Contributors:
Carrie Boom, Mike Leavitt, Matt Agnew, Steve Kwon, Rachel Lundgren, Sam Mandell, Chris Ingraham, John Keech, Patrick Phelan, Kari Keyes, Oliver Lao, Matt Crouthamel, Ilan Avin, Joe Woodward, Elina Quiroga, HMC Pharmacy, Pamela Popplewell, Fred Endorf, Pediatric Surgery Department, Burn Surgery Department, RAC Committee, Audrey Murray, Suzanne Mills, Karen Horvath, Kate Mandell
WORDS OF ADVICE
“Treat every patient as though you were the only doctor taking care of them. If you miss the change in labs or fail to follow-up on a film or don’t look at the wound with a critical eye, no one else will - and the patient will suffer.” -Dr. Katie Nason, class of 2004

“Some day there will be no attending to give you the right answer. From the beginning of your residency, think of every patient as if he/she were your own. Prepare yourself to handle each situation: pre-op, intra-op, and post-op” -Dr. Lily Chang, class of 2003

“When you arrive to the OR, remember that the patient is the focus. Always have the relevant films up on the board or the computer, make sure the scd’s are on, help the nurses position...show your interest in the patient.” -Dr. David Gourlay, class of 2004

“The only way I ever found to get through a Byrd clinic alive was to look at the patient list the day before and read-up in advance.” -Dr. Alexander Farivar, class of 2007

“If you are in training, observe your resident and faculty teachers closely and make sure that you know the difference between a good and thorough provider and someone who is just going through the motions. Imitate the good ones and pretty soon it will be second nature.” -Dr. Craig Hampton, class of 2004

“Always check the OR schedule before going home so you know the cases and changes for the next day.”

“Come prepared to the OR with a plan for the operation - do not rely on the faculty to ‘guide you’ through the operation. Know the anatomy, the steps and the pitfalls.”

“If you come across a problem that you don’t know how to handle or that you haven’t encountered - sit at a computer - look it up and educate yourself about the subject - only then call the senior resident or staff.”

“Don’t let the junior residents ‘wait’ for you to round - get the information you need from them and send them home.”

“Call the team caring for a consult and tell them your staff’s impression as soon as possible - don’t make them wait to the next day - and don’t make them read your recommendations in the chart - direct communication is always more effective.”

“Come prepared to M&M with some subject to discuss, especially if you have no complications - if you don’t the staff will decide the subject for you and you’ll seem less informed.”

TOP 10 FOR INTERNS FROM INTERNS:
First, be proud. Be a sponge
Be a doctor Know when a patient is sick
Write everything down!! Remember your reputation starts today
Prioritize your boxes Be courteous to the nurses
Use your resources Lastly, have fun!
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IMPORTANT SURGERY EVENTS
• Department Grand Rounds: 1st Wed of every month in K-069
• Surgical Science Series: 2nd and 4th Wed - junior residents (R1, 2, 3), 3rd and 5th Wed Senior Residents. **Note: for more refined assignments for the R3’s, please see individual work hours site for each rotation
• Harkins Resident Symposium: Thursday and Friday mid-September. Exact date announced in annual notice from Chairman’s office. Held at the MOHAI.
• Strauss Lecture: Friday in mid-September
• Schilling Resident Research Symposium: Friday morning in January. Presentations of research by residents. Exact date announced by Chairman’s office. Held at the MOHAI.
• Resident Ski Day: This paid work day given to residents by Dr. Schilling (former chair) to foster resident comraderie. Choice = ski or work. (A day off to do your own thing is not an option.) Use it or lose it. Tuesday in February  *see annual notice from Education office
• Oyster Fry/Chief Roast: Held in the end of June
• Graduation/Chief’s Dinner: Usually the last weekend before the end of the year
• Start of New Year: June 25th
GENERAL INFORMATION

For detailed information, please see department intranet: depts.washington.edu/surge

Harborview Medical Center
325 9th Avenue
Box 359796
Seattle, WA 98104-9796
Paging: 206.731.3000
IT: 206.731.2111 @ 7EH-66.2

UWMC
1959 NE Pacific Street
Box 356410
Seattle, WA 98195-6410
Paging: 206.598.6190
Operator: 206.598.3300
IT: 206.616.8115 or surgtech@u.washington.edu

Children’s Hospital & Regional Medical Center
4800 Sand Point Way NE
Box 359300
Seattle, WA 98105-9300
Phone: 206.987.2000

Veterans Affairs Puget Sound Health Care System
1660 South Columbian Way
Box 358280
Seattle, WA 98108-8280
Paging: 206.762.1010

Resident Mailing Address
1959 NE Pacific Street
Box 356410
Seattle, WA 98195
Fax: 206.543.8136

Educational Staff:
Gina Coluccio: coluccio@u.washington.edu 206-543-3687
Neil Kline: otter2@u.washington.edu 206-221-6642
Suzanne Mills (HMC): smills@u.washington.edu 206-731-3433
Jennifer Stuart: stuart22@u.washington.edu 206-543-3654
Audrey Murray: aamurray@u.washington.edu 206-685-9510
Robert Johnson (VA): (ext. 63613, page 608-8432)
Pam Burke (CHRMC)

Phone Calls
To make a long-distance call or fax: At UWMC: dial “77” from resident room (or “8” from hospital) 1-area code-phone #. At the beep dial the UWATTS# 9006927. At HMC: dial 77 + area code + Phone Number + 3578330

DEA #:
HMC: AH3308702 + your number UWMC: AU0970916 + your number
ACGME SIX CORE COMPETENCIES
PATIENT CARE
MEDICAL KNOWLEDGE
PATIENT-BASED LEARNING AND IMPROVEMENT
INTERPERSONAL AND COMMUNICATION SKILLS
PROFESSIONALISM
SYSTEMS-BASED PRACTICE

On the intranet under the EVATS tab is the curriculum for the six core competencies - to be completed during your EVATS rotations. You should try to do one category per year. Remember to log completed items on your EVATS portfolio. You must complete at least one per year, though you are encouraged to do more.
depts.washington.edu/surged/ACGMECOMP/index.html

WORK HOURS POLICY
Work Hours should be entered on the Intranet (Veriform) daily. Login and password are the same as myUW account.
https://medeval.som.washington.edu
• Duty hours limited to 80 h/wk, averaged over four-week period
• Residents must have one day in seven, averaged over a four-week period.
• There should be 10 hours between all daily duty periods and after in-house call.
• In-house call is no more frequent than q3d, averaged over a four-week period.
• Continuous on-site duty, including in-house call, must not exceed 24 consecutive
hours. Residents may remain on duty for six additional hours to participate in didactics, transfer of care, outpatient clinics, and continuity of care.

- In-house call: duty hours beyond the normal workday when residents are required to be immediately available in the assigned institution.
- At-home call (pager call): call taken from outside the assigned institution. Frequency is not subject to the every third night limitation. When residents are called into the hospital from home, the hours residents spent in-house are counted toward the 80-hour duty limit.

To ensure that all patients admitted to a service or consult service don’t get missed or forgotten:

- The resident who initially evaluates a patient must put them onto CORES and assign a team, attending and ‘service’/consult at the time they evaluate the patient.
- The residents on the primary team fill in the info (meds, all, etc.) on all pt’s on their CORES list.
- It is the job of all residents at all levels to ensure appropriate transfer of care, verbally communicate all patients to the next ‘crew’ and cross-check the other guy to make sure no one slips through the cracks.

**ID CARDS**
All hospitals have their own identification cards, which also allow for door entry. Your badge must be visible and above waist level.

- **HMC:** The ID office is on the 8th floor, 8EH70 (phone # 731-3386). Your ID badge is needed for entering the parking garage, ED, and OR after 7pm.
- **UWMC:** The ID Office is located in the Public Safety office, NW014 (near the BB elevators). Phone # 598-4909. You can get both a medical center ID as well as a Husky Card here. Replacement cards if you lose them are 10 dollars.
- **CHRMC:** You will get your ID badge on arrival at CHRMC. The office is in the Boone modular (phone # 987-2668). – be sure it is activated to open OR and locker room as well as hospital doors.
- **VAMC:** You will get your ID badge on arrival. The office is in the basement. This usually requires fingerprinting. You need your badge for entering the facility at night.

**HUSKY CARD**
Used for on call meals, U-Pass, Parking, and more. To replace go to the Public Safety office at UWMC (NW014). For info on how to put money on the card go to huskycard.hfs.washington.edu. All deposits are refundable.

**LAB COATS**
- All residents are given two lab coats at the start of residency. They are laundered free of charge. To have your coat laundered leave it in the dirty clothes bag in the back of RR401. It takes about a week for it to come back.
- If your coat becomes too dirty or falling apart new coats can be obtained by talking to Neil. Otherwise you get new coats as a chief.

**ON CALL MEALS**

- **UWMC**
  Residents who are on-call (in-house or at-home) or are in hospital after 7 p.m.
  Weekdays: two meals. 7.50$/meal or 15 $ total.
  Weekend or holidays: three meals. 7.50$/meal or 22.50$ total
  After hours: who work past 7 p.m. are eligible for one meal

  **Purchasing On-call Meals:** When purchasing a meal (Plaza Café or food cart), you need to notify the cashier you are part of the “On-call meals program” and your pre-authorized Husky Card will be swiped.
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<tr>
<th>TIME</th>
<th>LOCATION</th>
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<tr>
<td>7:00 – 7:25 p.m.</td>
<td>Pacific Towers – Radiology Hallway</td>
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<td>7:30 – 7:55 p.m.</td>
<td>Pacific Towers – 4N/4S Hallways</td>
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<td>8:00 – 8:25 p.m.</td>
<td>Muilenburg Tower – 4NE/4SE Visitors’ Lounge</td>
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<td>8:30 – 8:55 p.m.</td>
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<td>10:35 – 11:05 p.m.</td>
<td>Pacific Tower – 6N/6S Hallway</td>
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<td>Muilenburg Tower – 8NE/8SE Hallway</td>
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<td>3:00 – 3:30 a.m.</td>
<td>Pacific Tower – 3rd Floor</td>
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**Harborview**
Residents are reimbursed for meals when on-call or when required to stay at the hospital after 7 p.m. Cafeteria hours are 6:30am – 8pm Mon – Fri, and 6:30am – 6:30pm weekends/holidays. Coffee shop open all night.

**Reimbursement Process:** You must complete a meal comp form to be reimbursed and send it to Suzanne Mills (206 731-3433). Reimbursements are placed on your Husky Card. ED shifts are done automatically.

- $12 for on-call, in house 24-hour shift
- $12 for on-call at home, returned for patient care and remained overnight
- $5.50 for in-house past 7 p.m., but did not stay overnight

**VA**
Residents are reimbursed for meals when on-call or when required to stay after 7 p.m. Snacks and frozen meals are available in the Call Resident Meal Room (Building 100, Room BA-101).

- $10.50 for on-call, in house (overnight)
- $5.25 for in-house past 7 p.m., but did not stay overnight

Requests should be submitted to Robert Johnson and checks are sent to your UW mailbox.
CHRMC
Residents are provided with meals when on call or stay in the hospital after 7 PM. Meals are obtained in the Sound Café, which is open daily from 6:30am to 7:30 pm and 1 to 4 a.m. Breakfast everyday! Snacks are also available 24/7 in the resident/fellow lounge (G-0007).

PARKING:
UWMC: PPUP or Permit Parking
PPUP (Pay Per Use Parking): W-26 West Garage / corner of NE Pacific St. & 15th Ave NE. Take your Husky Card to Parking Services on the 4th floor of HSB T-wing. Complete the Blue Parking Card and sign a payroll deduction authorization slip. Each time you enter the garage (by swiping your Husky Card), the daily rate will be automatically deducted from your paycheck There is no advance payment and you can easily renew online.
Note: You must be signed up for PPUP in order to park at HMC garage.
Permit Parking: E-12 for R1-4 / E-11 for Chiefs. Residents must take a signed Blue Parking Card to the Parking Services Office with cash or check. You will pay the daily rate of $4.25/day, but you must pay for the permit in advance. Important! You may NOT sign up for BOTH permit and PPUP.
Conference Wednesdays: If you are coming from another hospital, you may park in E-12. Simply inform the gatekeeper that you are attending the “Wednesday conference”.
Parking Tickets: Should you receive a parking ticket, you may petition to have the charges reduced. Contact Neil (221.6642) for more details

HMC
For Your First HMC Rotation of the Year: On the first day of your rotation - park in the View Park Garage. Enter through the patient entrance to pick up a ticket, but park in the Staff Parking Area. During the day go to the HMC Parking Office (1 EH 116) and purchase a parking permit. When you leave the hospital give the attendant your ticket and show him/her your permit. At the end of your rotation, save your parking card for future HMC rotations. You have to update yearly.
For Subsequent HMC Rotations: Call the parking office before the first day of your rotation to reactivate your parking card. If you no longer have the card or you cannot reach anyone in the parking office proceed as above for a first rotation.

CHMC & VAMC: Free Parking in designated lots.

SCCA
825 Eastlake Ave E
Seattle Wa 98109
206-288-1000
Directions: Cross the University bridge to Eastlake. Follow Eastlake to Aloha street (do not bear right at Fairview Ave) Turn right on Aloha. SCCA clinic and parking is on the left.
Parking Instructions: The SCCA garage is located off Aloha street in an underground garage. Take the elevator to the first floor and then change elevators and proceed to the breast care clinics. ****Bring your parking ticket and it will be validated.

Hospital Shuttle:
There are shuttles that run between various campuses. Schedules are available online @ www.washington.edu/admin/hsexpress/shuttles.html
Shuttles run between: UWMC/Roosevelt/HMC, and UWMC/Childrens/SCCA.
At UWMC leave from back oh hospital by the circle outside the Cascade elevators. At HMC pickup is on the south side of the building. From UWMC the shuttles leave approximately every 15 minutes from 6am – 6:15 pm
Surgical Sciences:
All sessions (except Grand Rounds) take place in RR401 from 7:30-11:30 am.
- Junior residents will meet the 2nd and 4th Wednesday of each month
- Seniors will meet the 3rd and 5th Wednesdays
- Grand Rounds takes place the first Wednesday of every month from 6:30-8:00 am in K-069

You will be asked to participate in 3 ways:
1. Attendance
2. Powerpoint presentation – look online. Modify prior presentations and bring up to date. One resident each week will be assigned to work with a faculty and prepare a ppt presentation (30 slides max) on the reading. (Use old ones for ideas)
3. Advance preparation: You’re expected to do the reading and prepare for this conference. Readings for juniors will be found in Sabiston. Faculty will assign readings for seniors at their discretion.

Also available online are:
- Former power point presentations for learning as well as for modifying for future presentations (we are not trying to reinvent the wheel). Use them!!
- Sabiston online
- ACS Surgery online and weekly curriculum
- Access Surgery

Academic Project
All categorical residents must complete one academic project with UW faculty mentor prior to graduation. Possible academic projects:
- Peer-reviewed publication
- Regional scientific presentation (podium or poster)
- Schilling Resident Research Day presentation
- Seattle Surgical presentation
- WA State ACS presentation
- Co-author on a book chapter
- In addition, a National scientific presentation where you or your faculty mentor presents the project (podium or poster) can meet this requirement.

Isis
The ISIS lab is a wonderful resource located on the first floor of the Pavilion. There are simulators, videos, practice models, and supplies there for learning off the patient. Each year there are also a variety of modules that must be completed for your EVATS portfolio. Try to make it to ISIS as often as possible. This is also a great place to practice using the Endo-stitch before you rotate on Surgery O so that you can participate in some of the cases.

Schedules
Call schedules, vacation schedules, and coverage schedules are available on the intranet. These are often not completely up to date and it is best to talk with the Chief at your hospital for the most recent schedules. Schedule changes need to go through the Chief of the hospital you are at and Dr Horvath. Try to make any major schedule changes very early as the schedule is often very restrictive for work hours reasons. If you do switch a call be sure the paging operators have the proper information.
**EVATS**
This is a rotation which combines vacation with coverage, academic learning, and technical skills practice in the ISIS lab.

**Your portfolio:** Graduate medical education across the country is moving towards resident ‘portfolio’ development as a way of collecting ACGME competency-based data about your self. The idea is eventually to use the portfolio as a method of demonstrating competency in the 6 areas. The educational focus during your EVATS rotation will be three:
• work on your Academic project with a faculty
• to enhance your proficiency in the ACGME competencies, and
• to work independently on your Technical Skills outside of the OR

**Step 1:** Read web-page (EVATS on intranet) and look at everything pertaining to your year.
**Step 2:** Review your portfolio each year. At the end of the rotation, give completed portfolio to Audrey.
**Step 3:** Several people have standing office hours. Look on the intranet for learning opportunities.
1. Dr Wright in ISIS lab.
2. Email Dr. Robert Condon, (former UW graduate) Mon to confirm Wed meeting 1 - 3pm
3. Contact Dr. Jack White, (retired Pediatric Surgeon) Tues to confirm Thur meeting 1- 3pm. Dr. White prefers that you phone him at 206.367.3379.

Keep a copy of your EVATS Portfolio in your personal files. You will need it later.

**COVERAGE:**
• Service coverage during EVATS: when you cover a service as an EVATS rotator you cover days as well as night call (unlike research residents who only cover night call)
• Vacations during EVATS rotations: an EVATS rotator may leave on the Saturday prior if no other assignments have been made. They cannot leave on Sat morning prior to 6am (ie: not Fri night).
• You must be in town and available by pager throughout your EVATS rotation except when you are on vacation.

**RESIDENT VACATIONS**
Except where otherwise noted, University of Washington vacations are Monday through Sunday as follows:
• 2 weeks of vacation off EVATS
• 1 week of vacation off rotation in the opposite half of the year (covered by an EVATS rotator)
• Saturday or Sunday morning departures may occur ONLY if you get written (email) permission from Dr. Horvath. Sometimes it will be possible to grant this request - other times not. The residency program cannot support requests for leave any earlier than Saturday morning for any reason. This means that the EARLIEST plane ticket you can get (if approved) is a Saturday 6am flight.
• Return from vacation must occur by Sunday night (available for clinical service for Monday morning rounds). This is also a requirement for vacations taken from EVATS. If your flight is unexpectedly delayed, you MUST notify the Education Division office about any delays. It is not uncommon for an EVATS coverage need to arise and a voicemail left at your home regarding a Monday morning coverage following a vacation.
RESIDENT TRAVEL POLICY
For policies regarding paper presentation:
https://depts.washington.edu/surged/POLICIES/travelpolicy.html
Reimbursements:
https://depts.washington.edu/surged/POLICIES/TravelReqForm.html

• The department sponsors R4 travel to attend the ACS Annual Clinical Congress. All residents must be members of the ACS Candidate Group. Residents will be asked to present the most interesting, practice-changing thing they learned to the resident group on the first Wed in November following Grand Rounds.
• Chief residents can participate in meetings following the guidelines. In addition, all chief residents are asked to pick a meeting of their choice, one that is closely associated to their future activity.
• Basic Rules: 2 Days West of the Mississippi, 3 Days East of the Mississippi = 3 days (travel there, day of presentation, travel home). This policy was created with the understanding that travel times differ to different places in the U.S. Your SOL must be up to date before traveling. Any questions – talk to the program director

PATIENT SAFETY NETWORK
The PSN is a program available on all HMC and UWMC computers for logging and recording errors that effect patient care. You are encouraged to use this whenever these occur. It is very straightforward and takes about 5 minutes to enter. These reports are then reviewed and actively used to make systems based changes. UWMC M&M cases are also entered into the PSN.

RISK MANAGEMENT
The Office of Risk Management is responsible for university-wide risk financing (including all insurance policies) and claims management programs and provide risk management consulting services to all schools but Health Sciences.
At the UW: 206-598-6303
Cindy Jacobs, director, 206-598-6315, cajacobs@u.washington.edu
Julie Tin, associate risk manager, 206-598-6303, jtin@u.washington.edu
Leona Starks, associate risk manager, 206-598-1876, lstarks@u.washington.edu
At HMC: 206-744-9574
Jessica Weinman, administrative coordinator, (main line) 206-744-9574
Pamela Runciman, associate risk manager, 206-744-9572
Pat Tennent, director of risk management, Harborview, 206-744-9571
www.washington.edu/admin/risk

ETHICS
You should consider asking for a consult when two conditions are met:
1. you perceive that there is an ethical problem in the care of patients, and
2. resolution does not occur after bringing this to the attention of the attending physician.

To Contact them: Check with your hospital to identify the pager number to reach the ethics consultant. There should be an individual at each hospital who carries a pager for responding to ethics consultations. If not readily available, call the UW Department of Medical History and Ethics for help locating a consultant (543-5145).

PALLIATIVE CARE
This is a great resource!
Patients and Families Benefit from a Palliative Care Consult when:
• Curative therapies are no longer effective and the goals of care are changing
• Team/patient/family needs assistance with complex decision-making and determination of goals of care, including addressing DNAR issues
• There have been recurrent admissions for treatment of advance illness
• In an ICU setting with documented poor prognosis, or prolonged stay in the without evidence of progress
• There has been a significant injury or medical event that will result in permanent life changes that may effect quality of life as determined by the patient or family
• There is no documentation of discussion regarding wishes and treatment preferences if the medical conditions worsen
• Patients, families, or significant others are experiencing emotional distress
• Uncontrolled psychosocial or spiritual issues related to end-of-life
• Prolonged length of stay (>5 days) for patients with a life-limiting illness

The Palliative Care Team can often assist with Care Planning
To Request a Palliative Care consult:
At HMC: (206) 731-3409, or call the Harborview paging operator at (206) 731-3000
At UWMC: Page the Palliative Care resident through the operator

NEEDLE STICK:
Following an Occupational Exposure to Blood/Body Fluid
1. PLEASE, DON’T PANIC
2. REMOVE all soiled clothing.
3. WASH Wounds and skin with soap and water. Flush mucous membranes with water.
4. WRITE the source patient’s name, hospital number, date of birth, and location
5. NOTIFY supervising staff member you need to report to Employee Health.
6. REPORT TO EMPLOYEE HEALTH (after hours report to EMERGENCY DEPARTMENT). They will take care of testing the patient and getting consent.
7. HELP!
   • At UW: UWMC Campus Health Services or the UWMC ED (206-598-4000).
   • At HMC: Go to employee health during day time or ED (206-731-4074)
   • At CHRMC: Call 987-2633, or go to ED

Employee Health: Go here for TB tests, immunizations, flu shots, needle sticks or other exposure:
• UWMC: Rm NE210 (by ED) phone 598-7971
• HMC: Rm 7EC-02 phone: 731-3081
• CHRMC: Bret Boone Module Rm M104 phone 987-3365

LICENSING/DEA:
DEA: For more details go to:
http://www.uwmedicine.org/Education/ResidenciesAndFellowships/Policies/DEA+Policy+and+Licensure.htm
1. Residents and fellows who write prescriptions are required to register for an individual DEA license. Licenses may be obtained on a fee-exempt basis while in training in a UW GME training program; however, such licenses are restricted to activities within the scope of the training program (including activities at UW Medicine sites and other affiliated training sites)
2. It is the responsibility of the individual resident or fellow to obtain and maintain DEA licensure. All license applications must include a copy of the physician applicant’s Washington State medical license and should be submitted to the GME office for signature by the Certifying Official (if
Applicable). Registration certificates are typically issued in 8 to 10 weeks.

