment and BMI >30 and contraindicated in dialysis patient
    - Lovenox is also expensive, only dispense the amount you think they will need if sending home on a bridge (3-5 days).
- **Fondaparinux:**
    - Used for bridge or DVT prophylaxis in patient with HIT
- **Pletal:**

    - Used for claudication and sometimes to reduce intimal hyperplasia - DC post op after revascularization.
    - Contraindicated in heart failure
- **Bivalirudin:**
    - For patients with heparin allergy or HIT. Note artificially elevates INR.
- **Heparin:**
    - There are 3 order sets which differ based on goal PTT and bolus and clinical condition:
        - A fib/ACS: this is a LOW intensity (goal PTT 55-75) WITH BOLUS which has initial and PRN boluses in order to achieve goal PTT faster.
        - IR/Vascular: also LOW intensity (goal PTT 55-75) WITHOUT BOLUS goal achieved more gradually. Used post op for high risk bypasses when you are also worried about post operative bleeding.
        - DVT: HIGH intensity (goal PTT 65-100)
        - "Chicken Heparin": low dose without PTT target (500 units/hr) There is no set protocol for this; it is largely attending preference and gestalt of how the case went.
        - Make sure you check the dose of the initial bolus (computer weight adjusts it) in general do not want to give more than 5000-7000 units at once. In many cases can just skip the initial bolus versus reduce it.
        - The protocol you use will be dictated by attending or clinical scenario.
    - Should be held on call to the OR - which means when the OR desk calls the floor nurse to ready the patient for transport (~2-3 hours before case starts)
    - Find out from attending when to restart a heparin drip post op usually 4-6 hours versus will be discontinued as you have resolved the thrombotic issue.

Misc

- **Antibiotics**
    - Infections most commonly seen are diabetic/dysvascular foot wounds/BKA stumps and groin incisions. These are generally polymicrobial and warrant broad spectrum antibiotics. Vancomycin and zosyn which ideally will be narrowed once OR culture obtained. Bedside culture is generally not useful as the wounds tend to be chronic/colonized.
- **Contrast nephropathy prophylaxis:**
    - Consider in patients with an elevated creatinine or decreased GFR should receive this prior to a CT scan, angiogram, or other OR procedure involving contrast (e.g. EVARs). Caution if patient has reduced EF may defer this. Order set in epic.
- **Contrast allergy prophylaxis:**
    - order set in epic, be aware the first dose is administered at 12 hours pre op, then 2 hours, then 1 hour. Make sure the scheduled times are correct.
    - They will be hyperglycemic after this if diabetic and with leukocytosis.
- **ESRD on dialysis**
    - Most patient go to R5 where the nurses are comfortable with dialysis patients, also that is where the dialysis unit is
    - Peritoneal dialysis is done in the room

    - Hemodialysis: call nephrology on admission so they can schedule inpatient dialysis
        - They will want to know: when they normally (MWF or T/Th/S schedule, who their neurologist is.
        - Baseline BMP to check potassium
- **VACs**
    - As soon as a patient gets a VAC placed that they will be discharged with, fill out a VAC form (google KCI vac form or obtain from care management) and give to care manager so they can order a home VAC for a patient, generally takes 24 hours.
    - HAVE ATTENDING OR APP SIGN IT IF YOUR ARE NOT PECOS Certified (care manger will let you know)

Common Procedures

Angiograms

Pre-operative:

- Check access side groin for yeast infection, if present and severe may need to reschedule case.
- Note creatinine, contrast/metal allergies. .
- Consent: should include possible intervention (angioplasty, stent), risk should include kidney injury from contrast, skin injury from radiation.

Post-operative

- Specific post-op concerns: access site complications (bleeding, arterial occlusion)
- Blood pressure control: see sheath pull section below
- Antiplatelets: Patients who have a PTA or stent of the lower extremity or visceral arteries will often be placed on DAPT for 1-3 months. If they are new to Plavix, they should be loaded with a 300mg dose. Larger vessel interventions (i.e. iliacs) usually are maintained only on ASA.