3. If you have not yet received your DEA license registration, please use the institutional DEA number. This number should be written: Institutional DEA Number (hyphen) MedStaff ID#. If you do not know your MedStaff ID#, please contact your program or the GME office at 543-0065.

4. UW: AU0970916  HMC: AH 3308702  CHRMC: AC0985258

Medical License:
http://www.uwmedicine.org/Education/ResidenciesAndFellowships/Policies/Licensing+Policy.htm

All residents must hold an active medical license while training in a UW graduate medical education program. The following types of licenses are available for residents and fellows in Washington State:

1. Limited Physician & Surgeon License (ML) – This license is available to residents and fellows with less than two years of post graduate medical training accredited by the ACGME. This license permits the holder to practice medicine only in connection with his/her duties as a resident physician.

2. Full Physician & Surgeon License (MD) – This license is available to residents and fellows with two or more years of post graduate medical training accredited by the ACGME and successful completion of a national licensure examination (i.e., USMLE or LMCC). Foreign Medical Graduates also require ECFMG certification.

3. Renewal notices for expiring licenses are sent out by the DOH 6-8 weeks prior to the license expiration date. If your license is set to expire and you have not yet received your renewal notice, you may contact the Customer Service Center at (360) 236-4700.

Evaluations:
All resident evaluations are available online after you finish your rotations. Additionally you are expected to provide feedback on both the attendings and the rotation. This is compiled over several months before going to attendings to keep anonymity. The new evaluation system starts in June 2008. The evaluation system will be through Verinform. Your login will be the same as your UW login. You are also responsible for timely feedback to medical students, which should happen regularly throughout their rotation.

Operative Log
1. Log in: go to http://www.acgme.org and select “data collection systems” (left column). Select “Resident Caselog System” and then click “login”.
   - User Name = first initial last initial and last four digits of your SS#
   - Password = type “uow” and last four digits of your SS#

2. Enter Cases
   1. Click “Procedure”
   2. Click “Add”
   3. Enter information in the fields

   NOTE: You must enter ALL the procedures on same day for same patient on ONE entry.

3. Input CPT:
   - If you know the appropriate CPT code enter it and press “Select”
   - If you do not know the CPT then select “search”
   - After you have selected a CPT, the procedure will appear in the “selected procedures box.” If the procedure fulfills a defined category, the area will appear in the “Defined Category” box under the selected procedures box.
5. You must select one CPT to achieve credit. In the “Selected Procedures Box” highlight the procedure you would like to get credit for, usually the one that gives you the defined category credit. Click “credit” box. Once highlighted the appropriate CPT code will have an asterisk by it.

6. Input outcome if necessary.

7. Click “save.”

- Complete by the end of R2 year: Surgical Critical Care: 20
- Complete by the end of R3 year: GI Endoscopy: 85 (35 EGD, 50 colonoscopy); Trauma Non-Op: 20; Pediatrics 20 (5 must be appendectomies)
- Complete by the end of Chief year (March 30): 750 total cases

<table>
<thead>
<tr>
<th>Procedure</th>
<th>CPT Code</th>
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<tbody>
<tr>
<td>Liver: 4</td>
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<tr>
<td>Pancreas: 3</td>
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<tr>
<td>Vascular: 44</td>
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<tr>
<td>COMMON MAJOR</td>
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<tr>
<td>Abdomen: 65</td>
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<tr>
<td>Alimentary: 72</td>
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<td>Endocrine 8</td>
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<td>Head &amp; Neck: 24</td>
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<tr>
<td>Laparoscopy (Basic 60, Complex 25)</td>
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</tbody>
</table>

**Common Codes**

- Critical Care: 99292 x mult
- Central Line (>5yo): 36556
- Swan placement: 93503
- Chest Tube: 32020
- Intraperitoneal dialysis: 49420
- Tracheostomy: 31600
- Non-Op trauma: 99199
- DPL: 49080
- Cricothyroidotomy: 31605
- ED Thoracotomy: 32160
- Negative Ex Lap: 49000
- VATS: 32653
- EGD (no intervention): 43235
- Colonoscopy (no inter): 45378
- Partial Mastectomy:
  - no nodes: 19301
  - with nodes: 19302
- Simple Mastectomy: 19180
- MRM: 19240
- Escharotomy: 16035/16036
- Debridement (1st 100cm): 15000
- STSG (first 100cm)/burn: 15100
- Inguinal hernia: 49505
- Incarcerated: 49507
- Recurrent: 49520
- Laparoscopic: 49650
- Lap recurrent: 49657
- 6m-5y: 49500
- 6m-5y incarc: 49501

**COMPUTER INFO**

(uwresidents.com, CORES, Mindscape, ORCA, CIS, CPRS, Epic Web, PACS, CIS (CHRMC) etc)

IT Services: 543-7012 or mcsos@u.washington.edu
Forgot password for ORCA/Mindscape/CIS: Call 543-7012
Forgot UW Net ID (Email): (206) 543-5970 M-F 8-5, or http://www.washington.edu/computing/uwnetid/password/forget.html.
To gain access to all sites go to Housestaff homepage: uwresidents.com

ORCA: Notes, labs, radiology, vitals, nursing notes, Med recon forms, medications, clinic schedules
• ORCA PowerChart can be logged on to from any computer with access to the Internet. The goal is to eventually have this be the primary computer system for all information (CIS/Mindscape go away).
• Address: https://orca.medical.washington.edu. You will be asked to enter your IRIS username and password. Then select ORCA PowerChart icon and log in to ORCA.
  Login: _________________________    Password: ______________________
  (change every 3 m)
• Help: IT Services Helpdesk (206) 543-7012
• General info: http://www.orcaed.washington.edu/faq/index.html
• To correct or delete a document: mcsos@u.washington.edu

ORCA Surgery Admit/Consult Note. To be used for ALL Surgery Admissions (floor or ICU from clinic or direct admit) and Consults on HMC I/II/TV & Surgery A/O/B/S. Using other templates (e.g. Consultation) causes billing problems. Please DO NOT modify the template.
  1. Create new note
  2. Select Surgery Admit/Consult Note
  3. Fill in all aspects of template
  4. Send to attending for signature when finished
  5. For ALL consults - the primary (requesting) team MUST document the consult request by inserting and filling out the consult request template in a progress note. Please check to make sure this is done.
  6. Be sure to forward note for signature to chief and responsible attending.
  7. These notes cannot be written by medical students. (They can write it up for their write-up.)

Mindscape: For reading notes, access PACS, Med Recon forms.
Being phased out.
Login: ___________________________  Password: ______________________
  (change every 3 m)

The MINDscape application is available from any web browser through the site https://mindscape.mcis.washington.edu/mindscape/.

CIS: Nursing notes, Vitals, I/Os, PT/OT/Nutrition Recs, Labs, not available outside of the hospital.
Login: ______________________    Password: ____________________(changes every 3 m)

EPIC Web: Outpatient/satellite clinic system. These notes are now meshed into ORCA/Mindscape and you can access this from Mindscape page. The EPIC Hyperspace application is located from the application list on the site

PACS: Radiology viewing.
Login: ___________________________  Password: ___________________________

You can access images on Mindscape/ORCA (one patient at a time). There is also
a link on the Housestaff homepage and the intranet. To obtain direct access to PACS/Centricity for viewing patient radiology images:

1. Complete the Employee Access Activation Form (check the “GE PACS” box)
2. Sign and send to
   Suzanne Mills
   HMC Department of Surgery
   Box 359796
   325 Ninth Ave
   Seattle, WA 98104
3. Suzanne will pass the information on to the Radiology IT person. Your login and password will then be issued to you.

CORES: List manager

This is what is used for daily team lists at HMC and UWMC. Web-based system at HMC and UWMC to organize your patient list, store your entered diagnosis, problem list, medications and other information. The system is linked to CIS and will import a 48-hour block of vital signs and laboratory data. It can tell you when it was last updated by CIS, but: It can’t tell you when the data was entered to CIS by nursing or the lab *****always check CIS yourself!!****


The system allows you to enter lines, antibiotics, procedures and associate them to dates so your lists automatically include antibiotic day number, line day number and post-op day numbers. Please be careful. The system will not restrict users to particular services, so don’t inadvertently edit someone else’s list.

To ensure that all patients admitted to a service or consult service don’t get missed or forgotten:

- It’s the job of the resident who initially evaluates a patient to put them onto CORES and assign a team, attending and ‘service’/’consult ‘ at the time they evaluate the patient.
- It’s the job of the residents on the primary team to fill in the info (meds, all, problems, etc.) on all pt’s they find on their CORES list.
- It is the job of all residents at all levels to ensure appropriate transfer of care, verbally communicate all patients to the next ‘crew’ and cross-check the other guy to make sure no one slips through the cracks.
- All data on the CORES list should be double checked and the list should be updated daily.

CPRS: System used at the VA for all notes, orders, labs, radiology

You username and password will expire each time you leave the VA and need to be rest prior to restarting a rotation there. This is done through Robert Johnson.
Login: _________________________  Password: __________________________

CIS/CHRMC: Used for notes, online orders, labs, radiology

There is a fair amount of online training required here so try and complete that before you arrive or you will spend your first morning on the computer, You cannot do anything at Children’s without computer access. Learn common online order-sets and refresh often
Login: _________________________  Password: __________________________

Remember: In general you can access all of these sites from the Housestaff home page: uwresidnts.com. This site also gives you access to the Library homepage, Verinform, Webpine, and the Surgery Intranet.
HEALTH SCIENCES LIBRARY
http://healthlinks.washington.edu/hsl

• Location:
  T-334 Health Sciences Building
  1959 NE Pacific St, Seattle
• phone and email:
  (206) 543-3390; FAX (206) 543-8066
  hsl at u.washington.edu

• Mailing Address:
  University of Washington
  Health Sciences Library and
  Information Center
  Box 357155
  Seattle, WA 98195-7155

Librarians: Available for assistance with literature searches or any other information based questions. They can be very helpful both for academic projects as well as for looking into literature for M&M questions or for conferences (Thurs. Pre-Op conference, Trauma Conference etc.). The more focused your question is the better they are able to help.

Ellen Howard
Head, K.K. Sherwood Library
Harborview Medical Center
325 Ninth Ave.
Box 359902
Seattle, Washington 98104-2499
206.616.3033; FAX 206.731.8673
ehh@u.washington.edu

Amy Harper
Information Management Librarian
Health Sciences Libraries
University of Washington, Box 357155
Seattle, WA 98195-7155
206.616.6630
206.604.9876 (cell phone)
alharper@u.washington.edu

Healthlinks gives you access to a wide variety of resources:
• Up to Date: General information about most disease processes – more medicine focused.
• PubMed: Searching all journals and texts
• DynaMed: Similar to Up to Date.
• Cochrane Review: Good for evidence based reviews – not available for all subjects.
• Journals: Go to ejournal tab for alphabetical list.
• Access Surgery: videos, animations, textbooks, atlas and anatomy resources, Board Review materials
• ACS Surgery
• Sabistion Online: Textbook available online
• Schwartz Online
• Vesalius: Internet multimedia resource for surgical education. Surgery residents sign up and create personal password at Surgery Intranet page.
• Links to various Surgical Associations
• Calculators for Trauma Scoring Systems
• Anatomy books and diagrams

NCBI: You can sign up for an NCBI account on the library page. This will allow you to store lit searches and abstracts from searches online for later review. Register on library page. You can use My NCBI to:

  * Save searches
  * Set up e-mail alerts for new content
  * Display links to Web resources (LinkOut)
  * Choose filters that group search results

Surgery Toolkit: To access the Surgery specific page go to the Toolkits tab, click on Clinical Specialties and select Surgery.
CHRMC Card

VAMC Card

Getting started ...

Telephone keypad functions:
1. Listen
2. Record
3. Review
4. Pause
5. Go to Next Report
6. Go to End
7. Fast Forward
8. Go to Beginning
9. Disconnect
To Clear ID – press *
To Insert – press #, then 6

To review a previously dictated report:
Dial ext. 62908 to access system
Enter your 5-digit DUZ number
Press *1, then select 3 to review
Enter patient’s 9-digit SSN followed by #,
then enter 2-digit work type followed by #
For the next report (same SSN) press 5
To begin a new search press *
To release dictation after listening press 9
To return to the dictation option press *1
then press 1

**Radiology – work type **
** Nuclear Medicine – work type **
At SCCA:
New patient: 75
Return patient: 34
Stat: 76
Service/Clinic Type: 99

Clinic Note – This template must be used for all H and Ps at UW/HMC. Available in the clinics.

1. Admit Note/Consult Note: At UWMC and HMC and VAMC use on-line template. Must be written on any patient admitted from clinic or coming in from home/an outside facility who is admitted pre-operatively.

Name of requesting/referring provider
Chief Complaint
History of Present Illness
PMH
PSH
Meds
Allergies
Social History
Family History

ROS
PE: Vitals and Complete Exam
Labs
Radiology and studies
Assessment
Plan
“Seen and discussed with Dr _______”
Attending Surgeon

2. Pre-Op Note: In times when patients were in house before operations this was a note that included indications for surgery, a review of labs, pre-op tests, and radiology, consent, and a discussion of plan for OR. Currently the VA requires a pre-op note on all patients by 3pm day before surgery (does not require PE or seeing patient). In general it is a good idea to look over all patients prior to OR. This ensures both familiarity with patient and that no planned pre-op work-up is missed.

3. Operative Note Dictation Template: In addition to the dictated note, patients at the UW and HMC need a paper note (usually in the yellow packet) filled out after every operation. Below is outline for dictated op-note. Do not dictate unless asked by attending.
  • Patient’s Name:
Post-Operative Note: Any patient who has had an operation needs a postoperative note written in the chart as well as a post-operative check. Often times these are signed out to a night-float resident. Please be sure to communicate what operation was done, if there were complications, and what specifically you want checked on the post-op check (labs, radiology, incision, drainage, etc.)

Name of Operation
Subjective: pain control, nausea
Objective: Vitals, EBL, drain outputs, PE, f/u labs
Assessment
Plan

4. SOAP Note:
S: Subjective – Includes overnight events and patient’s report of how they are currently feeling.
O: Objective – Vitals with ranges, Ins/Outs (by category), drains, PE, labs, radiology
A: Assessment – One sentence to tie together. This is the hardest part.
   69 yo female POD #2 s/p R hemicolectomy doing well now with return of bowel function.
P: Plan – Depending on complexity of the patient this can either be a detailed plan by organ system or a list of things you want to do for the patient. In the ICU it should always be by system.
   ****Remember each day to think about line/drains/tubes (i.e. are they still needed) and disposition.

5. Phone Note: Any patient phone call should be documented in the chart. CC to attending involved.
   • Date and Time of call
   • Call from:
   • Chief Complaint:
• Description of conversation:
• F/U Plan:
• ** If you call in a prescription dictate what medication and how much.

6. Called to See Patient Documentation: On call you are often asked to see and evaluate patients and sometimes perform interventions. Anytime you are seeing a patient for a major event, making an assessment, or performing an intervention there should be a note in the chart to document such.
• Called to see patient for: ________________
• Description of Event/Vitals/Exam
• Assessment
• Intervention/Plan

7. Procedure Note: All procedures done to patients require consent and documentation in the chart. Check with attending to see if they wish to be present. Templates are available on ORCA. The note should include:
• Indication
• Procedure
• Consent
• Description of Procedure
• Complications

8. Discharge Note Dictation Template
• Date of admission:
• Date of discharge:
• Attending
• Primary referring physician (with address):
• Reason/diagnosis for admission:
• Past medical history and past surgical history (with dates):
• Allergies:
• Outpatient medications (with doses):
• Procedures this admission (with dates):
• Hospital Course: be brief. Include complications or significant events during recovery.
• D/C Medications (list meds that were added or changed during hospitalization):
• Disposition:
• Activity, Diet:
• F/U plans (include any tests scheduled for date of f/u):

CONSULTS
Presentation: To start state your overall assessment of problem with a brief plan. (This orients the listener and is a great way to start. It should be no longer than 1-2 sentences.)
• HPI
• PMHx
• PSHx
• All
• Meds
• Social
• FHx
• ROS
• Vitals: Presenting and current
• PE
• labs or studies done
• Assessment: primary & differential diagnosis
• Your Plan (should have thought about it and even read a bit....)

During your first few years as a resident it is best to write out the above in its entirety and synthesize the information into a coherent Assessment and Plan of what you recommend doing about the patient’s problem prior to presenting.

Common errors:
1. Omitting the first 1-2 sentences.
2. Stating the first 1-2 sentences then stopping.
3. Stating the HPI but omitting the other elements.
4. Presenting everything, but without any order... i.e. jumping around. (This is the most common error and is best corrected by reading your presentation. Nothing wrong with this. If you find this to be one of your problems, it is helpful to tell your senior resident/attending at the beginning.
5. Doing everything right but stopping dead before the Assessment and/or the Plan. Plans should always be communicated directly to the team requesting the consult.

Pre-Op OR Cheat Sheet: You should prepare for all cases the day before or sooner.
• Complete history & physical
• Labs (CBC, coags, chem. 10 +/-LFTs, BNP) – let chief know if significant abnormalities or changes
• EKG, CXR (selectively), U/A (at VA), other imaging related to procedure (Review these!)
• NPO after midnight (hold tube feeds if not intubated), maintenance IVF
• Antibiotics on call to OR; chlorhexidine scrub evening prior to OR
• Cefazolin if no viscus involved, cefazolin + flagyl for bowel, Vanco often used in vascular cases
• Anti-coagulation: Usually hold ASA 7-10 d, plavix 5-7d, coumadin 5d, heparin gtt 4 hours (ask!)
• For general surgery cases (especially cancer or bariatrics), want 5000U sq heparin given pre-op
• Some services (e.g. ortho) want prophylactic anticoagulation held x 12 hours prior to OR
• Bowel prep (start early!!) - check with attending on necessity and type
• Consent
• Think about home meds – 1/2 insulin, hold lisinopril & oral hypoglycemics, give beta blocker
• Check for consult notes & recommendations**
• Good to be familiar with AHA/ACC guidelines for peri-op cardiac risk stratification (Eagle KA et al, Circulation, 2002)
• Call chief after H&P, labs etc are done, or if in doubt about anything!

Preparation for cases
• Know the patients H&P, indication for operation.
• Review anatomy, the steps of the procedure & potential complications
• -Pre-op: mark patient, update H&P; introduce yourself to scrub & circ, put name & pager on board (nurses MAY call you when patient is in the room)
• Arrive before patient is asleep
• Open your gloves; check whether you need to open a gown
• Help with: SCDs prior to induction. Foley. Verify Abx and heparin. Pad & position pt. Clip hair
• Tell anesthesia if need NGT
• Get OR lights in appropriate position, check on head lights
• Put peddles, steps in appropriate locations
• Call attending if they aren’t already there
• Scrub & drape (typically wait for attending prior to incision)

Post-Op To-Do List
  E  Enter pt in Cores
  A  ACGME case log entry (SOL)
  T  Talk to accepting resident (floor, ICU)
  F  Family (usually done by the attending, but not always)
  O  Orders - write
  O  Op note (every pt should have a brief WRITTEN op which is available before the dictated op note is available. This written op note should include the location of the drains.
  D  Dictate op note, call ‘doctor’ to sign out

Tips for post-op orders:
1. Always a good idea to review basic orders (po status/abx/DVT prophylaxis/drains) with attending.
2. Remember to think about head to toe prophylaxis: Pain, nausea, itching, reflux, DVT, stool softeners, antibiotics, beta blockade, insulin
3. Write for appropriate consults: PT/OT/SW/Nutrition
4. Clearly specify all drains and dressings
MORBIDITY & MORTALITY CONFERENCE

UW: Fri 6:30 am. Presentations are brief. Presentations are done by resident involved in the case. Use template. Have all complications listed on transparency.

- **COMPLICATION:**
- **DATE OF COMPLICATION:**
- **OPERATION:**
- **DATE OF PROCEDURE:**
- **SURGEONS:**
- **PT CHARACTERISTICS:** name, number, BRIEF history
- **ERROR TYPE:**
- **DISCUSSION:** i.e. what you would have done differently. Present the relevant literature which supports the conclusion you’ve stated above. 1-2 articles, 5 line summary, noting how the particular citation helped you arrive at your conclusion. This is not a review of the literature or a treatise. It is to be concise and supported by literature in order to get your point across. You should FOCUS on one single aspect of the patient’s complication, directing your research and presentation to this.

1. You will need to make transparency of cases
2. You need the paper M&M form filled out for each pt to give to faculty member running M&M
3. Bring overhead of work hours.

**Transplant:** As the R3 on transplant you will be responsible for presenting a brief synopsis of all the patients currently on the service as well as reviewing and major M&Ms for the week. This is all based off of the online tracking program used on transplant. The fellow can show you how to gain access. You should print the list out and have a two sentence summary for all inpatients. The M&M portion is less formalized than elsewhere.

**HMC:** Fri 7am. Presentations are brief and done by the R3s. Have coroner’s report available. Talk with people who were there. Nice to have one be a teaching case with short presentation. Use template:

- **DATE OF COMPLICATION**
- **COMPLICATION**
- **OPERATION**
- **DATE OF PROCEDURE**
- **PT CHARACTERISTICS:** name, number, BRIEF history
- **ERROR TYPE**
- **DISCUSSION**

**HMCI, II, TV, BPS** all present here. Note that Vascular also has a separate M&M each month. Traditionally if there are no BPS M&Ms that resident does a short presentation on an interesting topic or case. (sometimes no time)

**VA:** Wed 5pm for Vascular and General Surgery (done by R3 and R4). Each case discussed with literature review. Ideally use a template similar to the ones above. You will have access to overhead projector so make transparency. The literature review and highlights should be on a transparency.

**CHRMC:** Often done by fellows. Check with them to see if they would like you to prepare a case or a presentation. If done it will take place during the Thursday morning conferences.

*You must go over the presentation with the responsible attending before M&M.*
Admitting.....598-4310
Angio Lab.....598-6209
Blood Center
  Puget sound.....292-6525
  Univ district.....522-2462
  UWMc.....598-6248
Cardiac Cath Lab....598-4077
Chaplain.....598-4630
Clinical Engineer...598-4268
Clinics
  Anticoag.....598-4874
  Chronic Pain.....598-4282
  Dental.....598-4277
  Diabetes.....598-4882
  Eye center.....598-4011
  GI Endoscopy.....598-4377
  Gyn-Onc.....598-4073
  Medicine.....598-4615
  Neurology.....598-7688
  Oto.....598-4022
  Pediatrics.....
  Psychiatry.....
  Renal.....598-4615
  Rehab.....598-4295
  Surgery.....598-4477
  Transplant.....598-7373
  Urology.....598-4294
Computer Help.....543-7012
Echo Lab.....598-7000
EEG Lab.....598-4211
EPS Lab.....598-4555
ER.....598-4000
Employee Health.....598-4848
Engineer.....598-4911
Environ Svcs.....598-6181
Facilities Services.....598-6181
Flow Supervisor.....598-9190
Home Infusion.....598-6064
Information Desk.....598-6555
Interpreter Srvcs.....598-4425
Laboratory
  Bleeding Time.....598-2583
  Chem, Hemo, STAT.....598-6224
  Coag.....598-6242
  Micro.....598-6147
  Path.....598-6400
  Satellite ABG.....598-8700
Lost & Found.....598-4909
Materials Mgt.....598-6181
Medical Records.....598-4344
Nuc Medicine.....598-4240
Nursing Units
  4 NE.....598-4422
  4 SE.....598-4400
  4 S LSU.....598-4670
  5 NE.....598-4500
  5 SE.....598-6500
  5 N.....598-4660
  5 S.....598-7474
  5 E.....598-4543
  6 NE.....598-6800
  6 SE.....598-4410
  6 N.....598-4606
  6 S.....598-4600
  6 E.....598-4616
  7 NE.....598-7770
  7 SE.....598-4818
  8 NE.....598-8902
  8 N.....598-4800
Nutrition.....598-4151
Occup Thrapy.....598-4830
Operating Room.....598-4270
OR dsk (main).....598-4270
OR Frnt dsk (Pav).....598-9846
Ostomy Nurse.....997-4422
PACU.....598-4216
Paging.....598-6190
Parking.....543-6165
Patient Placement.....598-4311
Pharmacy
  Discharge.....598-5441
  Inpatient.....598-4088
  Outpatient.....598-5027
  ICU.....598-3323
  IV.....598-4087
Physical Therapy.....598-7635
PICC Nurse.....598-8702
Pager.....598-9288
Podiatry.....598-4288
Presurgery.....598-5053
Prosthetics Lab.....598-4026
PFT Lab.....598-4265
Rad Oncology.....598-4100
Radiology.....598-6200
CT.....598-6214/2047
File Room.....598-6206
Flouroscopy.....598-2029
Interventional.....598-6173
MRI.....598-6214/4862
Ultrasound.....598-6211
****** On Call: 598-2068
Rehab Medicine.....598-4828
Respiratory Care.....598-4444
Risk Management.....598-6803
Safety.....598-6011
Social Work.....598-4370
Speech Pathology.....598-4852
STAT Nurse.....540-9290
Surgery Center.....598-4880
Surgery Waiting.....598-2069/4505
Transcription.....598-6177
Vascular Lab.....598-4449
VNS Referrals.....598-6605
Pager.....680 9495
Non-weekdays.442-2151
Volunteer Services.....598-4218

Paging: 86190
Operator: 83300
Dictation: 186
Radiology on Call: 82068
ER: 8-4000
OR Front Desk: 84270
Call Rooms/Door Codes:
Surgery Office: 423
4N/S Door Code: 7474#
Crow’s Nest: 6th floor B stairwell: code 325
R2 ICU Call Room: Hallway outside 5N, code: 8800*
CT Surgery Call Room: on 5SE Hallway A
Transplant Call Room: on 4SE
OR Locker rooms: Girls_________Boys ____________ (ask at OR desk)
5E Locker Rooms: Across from ICU call room. Boys:_________ Girls: 8800*
ED Code: 2001#
Supply Rooms (all): 9710*
*Food available from nutrition rooms on 5SE and 5N with discretion.

Conference Schedule:
Tuesday: Lunch – 11:30 RR401
Vascular Conference - 3:30 pm ISIS conference room (Surgery B)
Wednesday: Grand Rounds (1st Wed), Surgical Sciences (other Wed)
Thursday: Pre-Op conference – 7:30 am RR401
Friday: M&M – 6:30 am RR401
Pellegrini Conference – 4pm RR 401

General Principles:
• EVERYONE needs a Medication Reconciliation form if admitted.
• R1s must attend multidisciplinary rounds for their team
• Any patient admitted from ED/Clinic/Home needs Admit note
• Call APS to run list with them in am to help facilitate pt care
• Discharge summaries should be completed on (or the night before) day of discharge
• Discharge medications should be completed the day prior to discharge.
• Discharge orders must be in by 8am
• R1s should get to OR to open/close cases

Communication:
• All important clinical events (i.e. instability, transfer to ICU, blood transfusion, change in plan) should be communicated to senior resident and/or attending. Receipt of this information must be confirmed to prevent missed communication. A text page alone is not sufficient.
• Questions about patients should go to the attending of record, day or night. If the attending is unavailable, it is the attending’s responsibility to identify a covering physician and to note this information in CORES. If it is unclear who is covering, contact the attending on call.
• Bounce-back patients should go to the original attending. If that attending is unavailable, responsibility lies with the on-call attending, not the covering physician.

Medical Students:
• They should have clear expectations laid out for them on Day #1
• They should follow 2-3 patients on the service and present them daily.
• There main place is in the OR or clinic. Help them to prepare.
• Their day is over at 6pm unless they are on call. When on call they report to ICU R2.
• It is O.K. for students to do ORCA notes on POSTOPERATIVE patients ONLY. STUDENTS MUST NOT CHART ON PATIENTS WHO ARE BEING MANAGED NONOPERATIVELY OR PREOPERATIVELY ON PATIENTS WHO HAVE BEEN ADMITTED FOR AN OPERATION !!
Consults:
• All consults are initially seen by the R2 Consult/on call resident
• Consults should be seen promptly
• Requests for consults must be documented in the requesting team’s note/on chart
• Vascular consults are discussed with the Surgery B Chief/On call Chief
• Surgical consults are discussed with the Acute Care Chief/Chief on call
• Bounce-backs are seen by R2 consult and directed to appropriate team
• All consults should have a consult note typed into ORCA
• Any plans or recommendations should be communicated directly with the primary team

General Clinic Thoughts:
• Look up clinic pts the night before – schedule on ORCA.
• When pt arrives the room number is placed on the list put, your initials by the pt you are seeing
• Fill out yellow packet if needed while waiting to present to an attending
• Use the light system (yellow means you are in the room)
• After seeing pt communicate plans with nurse
• Dictate following the template. ALWAYS INCLUDE ALL REFERRING PROVIDORS.
• If you see pt without the attending you must do the fee sheet.

Clinic Location: Pavilion 3rd Floor
Clinic Staff:
• Clinic Mgr: Nancy Alotis; 598-4285 | 645-0241 (p); nalotis@u.washington.edu
• PCC for lines: Inna Condrea; 598-9459 | 559-8643 (p); Clinic nurse triage line 598-4549
• New pt intake co-ord: Marion Chuk  598-5879
RN’s:
• Sandra Draper  598-8932  drapers@u.washington.edu
• Jane Knorr  598-3389  | 598-7944 spectralink jknorr@u.washington.edu
• Maryann Herold  598-3390  | 598-9532 spect heroldma@u.washington.edu
• Colleen Zakar  598-3667  | 598-2210  (spectralink) czakar@u.washington.edu

Pre-Op Medicine Consults: There is a medicine consult service available to assist with both pre-operative surgical optimization as well as in house management of patients with complicated medical problems. They are very thorough and if they are seeing your patients be sure you both read their notes as well as touching base with them daily. Who should be referred:
• Major predictors: Unstable coronary syndrome, decom CHF, significant arrhythmias, severe valvular dz.
• Intermediate predictors: Mild angina, prior MI, prior CHF, DM, Renal Insufficiency
• Coumadin therapy for mechanical valves, DVT, PE in last 6 months
• Minor (space available): elderly, arrhythmia, low functional capacity. h/o stroke
• For bariatric patients: CAD, IDDM, CRI Cr>2, pulm HTN, h/o stroke, h/o CHF, Aortic Stenosis, heart valve, h/o coronary stent, or 2 or more of the following: (DM2, HTN, Afib, BMI>55, Anticoagulation, age>50.)

Tips for Oelschlager/Pellegrini Clinic: (Thursday)
• Typically charts have been reviewed by the CVES fellow the day before – each patient will have a folder with relevant outside studies and communications. There will also be an H&P form on which you write all data and the H&P. Dr Oelschlager will use it to dictate.
• Dr Oelschlager dictates his patients in Thurs. clinic.
• Dr Pellegrini wants dictations done in the form of a letter addressed to referring provider
• The referring providers are listed in the back of the patient folder.
• Almost all patients have 4 studies: EGD, UGI, 24H pH monitoring, Manometry. Look for all of these in computer records and chart. Sometimes the UGI or 24H pH are not reported yet as they are generally done same day – call for reports.

Tips for Bariatric Clinic:
• Take good weight history: what their weight has been, diets, weight loss attempts, exercise.
• Calculate BMI (google BMI calculator)
• Assess what they know about weight loss surgery and different options
• Assess motivating factors for surgery. Do they know someone who had it?
• Associated morbid conditions (OSA, HTN, CAD, DM, PVD, CRI, edema)
• In general all patients need: 1. Bariatric seminar 2. SW 3. Nutrition 4. Labs 5. +/- medicine consult. (see above) 6. Also consider UGI, RUQ US, PFTs as indicated
• In general Lap Band is a better tolerated surgery with fewer major complications but requires more clinic visits and care. It has different pattern of weight loss and less effect on diabetes.
• In general gastric bypass has higher operative risk but requires less post-operative care or adjustment. It does help diabetes. Longer hospital time.

Tips for Liver Tumor Clinic: (Tues and Wed am on SurgeryB)
• In general pts have not been seen in clinic before and their paperwork/imaging is in the door.
• See the patient and do a brief H&P and glance at images (15min).
• Be sure all patients are seen by 9:30 when it is time for conference.
• During the conference you present the patient – the images are presented by radiology and path by pathology.
• After conference you will go back to clinic – see the pt with the attending and dictate notes. Dictation should have a paragraph saying the pt was discussed at tumor board and the plan.
**UH ACUTE CARE**

All Attendings on rotating basis – see call schedule.
Residents: 5,2,1

**Purpose:** This is a new service. This service will be responsible for inpatient consults and urgent outpatient visits. In addition there will be an inpatient component of the service the majority of which will be patients admitted from ED with acute issues and patients operated on by the service (i.e. appys, choles. bowel obstruction, abscess, etc.)

**Schedule:**
Currently no set schedule. Should attend all UW conferences if not actively seeing consults.
- R1 – responsible for managing the inpatient service (orders, notes, OR)
- R2 – responsible for seeing all new consults and rounding on old consults.
- R5 – Oversees R1 and R2, staff consults with attending. OR. Also, available to cover cases as needed.

**Tips and Common Calls:**
1. When seeing a patient who will be going for an operation be sure and get consent early and place it on the chart
2. Once plan for OR in place with attending the case must be “booked” by filling out paper at OR desk. Also call desk to let them know at 84270.
3. Consult requests must be documented in a progress note or on an order sheet by requesting service.
4. Line requests: Urgent (i.e. same day/next day) – must be attending to attending request. Non-Urgent – team should go through line coordinator. She will then send emails when lines are added to the schedule. Temporary – we occasionally help other services place large lines (pheresis catheters etc) at bedside, these are treated as a regular consult. All line requests must have a form completed saying what kind of line they desire.
5. Common Calls
   - Line Removal: Always ask type of line, why being removed, alternative access, recent coags and platelet count. Many patients on Heme-Onc will require platelets or FFP before lines are removed. The primary team should do this and call you when patient ready. You must obtain consent. It is helpful to ask the OR for the Hickman tray – may be overkill but it beats being stuck on 8NE without any instruments. **Note** There are no scalpels in tray – scalpels are most easily found on 4SE, 5SE and 5E. Hold pressure over vessels for 15m following d/c. Send for culture.
   - Cardiac Cath/IABP Complications: often for pseudoaneurysm/bleeding. Do vascular exam. Duplex if concern is for pseudoaneurysm. CT with contrast if concern for bleeding. Dr Zierler can help with thrombin injections of pseudoaneurysms. See article: (Diagnosis and Treatment of Femoral Pseudoaneurysms. Zierler et al. 1995 Vascular US Today 10(10): 197-220.
   - Necrotic toes; Start with good vascular exam, duplex, AAs Is. For cold toes that are not operative candidates think about Rook boots.
   - Perirectal abscess: If complicated or deep may need imaging, if recurrent always ask about Crohns, do not do rectal on neutropenic patient.
   - Appy: Young men do not always need imaging if good story. If the ER calls you early staff with Chief to possibly avoid unneeded imaging. Always check with attending on lap vs. open before consenting. Obese patients and women with unclear picture better lap candidates.
   - Cholelithiasis/Cholecystitis: Do not require emergent operation. If cholecystitis (elevated wbc, inflammation) – use unasyn, admit, usually lap chole before d/c. Symptomatic cholelithiasis can be treated on presentation or f/u later depending on schedules. Sick pts with cholecystitis – consider percutaneous chole tube by IR.
   - Partial SBO: In general if we are consulted for obstruction they should have an NG.
• Rule out Nec Fasciitis: These patients should be seen and discussed with the chief promptly. Of particular concern is high wbc counts, tenderness, purplish skin discoloration.
• Attendings at the UW in general do not do tracheostomies -> refer to ENT.
• G Tubes: If candidates pts should first be directed to GI for PEG or IR for perc G tube. Operative G tubes only for complicated pts unable to have less invasive procedures.
• Dialysis access -> know line history, vein map. (Meissner or Transplant does them)
• Abscess: If possible try and arrange conscious sedation and drain in ED. If large, deep, or poor pain control book for OR. Pt should start abx in ED.

**Important numbers:**
- Line coordinator: 8-9459
- Vascular Lab: 84449
- IR: 8-6173
- OR: 8-4270
- ER: 8-4000
- On Call Rads: 8-2068
Residents: 4, 3, 1 and 2 laparoscopic fellows

Specific cases: Gastric Bypass, Gastric banding, Nissen fundoplication, Paraesophageal hernia repair, Myotomy, lap assisted transhiatal esophagectomy

Schedule:

Monday:
- 830-end Clinic Dellinger
- 830-1230 Clinic Oelschlager
- 900-1000 Multi-disciplinary Rnds (R1)

Tuesday:
- 700-800 Tumor board BB204
- 730-end OR Oelschlager
- 730-end OR Wright
- 900-1000 Multi-disciplinary Rnds (R1)

Wednesday:
- 630-0815 Grand Rounds-1st Wed
- 730-1130 Surg Sci
- 815-end OR Dellinger
- 815-end OR Pellegrini
- 815-1200 OR Flum (1st and 3rd)
- 815-1200 OR Flum (1st & 3rd)
- 1200-end clinic Flum

Thursday:
- 730-830 Pre-op Conference
- 730-end Clinic Oelschlager
- 1300-end Clinic Pellegrini
- 730-end OR Flum

Friday:
- 630-730 M&M/Pre-op Conf
- 730-end OR Dellinger
- 730-end OR Pellegrini
- 730-1200 OR Flum (2nd & 4th)

Contacts:

Dietician: Judy Brown
598-8361 | 598-1253 (p)
Fluoroscopy 598-2029
Med Consult 598-5160

Bariatrics NP
Pattei Hardman 598-1149
phardman@u.washington.edu

Swallow Ctr 598-7350
Ostomy Nurses 997-4422
Susan Willard, RN 598-4532

PCC for Swallow, P&O: Nancy Pierson
598-4547 | 997-4857

PCC for lines: Inna C
598-9459 | 559-8643 (p)
inna@u.washington.edu

Bariatric PCC:
Suzanne Ultsch
543-15861 | 540-9119 (p)
ultsch@u.washington.edu

Gerd/GS PCC: Nancy Pierson
598-4547 | 997-4857 (p)
ncp@u.washington.edu

SW Bariatric: Sara Houck 598-8417

Dellinger, Pellegrini, Oelschlager, Flum, Wright

Pellegrini, Carlos 543-3106
PCC: Nancy Pierson
598-4547 | 997-4857 (p)
ncp@u.washington.edu

Dellinger, Patch 982-6500
if no answer at night, call 324-4395 (home)
PCC: Inna Condrea
598-9459 | 559-8143 (p)

Flum, David 991-9142
PCC: Suzanne Hoehne
598-9484 | 540-9119 (p)
ultsch@u.washington.edu

Oelschlager, Brant 663-9986
Gerd/GS PCC: Nancy Pierson
598-4547 | 997-4857 (p)
ncp@u.washington.edu

Wright, Andrew 994-5395
PCC: Lynn Dieterle
598-9016 | 986-0261 (p)
dieterle@u.washington.edu
If pt needs clinic f/u /c tests, scans, etc. /p discharge notify attending’s nurse by phone or email (they f/u & make sure they’re done)

Preprinted orders are in the PACU: always read as they need to be edited: Lap Nissen/Myotomy/PEH, Lap Chole, GI Surgery, Gastric Bypass, ICU admit orders (in ICU)

Tips:
- Persistent tachycardia (p > 120) despite adequate fluids and analgesics on or after GBP POD 1 mandates a call to senior team members
- Thursday Clinics: GERD patients presented in clinic in a standardized fashion. Residents should familiarize themselves with key hx and PE points early in the rotation. There are 4 min studies: manometry, 24H pH monitoring, EGD, UGI.

Protocols:
1. **Nissen/Myotomy Post-Op Lap**: Use pre-printed orders
   1. Write discharge med orders so patient can be d/c’ed early the next day. Need Pill crusher.
   2. Post-op check, ask about dysphagia and nausea specifically.
   3. Be sure pt and family are ready for discharge the following day
   4. Oxycodone elixir. IV narcotics OK for breakthrough overnight-MSO4 or Dilaudid
   5. Toradol 15mg IV q6 (unless over 65, renal problems, aspirin/NSAIDS allergy), check with attending.
   6. Control post operative nausea aggressively- scopolamine, reglan, zofran, compazine
   7. Foley catheter MUST be removed at 5am POD#1, OR a voiding trial ordered.

Diet
1. Maintenance IV fluids, heplock with good liquid intake.
2. Begin PO clear liquids once awake and able. Advance to Full liquids next morning.
3. Nutrition consult in hospital for esophageal diet instructions. DO NOT GIVE ESOPHAGEAL DIET IN HOSPITAL. (**Note you actually have to cross this out on preprinted orders****).
4. Crush all meds/elixer, not crushable -> find substitute (change long acting to short acting)

Gas Bloat
1. Limit oral intake, go slowly. Pay attention to increasing distention, if increasing - Check abd films.
2. If large gastric air bubble Discuss results with attending.
3. DO NOT place NGT in any esophageal surgery pt without discussing with attending. (MD must do)

DISCHARGE GOAL:
Discharge by 10am post op day 1. All patients must have:
1. Antiemetics: Reglan elixir. 20-30 doses, Stool softeners. No colace elixir- Use MOM and Senekot
2. Pain Meds: narcotic elixir (oxcodone etc) 60-80 doses and Tylenol/Ibuprofen elixir 20-30 doses
3. Specific instructions needed for restarting home meds and any new medications. Pill crusher

2. **Gastric Bypass**: Use pre-printed orders for ICU, floor, and transfers.
   - All open bypasses and lap bypasses with OSA or complicating conditions go to ICU post-op
   - All patients need PT/OT/Nutrition consults as well as Lovenox teaching.
   - Strict glucose control with Insulin gtt until on diet then switch to SQ
   - Bypass patients should be on Lovenox and leave with one month supply.
   - Diet is restricted by drinking only what fits in a small cup.
• Meds should be elixer or crushed.
***These patients can become very sick and may be difficult to diagnose. Be very suspicious about tachycardia, fever, low uop, c/o abd pain and distension. ALWAYS call chief if there is any question or concern. Use KUB to check for remnant distention which is often treated with placement of G tube.

3. **Laparoscopic Band Procedure**: (pre-printed orders coming soon)
- Usually overnight stay on 4S
- If have foley catheter should be removed in am/in general no foley
- Pay attention to transitioning pt from insulin drip to home regimen.
- Diet is anything that can be sipped through a straw until seen in clinic (@2wks)
- Meds need to be crushed or elixer. Give pill crusher. Write discharge rx the night before d/c.
- Pts need instructions for any new meds or restarting home meds.
- Clinic f/u usually in 2 weeks

4. **Esophagectomies**: speak with attending re specific plan
- ICU post-operatively
- NPO with NG Tube and sign to not manipulate.
- Talk with attending before starting J tube feeds
- Cervical drain remains in place until after swallow evaluation
- Esophogram usually day 6-7 – clear with attending (talk with attending and radiology)
- Common post-op complication is atrial fibrillation.
UHB
Byrd, Yeung, Park, Anderson, Vascular (Meissner, Clowes, Zeirler)
Residents: 5,4,2,2,1
Surgery B cases: Oncology: Breast, Thyroid, Parathyroid, Liver, Pancreas, Vascular

Schedule:
Monday:
730-end OR: Byrd
730-end OR: Vascular
730-end OR: Anderson

Tuesday:
700-800 Tumor board BB204
830-1600 R2b to SCCA Melanoma & Breast: Byrd (MANDATORY)
830-1200 Liver Tumor Clinic: Yeung/Park
900-1300 Vascular Clinic
1200-end Melanoma Clinic: Yeung
1500-1600 Vasc Conf (MANDATORY)

Wednesday:
ALL
0630-0815 Grnd Rnds-1st Wed
0730-1130 Surg Sci
0900-1300 Liver Tumor Clinic – Yeung/Park
0830-end OR Vascular
1300-end OR Yeung
0900-end R2a to Roosevelt Anderson

Thursday:
0730-0830 Pre-op Conference
0730-end OR Byrd
0730-end OR Anderson
0800-1700 Clinic Meissner

Friday:
0630-0730 M&M
0730-end OR Yeung
0730-end OR Park
0800-end SurgOnc/Endo Clinic: Byrd
0800-end OR Vascular (1st,3rd,5th)
1100-1800 R2a to SCCA BCSC Anderson & Mann (MANDATORY)
1200-end Clinic Clowes

Contacts:
Dietician: Judy Brown 598-8361 | 598-1253 (p)
Vascular nurse coord: Kim Cantwell-Gab 598-4979
Vascular Lab 598-4449
Med Consult 598-5160
Ostomy Nurses 997-4422

Anderson, Ben 559-5578
PCC: Toni Pulikas
598-9483 | 994-7157 (p)
tpulik@u.washington.edu
RN Rsvlt: Keri Hadley 598-6974
crombie@u.washington.edu
RN Bckup: Gail Buchanan 598-8795
gbuchana@u.washington.edu

Meissner, Mark 680-0645
PCC: Nancy Clark
598-9436 | 986-2431 (p)
nlclark@u.washington.edu
RN: Colleen Zakar
598-3667 | 598-2210 (spectralink)
czakar@u.washington.edu
Tips:

Printed orders are in the PACU: Lap Chole, Thyroid/PTH, GI Surgery, ICU admit orders (in ICU) Angiography pts admit to 4S under Surg B and need POP checks & d/c orders Angioplasty pts need an arterial duplex before discharge.