Discharge

- Generally day of surgery
- Specific education about access site issues
- Document pulse exam prior to discharge (Template FUDCPOC)

Sheaths

- Endovascular interventions are done through a sheath. During endovascular procedures, the patient is systemically heparinized.
- Generally hold 3-5 minutes per french of sheath (~25 minutes for 5 Fr). You should be trained to pull a sheath before doing so for the first time

- Most of our sticks are retrograde, which means the arterial puncture site is more proximal than the skin puncture site. For antegrade sticks, the arterial puncture will be more distal.
- At the end, gently relieve pressure, make sure that no hematoma is forming, and cover puncture site with a bandaid (no gauze on top, as it would hide hematoma). Once sheath is pulled, patients should lie flat for 4 hours.
- If a closure device is used (and does not fail) no pressure is needed, bedrest is 2 hours

Carotid Endarterectomies

Pre-operative:

- Symptomatic (usually inpatient) vs asymptomatic (usually elective)
- ASA day of surgery and plavix if symptomatic. If the patient has not taken any antiplatelet medication in the past 24 hours, check with the attending as case may get postponed.
- Document pre-operative neuro exam in sticky

Post-operatively:

- Specific Post op concerns:
  - New stroke symptoms call code stroke and rescan CTA head and neck to ensure revasc is open. Recrudescence of prior CVA symptoms
  - Neck hematoma if airway compromise or expanding this require return to OR, small/stable can be monitored.
  - Blood Pressure Control: BP control is very important post-operatively, usually a SBP goal 100-160.
  - Post-CEA patients are prone to orthostasis, and they are also at risk for reperfusion syndrome, which is when the increased blood flow through a previously stenotic carotid causes cerebral edema. Any headache in a post-carotid patient must be taken extremely seriously, as this can be the first sign of reperfusion syndrome. The key to managing this is to take a BP and aggressively treat hypertension (especially SBP >160) until the headache resolves. This should be both included in the discharge summary and verbally discussed with the patient/family.
  - Marginal mandibular nerve injury or palsy: lip lag on the operative side
  - Hypoglossal nerve injury or palsy: tongue deviates to the operative side
  - Vagus/glossopharyngeal: Hoarseness, dysphagia
- Anticoagulation: Continue ASA. DC Plavix if patient was on it for symptomatic carotid unless for other medical reasons.
- Activity: Activity is as tolerated with the HOB at 45 degrees the first night
- Usually PACU for 6 hours for Neurocheck and then medsurg. Usually home POD1.

Discharge:

- Special attention to blood pressure at discharge. May need to hold home agents temporarily or start on new agents. If this is the case, will need PCP follow up within a few days (you make that appointment) and ensure they can check blood pressure at home twice daily. Explicit instructions to go to ED for headache and uncontrolled HTN concerning for reperfusion syndrome.
- Be sure to verbally instruct and write in the discharge instructions for patient to monitor their blood pressure at home, and if they develop a severe headache they should go to the nearest ER immediately for blood pressure check and management. Reperfusion injury, though rare, can lead to seizures, long term neurologic deficit and death if not treated expediently.

Carotid Stents (TCARs)

Pre-operatively:

- Similar to CEA, with the exception that they will have been started on Plavix at least a week preoperatively. Be sure to confirm this with the patient as the case will need to be postponed if they have not been taking this, as in they took plavix day of surgery.

Post-operatively:

- similar to CEA

Discharge:

- similar to CEA, with the exception that all will go home on Plavix and ASA (for 90 days) and then ASA only

EVARs/FEVARs/PMEGs

Pre-operatively

- Generally admitted the day of surgery
- Ask about chronic back pain - good to know if they have pain post op to help delineate symptoms of RP bleed
- Be sure to check and document groin exam (i.e. previous surgery, infection, yeast) and lower extremity pulse exam.
- Clear liquids only the day prior to surgery (decreases bowel gas which makes intraop visualization easier)
- Consent: injury to renal function, complications related to groin access, loss of circulation to bowel

Post-operatively

- Specific post-op concerns: groin incision problems (infection, hematoma, seroma, lymph leak), renal failure, lower extremity perfusion

- Post implantation syndrome - general malaise, abdominal pain
- Blood Pressure Goals: normotensive
- Anticoagulation: No need for specific anticoagulation except ASA
- Activity: as tolerated
- POD#1: OOB, discharge if voiding, walking, eating etc.

Discharge

- Usually DC POD1 and follow up in office 1 month with a CTA

TEVARs

Pre-operatively

- Similar to EVAR.
- Be sure to document a thorough neurologic exam, groin exam (i.e. previous surgery, yeast), lower extremity pulse exam

Post-Operatively

- Specific post-op concerns: CVA, spinal cord ischemia/paralysis (monitor and document lower extremity exam carefully, need to know about hip flexors—having a pt wiggle their toes is not enough), groin incision problems (infection, hematoma, seroma, lymph leak), renal failure, lower extremity perfusion
- Usually have high MAP goals Post op (>80-90) and need ICU for Q1Hrs neuro checks and Pressors (usually for 24-48 hrs)
    - May need spinal drain depending on length of coverage
    - Spinal drains insertion and maintenance is done by Anesthesia, but you should be aware of the pressures and any problems with the drain.
- Anticoagulation: No need for specific anticoagulation except ASA
- Activity: usually bedrest until POD#1

Discharge

- POD 1-2 if neuro exam stable or later if spinal drain present

Open AAA/Juxtarenal AAA/TAAA

Pre-operatively

- OK to continue ASA, but if the patient is on Plavix, determine the indication and if the patient has/hasn't stopped this.
- EKG, CXR, PFTs if going in the chest, Type & cross 2-6 units depending on CBC and extent of surgery
- Most patients will have a PREP visit so make sure to read the note and carry over any postoperative plans.