Protocols:

1. Thyroid: Use preprinted orders
   - Subtotal: outpatient or overnight. No special orders. Check voice.
   - Total: Will stay overnight, check voice, watch for tingling.
   - If have drain comes out am of POD #1
   - Discuss thyroid replacement plan: cytomel vs levothyroxine
   - Check iCa, write for prn calcium replacements
     - Post-op check: Check for hoarseness and hematoma. Ask about peri-oral and finger tingling.
     - Discharge and follow-up: Usually d/c POD #1. F/U 2 weeks. Need thyroid replacement

2. Parathyroid: Use preprinted orders.
   - Check am iCa (also watch Mag/Phos)
   - Write for Ca replacements scheduled and prn (esp. if multiple glands/large adenoma)
   - Post-op check: Ask about hoarseness, peri-oral or finger tingling.
   - If significant problems with calcium post-operatively get endocrine involved.
   - Discharge and follow-up: Usually d/c POD#1. F/U 2 weeks. Should go with calcium (TUMS)

3. Breast (usually only mastectomies stay overnight)
   - Post-op orders: Pain meds, stool softeners, ADAT, HLIV, JPs to bulb suction, d/c Foley, drain teaching, check with attending about: antibiotics (usually if implant placed), DVT prophylaxis.
   - Post-op check: Look for hematoma, be sure pt ready for discharge in am
   - Discharge and follow-up:
     - Meds: Pain meds, stool softeners, home meds
     - Drain teaching, Shower guard for showering at home, ok to shower (chk with attending)
     - Remove full dressing in 48h
     - Drains are removed in clinic – need teaching before d/c.
   - Follow-up 1-2 weeks (appt usually made, check ORCA)

4. Liver Resection (can be done either open or laparoscopic)
   - Talk with anesthesia pre-op about epidural/CVP monitoring, transfusion criteria CVP should be kept low during case to help with bleeding.
   - Pts usually come to ICU following case for monitoring and frequent lab checks.
   - Usually only leave drain if: biliary anastomosis, entry into bowel, diaphragm...
violation, or special circumstances.
Labs – serial Hct, Coags, LFTs on Post-Op Day #1.
Clarify with Chief/Attending before starting any anticoagulation (even prophylaxis).
Consider Vitamin K as well as FFP if elevated INR (like under 1.5-1.7)
May get reactive effusion – think about this if desats get CXR.

5. RFA:
   Usually stay overnight on 4S – ADAT, d/c foley
   No need for any f/u labs

6. EVARs: Orders usually done by attending/IR -> double check for completeness.
   Spend one night in ICU and then to floor
   Post-Op Check – check groins for hematoma
   F/U: Ask attending re imaging prior to d/c (AXR and F/U US or CT after d/c to follow graft)

7. CEA: Spend night in ICU before going to floor. Be sure have beta blocker if indicated.
   Post Op Check: Check for neck hematoma, check cranial nerves and neuro exam.
   Discharge and F/U: Check with attending re ASA or Plavix. Usual f/u 2 weeks.

*If pt needs clinic f/u /c tests, scans, etc. /p discharge notify attending’s nurse by phone or email (they f/u & make sure they’re done)
UHS

Sinanan, Mann, Horvath, Satava, Calhoun

Residents: 5,4,1,1, International Sub-I

Surgery S Cases: Breast, Sarcoma, Colorectal (LAR, APR, IPAA, Colectomy)

Schedule:

Monday:
0730-end: OR Mann
1200-end OR: Calhoun

Tuesday:
0700-800 Tumor board BB204
0730-end OR Horvath
0800-end: Clinic Mann
1200-1430 SCCA Brst Calhoun
(MANDATORY R2)

Wednesday:
0630-0815 Grand Rounds-1st Wed
0730-1130 Surg Sci
0830-end OR Calhoun
0830-end: OR Mann

Thursday: Clinics go late.
730-830 Pre-op Conference
830-end Clinic Horvath
830-end Clinic Sinanan
830-end Clinic Satava
900-1000 Multi-disciplinary rounds
(Mandatory R1 attendance)
800-end Roosevelt Calhoun
(coordinate /c Surg B chief)

Friday:
630-730 M&M
730-end OR Sinanan
730-end OR Satava (rare)
800-end Clinic Mann
1100-1800 SCCA BCSC Calhoun

Saturday: (if not done Friday)
800-1700 OR Sinanan

Contacts:

Dietician: Judy Brown  598-8361 | 598-1253 (p)
Med Consult 598-5160
New pt intake co-ord: Marion Chuk  598-5879
Ostomy Nurses 997-4422
Susan Willard, RN 598-4532
PCC for lines: Inna C  598-9459 | 559-8643 (p)

Calhoun, Kristine 540-1590
PCC: Suzanne Hoehne
598-9484 | 540-9119 (p)
ultsch@u.washington.edu
RN Rsvl: Keri Hadley 598-6974
crombie@u.washington.edu
RN Bckup: Gail Buchanan 598-8795
gbuchana@u.washington.edu

Horvath, Karen 994-7204
PCC: Inna Condrea
598-9459 | 559-8143 (p)
inna@u.washington.edu
RN: Maryann Herold
598-3390 | 598-9532 (spectralink)
heroldma@u.washington.edu

Mann, Gary 991-0926
PCC: Toni Pulikas
598-9483 | 994-7157 (p)
tpulik@u.washington.edu
RN GSurg: Sandra Draper 598-8932
drapers@u.washington.edu
RN Rsvl: Gail Buchanan 598-8795
gbuchana@u.washington.edu
RN Bckup: Keri Hadley 598-8795
crombie@u.washington.edu

Satava, Richard
425-765-0730 (cell)
595-5946 (p)
PCC: Inna Condrea
598-9459 | 559-8143 (p)
inna@u.washington.edu
RN: Jane Knorr
598-3389 | 598-7944 (spectralink)
jknorr@u.washington.edu

Sinanan, Mika 991-3168
PCC: Doris Campbell
598-9482 | 986-2316 (p)
cambdnw@u.washington.edu
RN: Sheryl Crook AM
598-9531 spectralink
sacrook@u.washington.edu
General:

- Bowel preps: Not all attendings use bowel prep – always check. If using options are: Fleets Phosphosoda po vs. Golytely check with attending. Occasionally use enemas for anorectal cases and LAR, APR.
- Wound care particulars include: handle all JP drains w/ sterile technique: change dirty dressings, swab skin w/ betadine.
- Pelvic JP drains: placed above any perineal closure; stay in for a long time in an effort to reduce perineal wound disruption. Do not pull without checking with chief/attending.
- Foley: On any low rectal case foley remains in for minimum 5 days – check with attending
- Printed orders are in the PACU: Lap Chole, GI Surgery, ICU admit orders (in ICU)

Tips:
In general this service does a fairly wide variety of cases and each attending has specific preferences. Clarify post-operative plans at the end of the case.

1. Breast: Calhoun does operation with scissors, Mann combo of scissors and bovie
   - Breast (usually only mastectomies stay overnight)
   - Post-op orders: Pain meds, stool softeners, ADAT, HLIV, JPs to bulb suction, d/c foley, drain teaching, check with attending about: antibiotics (usually if implant placed), DVT prophylaxis.
   - Post-op check: Look for hematoma, be sure pt ready for discharge in am
   - Discharge and follow-up:
     - Meds: Pain meds, stool softeners, home meds
     - Drain teaching
     - Shower guard for showering at home, ok to shower
     - Remove full dressing in 48h
     - Follow-up 1-2 weeks (appt usually made, check ORCA)

2. Dr Horvath likes all drains fastened to the patient’s body with sutures and tegaderms as well as having all drains clearly labeled. This is especially important in pancreatitis patients with large numbers of drains. Know both the shift and 24 hour outputs and consistency before any phone calls.
3. Colorectal Ca patients go home with a month prescription for Lovenox and need teaching before d/c.
4. Any low rectal case (LAR, APR, IPAA) is likely to have had a lot of dissection near the bladder any some stretch on nerves to the bladder. They will not be able to urinate if the foley is taken out early. Usually leave until day 5 or so. (This is often when the epidural is removed anyway.)
5. Be sure any patient with new ostomy gets stoma teaching and a visit from Susan Willard.
6. Always be thinking about a leak. If a patient has a very prolonged ileus or low pelvic pain have low threshold for AAS and then CT scan. Always talk with attending. If have a diverting stoma these leaks are usually dealt with using antibiotics or IR drainage.
7. Check all wounds daily.
8. Patients should have nutrition labs every Monday. If they are not progressing with diet consider TPN/Tube feeds – talk with attending.
9. Think about dispo early especially if patient is from far away or likely to need home health, home infusion, or SNF (skilled nursing facility).
10. Check ORCA for notes and addendums from attendings indicating plans. Dr Sinanan often rounds late at night and will make changes.
11. Wear a headlight in the OR for most cases especially in the pelvis.
12. It can be helpful to read through old operative note to get an idea of how the operation is done by that attending. Ask residents on the service before you for examples.
UH NIGHT FLOAT
Residents: R1 (floor), R2: Consults/ICU, R4/5 chief on call

Surgery R1 NCCT: Your job is to cover all the floor patients at night. You arrive at 6pm to get sign out from the other services. You should stay through am rounds for continuity.

Tips:
1. You must keep nighttime call log for each service (i.e. what happens)
2. Document in ORCA all patient calls as well as major overnight events.
3. If you have questions or problems always call R2 or Chief
4. You are these patients doctor for a month. Round and get to know them.
5. Assist teams with discharge paperwork for patients going home in am.
6. Check with chief about on call cases you can help with.
7. Be sure before teams go home that you have a plan for all the patients. If you don’t know or you don’t understand - Ask.
8. Good, clear sign out is critical to care of patients and is YOUR RESPONSIBILITY.

 Rounds: In the morning you will do AM rounds until 7am for continuity and education (Mandatory).
Surg O Mon
Surg B Wed
Surg S Tues, Thurs, Fri
You should also attend M&M on Fridays.

Common Calls: See Common calls section. You should always go to the patient’s bedside, make an assessment, start the work-up, call the Chief with a plan. Chest Pain, SOB, Low UOP, Low BP, Desaturation, Tachycardia post gastric bypass – please take this very seriously.

Surgery R2 NCCT: Your job is to cover ICU patients at night, see any new consults at night and discuss with Chief on call, back up and be a resource for R1 NCCT, do cases, teach and assist medical students on call. You arrive at 6pm for sign-out. You stay until all teams have completed ICU rounds in the am. The medical students will report to you at night and it is your job to be sure they are with you to see consults.

Tips:
1. Remember that patient care happens at night so take an active role in managing the ICU patients – you care for them for half of their day.
2. After sign-out round and check in on all ICU pts, answer nurse questions – this prevents calls.
3. All consults should be seen promptly. If concerned call Chief before you even finish seeing the patient.
4. All major ICU management decisions should be discussed with the Chief on call. You should always formulate a plan yourself – but discuss before implementing.
5. The on call medical students are your responsibility – they should see any ED consult with you and be present in any OR case.
6. Take an active roll on morning rounds.
7. Good, clear sign out is critical to care of patients and is YOUR RESPONSIBILITY.
8. Remember the medical student.
9. There is always backup – call if you need help!

UH ICU (R2): Covers the surgery ICU patients during the day. You should arrive to take sign-out from night person and be available to round with all teams in the morning so you can discuss plans for the day.
Tips:
1. Patients should be presented and discussed by system to ensure nothing is missed.
2. Be sure you have a clear plan of action after morning rounds.
3. Try to get main work done in the morning as new admissions usually come in the afternoon.
4. This is your time to learn about Vent management, SWANs, lines, pressors etc – use each patient as an opportunity – The ICU book (by Marino) can be very helpful.
5. Always call if there is a question or concern

UHC (CT SURGERY)
From CT Surgery Book By Carrie Boom

Residents: R1 on thoracic and 2 R2s day/night
CT Surgery patients are on 5SE (ICU) or 5NE (tele)
They have their own manual you should follow – handed out on Day #1.

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone</th>
<th>Phone</th>
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<tbody>
<tr>
<td>Gabriel Aldea (Cardiac)</td>
<td>680-4993</td>
<td>940-2032</td>
</tr>
<tr>
<td>Nahush Mokadam (Cardiac)</td>
<td>540-2088</td>
<td>276-6333</td>
</tr>
<tr>
<td>Edward Verrier (Cardiac)</td>
<td>626-2677</td>
<td>850-0394/542-0242</td>
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<tr>
<td>Michael Mulligan (Thoracic)</td>
<td>998-1584</td>
<td>369-7541</td>
</tr>
<tr>
<td>Thomas Varghese (Thoracic)</td>
<td>559-0352</td>
<td>473-7952</td>
</tr>
<tr>
<td>Douglas Wood (Thoracic)</td>
<td>986-2634</td>
<td></td>
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<tr>
<td>Carrie Boom (Cardiac NP)</td>
<td>540-8204</td>
<td>794-3782</td>
</tr>
<tr>
<td>Nicola Kaye (Cardiac NP)</td>
<td>680-2006</td>
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<tr>
<td>Sinclair Blake (PA)</td>
<td>559-8156</td>
<td>920-6655</td>
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<tr>
<td>John Palmer (PA)</td>
<td>994-2851</td>
<td>443-9401</td>
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<tr>
<td>Andrew Barnes (PharmD)</td>
<td>998-0581</td>
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<tr>
<td>Lynda Tanagi (PharmD)</td>
<td>994-6736</td>
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<tr>
<td>Shauna Andrus (VAD Coordinator)</td>
<td>994-6986</td>
<td>499-1343</td>
</tr>
<tr>
<td>Irina Kalinkovich, (PCC)</td>
<td>340-9479</td>
<td>Office 598-3636</td>
</tr>
<tr>
<td>Karen Smith, MSW</td>
<td>998-0412</td>
<td>Office 598-4583</td>
</tr>
<tr>
<td>R.J. - Clinic MA desk</td>
<td>598-8017</td>
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CT office code 3370

Rounds: Rounds start on 5SE on the following general schedule:
6:00 am Monday, Tuesday, Wednesday, and Thursday (except 1st Thursday)
5:30 am first Thursday, Friday
7:00 am weekends and holidays

Weekly Conferences
Wednesday:  7:30-8:30a  Cardiology/Cardiac Surgery Conference
1st Wednesday:  6:30-7:30am General Surgery Grand Rounds
2nd and 4th Wednesday:  7:30-11:00am General Surgery conference (R1 and R2s)
Thursday:  6:30-7:30am Thoracic Conference (Thoracic M+M 1st Thursday)
Friday:  6:30-7:30am Cardiac Surgery Conference (Cardiac M+M First Friday)

Forms available for use: PLEASE use pre-printed forms. Located in ICU or located in file in 5NE-5207

Extra Responsibilities (ICU resident)
1) Daily notes for all ICU patients on ORCA – FORWARD daily notes to attending on record during the week – ON WEEKENDS, forward ONLY to on call attending.
2) CXR orders – order CXR for all intubated patients, thoracic patients. Do NOT order portable CXR’s for cardiac floor patients unless dictated by clinical condition, even if chest tubes.
3) Update CORES including med list
4) Perform Interim summaries on all patients in ICU > 7 days

Cardiac Floor: Address the following issues in each and every cardiac surgery floor patient
- Initiate/titrates β blocker as tol until HR < 60 or SBP < 100
- Initiate/titrates ACE-I (or ARB if ACE-I intolerant) if indicated for reduced EF, CABG, DM, HTN or if previously on one (if creatinine allows)
- Evaluate fluid status (i.e. increase, decrease lasix)
- Evaluation of finger sticks w/ initiation or titration of meds/insulin prn
- Check for Coumadin needs? *See INR flowsheet in yellow booklet, initiate one if one doesn’t exist*
- Restart appropriate home meds if not already done
- Chest tubes, JPs (water seal, discontinuation)
- Wires? (d/c if no rhythm issues after POD #3 or if anticoagulating w/ coumadin PRIOR to □ INR)

Thoracic Floor: Address the following issues in each and every thoracic surgery floor patient.
- Chest tube plan
- Epidural plan
- Foley plan (related to epidural)
- Anticoagulation plan (once epidural out)
- J tube issues
- Staples plan
- Follow-up plan/schedule

Cardiac Pearls:
- AFib? Happens in 25-50% of all cardiac surgery patients – don't panic – read the AFib section
- AVOID use of IV dilaudid in our patients please!
- Do not give blood products to pts who have not previously received them – discuss with fellow/attending
- Antibiotics continue only 24 hours post-operatively unless special circumstances
- CABG patients get ISDN 10 mg tid x 10 days if LIMA used
- CABG patients get Imdur 30mg q day PLUS Diltiazem 30mg q8h x 6 m if radial artery graft (RAG) used
- Valve patients – refer to Anticoag guide to evaluate need for ASA, warfarin, INR goals and heparin bridge
- All patients on water seal or sans chest tubes can go down for 2v CXR

Thoracic Pearls:
- Avoid colloids for volume replacement in thoracic patients check with fellow/attending
- In GENERAL run thoracic patients DRY
- NO Toradol, NSAIDs or LMWH for transplant patients
- Authorization from ATTENDING prior to swallow evaluations
- Dr. Wood's ESOPHAGECTOMY patients NPO X 7 days post-op: minimum
- ESOPHAGECTOMY patients: DO NOT MANIPULATE NG
- No daily labs unless clinically indicated – EXCEPT transplant patients
- All pts with chest tubes on WS can go downstairs for PA/LAT CXR
- No albumin for Dr. Mulligan patients
- R1: Info to know for each pt before AM rounds includes: Events o/n, CT output, air leaks? oxygen?
### HTN Goals
SBP 100-120 mmHg or MAP 60-80 mmHg unless otherwise indicated (i.e. CVA, renal dysfunction, etc.)

### Oral antihypertensives commonly used in CT surgery

<table>
<thead>
<tr>
<th>Drug</th>
<th>starting dosages</th>
<th>frequency</th>
<th>Max daily dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-Blockers</td>
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<tr>
<td>metoprolol</td>
<td>12.5mg, 200mg, 25mg, 3.125mg</td>
<td>q12h-q8h, q12h-q6h, qday, bid</td>
<td>450mg, 2400mg, 100mg, 50mg</td>
<td>Continue up-titration of beta-blockers to keep SBP &gt; 100, HR &gt; 55, no &gt; 2 β AV Block</td>
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<tr>
<td>labetalol</td>
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<td>atenolol</td>
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<td>carvedilol</td>
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<td>ACE-Inhibitors</td>
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<tr>
<td>lisinopril</td>
<td>2.5mg, 2.5mg, 12.5mg</td>
<td>qday-q12h, q8h</td>
<td>80mg, 40mg, 450mg</td>
<td>Δ to qday or q12h, drug if toleration of ACEI estab.</td>
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<tr>
<td>enalapril</td>
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<td>captopril</td>
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<td>ARBs</td>
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<tr>
<td>losartan</td>
<td>12.5mg, 40mg</td>
<td>qday-q12h</td>
<td>100mg, 320mg</td>
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<tr>
<td>valsartan</td>
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<tr>
<td>Ca++-Channel Blockers</td>
<td>30mg, 5 or 10 mg</td>
<td>q6h, qday</td>
<td>360mg, 10mg, qday</td>
<td>switch to XL prior to d/c, avoid use postop (edema)</td>
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<tr>
<td>diltiazem</td>
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<td>amlodipine</td>
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<td>Diuretics</td>
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<tr>
<td>furosemide</td>
<td>10-20mg, 20mg, 12.5mg, 2.5mg</td>
<td>qday-tid, qday-tid, qday, qday-bid, qday-bid</td>
<td>600mg, 600mg, 50mg, 50mg, 1000mg, 20 mg</td>
<td>replete K+ if necessary</td>
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<td>torsemide</td>
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<td>HCTZ</td>
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<td>spironolactone</td>
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<td>chlorothiazide</td>
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<tr>
<td>metolazone</td>
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<tr>
<td>Other</td>
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<tr>
<td>hydralazine</td>
<td>10-25mg, 0.1mg</td>
<td>Q6-8h, Q12h</td>
<td>300mg, 2.4mg</td>
<td>avoid use postop (orthostatic hypotension)</td>
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<tr>
<td>clonidine</td>
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</tbody>
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### TRANSPLANT
Residents: R2, R3, fellows

Transplant has their own manual and immunosuppression book – carry at all times. This has all protocols for post-transplant immunosuppression as well as other protocols and medications.

**Attendings:**
Adam Levy: 663-9972
Ramasamy Bakthavatsalam (Baktha): 991-6018
Jeff Halldorsen: 541-1047
Jorge Reyes: 559-2910
Andre Dick: 541-0364
**PAs:** Cover most of the floor work during the day and will see ED consults during the day.
Monica pg 986-0329, ph 85104
Reggie pg 540-4759, ph 85672

**Other Contacts:** Transplant patients are primarily on 4SE and in the ICU.

LCNW (op cntr 24/7) 425.201.6563
HLA lab 292-1860
DOOR 6174*
4SE supply 9710*
Copier code 2906
PSBC: 292-1860
max.amc.washington.edu
www.portal.unos.org
www.mdcalc.com
Lynn Davis (pharm) 540-4723
Baxi Vu (pharm) 541-4446

**Schedule:**
- Liver Rounds 9am daily
- Kidney Rounds 1pm daily, Tues 12pm (except weekends and holidays when 8am)
- Thursday: Kidney M&M at 8am
  Liver M&M at 10am
- Immunos usually come back around noon and should be checked before writing next dose.
- Call is q2 – q3 depending on number of residents – home call.
- Much of the schedule changes as the nature of transplant is that it can happen anytime.

**R2 Responsibilities:** Floor work, immunos, call, general surgery cases and kidney transplants, helping with procurements and livers when on call.

**R3 Responsibilities:** All of the same as the R2 plus: 1. round on ICU patients (they are on medicine ICU service) 2. Thursday M&M.

**M&M:** All of the data is on MAX (transplant database). The fellow will show you how to access when you get on service. You should print out a list of all kidney inpatients, all liver inpatients, all transplants, for the week prior to the M&M. Look up or be able to say brief history and outcome/plan for each patient. If there is a more complicated M&M more details should be available. You do not need to make overheads as MAX is just pulled up at M&M.

**MAX:** (max.amc.washington.edu) This is the transplant database. It is used for data tracking and M&M. It can also be used for gathering transplant specific H&Ps when you are admitting transplants pre-op. Often their immuno plan will be there as well.

**Tips:**
- Be available. Procurements can be great opportunities both to travel and to see terrific anatomy.
- Get to the OR even if just to backtable or close. The more you are there the more you will do. Again there is wonderful anatomy on transplant.
- Remember these patients are sick. Do NOT blow them off. Always f/u and check.
- In general when liver patients are sick they are either infected or bleeding – be sure you work them up for both until find a cause.
UROLOGY
7SE is the Urology floor. Most ICU patients go to 5E. Overnights - pavilion short stay.
Urology resident’s office (Pavilion 1st floor)
There are 2 fellows - one in Urology cancer and the other in laparoscopy
Locker room on 7SE (combo 4818*)

Conferences
Wed am – lecture Thursday – pre-op conference

Please try and scrub-in/ watch at least one each of the following during your rotation:
• Retropubic radical prostatectomy
• Suprapubic prostatectomy
• Bilateral/unilateral lap nephrectomies
• Open total and partial nephrectomies through flank and Chevron
• Perc nephrostomy, cystoureteroscopy
• Repair cyctocele/rectocele/enterocele with pelvic sling
• Cystectomy with ileal conduit
• Cystectomy with ileal neobladder
• TURPs
• Insertion of suprapubic catheters
• Try to pay attention to anatomy.
• Learn about all the different type of catheters!!

Daily Schedule:
1. Print out cores list for team. Pre-round on CIS, labs, check consult notes.
2. Put the charts, order book, and extra lists on the small cart on 7SE.
3. Rounds: Intern’s job is to write notes and orders. Rounding always starts on 7SE and moves down.
4. Remainder of the day:
   • Chief wants you to spend ½ a day in clinic per week. Arrange with team.
   • Answering calls on floor patients and newly post op patients
   • Write all notes
   • Scrubbing into cases - Great time to help open/close.
   • H&P updates - you will be called, at times out of rounds, to update patient’s H&Ps
   • Social work rounds - Mon or Tues- discuss the disposition of the patients.
5. Afternoon rounding: Round with the R3 and often the R5. Preround before this.
6. Call: Home call. You are on every Friday night and Saturday until 1700 and any weeknight the Harborview resident is on call. Ask R3 for a schedule. You cover Urology floor patients ONLY.
7. Dr. Lange requests you e-mail him when his patients are discharged so he can write a letter to the referring doctor. He wants the name, medical record number, operation, and highlights of the hospital course. His email is Lange@u.washington.edu.

Floor tips
• Prostatectomy - usually clears POD 0 and reg diet POD 1, OOB POD 0 and ambulate POD 1. Usually here 2 days, lap cases sometimes leave POD 1. All go home with a foley in place and need foley teaching before D/C.
• Cystectomy - 2 options:
  - Ostomy: they have ureteral stents in place as well as a red rubber catheter and a penrose. The penrose usually comes out first (after 5-7 days). Will need ostomy teaching before D/C and visiting nurse after D/C
  - Continent reservoir: have ureteral stents, a malecot (foley into the stoma), and a suprapubic foley. Stents stay in usually 7-10 days. They need ostomy teaching and VNS for D/C. The stents and foleys start getting flushed with NS POD 3-4.
• Cystoscopy w/ biopsy: often have continuous bladder irrigation overnight (a special foley that pumps fluid in and lets it run out - prevents clots). Usually go home with several days of abx.
NEUROSURGERY
Pts located on 4NE or ICU
Attendings: Silberfeld: neuro-oncology
            Rostomily: skull base
            Tredway: spine
            Hillard: spine
            Loeser: functional, pain

Conferences (all in 7th floor RR conference room unless specified):
• Monday Skull Base with Rostomily  4-6pm
  o May or may not happen
• Tuesday Morning Spine Conference
  o 7am, you are usually late because of rounds
  o Joint case conference between Ortho and NS.
• Wednesday Grand Rounds (@HMC)
  o To HMC via shuttle or ride at ~630 in research bldg
• Wednesday Case conference - 5pm
  o All UWMC attendings show up
  o Junior presents cases on the board for the next week

Useful Numbers
• Page Operator 8-6190
• NS Social Worker (Hkori) 8-6193
• MRI/CT/Radiology at bottom of patient list from cores

General Tips: (From Mike Levitt)
• Get Eric’s guide to the U, especially for managing the Loeser pump patients, and
  you need to know that stuff and it will come up on call and during the day
• If you are on call, you are expected to go to the pre-op holding area in the
  surgery pavilion at 530am to put fiducials (small circular stickers for MR
  localization) on any crani patient who is getting a stealth MRI. Look ahead on
  the surgery schedule for any patient marked STEALTH.
  o To put on fiducials, first look at what surgery the Pt’s having (ie left side,
    right side, posterior, etc.) then shave between 10-12 quarter-sized spots on the
    Pt’s head. In general, they should be randomly scattered and not symmetric,
    with ~3/4 of them around the surgical area and one on each mastoid process.
    Apply benzoin, then stick on fiducials. Trace outline and center dot with marker.
• To draw CSF from an EVD (extra-ventricular drainage) or lumbar drain, get a
  10cc syringe, two red caps, a biohazard bag, and betadine (you may also need an
  18G needle). With sterile gloves, draw around 6-8cc of CSF from stopcock most
  proximal to the Pt. Put a red cap on the syringe, apply betadine to the line at the
  stopcock site, and place a new red cap. Send the CSF as a STAT lab by telling the
  nursing station. Send for gram stain, culture, protein, glucose, and cell count.
• There is a radiology reading room/consultation room on the second floor with a
  radiologist in it 24/7. You should go here for reads.
• You have to hound radiology all day long to get your MRIs done. Usually they give
  priority to outpatients between 9 and 5, so inpatients are done between 6-9 am and
  6-11pm. Call often and the techs will usually have a good idea when MRI will be
  done. Always fax them yourself and call MRI immediately afterward.
• Typically, crani patients get a post-op head CT immediately after OR, then a post-
  op MRI (usually MRI brain “tumor protocol”) within 24h of surgery.
• On call:
  o Do not call APS unless cleared by the chief; Tredway especially dislikes APS.
  o If you are on call and there are no ICU patients in house, you may take call from
    home.
• You also usually have 2-6 ICU patients.
• Loeser pain pump: Learn to use the pump programmer ASAP (ask the R2) – one
  is kept in the surgical pavilion clinic and the other in the front cabinet on 4N.
HARBORVIEW MEDICAL CENTER
Address
Harborview Medical Center
325 9th Avenue
Box 359796
Seattle, WA 98104-9796
Paging: 206.731.3000
IT: 206.731.2111 @ 7EH-66.2

Main Contacts
Lisa McIntyre: lmcintyr@u.washington.edu   Phone: (206) 744-2227
Suzanne Mills: smills@u.washington.edu     Phone: 206-731-3433

Phone Numbers
744-XXXX (used to be 731)
744-3000
dial 4 - XXXX

Chief Office 3355
Surgery Clinic 3241
Surgery Office 8741
PACU: 2310, 3403
ER 3074/4074
ER Charge Nurse 4025
ED Obs 8575
ICU Hold 2395
2E/CCU 3025
SICU 4628
2W NICU 5935
2W MICU 3257
2W TICU 3510
3E Tele 3351
3W Epi 3347
4E 3331
4 W 3201
5E Ortho 3550
6E Ortho 3273
LSU 8088
7E Surg 3354
8E BPS 8704
BICU 3127
PICU 5666
OR 8800 (88RM#)
Paging 147

Paging Emergency 301
Pharmacy 5944, IP 3220, OP 3218
Radiology 3105
Angio 3380, 5858, 6256
Fluoro 6133
Main Xray 8916
CT Trauma 8434
CT Main Scan 6245
CT In Pt 6937
MRI 6420
CT OP 6842
Reports 2248
File Room 3109
Body rads 6741, 2812
Chest 6142
Trauma Radiology 3346
ER Radiology Resident 3651
Body rads 6741
Neuroradiology 4723, 6143
Nuc med 6143
Vascular Lab 8048
Angio 5858
Main Lab 3451
Micro 5858
Path 3145
Surgery Clinic 4704, 4705, 2094, 2167

Other:
OR Coordinator (Larry Hanks): x43195
GS Clinic (Alison): x44077
R1 Call Room: x48047
R3 Call Room:
R5 Call Room:

Hot Pagers:
Team I: 559-1115
Team II: 559-2221
Vascular: 663-3333
TICU: 540-0050

Codes
HMC R1 Call Room 7EH24: 2-5-4-3
BPS R1 Call Room 9th Floor: 1-7-7-6
TICU R2 Call Room 2W88: 1-8-8
HMC R3 Call Room GH 09: 1-3-3-1-3-3
Ground Floor Scrub locker room: 1-7-3-9-5-5
HMC ER: 123 double door
door 3074
backdoor 134
Herman Library 7EH64 1-5-4-3

The Surgery Administrative Office at HMC, 7 EH 66, Now has a punch-lock combo on the door. Combo is 7874 You might remember it by: If you were on a phone key-pad, it would spell SURG. The copier code: Login = 1 PW = 7874 Then press ID button.

CONFERENCES:
General Surgery:
- Trauma Conference: Mon 12:00 pm R&T Room 109-113
- TICU Rounds (Maier Rounds): Tues 7:00 am TICU
- Grand Rounds/Surg Sci: Wed am at UW
- ICU Conference: Wed 11am R&T building
- Tumor Board: 12:00 4th Thurs. R&T building
- M&M: Fri 7am R&T building
- Jr. Resident Conference: Fri 10:30 Herman Library

Thoracic:
- Trauma Conference: Mon 12:00 pm R&T Room 109-113
- Grand Rounds/Surg Sci: Wed am at UW
- Tumor Board: 12:00 4th Thurs. R&T building
- Thoracic didactic 6:30 am at UWMC
- M&M: Fri 7am R&T building
- Jr. Resident Conference: Fri 10:30 Herman Library

Vascular:
*** Morning Report: M/T/Th am meet at Starnes office (Tues alt with Tran)
- pm rounds with attendings 2x/week and walk rounds Fri pm
- Trauma Conference: Mon 12:00 pm R&T Room 109-113
- Vascular Conference Tues 7am (M&M is first Tues of month)
  - Limb viability: Tues 8am with Jacki
- Grand Rounds/Surg Sci: Wed am at UW
- IR Conference: Thurs 8:30 in Angio Suite
  - Tumor Board: 12:00 4th Thurs. R&T building
  - M&M: Fri 7am R&T building
  - Vascular Conference (with presentations): Fri 8am Herman Library

BPS:
*** Wound Rounds: M/T/Th/Fri 10-10:30, Wed 11-11:30
- Burn Resident Teaching rounds: Tues 7:30 Herman Library
- Burn Rounds: M/Th 12:00 on 9th Floor
- Grand Rounds/Surg Sci: Wed am at UW
  - M&M: Fri 7am R&T building

Ortho:
- Grand Rounds: Mon 7am – R&T building/UW (alternate weeks)
- Fracture Conference: Mon 4pm
- Wed am: Journal Club/M&M/Case conference – R&T building
- Jr Trauma Conference: Fri am – R&T or Ortho lab
- Table Rounds: Sat/Sun am
NS:
• Grand Rounds: Wed 7-9am R&T (often intern off this day)
• Radiology Rounds: Thurs 7:30-8:30 am Radiology Conference Room

CLINICS:
Clinics in general are located in the clinic wing (West Hospital). This will be changing along with some of the clinic times when the new building is open and running.

General Surgery: 3rd floor
  GS1 general: Monday am
  GS1 trauma: Wed am
  GS2 general: Tues am
  GS2 trauma: Thurs am

Thoracic: 3rd floor
  Monday pm (general), Tues pm (Chest Clinic with Pulm), Fri (SCCA)

Vascular: 3rd Floor
  Tues am (Renal Clinic), Fri (general clinic)

BPS: 8th Floor East Hospital
  There are multiple clinics ongoing – try and make an effort to attend if you can.

Ortho: In West Hospital
  Red: Thursday
  Blue: Tuesday
  Green: Wednesday

NS: No clinic required
**Note – when the new building opens there will be changes in the OR and clinic schedules. General surgery will have OR block time daily.**
Communication:

There must be excellent communication to facilitate care. Residents that operate should communicate (verbally, if not in person) with the intern or R2 that will be taking care of the patient post-operatively. R3s that admit from the ER should communicate with the intern (verbally, if not in person) if a patient is admitted to the floor and the R2 if a patient is admitted to the ICU. R2s should communicate (verbally, if not in person) to the intern if a patient is transferred out from the ICU to the floor and vice versa. R1s are responsible for adding and updating all floor patients to CORES. R2s are responsible for adding and updating ICU patients to CORES (ICU and general lists). R3s are responsible for adding consults to CORES. In general if you operate on a patient you should update/add them onto CORES after the OR.

Patients transferred from the unit to the floor who have been in the unit greater than 3 days must have a transfer summary!

Nurse Practitioner Service:

There is a Nurse Practitioner Service at HMC with a limited patient capacity which can provide care for long term non general surgery patients. In general patients who have not been operated on by general surgery and have no active general surgery issues can be transferred to this service on a space available basis. Transfers should be alternated between Team I and II. All transfers should include detailed sign out. The R3 and R5 should be available to assist the nurse practitioners with questions if needed.

Patsy Thomas: 663-8580
Kris Bauer: 540-6174
Ann Frolich: 540 - 3908
Catherine Slack: 540-5584

HMC TRAUMA TEAM I/II
All attendings have offices on the 7th floor.
Attending Call Room: x44309

Team I
Saman Arbabi, MD: 340-7013
Joseph Cuschieri, MD: 559-2272
Ronald Maier, MD: 540-4869
Grant O’Keefe, MD : 559-7394
Tam Pham, MD does both services
and BPS: 540-0939 x8565

Team II
Eileen Bulger, MD: 663-0217
Hugh Foy, MD: 405:5328
Jerry Jurkovich, MD: 994-3530
Lisa McIntyre, MD: 541-0259 x3338

Nurse Coordinators:
Andrea Gahl (HMC I): 680-5362 x3567
Betsy Schmitt (HMC II): 994-8025
Heidi Swersie (HMC II): 994-8025

HMC I/II Structure: R5, two R3s, two interns.
Roles: The R5 is the chief on either HMC I/II. They are ultimately responsible for all of the patients on the service including ICU, floor and consult patients. Additionally they should take the active role in educating and organizing medical students. The fellows provide guidance and help. R3s are responsible for ICU, floor and consult patients to varying degrees. Additionally on call days they are responsible for all general surgery consults and overseeing the work-up of trauma patients in the ED. Interns are responsible for the daily care of patients on the floor and going to clinic. They are responsible for the minute-to-minute care of patients and coordination with other services and teams to facilitate patient care. That means they see patients, write notes, look up labs, call consults, order diagnostic tests and follow-up on all of the above. Interns should direct all questions to one of the R3s on their respective service and if they are not available, the chief for the service.


**Schedule:** Everyone is expected to do their best to come and leave on time.

- **R5:** Mon-Fri 5am – 6pm and every other Sat 6am-Sun noon
- **R4 (Night float):** Sun-Fri 6pm – 7am
- **R3:** Take straight q4 call. Should leave by noon on post call days. If not on call on weekend then off.
- **Dayshift R1s:** Mon-Fri 5:30 – 6pm. Weekends (alternate) Sat and Sun 5:30am-5pm
- **Nightshift R1:** Sun-Fri 5:30 pm-6am
- **TV R1s:** Mon-Fri 5:30am – 6pm  and alternate Sat 6am-Sun 10am (daytime cover TV only, night time covers HMC I and II as well as TV.

**Weekend coverage**
- The ICU team (attending or fellow) will notify the trauma attending of any surgical (wounds, dropping hematocrits, concern for intra-abdominal infections, etc.) issues on the weekends. Therefore, the R4 will no longer have to round on the ICU patients for the R5 that is off that weekend.
- The on-call R5 should make rounding on the ward patients and consults a priority, rounding on the ICU patients for surgical issues as time permits.

**Hand offs:**
- Monday-Friday: All patients that come to ER after 5am will go to the team coming to be on-call that day (not the post-call team).
- Saturday-Sunday: At 7am of weekend days, the R3 coming to call should show-up in the ER and get sign-out of the patients from 5-7am and assume care. The post-call R3 can go and round, then leave the hospital with his/her team by noon.
- The Chief on the “coming on call” team should round on the floor and secondly in the ICU (since there is an ICU team rounding). The R3 will meet with the chief to round once things are squared away in the ER.

**R1 Pearls**
- Get to know and make use of the consulting and professional services available such as physical and occupational therapy, speech therapy, UDF (unit discharge facilitator), and charge nurses to expedite care.
- Someone from the team MUST attend dispo rounds held in the side room on 7E every morning.
- There is a pharmacist available to the surgery team at all times. They are an invaluable resource. Use them.
- Most patients will need clearance from PT/OT. Any patient with LOC will need a cognitive evaluation. These things should be thought of early so they can be scheduled through the day.
- Think early about the types of care a patient will need and the resources they have as they approach discharge. Talk with SW and the UDF early about patients who will need a shelter, respite, SNF.
- Rehab consults must be called on appropriate patients
- Stay in touch with consult services and know there OR plans and f/u plans for patients – once they are in place be sure to add them to CORES so everyone can know that info.
- Prepare discharge medications and summaries the evening before an anticipated or expected discharge. Keep the list up-to-date with any and all information related to your patients.
- When you round I the morning for each patient think about 1. what lines/tubes/ drains they have and if they need them 2. Review medications (DVT proph, abx, GI proph) 3. Nutrition 4. Ongoing needs from other services 5. Disposition and barriers to discharge.
- Morning sign-out must include any important overnight event and how it was handled. It is most helpful to have all the information about these events (i.e.
look into them yourselves – check on pt, check with nurse) before rounds so that rounds can flow smoothly.

- Evening sign-out must include any pending issues on patients as well as plans for what should happen if...and when an upper level should be notified.
- Before leaving the floor for the OR it is always a good idea to check in with the charge nurse and answer any pending questions. This often prevents many small calls while you are trying to operate.
- If you are not doing something else GO TO THE OR. The best way to operate is to be standing there.
- When you are getting sign-out on ICU patients be sure to clarify all injuries, consulting teams and ongoing plans – this will only make your life easier.

R3 Pearls

- In general you and your partner are responsible for the day to day running of the service and directly supervising R1s and medical students. There are many ways to divide the service. Some divide floor and ICU, some divide floor. Find a system that will work for your team to have all the patients seen. Be sure you update each other so that everyone knows about everyone.
- R3 is responsible for seeing and following any consults.
- Be sure to speak with each Trauma Doc you are working with and let them know when you would like to be called with consults and how you like to manage patients. i.e. expectations. Do not assume anyone knows what you want or how to work up a patient.
- You are responsible for making sure all patients get a proper work-up and the chief is kept informed. Call the chief early about any sick patients, ICU patients, operative patients.
- Before admission or discharge check up that all patients had proper work-up: trauma series, ua, adequate hcts, check all labs, abdomen cleared, mediastinum cleared, spine cleared, consults called and have plans.
- Sign-out all patients to R1 or R2 with your plans for their continued care.
- All lines, chest tubes, etc done in ED by juniors must be supervised.
- Find a method (Cardboard, stickers, list, etc) to keep track of all consult patients and pending studies.
- Always review CORES around 4:30 am when on call to be sure all patients were added before list printed for am rounds.
- Get to the OR as much as possible. You will often be able to do the case with the R5 which is a great learning experience.
- Be sure to log all non-op trauma cases (splenic/liver lacs/polytrauma that are non operative).
- Keep track of M&Ms for the week. Do not forget to call coroner’s office for cause of death.

R5 Pearls

OR Issues

- Dr. Foy is fond of saying that the first thing you should do in the morning and the last thing you should do at night is check the OR board. He might be right. The OR schedule is incredibly fluid. Make sure that everything that you know about is lined up the way you intend it to be, keep on top of all the changes that take place, and minimize surprises. Checking in with the front desk frequently – and being polite about it – means the difference between doing your appy at 3pm and 3am. Don’t neglect this task.
- Try to look ahead and plan a week in advance. Over the weekend, look at the OR schedule for the coming week and know the patients and the basics about the cases so you can prepare. It also allows you to assign cases appropriately. Remember, though, that the OR schedule at HMC is in constant flux.
- Review previous operative dictations from attendings to learn how they do a
particular operation.
• Communicate with Larry Hanks frequently. If the schedule is not to your liking, figure out one that is, make sure it will work with Larry, and clear it with the appropriate attending. They tend to be flexible.
• Meet Deb Merte at the start of your rotation. Call her a few days before a big case. She will ensure the right equipment is ready. She has handouts from the attendings for many of their major cases. Her contact info is: office 744-3614; spectralink 7691; pager 405-8578.

Teaching
• You will be pulled in multiple directions at all times and may not always be on rounds, so it is easy to neglect the medical students. Try not to. Make sure the R3s are coaching them on how to present on rounds, so that when you are there, they can shine. Bring them with you to see interesting patients. Review scans with them. Page them to let them know you are going to the OR, talk with them about the case, and point out the anatomy. Let them close incisions or be the primary surgeon on an I&O at 4 am with you – they will love you for it.
• Create a list of potential teaching topics for the medical students/interns so if you have 5-10 minutes and can’t think of anything, you have a resource for teaching material.