- Make sure SCU residents are aware of admission as they will go there post op. Place an admission order to ICU before starting the case.
- Patients should be on a clear liquid diet pre-op and receive BID Dulcolax PR on the day prior to surgery
- Hold ACE-I / ARBs / diuretics the morning of surgery but to be sure to give the beta-blocker. If there is to be a spinal drain or epidural placed, be sure and hold Plavix and SQH.
- Consent: usual issues plus splenectomy, spinal cord ischemia and CVA for TAAA

Post-operatively

- Specific post-op concerns: lower extremity exam (can embolize debris during clamping or mobilization), renal function (particularly if a suprarenal clamp), pulmonary complications, wound complications (serous leak, dehiscence). Spinal cord issues for TAAA and they will have spinal drain in place.
- Blood pressure goals: usually 100-140, may be lower if there is concern about the anastomosis or bleeding. May be higher for TAAA for spinal cord perfusion.
- Anticoagulation: ASA, SQH on POD#1.
- Activity: no restrictions unless aorto-bifemoral graft, in which case no sitting at 90 degrees for several weeks.
- Patients with suprarenal clamps/renal bypasses may also receive "renal cold" instilled during the clamping, which is a nephropreservative fluid containing mannitol. This may falsely elevate the urine output post-op so be aware when monitoring the hemodynamic and fluid management of the patient in the first 24 hours.
- Chest tubes are placed for all TAAA and some juxtarenals/suprarenals if a significant portion of the diaphragm is split. This is both for initial lung expansion but more so for effusion which frequently develops. Generally left in place until output <150cc/24 hrs. Usually left on suction until removal (no water seal trial needed)

Discharge

- The majority of these patients with go to an inpatient rehab, so involve Case Management early

Lower Extremity Bypasses

Pre-operatively

- May be pre-admitted, but many are same day admits
- Check to see if there is appropriate vein mapping
- Be certain there are good calf/ankle PVRs and ABIs documented in the chart and admission note
- Consent: injury to surrounding structures, wound breakdown, need for further procedures

Post-operatively

- Specific post-op concerns: patency of graft (be sure you know the pulse exam immediately post-op and any change should be reported to the attending immediately.
- Bleeding, wound breakdown (particularly in patients with long leg incisions)
- Blood pressure goals: normotension
- Anticoagulation: dictated by the length of bypass, conduit used (long PTFE grafts frequently get heparin/Coumadin/NOAC, whereas above knee PTFE or vein grafts usually only need ASA) and other medical problems. If the patient needs heparin or Coumadin, ask the attending when this should be started.
- Activity: bedrest day of surgery, generally up to chair POD 1. If distal bypass may need bedrest until POD 2-3. Clarify with attending.
- All patients should get a PT consult.
- Dressing should remain up until POD#2, then replaced unless saturated. If there is a foot ulcer, the weight bearing may be limited but if not, they are WBAT.

Discharge

- Most stay until POD#3-4, and some will go to rehab. All should get VNA for wound checks.

Thrombolysis

Pre-operative

- Most of these patients will be ER or consult patients with a newly occluded vessel (venous or arterial) or graft, so pre-op issues are largely done as the patient is being mobilized to the OR. All patients with a lysis catheter in place need to be IMC level usually CICU or R3 COR.
- Ensure no contraindication to lysis (recent surgery, CVA, intracranial hemorrhage, uncontrolled HTN)
- Consent: need serial consents for second look angio, +/- intervention which could include thrombectomy or bypass. Also include bleeding, injury to kidneys, need for open procedure if lysis fails or there is a bleeding/ischemic complication.

Peri-operative

- These patients will have an angio where the occluded segment is traversed and laced with tPA and a catheter is placed. These catheters generally go through a sheath and are well sutured into place and heavily Tegaderm'ed. The tPA mixture should run through the end of the catheter, and a slow heparin infusion is run through the sheath to ensure the sheath does not clot off.
- tPA is run at a set dose, which is determined by the size of the patient and the amount given during the initial procedure. The heparin is generally run as a subtherapeutic, non-sliding scale set dose. If these have not been clarified in the orders by the attending, be certain and ask.