Managing the Team
• Lead by example.
• Know your team. As early as possible learn the strengths and weaknesses of everyone on your team (interns, ICU R2s and fellows, Trauma Doc, R3s, night chief) and give them an appropriately long/short leash. Continually re-evaluate and adjust accordingly. HMC provides the greatest opportunity for resident autonomy at every level, but a weak link in the chain at any point can have disastrous consequences.
• Know when and what to delegate. It is almost impossible to see every patient every day within the confines of the 80-hour workweek. Therefore, to preserve your sanity you must be willing to delegate some responsibility to various members of the team, whether it be allowing the ICU team to manage non-surgical issues in the ICU, the R3s to manage non-urgent consults and ER trauma without immediate oversight, or the interns and R3s to manage floor patients without you. Again, the job is bigger than one person can handle, and it is up to you to figure out where and on whom your attention needs to be focused.
• Make your expectations clear. Be as specific as possible whenever someone new starts on your service. Examples include telling new R1s what you expect them to know for morning rounds, what your CORES requirements are, pet peeves, telling the R3 at HMC that they should take charge of the service. This sounds simple but is actually one of the hardest things to do. We all fall into the trap of assuming everyone knows what we want, but they don’t. The less guesswork people have to do, the happier they (and you) will be.
• Communicate clearly and with as much detail as necessary to ensure your point gets across. Remember to specify what you want as people don’t always understand the multiple steps required to accomplish something. At the same time, don’t try to control everything your juniors do – they will resent you and you will get exhausted.
• Give regular, balanced feedback. The standard feedback “system” is less effective than one-on-one conversation. This is particularly true for the R1s and R2s, for whom everything is brand new. Most people do want to do a good job but many have no clue whether they are terrible, terrific, or just average. The tendency is to focus on the deficiencies. Make the feedback constructive, and be sure to recognize good work when it is done.
• Finally, credit for a smoothly-running service should go to the team; deficiencies
are your responsibility. In recent years some of the least successful chiefs have been those who have been unwilling to share credit but who have been the first to assign blame. Acknowledge your juniors’ success publicly; discuss the failures privately. Protect your teammates, and they will protect you.

HMC Night float (R1, R4)

R1: Your job is to run the floor at night. Try and remember that patient care continues 24 hours a day and that many things can be accomplished at night. In addition to putting out fires and answering questions help out by working on discharges and other floor work.
- If you have problems or questions on the floor patients your first call should be to the R3. If they are unavailable call the Chief.
- If you have free time head down to the ED to see if you can help out admitting and working up patients.
- Any Rapid response should be addressed immediately and discussed with the Chief on call. If you don’t the stat nurses will. These should be documented with an ORCA note.
- You have a critical job in maintaining continuity. Be sure to take notes overnight so you can give clear am sign-out.
- When getting evening sign-out be sure you have clear plan for all patients.
- Keep CORES updated especially on new admits

R4: Provided night time continuity. Main job is to back up the R3 with consults and take patients to the operating room. There is often a fellow on call at night as well who is primarily helping in the ICU.
- On arrival:
  1. Check who is on call and if there is a fellow
  2. Check in with R3 on current ED situation (this is often busiest time in ED)
  3. Check OR board and take over if any chiefs are still in OR with ongoing cases.
  4. Brief sign out on active issues from HMC I/II/TV chiefs
- Recommend rounding and running list early with floor R1 and ICU R2 to learn active issues, answer questions, and do some teaching.
- Encourage R3 to keep you updated constantly as they are your link to what is going on.
- Review all important films and work-ups for completeness and before discharges
- All procedures in the ED should be supervised by an R3, R4, R5, or fellow
- Review resuscitation protocols and remember to keep sick patients moving through and get them to proper locations (OR, ICU, IR)
- Fellow and Attending must know about all ICU admissions and operative cases
- Keep OR appraised of all potential operative cases

HMC TV

Residents: R5 (Thoracic), R4 Vascular, 2R1s, PA

Attendings:

- Benjamin Starnes, MD (Vascular): 540-3183
- Nam Tran, MD (Vascular): 986-0229 x 4829
- Thomas Varghese, MD (Thoracic): 559-0352

Other:

- Mark Meissner: 680-0645
- Tom Burdick (IR): 541-1381
- NW Orthotics: 323-4040
- Vascular PA: Jackie Peterson: 559-7960
- Vascular ARNP: Brenda Allen: 680-8129
- Vascular PCC: Ana Lecksiwilai: 744-2452
- OR Coordinator: Larry Hanks: x3195

Schedule (Hours): For the TV service on the weekend, the 2 interns will alternate
Saturdays where they will do both daytime and nighttime call, a full 24 hr shift, covering all services at night. The dayshift interns on Team 1 and 2 will be expected to cover their services until 5pm on Saturday to allow the TV intern to focus on TV patients during the day. On Sunday, the TV intern will then sign out the TV service to the TV R4 who will be coming in as the dayshift chief. The other TV intern will be off that weekend. The R4 covers Sun-Fri 5:30am – 6pm. The R5 works Mon-Fri days, no call.

**Thoracic:**
- Conferences and Clinics:
  - OR Monday and Wed all day
  - Trauma Conference: Mon 12:00 pm R&T Room 109-113
  - Clinics Mon and Tues afternoons
  - Grand Rounds/Surg Sci: Wed am at UW
  - Tumor Board: 12:00 4th Thurs. R&T building
  - Thoracic didactic 6:30 am at UWMC
  - M&M: Fri 7am R&T building
  - Jr. Resident Conference: Fri 10:30 Herman Library

**Main Cases:** Bronchoscopy, VATS, Wedge/Lobe, Nissen, Esophagectomy
**R1 Role:** Clinic, Notes, Discharges, Conferences, chest tube management, should try to come to OR to learn bronchoscopy if available.
**R5 Role:** OR, Clinic, patient management.
**Chest Tubes:** Operative chest tubes are placed using a U stitch. When removing the tie down suture be careful not to cut U stitch (wrapped around tube). Have a second person available. The patient should take full breath in and hum. While one person pulls the tube (very quickly), the other should tie down the U stitch to close the hole. Then apply a tegaderm. The bandage remains for 48 hours. The stitch comes out on Day #5. When a chest tube should be on suction vs. waterseal often depends on clinical situation. Check chest tube plan with chief/attending. Always check CXR with radiology before removing any chest tubes.
**OR:** Dr Varghese starts all thoracic cases with flexible bronchoscopy. You should set this up so it can be done quickly at start of case. After this patient will need to be changed to double lumen tube and then positioned.

**Vascular:**
Residents: R4, R1s (R5 Thoracic available to help for cases as needed).
Conferences and clinics:
*** Morning Report: M/T/Th am meet at Starnes office (Tues alt with Tran) – this is to run the list daily and make plans for patient management. Done every day but Wednesday (done in OR).
  - OR: Mon/Tues/Wed
  - MIPS: Thursday
  - Clinic: Friday all day, Tues: fistula clinic
  - pm rounds with attendings 2x/week and walk rounds Fri pm
  - Trauma Conference: Mon 12:00 pm R&T Room 109-113
  - Vascular Conference Tues 7am HMC (M&M first Tues)
  - Limb viability: Tues 8am with Jacki
  - Grand Rounds/Surg Sci: Wed am at UW
  - IR Conference: Thurs 8:30 in Angio Suite
  - Tumor Board: 12:00 4th Thurs. R&T building
  - M&M: Fri 7am R&T building
  - Vascular Conference (with presentations): Fri 8am Herman Library
Main Cases: AV Fistulas, Bypasses, AAA, EVARs

R1 Role: Taking care of floor patients, notes, discharges, clinic, often will see consults if directed by the R4. There are some great opportunities for getting to the OR and doing fistulas and other cases.

R4 Role: The R4 TV will maintain primary responsibility for all vascular patients and vascular consults. This includes: Supervision of inpatient care of vascular patients, Operative coverage for all vascular (and thoracic) cases, Evaluating all vascular consults, Attending all clinics and conferences. Only when not occupied with vascular duties will this resident be available to assist with coverage for general surgery and trauma issues. The R5 is available to help with coverage of vascular cases.

- When the vascular R4 is not available (i.e. time off/ night): The R5 or on-call senior resident will cover these cases and patients.
- Vascular consults will be evaluated by the on-call R3 (from ED or night) or the R1 if they are inpatient consults.

Post-Op Care:

- EVAR: Patients spend night in ICU post-procedure. They can have their diet advanced as tolerated. Remove foley in am. Before discharge they should not only have their f/u arranged but also their f/u imaging. Patients usually get CTA at 1 month. Additionally before discharge patients should have 4 view of the abdomen to document graft position.
- Bypass: All Bypass patients should have ABIs documented in the chart post-operatively. Check with the attending about ASA, antibiotics. Always consider beta-blockade as patients usually also have CAD. Check wounds daily and keep leg slightly elevated. Wounds are often weepy for several days post-operatively and legs edematous – this will improve with diuresis and elevation.
- Fistulas: Usually outpatient surgery. Need oral pain meds and a 2 week follow-up. Also instructions not to ever bandage that are tightly even if there is bleeding (they can clot the fistula).

Consults: Most commonly for; AV fistula, non-healing foot ulcers, cold leg, AAA, vascular trauma.

- Fistula: Assess prior access attempts (h/o lines, prior fistulas, IVs etc.). Handedness. Cardiac history (for OR). Many patients will need vein mapping or arterial duplex to outline anatomy and location of acceptable vein. If no acceptable vein may need AV Loop graft.
- Non healing ulcer: Start with standard H&P. Important to distinguish between diabetic ulcer, venous ulcer, arterial ulcer. Be sure to get ABIs. If there is a problem with arterial flow next step can be duplex/angio (be sure to look at creatinine). If venous problem think about Unna Boot.
- AAA (ruptured): Should have trauma code called to assist with expediting care. If you have advanced warning call the operating room so that they can prepare (especially if thinking of doing endovascular approach). In ED do not over resuscitate to prevent bleeding. Send labs, esp. T&C. If unstable -> OR. If stable -> If coming from outside hospital and have films load and assess possibility of endovascular repair. If new patient and stable send to CT for AAA protocol CT and then down to OR if meets criteria. Need grafts, angio personnel, C arm, IR table. Asymptomatic AAAs worked up non-ergently with CTA.
- Vascular Trauma: Control bleeding – usually this can be done with direct pressure.
- Major indications for immediate OR: active hemorrhage, pulse deficit, expanding/pulsatile hematoma, distal ischemia, bruit, thrill -> OR for exploration vs. angio
- Minor indications: h/o hemorrhage, deficit in anatomically relate nerve, stable/ non-pulsatile hematoma, diminished ABI -> angio
- Always consider fasciotomies and compartment syndrome when re-vascularizing.
Check ABIs/Arm ratio: if >0.9 needs further workup (angio/duplex)

**How to measure an ABI:** You will need a free standing BP Cuff and a Doppler. Measure the patients systolic blood pressure in the brachial artery using the Doppler and cuff. The measure systolic pressure in dorsalis pedis and posterior tibial arteries in both legs. Use the higher of the DP or PT and the higher arm pressure. **Place the leg pressure over the arm pressure to get a ratio.**

- 1.0 = normal
- <0.9 abnormal – if trauma will need further evaluation (duplex, angio)
- <0.7 claudication
- <0.3 rest pain

Critical ischemia if skin changes, sensory or motor changes.

Do these on everyone! All post-op vascular patients should have these documented in a note.

*****If you ever cannot reach IR staff call the UW paging operator and page through them.******

**HMC TICU**

Residents: Fellows, 4-8 R2s that have primary minute-to-minute responsibility for the ICU patients. The respective surgical team (I/II/TV) manages the surgical issues.

**Conferences:**
- Trauma Conference: Mon 12:00 pm  R&T Room 109-113
- TICU Rounds (Maier Rounds): Tues 7:00 am TICU
- Grand Rounds/Surg Sci: Wed am at UW
- ICU Conference: Wed 11am  R&T building
- M&M: Fri 7am R&T building

**Rounds:** The team rounds daily at 8am and formulates plans for all patients for the day. You should have pre-rounded on all your primary patients. The nurse will usually present data by system and you will present any additional info and the plan. You should also be available to round (even if only paper rounds) with surgery service to review plans and progress.

**Responsibilities:**
- Daily rounds and notes
- Contact with all surgical teams involved with your patients to follow up on operative plans.
- Constant assessment of need for lines, tubes, etc.
- Clear sign-out to on call resident or floor resident during transfer of care
- Keeping chief/fellow/attending informed.

**Documentation:**
- All patients need an admit note, a daily progress note, and an interim summary when they go to the floor.
- All procedures must be documented in a procedure note.
- Patients must be kept up to date in CORES – including all lines and procedures.

There are a variety of protocols you should familiarize yourself with: Sedation, Sedation Vacation, VAP, SBT, Nec Fasciitis, cortisol deficiency, Factor VII, activated protein C, insulin protocols, nutrition protocols, anticoagulation guidelines, spine protocols. (see later sections of this book). Additionally there will usually be a nutritionist, pharmacist and often the pulmonary critical care team on rounds who are invaluable sources of information.
Sign out: When patients go to the floor there must be verbal communication between the R2 and the floor R1. Patients who are physically in the ICU are taken care of by the ICU resident even if they have floor orders.

HMC BPS (adapted from Burn Pearls)
***You should have Burn Pearls in your pocket throughout the rotation. Read from cover to cover.***

Attendings:
David Heimbach: x8006
Nicole Gibran: x3140
Matt Klein: 559-6300
Tam Pham: 540-0939
Nick Vedder: 986-6047
Craig Birgfeld: 995-9288
Jeff Freidrich: 994-5893
Gruss: 991-6076
Hopper: 469-4168
Mathes: 986-0221

ARNPS:
Karen Bidwell: 541-5293
Rhonda Clayville: 559-8016

ICU patients are mostly in BICU (9th floor) and floor patients on 8E.
Call Room on 9E

Residents: Burn fellow, Senior plastics residents, R3 and four interns along with two ARNP
R3 is responsible for all of the patients
There are 4 interns, some are from different programs (Swedish, Madigan, VM, NW). Interns are responsible for the daily care of patients on the floor and ICU. The service is divided into Burns, Plastics, Cranio Facial and Hand, The rotation is divided in 4 weeks, divided into OR, Days, Nights or CF/hand.
1. OR Intern: In the OR all day. Talk with the R3 to know which room. Pre-op all patients having surgery that week (ask the R3) and post op all patients of the day (you can ask the day intern to do it for you). Call R3 with all questions.
2. Day Intern: You take care of the patients in the ICU, consults in the ER or floor and after 2:00 or 2:30 (when the ARNPs sign-out) you take care of all the floor patients as well. Call R3 with all questions.
3. Night Intern: Start at 6pm. Take care of all ICU and floor patients of all the services (burns, plastics, CF), as well as all the consults from ER and floors. You write the notes of the ICU patients for the following day and the ARNP writes all floor notes. After rounding with burns and plastics you can leave. Be sure to clarify who you should call with patient issues and/or consults for that night. It can be the R3, the senior plastics resident, the burn fellow or a combination.
4. CF/hand Intern: You round with the plastics resident on the CF service (R4). Contact them when you start. CF clinic M and W. You will write the notes, go to the OR, pre-op and post op all the patients on the CF service. CF covers the ER on W, Th and every other weekend. Plastics hand covers the ER on Tuesday, Thursday and every third weekend. Call plastics R4 with questions. The ARNPs are available to manage the floor patients during the day.
Interns are on call 2 out of 4 weekends. (either Sat or Sun) On the weekends you round with the burn and plastics services, you write all the notes of all the patients with help of the night intern or the intern on call the day before. You cover the consults from ER, and floor and remember when CF/hand are covering.

Nurse Practitioners:
The nurse practitioners do a lot of work. In general they round with the team in the morning. They then take primary responsibility for managing floor patients and writing notes. They also have clinics they manage. Usually they will sign out
around 2:30-3pm. They are not there on weekends.

**Schedule:**
Monday: OR all day – 2 rooms, Multidisciplinary rounds at noon (9E)
Tuesday: Vedder OR all day, Burn teaching rounds at 7:30am
Wednesday: OR in am
Thursday: Craniofacial OR, Multidisciplinary rounds at noon (9E)
Friday: OR all day Burns and Plastics

**Rounds:** Wound rounds daily at 10 am, except Wed at 11 am. Need to tell ICU and Floor nurses which patients are going to be seen that day so they can be in the tank rooms. Must be there. Any patient seen on wound rounds should have a note with the plan entered into the medical record.

**ED Consults:**
1. Burns: Should be seen as soon as possible. Almost all are admitted for wound care and so orders should be written to get them out of the ED ASAP wither to floor or ICU. All patients should have burn diagram done in the ED. Use burn specific admit orders.
   **ICU:** >20% adults, >15% kids <4y or adults >60, any major co-morbidities, intubated. In general should go very quickly to ICU – all lines and escharotomies can be done there.
   **Floor:** all other patients
   **If clinic f/u:** Call clinic at x5735 and leave message with name, mr#, contact #, f/u date. Pt should get number of clinic so they can call for appt. Usually Mon/Tues/Wed clinic.

2. Plastics/CF: Facial lacerations with fractures are covered by the service that is covering facial fractures that day. Isolated lacerations are plastics. In general you help with any lacerations on the face of women and children or any complicated laceration. If the laceration involves the eyelid think about talking with Optho. Always talk with R3/Plastic chief if you have questions about how to close a laceration.

**OR:** Know the OR plan for the patients for the day. In post-op orders be sure to include the specific dressing plan and review with the attending what that is and when the patient should next be seen on wound rounds. Remember the OR is very warm – drink water before the case.

**Simple Tips:**
1. Read Burn Pearls
2. Brief Topical Treatment Overview
   1. Blister (great biologic dressing
   2. SSD: Silver sulfadiazine, soothing, broad spectrum, does not penetrate eschar, usually used as initial dressing, can cause leucopenia.
   3. Sulfamylon: broad spectrum, penetrates eschar, painful, can cause metabolic acidosis, use on larger full thickness or infected burns.
   4. Acticoat: silver impregnated fabric, often used on donor sites
   5. Bactiracin: antibiotic, keep from desiccating, smaller, shallower burns
   6. Bactroban: Active against MRSA, use for MRSA graft melt
   7. Beta glucan: soothing ointment for shallow or nearly healed itchy burns
3. Early Resuscitation:
   • Burns >15% use Parkland (Baxter) formula: LR started at a total 24h supply of 3cc/kg/% burn at a rate where first half given over 8h, remainder over 16h. (originally was 4cc/kg/%burn).
   • When getting patients from Airlift/another hospital pretend they got the right amount and continue the resuscitation as outlined by Baxter formula (i.e don’t try to catch up.)
Titrate fluid to UOP of 30cc/h and MAP >60mmHg

4. Inhalation: patients with CO >10% (back calculated), closed space fire, carbonaceous sputum, are at high risk for needing intubation. Always check CO level: T1/2 of CO in blood on 100% is 1 hr.
5. Burns >30% get Ophto consult for intraocular pressure

HMC ED
ED Structure: R2 (trauma doc) and 2-4 interns
Description: The emergency department is split into two ‘sides’ medicine and surgery. Surgery patients are associated with the color red, medicine is blue. Patients are triaged when they come into the ER, by the triage nurse, and the more acute patients are sent to ‘resus 1, 2, or 3’. There are attendings that oversee the activities of the ER for both medicine and surgery. The surgery side is run by a surgery R2 or attending known as ‘trauma-doc’. Trauma-doc is responsible for organizing interns, delegating responsibilities, ordering tests, calling consults, fielding calls from outside physicians/hospitals and updating the R3 and the attending. The interns are responsible for primary patient care. The ‘shifts’ run for twelve hours from 7A-7P or vice versa.

Tips for your first intern rotation:
• Show up ~20-3 minutes (or the day before) early to get oriented with your physical surroundings, the make-up of all of the rooms, the location of radiology, how to order radiology tests, get stickers and send labs. Learn what is in which drawer.
• Home base is the ‘fishbowl’.
• Things you will need include Tina’s Tips (see addendum) and how to drain an abscess (see procedure section). You should read and know these outlines before starting.
• Your job is to facilitate the expedient management of trauma patients.
• All trauma patients are managed by the trauma doc and they should be kept up to date about all findings, studies, changes in condition, as well as any clinical decisions.
• When a trauma comes in they will need: IV access, labs, ABG, foley, restraints, primary and secondary survey, radiology recs. These tasks should be divided among interns to expedite process
• Check with trauma doc before submitting radiology recs.
• A member of the team should try to write initial physical and exam as patient comes in so information not lost.
• Write spine orders on all your patients once status known (the nurses love this).

Tips for Trauma Doc:
• Manage the board – have work-up and tests there so you can follow progress.
• Review trauma algorithms
• See all new traumas as they come in and by end of resuscitation have outlined plan and delegated duties.
• Keep R3 informed about any patient that will need or is being followed by general surgery.
• Continually touch base with Radiology to f/u on films and get reads.
• Call consults early as it can take some time for them to come.
• Interns must be supervised for all lines and tubes.
• Sick patients: BD>6 need to get out of ED
HMC NS
Role: Main role is to see consults in the ED and on inpatients.
Important Numbers:

HOT PAGER 540-5189 (vascular)  Angio 2857
HOT PAGER 540-5185 (TBI)  Neuro reading 8097
ER/Consults pager 540-5014  Pharmacy
Lab 3451,  Kelly 559-6451
Dict 3743  Heather 540-3074
MRI 2460,  Purvi 663-2185
CT 6937  NOW: Will Mashmeier cell: 992-8104
Xray 3105  UDF Nancy or Tim - 437-7694
ED xray reading room 3651  3W/NSU: 3347

Nurse Practitioners:
Alaro Lawson  540-5808  Mary Stout  540-3185
Sarah Layman  541-3829 / 225-7286  Jenny Choi  540-0384
Joan Palmer  559-3610  Bernice Gulek-Bakirci  540-0015

Schedule:
• Daily rounds start at 6am in Neuroradiology Reading Room
• Daily activity is to see all new consults and staff with R2
• You are on call on Friday night to help with consults.
• In general you have one weekday off per week (Wednesday).

Tips:
• See Consults promptly as often need plan to keep moving through ED
• Always check platelets, coags, ASA use on consults and order products early if needed.
• Communicate plans with primary services directly
• Always get reads directly from Radiology (review with them)
• If you are available help in NICU (LPs, Ventrics, Lines, Drains)
• A complete neuro exam should be done on all patients, including rectal (also for spine).
• If possible get to the OR to try and see decompressive crani, ventric, etc.
• Ventric carts are in NICU, ED, and one floating cart for other floors.

HMC ORTHO
Role: Floor Work
CODES: Call Room: 3355, Library: 24153
Call Room: 5E corner room - Code: 3355
Ortho Library on 6th floor center hallway (meet here in am to start rounds)

Important numbers:
Trish CLINIC F/U For ER pt’s: 4624
CAST ROOM 6647
PICC 5850
Clinic back line 6522 or 6508, 6669
Chief office 4645
Library 4660
NW orthotics 323-4040 or 1800-436-5977
Mike Kabalin, pharmacist 559-1879/or Anita Brethauer, pharmacist 541-8459
Joanie LVS: x4870 (p) 663-5478
UDF -- Carol/Phuong -- 437-5766
6E UDF--Alyca/Lindsay  947-5663
LV(limb viability) rounds 7 on Tues. 6 central elevator
LD phone # 5123978

Nurse Practitioners: Each service has a nurse practitioner.
  Spine: Theresa - 697-1660
  Red: Karen – 697-1661
  Blue: Moe – 947-5662
  Green: Gwyn – 697-1162  WkndNP :Christina Brinch 947-5664
  Hand (PA): Susan Silva – 344-9761

Schedule:
  • In general rounds are early, bring dressing box (med student can carry)
  • Majority of day is floor work and dispo. Often leave early for hours reasons if
    not on call.
  • Call is in house q3d
  • Clinic one day per week

Tips:
  • Help out in ED if you can – you will learn the most about splinting and fractures
    and you will be a great help to the R2 who is always busy.
  • Learn how to: place traction pin, splint LE, reduce shoulder, read plain films
  • Pay attention to what films are ordered and what follow up films are needed
    (will help you both on Ortho and later as trauma doc etc.)
  • If significant medical problems, diabetes etc. talk to team about medicine or
    geriatrics consult.
  • Always think about DVT prophylaxis and when it can be given.
  • Any patient with LE fracture should have ABIs done to assure no vascular
    injury.