- When they come out of the OR, you should see them right away to assess which catheters are in place, and if there is any bleeding. Hematomas at the access site or in the affected extremity can happen during lysis, and having a baseline exam is imperative. Reperfusion injury can also occur from the restoration of blood flow to an ischemic limb. If a night float is to be covering the patient, see the patient together with the daytime coverage during shift change to compare exams. They are also at high risk of compartment syndrome post-op
- Patients must be kept on flat bedrest with sheath precautions and CLEARS while sheaths are in place.

Thoracic Outlet Syndrome

Pre-operatively:

- Evaluate neuro and pulse exam of the extremity in ASU

Operative Technqiue

- Dr. Nolan and Dr. Deery are the two surgeons who do thoracic outlet syndrome.
- Dr. Nolan does Supraclavicular approach and Dr. Deery does transaxillary
- Dr. Deery patients have JP drain placed in OR
- All patients get a Stat CXR in PACU to look for PTX, Hemothorax, Hemidiaphgram

Post-operatively:

- Evaluate post-op CXR
- Dr. Nolan's patients get CXR on POD1 and Dr. Deery patients's only get CXR on POD1 if there was a PTX,
- JP out on POD1
- Multi-modal pain control post-op
- ICS is key

Discharge

- Most go home POD1
- SEDTOSDISCHARGE for Dr. Deery's instruction for rib resections
- SEDTOSPT for Dr. Deery's instructions for PT post-op for rib resection
- FUDCTOS for Dr. Nolan's Instruction
- Discharge with multimodal pain therapy (Tyl, Motrin, Phenergan, Flexeril, Oxy)

Amputations:

Pre-operatively:

- If grossly infected foot wound may require guillotine with revision to BKA or AKA at later date. Make sure you get serial consent.
- Physiatry consult
- Ideally will get peripheral nerve catheter pre operatively (sciatic-BKA, femoral-AKA)
- We do not do Syms Amputation due to inability to ambulate with prosthesis

Post-operatively:

- Complications: infection, hematoma, bleeding, wound dehiscence, falls
- Leave dressing in place until POD 2 unless saturated
- Post operative rigid dressing. This is a brace to prevent knee contracture and injury if fall. Therapy will call the orthotist in on POD 1 to adjust/customize if needed
- Shrinker sock for edema control
- Make sure donning tube in patient room to assist with sock replacement
- Physiatry consult if not done pre op (they may have seen outpatient if elective)
- Okay to resume any home anticoagulation when dressing is dry usually POD 2-3
- For toe amputations,
    - confirm activity and weight bearing status with attending
        - toe, post op shoe with ambulation
        - ray amp (heel weight bearing shoe with ambulation)
        - TMA non-weight bearing

Discharge:

- Most go to acute rehab

Dialysis access

Pre-operatively:

- Document pulse exam and neuro exam in hand
- Allen's test should have been done in the office pre op but good practice to repeat

Discharge:

- Discharge home same day

Reference H&P

- Direct admissions, Consults, New Office Visits - ***GET ACCESS TO HEALTH INFO NET (records from OSH)***
- **"Sniff test"**: mobility (what limits mobility, claudication or back pain or DOE), oxygen dependency (can they lay flat for an angio), body habitus (obesity complicates groin access, malnutrition complicates healing). All these can help determine how invasive a procedure this patient can tolerate.

- **HPI:**
    - Why are you being called, why did they present from/to the office? What is their chief complaint which may be different from why you are being called.
    - A note on acute versus acute on chronic: Duration of symptoms determines acuity. Onset of symptoms since 5 hours versus 2 months helps determine the urgency of treatment, i.e. someone with afib throws an embolism versus vasculopath thrombosed a 75% plaque. The former usually requires emergent OR, the latter may tolerate anticoagulation and more planned operative approach.
    - Wounds: duration (some may be present for years) , inciting event (traumatic v spontaneous)
    - Useful to list comprehensive vascular surgical history
- **ROS/PMH**
    - Cardiac: hx CABG (think about conduits vein, radial artery), PCI (are they on antiplatelet), CHF (most recent echo), valvular disease, a fib, are they anticoagulated
    - Pulmonary: these patients have a long smoking hx, COPD (+/- oxygen dependance), lung CA
    - Renal: CKD (baseline cr), ESRD (current access, hx of lines, dialysis schedule is important as this may be interrupted with surgery)
    - GI: GIB factors into safety for antiplatelet/anticoagulation/lysis, IBD can cause hypercoagulability, ischemia - weight loss, food fear, abdominal surgeries
    - ID: chronic abx suppression, outpatient abx - helpful to know if they develop diarrhea post op think c.diff
    - Neuro: prior CVA/TIA - when, what interventions. Amaurosis, prior neck radiation/surgery, right/left handedness.
    - Heme/onc: coagulation disorder (bleeding or clotting), prior work ups, HIT,
    - Uro: hematuria - good to know pre lysis, urinary retention at baseline
    - Endocrine: diabetes (this may not be listed in hx look for baseline A1C in chart)
    - PVD: claudication, distance to symptoms, location of symptoms, rest pain, ulcers, poor healing wounds, activity level at baseline, any past PVRs/ABIs.
    - Aneurysm: how discovered, rate of growth, associated symptoms (pain, early satiety), family history