Ward: When med studs are not around to help, you assume all of their duties as
well as being responsible for helping the R2 with the day to day running of the
floor. Either you or the R2 is responsible for having the list updated prior to and
at the end of the day. This means arriving 10-15 minutes before rounds, updating
anything necessary and printing a list for all team members. A list that is un-
updated or incomplete bogs rounding down and leads to duplicitious work which
then takes away from the ability of you and the R2’s to get to the OR, and can
make the whole team look bad due to unknown or missed injuries.

On Call: When on call you will take all primary floor calls and are responsible
for updating the list of all teams about any complications, (DVT, PE, MI etc) as
well as for calling or meeting with the appropriate team members to inform them
of these complications in the am. Take compartment syndrome calls seriously
and call your R2/R5 if you need help evaluating this. When the floor patients are
reasonably tucked in, helping the R2 in the ER is important. There is very little
night time sign out on the Ortho services.
VA PUGET SOUND HEALTH CARE SYSTEM

1660 South Columbian Way
Seattle, WA 98108
1-800-329-8387
1-206-762-1010

Access: Computer Resources & ID
Note that the VA uses its own (nationwide) computer system, Vista/CPRS. You will need separate passwords and training in order to gain access to the system. A separate VA ID is also required. Contact Robert Johnson (ext. 63613, page 608-8432) prior to your arrival to make arrangements.

vhapug login:__________________  Computer Help
Access Code:__________________  CPRS  63777
Verify Code:__________________  After hours  610-3390
Dictation code:__________________  Signature:__________________

In addition you will need a proxy card for access to almost everything – get this from Robert Johnson.

Important Numbers:
Note: Two prefixes (277 and 764) exist for VA numbers. From an in-house phone, dial 6 and then the last four digits. From an outside phone, you need to know which prefix to use. If the last four digits begin with a “2,” the prefix is 764. Almost all other extensions use the 277 prefix. If in doubt, call the operator or dial 762-1010, and then key in the five digit extension, beginning with “6.”

SECURITY  6-3113  OR  6-2134
    After hours  6-1495  PARU  6-3994
Admission  6-2412
AOD  6-1010  PEC  6-2600
Laboratory
    Hematology  6-1354  Inpatient  6-1382
    Chemistry  6-1394  Outpatient  6-2230
    Micro  6-2244  3rd Floor  6-6919
    Blood Bank  292-6525  Pharmacist  6-7550
Wards
    East Clinic  6-2800  Radiology
    2E (SDU)  6-2183  General Office  6-2409
    2W  6-2102  File Room  6-2151
    3E  6-2051  Reading Room  6-1664
    4E  6-2411  Angiography/IR  6-1289
    SICU  6-2764  CT  6-2419
    MICU  6-2161  MRI  6-3334
    CCU  6-2772  Ultrasound  6-1189
    Rehab  6-3109  Same Day Unit  6-2183
    Spinal Cord Injury  6-2622  Vascular Lab  6-1385
    Transitional Care Unit  6-2087
Residents Work Room  62141, 63154, 61381  Gym Code: 513
Call Room  Code: 425 Ph: 66875

Documentation

With the exception of some consent forms, all documentation at the VA occurs on CPRS. Once you learn how to use the system, you will have complete access
to a given patient’s chart, including the ability to read and review notes, labs, and images; as well as the ability to enter notes and orders, from any computer in the world with web access.

1. All patients must have a GENERAL/VASCULAR/PLASTIC SURGERY HISTORY AND PHYSICAL TEMPLATE completed within 30 days of going to the OR. Do not remove any of the items in the template, answer all the questions.

2. All patients need a pre-op note by 3 pm the day prior to OR. It is necessary to have it done by this time so the case may be cancelled in a timely manner if there is some reason to not operate at the scheduled time. Monday cases need notes by Sunday (preferably earlier so they can be replaced by another case if necessary). This pre-op note discusses all pre-op w/u, states you have reviewed all the information and the patient is ready for surgery, pre-op antibiotics are ordered, T&S or other blood ordered, Hibiclens shower or chlorhexidine wipes ordered, cardiac meds given on call to OR, AND that risks and benefits were discussed and consent obtained. Ideally, should be completed by the person who is planning on assisting with the surgery and not the on-call resident.

3. Each patient needs an admission note (by residents) and one by attendings within 24 hours of admission. If they are admitted post-op from a planned same day surgery they need both a note that explains why they were admitted AND one pos-top note. These may be combined.

4. All patients need post-op check and note. If you can’t do it – sign out to on-call resident. NO EXCEPTIONS.

5. When answering a consult in the computer you must attach a note to the consult or it will remain unattached and cause much grief and strife among the administrative personnel. If the computer won’t allow you to attach a note to a consult please call Robert Johnson (x63613 or pager 608-8432).

6. Discharge summaries must be completed and signed by the attending within 24 hours of discharge. Everyone – even short stays need d/c summaries UNLESS they are admitted to an “observation” bed and stay less than 24 hours. You can admit to an observation bed by entering “Surgical Observation” in the admit to location of the admission window.

7. Clinic Notes must be completed without 2 days of outpatient visit.

8. Operation reports must be dictated and signed within 12 hours of the surgery. Just sit down and dictate the report immediately – makes it easier and then you are never behind.

9. If you cannot meet any of these documentation requirements, please inform the attending as their performance criteria and evaluation (READ $$$) includes these documentation elements.

10. All notes – both inpatient and outpatient – MUST indicate that the case was discussed with the attending and list the name of the attending physician in your note. Be sure student notes say it also.

11. All outpatient (and discharge) narcotics need a hard copy signature. Either go to the satellite pharmacy and sign, print it yourself and tube it to pharmacy, or have secretary print copy for you to sign. Meds WON’T be filled without signature.

12. All possible consents are to be completed in IMED (computerized consent). IMED equipment is available in the Same Day Unit and in the East Clinic.

13. The method for recording telephone appointments under Encounters is as follows:
i. Click on Encounters when you are done with the note
ii. Click on the Procedures tab.
iii. Click on the appropriate box next to the “hp pro” (health care professional) corresponding to the amount of time your telephone appt. ran.

**VA Services:**
1. General Surgery – R5, R3, R1
2. Vascular Surgery – R4 and R1 as well as Vascular fellow
3. VA ICU – Closed unit – 2 R2s rotate between ICU and anesthesia
4. GI – done as an R3 if you come over. GI suite on 3rd floor.
5. Plastics – partially covered by Vascular R1

**VA General Surgery**
Pamela Popplewell can answer almost any question you may have.
Pam’s office 277-5090 Pam’s pager 610-7937

**Attendings:**
- Lorrie Langdale pager 570-2912 office 6-5247
- Dana Lynge pager 570-2932 office 6-3907
- Roger Tatum pager 608-6958 office 6-4778
- Peter Wu pager 570-5860 office 6-5287

**Nurse Coordinators:**
- Eileen Wilber (pager 570-2942) Ext. 61653
- Shawna Shaules (pager 609-3108), ext. 61653
- Charmaine Kauth 570-2682 (discharge coordinator)

**Weekly Schedule**

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Mon</td>
<td>OR- usually 2 rooms</td>
</tr>
<tr>
<td>Tues</td>
<td>OR (R3 in Thoracic room)</td>
</tr>
<tr>
<td></td>
<td>07:15 ICU rounds R1s, R2s, MS</td>
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<tr>
<td></td>
<td>13:00 Post op clinic (5 East)</td>
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<tr>
<td>Wed</td>
<td>Grand Rounds/Surg Sci</td>
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<td></td>
<td>10:30 Path conf (Rm BD 152)</td>
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<td></td>
<td>12:15 GI Rads conference</td>
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<td></td>
<td>13:00 Tumor Board (basement)</td>
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<td>16:00 M&amp;M</td>
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<tr>
<td>Thurs</td>
<td>am Clinic (East clinic)</td>
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<td></td>
<td>R2 does sig/anoscopy clinic</td>
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<tr>
<td></td>
<td>pm Pre-op clinic (2 East)</td>
</tr>
<tr>
<td>Fri</td>
<td>OR</td>
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</tbody>
</table>

**Call:**
- R1 q3 home call (1st call)
- R3 q3 home call (1st call), round every other weekend
- R5 q2 home call (2nd call), round every other weekend

**General Surgery Tips:**

CONSULTS:
- All consults require a formal consult request in CPRS.
- Consult reports must be filled out on CPRS template, with a designated attending cosigner.
During the day, consults should be directed through the R3 or R5.

After hours/weekend consults should be directed through the 1st call resident.

All consults should be seen in a timely fashion (immediately if emergent, within 1 hour if urgent, same day if non-urgent) and discussed first with the senior resident on call and then the Attending on call. When the R3 is on call, General Surgery consults may be staffed directly with attending.

The R3 will usually be the primary resident dealing with consult patients.

PREPS AND PREOP W/U’S

- All esophagectomy patients get bowel prep or at least clear liquids and a bottle of mag citrate or fleets phosphasoda the day prior to OR
- All Dr. Wu’s patients need to have their CT scans and other films printed off and hard copy taken to OR the morning of surgery. The radiology department prints the films and this should be done by the day prior to OR. They are only open from 7:30 – 4 pm. One team member must do this task.
- All Dr. Wu’s patients are to have UA's prior to OR.
- A definitive decision on whether a scheduled patient is okay for the following days OR should be made by 3 pm the day before surgery. If labs will delay order them stat.
- When ordering preoperative antibiotics check for previous MRSA. If present, give vancomycin as antibiotic on call to OR.
- Bowel prep protocols are as follows: 1 bottle of fleets phosphasoda given 2 days before surgery if possible. If not possible then take in AM of day before surgery. For patients with Creatinine > 1.3 give Mag citrate instead of fleets. Then order 2 gm of oral neomycin and 2 gm of oral metronidazole to be given at 1900 and 2300 the evening before surgery. (Chk with attndg).

POSTOPERATIVE CARE

- Whenever d/c’ing a JP DRAIN have a pair of hemostats open and ready at the bedside. Once the white portion of the drain shows use the hemostats to remove the drain
- Patients with OSA (Sleep apnea) who undergo surgery and have IV narcotics given to them are more likely to experience respiratory compromise. VA policy - all patients with sleep apnea and no regularly used CPAP/BiPAP machine have to go to a monitored bed (SICU or tele) post-op. If they use CPAP/BiPAP at home and bring it with them and are stable post-op they can be admitted to one continuous pulse oximetry beds on 3 East.
- There are 8 beds on 3 East designated for continuous pulse ox. These patients will be on floor status but will have an enhanced level of (remote) monitoring. To admit patients to those beds put in a nursing text order patient is to be admitted to a Continuous Pulse Ox monitored bed.
- Patients with actively infusing epidurals must be in SICU or in telemetry.
- Patients on IV metoprolol or other IV blood pressure control must be in SICU or telemetry.
- BiPAP or CPAP for SICU patients with respiratory depression is an ATTENDING level decision. Call early. Plan ahead, reintubate early in day as there is no anesthesia staff in house overnight. Intubations done after hours will be done by on-call resident or respiratory therapy.
- All patients whose surgery/procedure is changed intraop due to a cancer diagnosis need to a postop palliative care or hospice consult initiated. - very important for continuity of care and to meet performance measurements.
- Please DO NOT use conscious sedation unless you are in the ICU, recovery room, or PEC (and the nurses are there to help you)! You do not have clinical privileges. Take any patients to recovery room or ICU for procedures that require sedation. Discuss documentation requirements on each case with the
involved attending. Dictate a note vs. type a procedure note.

- For patient safety it is VA policy that you must transduce all central lines when placing them. This can be accomplished easily in the ICU’s or PARU. If placing a central line other than these locations please contact ICU charge nurse and ask for a bed to transducer a line.
- Foley: have nursing CHECK and RECORD a post void residual on all patients who have had an indwelling foley catheter removed and those who have difficulty voiding after same day procedures. Do not let patients go home without knowing they are emptying their bladder.
- Dr. Wu likes to continue antibiotic therapy on his bowel surgeries for 24 hours on SELECTIVE patients. Check with him during/after each bowel case.
- When transferring patients between areas be aware that in CPRS all medications remain active during transfer. This means that you new post-op that goes to SICU will still have all their PO pre-op meds active in the computer and that all of the patients transferred to the floor will still have IV vasoactive orders active UNLESS YOU DISCONTINUE THEM. Please review all active medications upon each transfer.
- When initiating tube feeds on post-op patients please start ½ strength TF’s and advance slowly to goal rate. THEN switch to full strength (this is especially important for Dr. Wu’s patients).

CLINIC INFORMATION

- If the R5 is unable to be in attendance at the Thursday afternoon pre-op clinic they will be given a list of the people who were seen and they will do the final review of the H&P, labs etc to confirm the patient is ready and appropriate for surgery.
- Patients scheduled for Lump and Bump clinic will be on weekly general surgery worksheet. If you are the resident scheduled to run the clinic please call Same Day Unit at x62183 and let them know to contact you when the patient arrives (give them your name and pager).

VA VASCULAR SURGERY
Resident Team: R4, R1; Vascular Fellow

Attendings:
Ted Kohler p: 570-2913
Tom Hatsukami p: 570-2921
Michael Sobel p: 570-2925

Nurse Coordinator:
Jane Blomberg 570-2958, ext. 65267

Other Numbers:
Clinic: 62800/63800
Vascular Lab: 61385
Angio: 61289
OR desk: 62134
CT: 61888
Operator: 762-1010
Charmaine: 63087 or 570-2662
Weekly Schedule: (Ask Jane to put weekly schedule on your desktop so you can access it to see admissions and patients coming for angios).

Monday: OR

Tuesday  7:00 am Vascular Conf at HMC
         am clinic (East Clinic)
         Attending Rounds (following clinic)
         Angio rounds (following clinic)

Wednesday OR

Thursday OR

Friday  am clinic (East Clinic)
       Attending Rounds (following clinic)
       OR one Friday per month

Call:
R1 q3 home call (1st call)
R4 q2 home call (2nd call), round every other weekend, alternates with Fellow

Consults:
• All consults require a formal consult request in CPRS.
• Consult reports must be filled out on CPRS template, with designated attending cosigner.
• During the day, consults should be directed through the R4 or Fellow.
• After hours/weekend consults should be directed through the 1st call resident.
• All consults should be seen in a timely fashion (immediately if emergent, within 1 hour if urgent, same day if non-urgent) and discussed first with the senior resident and then the Attending on call.
• The R4 will usually be the primary resident dealing with consult patients.

IR:
• The Vascular service also functions as an inpatient service for IR patients. On the Vascular schedule will be the names of patients who will require admissions for various IR studies.
• Anyone with Cr>1.4 will be admitted the night before angio for hydration. They need an admit note and orders. They then will need d/c orders later.
• If a patient is stented in IR they will stay overnight. They need admit and d/c orders.
• Be sure to talk with IR fellow to find out details of interventions.
• Usually the fellow does the presentations at angio conference but always check and be sure you know the cases if the fellow is not going to be there.

Common Cases: AAA, Aorto bifem, LE bypass, CEA, Fistulas. All but the fistulas usually go to the ICU either for Insulin drips, beta blockade, neuro checks, or because they are sick.
**Remember: In general the Veterans are even more sick than they appear – monitor them closely.

VA PLASTIC SURGERY
Resident: The R1 on Vascular is usually responsible for helping in Plastic Surgery Clinic as well as assisting in OR or with floor patients. They communicate with Plastics chief regarding responsibilities

Nurse Coordinator:
Plastic Surgery – Constance Bass (570.2940); Ext. 61066 (Voicemail)

Schedule:
Mon: AM Plastics clinic – East clinic
Tues: OR day
Fri:  OR day
**SICU ROTATION:**
**Residents:** 2 Surgery R2s and 2 Anesthesia R2s

**Schedule:**
- Daily rounds at 8am
- Teaching conference 2-3 days/week at 11am
- In house call covering ICU approximately q4
- M&M is Wed at 4:30 if interested
- Attend UW Grand Rounds/Surg Sci Wed am unless on call

**Role:** This is a “nearly” closed ICU. The patients in the SICU come from the General, Vascular, CT, Ortho, Urology, ENT, and Plastics services as well as IR. You cover patients in telemetry (PCU and the SICU). These services will write (in general) the admit orders to the unit post-operatively. Once in the ICU the general management of the patient is by the ICU team in discussion with surgical team. It is always a good idea to discuss issues such as: DVT prophylaxis, antibiotics, imaging or interventions, diet, floor transfer. You will round with the ICU team, write notes and follow up on orders/studies, touch base with surgical team regarding plans. Communication is key. If you are not on call you generally will be done at a very reasonable time.

**Call:** In general, q4. Main role is to cover the unit. You are the only surgery person in house. Occasionally the chief or R1 on the general surgery service may need you to evaluate someone quickly while they are on their way in. Please help. You also have the code pager and should help with access if needed in code situations.

**Tips:**
- The lists at the VA are Excel spreadsheets updated by you. Therefore they are only as good as you are so keep them up to date.
- Good communication with surgical teams is important. The CT surgery service especially is very active in the care of their patients. Keep them informed.
- All patients need daily notes, post-op notes, procedure notes
- Any patient with an insulin gtt or epidural must be in PCU or tele.
- Double check all meds and orders on transfer as they will stay active in computer unless cancelled
- The PCU can be a scary place for a sick patient. Remember this when you are discussing patient disposition. The nursing coverage at the VA is much thinner than other hospitals.
- Imaging at night has to be taxied to the UW to be read by a Radiologist – this means you need to actively follow up on images you want read: 82068

**ANESTHESIA:**

It is currently arranged so that the R2s do two back to back months at the VA – one in the ICU, and one on anesthesia (taking call in ICU). You can find out where to go first by asking the R2 already there ahead of you. On the anesthesia month you do not have ICU responsibilities other than call. You should report to the anesthesia department in the am.

**Role:** Your goal is to learn the basics of anesthesia, airway management, operative resuscitation, and basically what happens on the other side of the drape.
- Look up cases the day before (labs, pre-op risk factors). (Ask what assignment is.)
- Speak with the attending you will be working with the following day to make a plan.
- You will usually start out paired with a resident or CRNA but will eventually graduate to running your own room.
- Be there early enough in the morning to set up/or help set up your room (usually 6:15)
- Your main goal is to learn how to manage an airway. This includes learning to bag, oral airways, and a variety of ways to intubate.
*There is a pediatric general surgery resident’s manual that should serve as your primary guide when at Children’s. It is on the intranet. Please review it prior to starting your rotation and a physical copy should be given to you when you begin your rotation.

Address:
Children’s Hospital & Regional Medical Center
4800 Sand Point Way NE
Box 359300
Seattle, WA 98105-9300
Phone: 206.987.2000

Contacts:
Dr Waldhausen: Fellowship Director john.waldhausen@seattlechildrens.org,
(206) 987-2039
Chris Pendergrass: 987-5093
Chris Wong: 987-3241

Phone Numbers:
CHRMC main number 987-2000
CHRMC page operator 987-2000
Anesthesiology ext. 2518
Cardiology 2015
Computer Help Desk 1111
Congenital Defects 2206
EEG 2081
EKG 2268
ECHO 2019
ER 2222
GI 2521
Heme/Onc 2107
ID 2116
Laboratory (general info) 2102
Library 2098
Medical Records 2173
Nephrology 2524
Neurology 2078

Nursing Units
G2 2031
G3 2022
G4 2021
SCCA 2032

Orthopedics 2109
Operating Room 2047
Pathology 2103
Pharmacy 2033
Poison Center 2121
Pulmonary 2174
MEDCON 543-5300
Radiology (General appts) 2133
US 2135
CT 2136
MRI 2716
Fluoro 6077
Nuc Med 2137
Rehab Medicine 2144
Social Work 2167
Surgery 2039

Prefix is 987-, operator 7.2000, fellow phone 7.6527, resident phone 7.2405

Attendings:
Robert S. Sawin MD
Surgeon in Chief, Pediatric Surgery
CHRMC
Office: 2039

Daniel J. Ledbetter
Attending Surgeon CHRMC
Office: 2039

John H. T. Waldhausen MD
Division Chief and Program Director
CHRMC
Office: 2039

John Meehan MD
Attending Surgeon CHRMC
Office 2039d

Adam Goldin MD
Attending Surgeon CHRMC
Office 2039

Patrick Healey MD
Attending Surgeon
UW/ CHRMC
Office: 2039

Kenneth Gow
Attending Surgeon CHRMC
Office 2039
**Pediatric Surgery Nurse Practitioners:** The nurse practitioners will cover the in- and outpatient services. They are involved in direct patient care on the wards and in the clinics.

- Jenny Kreiss ARNP    Beeper: 916-7252     ext. 1075
- Cathy Boellard ARNP  Beeper: 469-0452     ext. 1466
- Ronelle Caskey ARNP  Beeper: 469-0564     ext: 1031

**Resources**

- Jennifer Maier RN    p 469 – 0401   ext 3453
- Shellie Stockfish    ext 2343

**Organization:**

- Chief Pediatric Surgical Fellow (Boss)
- Assistant Chief Pediatric Surgical Fellow
- PGY 2/3/4 (UW, VM, Swedish, Madigan)
- Intern x2 (UW)
- Medical Students

**Weekly Schedule**

**Monday**
- 0600 Rounds
- 0800 OR

**Tuesday**
- 0600 Rounds
- 0730 OR
- 0800 Clinic
- 12:30-13:30 Tumor board

**Wednesday**
- 0600 Rounds
- 0745 Core Lecture
- 0830 OR (SS as dictated by schedule)

**Thursday**
- 0600 Rounds
- 0800 – 1200 Teaching conferences,
- 0800 – Peds Grand rounds
- 0900 Neoat/Path/Rad/Journal Club
- 1000 – Fellow Conf., M&M
- 1100 – Resident Case Conference
- 1300 Clinic Mandatory

**Friday**
- 0600 Rounds
- 0730 OR

**Saturday /Sunday**
- 0630 Round with Fellow/on call
- OR is on the 4th floor, ext 2047

**References for reading about patients or operations**

Cases
The RRC currently requires 20 pediatric surgical cases to fulfill the pediatric surgical requirement. Not all cases count. You must have 6 pediatric appendectomies and 8 hernias. Be sure you fill these requirements – talk to Dr Waldhausen if there is a problem.