- **Medical History:**
    - Epic is a great tool but usually is not comprehensive, just because it auto populates your note does not mean it is accurate. Ask the patient, call family if patient is poor historian, look at their medication list can give you insight into medical conditions, ***health infonet helpful here.***
- **Surgical Hx:**
    - As above
    - Look for scars
    - Important to note ALL surgeries including vascular: hx of abdominal surgeries could mean adhesions, hernia with mesh, vein harvest etc all complicate future operative repairs. ***Health infonet.***
- **Allergies**
    - Specifically: Contrast, antibiotics, heparin. Often intolerances fall in this category (ASA due to GIB)
- **Family**
    - Family members with non-cerebral aneurysms or clotting disorders
- **Social**
    - Who is POA or decision maker if they lack capacity to consent for surgery
    - Living situation can affect dispo, wound healing
    - ETOH use - do you need to think about withdrawal post op
    - SMOKING
    - Religious beliefs - will they accept blood products
- **Medications:**
    - Pharmacists in-house can complete a deep dive medication reconciliation however this can take 24 h to complete. You need to at least have a comprehensive and accurate list of medications. Again Epic is not 100% accurate. Call their pharmacy, engage family, look for records from OSH/SNF in paper chart.
    - Special attention to: antiplatelet/anticoagulation (what is indication cardiac v vascular. When was last dose - NOACs have long half life), steroids or immunomodulators will affect healing.
- **Physical exam: this is full head to toe, specific attention to below.**
    - Head/Neck: bruit, scars, signs of neck irradiation
    - Cardiac/chest: murmur (valvular disease important to consider before GA), presence of lines/ports, a fib, pacemaker/AICD
    - Lungs:crackles, wheeze, rhonchi (undiagnosed COPD)
    - Abdominal: scars, pulsation, hernia, distension, pain or not with palpation (mesenteric ischemia is pain out of proportion to exam)
    - Upper extremity
        - Presence of AVF
        - Dominant arm
        - Pulses
        - Difference in blood pressure
    - Lower extremity

        - Venous disease: asymmetric swelling, vein harvest, varicosities evidence of procedures, wounds in the gaiter zone, hemosiderin staining
        - Arterial disease: hair loss, mottling, wounds toes or heel, dependent rubor, digital ischemia, gangrenous changes
        - Pulse exam: 1+ is present but diminished, 2+ is normal, widened or prominent think aneurysm.
        - Lay them flat to check femoral pulse (warn the patient you are going to be pawing around in their groin first)
        - In the setting of acute versus chronic ischemia bilateral LE exam can give you insights (palpable pulse on opposite side)
        - ABI can be done at bedside (by resident, not the nurse)
        - Use the correct terminology: palpable = pulse, Doppler = signal. There is no such thing as a Dopplerable pulse
        - Check between toes for wounds and heel
- **Laboratory/radiographic examination:**
    - CBC: thrombocytopenia, anemia, leukocytosis
    - CMP: underlying liver disease, renal function, metabolic state specifically hypo/hyperkalemia
    - Coagulation: INR, PTT, baseline fibrinogen
    - Type + screen: good for 72 hours prior to transfusion
    - CXR: baseline
    - EKG: baseline
    - MRI: if evaluation for osteo
    - ABI: baseline
    - CTA: for evaluation of arterial disease
- **Assessment and Plan**
    - What is going on with the patient, address the reason for the call. There may be multiple issues to assess. Remember to think about chronicity (acute on chronic, subacute, acute)
    - Plan: usually involves further imaging as appropriate: CTA, duplex, ABI. generally want to image both extremities for comparison (CTA aorta with runoff, vascular ABI complete), OR, abx, anticoagulation, etc.