Service Tips:
As a general rule all patient management decisions at Children’s should be cleared through the fellows or attendings.

Starting Service
- Get ID badge and computer passwords (only computerized order entry) ASAP. You are useless without them. They are needed for access to the hospital, OR, call rooms, stairwells. If possible, obtain these before your first day. Home base is the call room located on the ‘P’ level of the Giraffe building. The room number is G-0015. The OR is located on the 4th floor near the two emergency rooms. OR locker rooms are below the OR and have badge access that must be activated by the OR staff (get it activated by putting your name on a sheet). The cafeteria is on the 5th floor of the Whale building. This is where am rounds take place. Breakfast is always provided and all meals on call are provided. There is also food in a small kitchen room (G-0007) near the call room accessible with your ID badge.

Rounds:
• These usually occur twice each day at the discretion of the chief surgical fellow.
• Housestaff are asked to pre-round in the AM in order to obtain I’s and O’s, weights, etc. Present in standard format for fellow.

ORs
• Located on the 4th floor, ext 2047
• Daily schedule is posted at the front desk and on a large grease board in OR. The fellow will write resident assignments on the grease board in the morning. It is YOUR responsibility to keep track of the progression of cases and be in the OR 5-10 minutes prior to the start of the case to help position the patient and allow opportunity to discuss the case with the attending surgeon. It is your responsibility to familiarize yourself with the patient and to have done background reading.
• Housestaff are responsible for post-op orders (on computer), and for writing and dictating (check with attending) the operative note. Please do this at the conclusion of the operation.
• The OR desk can help you get access to downstairs locker rooms. Scrubs are teal at Children’s – you cannot wear blue scrubs.

Communication with families
Care plans should be discussed with the surgical fellows or the attendings before discussion with the families to avoid confusion. As a general rule: DO NOT ARGUE with parents and be VERY attentive to their needs and questions. Having a sick child in the hospital is a very stressful situation for most parents and probably is at an increased level compared to that which you have experienced in most adult hospitals. Despite your medical knowledge parents probably know their child better than you do, especially those children with chronic problems where there has been frequent contact with the health care system. Problems that occur with parents regarding patient management, questions, etc should be brought to the attention of the fellows and attendings immediately. If a disagreement does occur a safe response is to say you will check things out with the attending or fellow and get back to the parents.
Call

1. The on call resident is responsible for all ER, new consult and night ward calls. Most day (before 17:00 or 18:00) ward calls will go to the primary resident caring for each patient, however each resident should be familiar enough with the service to handle any call concerning a patient. New consults and ER patients should be discussed with the fellow on call and/or the attending surgeon on call.

2. The on-call resident and pediatric surgical nurse practitioner are responsible for day surgery H&P and consent. If called, please respond to day surgery immediately.

3. Consults and ER calls MUST be handled promptly. After having seen the patient, call the on call surgical fellow to discuss patient care and management plans. If the fellow is not immediately available call the on call attending or the attending to whom the consult was directed. Seeing ER patients and consult patients is an important service and these calls must be given priority.

4. If you are on call and need to be in the OR you must arrange coverage with another resident to cover ER and consult calls while you are unavailable.

5. ALL patients seen in the ER or in consultation by the general surgical housestaff must be discussed with the surgical fellow prior to making recommendations.

6. Outside Physician and Patient calls, Consult and ER calls: The primary goal of this service is to provide excellent care for the patients in this hospital and region. In general there is very little that we as a service cannot take care of. The answer to any call should be, “We will be happy to see the patient. Send them to the ER or clinic.” If you are unsure as to what we can do or where a patient should be referred ask the fellows or the attending on call. Please do not turn anyone away.

7. Call resident is responsible for floor transplant patients during weekend.

Finding Things:

Call Room: Located on the Plaza of the new hospital building (G-0015). Showers, a kitchen and a lounge are located in the area. There is a television and exercise equipment in the lounge and there are often popsicles, etc. stocked in the refrigerator. There is a call room for the fellows/attendings. Please leave this available for their use.

Pagers: Provided for the time you are at CHRMC. They can be obtained from the fellows or from Chris Wong (in Dept of Surgery). Be attentive to answering pages promptly.

Cafeteria: Located on the 5th floor. Meals are provided for dinner the evening on call and breakfast everyday. The cafeteria opens at 06:30 and closes at 19:30.

Library: Main library is located in main hospital on the 6th floor of the old building. Copy machines (free to residents) are available. Coe library located in the Dept. of Surgery, W7723. Houses some of the current surgical journals and most of the division’s collection of textbooks. There is also a collection of articles concerning each of the topics covered in the core curriculum.

Mail: The address is Children’s Hospital, Department of Surgery, W7729

Dictating

1. Residents are responsible for dictating all discharge reports on the day of discharge

2. any dictations that need signature will come to your mailbox on 6th floor.

3. Charts and records that need to be signed are in the dictating room on 4th floor.
Dictations
1. Enter your 5-digit ID#
2. the 2-digit report type:
   - 03 Interim Summary
   - 05 Stat dictation
   - 08 Consult
   - 44 Operative report
3. the 6-digit CHRMC medical record number.

When dictating any reports, you must include the following data:
1. your own name and title
2. type of report desired (corresponding with the code you entered)
3. patient name (spelling first and last names)
4. CHRMC medical record number (corresponding with the number you entered)
5. clinic name
6. exact date of service
7. patient’s date of birth
8. name(s) and address(es) for all referring physician(s).

Essential components specific to the OP note include:
1. Pre- and postoperative diagnosis
2. Title of procedure
3. Surgeon, co-surgeon, assistant
4. Anesthetic and anesthesiologist
5. Indications
6. Summary of procedure
7. Complications
8. Immediate postoperative condition
9. Estimate of blood loss and replacement
10. Fluids, drains, catheters left or given.

Computers
1. You will need to set up an account from the housestaff office in order to use the computer system at Children’s. CPOE training must be done prior to any patient care activity. Do not use another MD identification number. Do this before you come to Children’s.
2. Labs, radiology, pathology and clinic notes, d/c summaries, etc. are in CIS
3. All orders are done on the computer. Training must be done prior to or at arrival at Childrens.
4. A daily service list is kept on the computer in the residents/fellows office. This is usually kept up to date by the on call resident. Please be sure the diagnosis, operative procedure and attending surgeon are correctly listed.

Pre-operative Check List
1. NPO orders (Department of Anesthesia, reviewed 1/28/97)
   - < 6 months
     - Milk/solids: 6 hours
     - Clear liquids: 3 hours
   - > 6 months
     - Milk/solids: 8 hours
     - Clear liquids: 4 hours
   Pay attention to time spent NPO. If babies are to go > 3-4 hours NPO, an IV should be started.
2. IV fluids: Depends on the type of case
3. TPN: Patients should not go to the OR with TPN infusing in the IV. Order D (whatever concentration of glucose is in the IV) and equivalent
electrolytes on call to the OR.
4. Antibiotics: Generally best to order these when actually in the OR, rather than on call.
5. Labs: Depend on the patient and the underlying disease process. There is no required routine
6. Surgical Consent: Mandatory
7. Line Consent Form: Mandatory for any type of line. Filled out by the requesting service.
8. History and Physical: Mandatory
10. Anesthesia consult/Clinic appointment: Depends on the patient, but should be obtained on patients, particularly in the outpatient setting who have complex medical problems or may have difficult airway management problems.
CLINICAL PEARLS
NIGHT FLOAT CALLS

*Remember you are everyone’s doctor at night. See and evaluate patients. Document what you do. Sign it out to teams in the morning. Call your seniors with problems and questions.

**Always rule out the bad things. Always see and evaluate the patient before making major management decisions.

Chest Pain:
- If you receive a call that a patient is having chest pain you must go see and evaluate the patient.
- DDx: MI, PE, PNA, Effusion, Costochondritis, anxiety, incisional
- See and evaluate the patient:
  - Be sure they have stable vitals, adequate oxygen
  - Consider: EKG, CXR, Cardiac Enzymes, ABG
- Concern for r/o MI: Tele or ICU (r/o MI patients should have continuous EKG monitoring, serial enzymes and EKGs, ASA, beta blocker, Morphine, NTG, O2, consider calling cardiology if troponins increasing or have significant EKG changes (call your senior)
- Concern for PE: see below
- Concern for Pna: see below

SOB/Desaturation
- If you receive a call that a patient is having SOB you must go see and evaluate the patient
- DDx: Atelectasis, PTX, effusion, PNA, PE, MI, CHF, Asthma/COPD exacerbation, Aspiration, Anxiety
- See and evaluate patient. Assure ABCs.
  - Administer oxygen, neb treatment, assess need for intubation
  - Consider: CXR, ABG, EKG, CTA (rule out PE – talk with senior)
- Atelectasis: Alveolar collapse. Dyspnea, hypoxia. Assure pain control, I$?, pulm toilet by RT.
- PNA: fever, elevated WBC, infiltrate on CXR, check sputum, consider abx (call senior)
- CHF: Check PMH, usually after aggressive resuscitation. O2, diuretics, inotropes, vasodilators.
- COPD/Asthma: Pulmonary toilet, neb treatments,
- Aspiration: acute SOB, cough, fever. Manage conservatively, no abx unless develop pna.
- PE: Hard to diagnose. dyspnea, chest pain, tachycardia. If have concern send for CTA. (Check Cr)
- PTX: Seen on CXR -> chest tube

Low BP
- Go and see the patient, review their vitals and I/Os to determine underlying etiology.
- Assess ABCs, adequate access.
- DDx: Under resuscitation, infection, MI, PE, epidural, narcotics
- Wide variety of work-up depending on underlying etiology
- Consider: Fluid challenge, labs, EKG, if no response to fluid call senior and consider ICU transfer
  - Under resuscitation: Will have lower UOP, often tachy, low CVP, should respond to a fluid challenge -> bolus and increase maintenance rate
High BP
- Go and see the patient and review their outpatient blood pressures for a baseline
- DDx: Pain, hypoxemia, anxiety
- If adequate pain control consider hydralazine (5-10mg), or metoprolol (5mg)

Change in Mental Status
- If you receive a call for altered mental status you should see and evaluate the patient.
- DDx: Delirium, Alcohol Withdrawal, Narcotics, Seizure, Stroke, Hypoglycemia, Infection
- See and evaluate patient, assure ABCs
  - Be sure stable vitals and airway
  - Consider: basic labs, review medications, CT Head
- Delirium: often in elderly (sundown), check labs, r/o infection, ABG to/o hypoxia, check glucose
- ETOH Withdrawal: anxious, tachy, HTN, seizures – place on CIWA, treat with benzos (watch amount).
- Seizure: if ongoing -> benzos. Post-ictal: check labs (esp glucose), review meds, call neurology
- Stroke: If you think the patient has had a stroke: Head CT, call Neurology, supportive measures

Atrial Fibrillation
- If you receive a call for a fib you should see and evaluate the patient. (getting the idea?)
- Assure patient stable, check ABCs
  - Unstable -> call a code, consider cardioversion
  - Stable: review history, check labs (lytes: Ca, Mg, K), cardiac enzymes, EKG
- Treat: As long as adequate blood pressure start with Metoprolol 5mg IV, you can repeat this q5min x 3. It has a fairly fast onset for converting rhythm. Replace electrolytes. If metoprolol is not successful other options include Amiodarone, Diltiazem, Digoxin.
- If RVR need to get rate control. If metoprolol and dilt are not working consider ICU transfer for IV drips.
- Once rate controlled must convert or consider anti-coagulation if lasts >48h

Low UOP
- If you receive a call for low uop you should see and evaluate the patient
- DDx: Under resuscitated (dry), ARF, Obstruction, ATN (I.E. prerenal, renal post-renal)
- Consider: Look over I/Os, IVF rate, check foley, PVR (if no foley), UA, urine lytes, fluid challenge
- Goal: Determine if pre-renal/renal/post-renal as that will direct management
  - Pre-renal: Responds to volume, has low FeNa, most likely post-op
  - Renal: casts in urine, usually due to drug or toxin, give fluids
  - Post-renal: check foley, or if no foley (high PVR) place foley
- FeNa: Fractional excretion Na – (UNa/PNa) / (UCr/PCr)
**Tachycardia in post bypass patient**

- If you receive a call for tachycardia in a GBP patient you MUST see and evaluate the patient.
- DDx: Distended remnant, anastomotic breakdown/leak, pain issues, under resuscitated
- Always call senior:
  - Most concerning is new tachycardia or tachycardia that persists hours after the OR.
  - Assure ABCs, check UOP, give volume if needed.
  - Consider: Labs, AAS, UGI (talk with senior about any imaging beyond AAS)
  - These patients can be very difficult to diagnose when they have major problems so pay attention!

**Fever**

- High fever post-op - check wound to r/o clostridial infection.
- RFA patients will often have high fevers post-op
- In general fevers in first 24-48 hours less concerning
  - check blood cultures, UA and cx, CXR
  - consider CT Abdomen if all above are negative (talk with senior)
  - Other considerations: DVT, review medications
  - Treat with Tylenol
  - Do not start abx until you know what you are treating unless patient is decompensating in which case you should be talking with the senior and transferring the patient to the ICU

**FLUIDS/ELECTROLYTES:**

**Total Body Water**

- 2/3 total body weight
- 2/3 intracellular, 1/3 extracellular (2/3 interstitial, i/3 plasma)

To monitor fluid status, look at: daily weights, BP, HR, UOP, Bun/Cr ration, CVP. Best indicator of volume status is UOP.

**Plasma Osmolarity:** (280-295) (2xNa) + (glucose/18) + (BUN/2.8)

**Volume Replacement:** 4cc/kg/h for 1st 10kg, 2cc/kg/h for 2nd 10kg, 1cc/kg/h after (70kg = 110kg/h)

**PeriOperative Fluids:**

- Pre-Op deficit: Maintenance IVF x hr NPO + pre-existing deficit
- Maintenance in OR: Maintenance IVF x duration of case
- 3rd Space: 1-3cc/kg/h minor procedure, 3-7cc/kg/h (medium), 9-11 cc/kg/h (large)
- Blood Loss: 1 cc blood/collod per cc loss or 3cc crystalloid/cc loss

**Crystalloids:** Have sodium as major osmotically active particle. Use for volume resuscitation, maintenance

- **NS** - Na 154, Cl 154, watch for hyperchloremic metabolic acidosis
- **LR** - Na 130, K4, Ca 2.7, Cl 109, Bicarb 28, careful in folks with increases K
- **D5SLR** – Good post-op fluid
- **D51/2 with 20KCl** – standard maintenance fluid once resuscitation complete

**Colloids:** high molecular weight substances that remain in intravascular space, use in specific circumstances – data supporting use in situations varies.

- **Albumin:** Comes in 25% and 5% solutions. Will eventually go into extracellular space. $$ Also used in cirrhotics with low albumin
- **Hetastarch:** resembles glycogen, increase intravascular volume by amount infused
- **Dextran:** glucose polymer – also promotes peripheral circulation and decreases thromboembolism – often used after vascular surgery – can lower
Blood Products: See Transfusion section

GI Losses: Stomach (1-2L), Biliary (500-1000ml), Pancreas (500-1000ml), Duo (50-1000ml)
- Replace gastric with: D51/2 NS with 20-30 of KCl
- Replace pancreas/small bowel with: LR with bicarb
- Replace large bowel losses with: LR with K

Electrolytes:
- Na: low Na (asympt./twisting/sz) – treat with free water restriction, NS. Do not use hypertonic saline unless symptomatic. Must correct slowly to avoid CPM. High Na (dry, restless, seizure) – correct underlying problem. Correct slowly with D5W – half deficit over first 8h (avoid cerebral edema).
  - Na deficit = 0.6x(weight in kg)x(140-Na)
  - Free Water Deficit = (0.6 x kg weight)x(serum Na/ 140-1)
- K: low K (<4) – muscle weakness, ileus. High K (>6) – n/v/ekg changes, cardiac arrhythmias. Tx: insulin/glucose (10units and ½ amp D50), Ca gluconate to stabilize cardiac membranes, Kayexalate, Lasix.
- Ca: low Ca – numbness, tingling, cramps, tetany (Ca Chloride). High Ca – “stones, bones, moans, groans, psych overtones” – hydrate, diuresis, treat underlying problem
- Mg: low Mg – weakness, arrhythmia, sz, hyperreflexia -> stop Mg sources, Ca gluconate if severe

Acid Base
- pH/pCO2/paO2/bicarb/base deficit
- base deficit = 0.4xweightx(25-bicarb)
- Anion gap: Na – (Cl + bicarb)
  - Base deficit >6 -> unit for resuscitation
  - Enzymes do not function as well at pH <7.2 – consider bicarb in addition
  - Causes of anion gap acidosis = MUDPILES

NUTRITION:
Caloric Needs:
- Total Calories: 25 kcal/g
- Protein: 4kcal/g
- Fat: 9kcal/g
- Carbohydrates: 3.5-4kcal/g

20% lipid solution has 2kcal/cc
1g protein/kg/day
30% calorie from fat
Burns: 25 kcal/kg/d + (30kcal/dx%burn) and extra protein

Nutritional Assessment:
- Check: albumin, transferring, transthyrieten, crp
- Weekly nutrition labs on long term inpatients.
- Signs poor nutrition: acute weight loss, <85% IBW, alb<3 (increases morbidity and mortality)

RQ: ratio of CO2 produced to O2 consumed (always on ABSITE)
- >1: overfeeding, lipogenesis
- 1.0: Pure carbohydrate metabolism
- 0.8: Pure protein metabolism
- 0.7: Pure fat metabolism
- <0.7: Starving, ketosis

Nitrogen Balance: ([protein/6.25]-[24hour urine Na=4g])
- 6.25 g protein = 1g N

SI: enterocytes like glutamine
LI: colonocytes like short chain fatty acids
Enteral nutrition always preferred.

TPN: Total parenteral nutrition – requires central access. PPN can be given through peripheral IV at much lower dextrose concentration.
- Consider TPN in anyone who will not be able to take enteral nutrition for 5-7
Always speak with pharmacist and nutritionist when starting TPN to maximize caloric/protein needs.

- You must follow triglycerides and liver function tests on patients on TPN.
- Consider adding insulin daily as needed until stable.
- For insulin add half of amount used daily to TPN and continue SSI.
- Adjust electrolytes daily as needed.
- Consider adding Ascorbic Acid. Add 5mg zinc.
- Major complications: line sepsis, hepatic dysfunction

**HMC Nutrition Guidelines for Enteral Nutrition**

**Enteral Nutrition**

- Monitor electrolytes, triglycerides, liver function tests daily.
- Consider adding insulin daily as needed until stable.
- For insulin add half of amount used daily to TPN and continue SSI.
- Adjust electrolytes daily as needed.
- Consider adding Ascorbic Acid. Add 5mg zinc.
- Major complications: line sepsis, hepatic dysfunction
COAGULATION/BLEEDING:

Coagulation Cascade:

Labs: PT, PTT, INR, bleeding time, fibrinogen, D dimer, ACT

Fibrinolytic Pathway:

Natural anticoagulation: Antithrombin III (binds and inhibits thrombin, heparin binds here), Protein C and S (Vitamin K dependent, degrade factors V and VIII), Fibrinolysis (tpa -> convert plasminogen to plasmin -> degrades factor V, VII, fibrin)

Abnormal Bleeding: platelet dysfunction (vWD most common)

DIC: decreased platelets, prolonged PT/PTT, low fibrinogen, high fibrin split products and D dimer. Support and treat underlying cause. Usually need platelets, cryo, FFP. If significant thrombosis can consider low dose heparin.

HIT/HITT: thrombocytopenia from anti-platelet Ab, can also cause aggregation and thrombosis. Usually see large drop in platelets. Tx by stopping heparin, alternative anticoagulation needed.

DVT: Need anticoagulation if above knee. If cannot be anti-coagulated consider IVC filter.

PE: often presents with tachycardia, chest pain. If severe can be deadly.

Anticoagulate.

Antiplatelet:

- ASA - Irreversible inhibits COX. Prolongs bleeding time.
- ASA/Dipyridimole - inhibits camp phosphodiesterase, decreases platelet aggregation
**Plavix - ADP receptor antagonist**  
**Pletal**

**Procoagulants:**
- **Amicar** – inhibits plasmin (inhibits thrombolysis), use in DIC  
- **DDAVP** – similar to vasopressin, causes release vWF, helps in uremic patients  
- **Aprotinin** – inhibits plasminogen activation

**Anticoagulants:**
- **Warfarin** – prevents vitamin K mediated carboxylation of enzymes in extrinsic pathway. Takes 5–7 days to reach therapeutic levels. Followed by INR To reverse need Vitamin K and FFP.  
- **Heparin** - potentiates AT III, accelerates inhibition of Factor Xa and thrombin, administer IV or SQ, monitor PTT  
- **LMWH** - (enoxaperin, daltaperin) inhibits Xa > thrombin, more predictable, longer half-life, no reversal agent  
- **Lepirudin** - direct thrombin inhibitor (from leeches), watch in renal dysfunction  
- **Bivalrudin**  
- **Argatroban** - synthetic direct thrombin inhibitor, hepatic clearance  
- **Dextran** – decreases platelet aggregation, adhesion. Improves fem-tib bypass patency

**Topical:**
- **thrombin**  
- **Gelfoam** – collagen scaffold  
- **surgical** – regenerated cellulose

**Hypercoag w/up labs**: Factor V Leiden, Protein C or S deficiency, Antithrombin III deficiency, lupus anticoagulant, anti-cardiolipin antibody, factor XII (Hageman factor), prothrombin mutation, homocysteine levels, acquired hypercoagulability.

**Stopping bleeding in dialysis pts:** hold gentle pressure over site, be sure you can still feel thrill as applying pressure. May need to hold for up to 30 minutes so be comfortable. Do NOT wrap tightly you will thrombose the fistula. DDAVP. Gelfoam.

**Transfusion:**
1. Whole Blood: RBC’s, non-functional WBC’s, platelets, plasma, shelf life 35 days at 4º. Usually unavailable and not used 2/2 inefficient use of blood  
2. PRBC: Refrigerated shelf life 42 days. 250-300 mL of PRBC is approx 180mL RBC, rest plasma, non-functional WBC, platelets. Factors V and VIII degrade rapidly. Provide oxygen carrying capacity and helps to maintain delivery  
3. Platelets: Single donor= 50-70 mL= 5.5 x 1010, Apheresed from single donor, contains 6-10X as a single donor pack,. Lasts 5 days at 20-24 degrees. One apheresis platelet pack should raise count 30-60K  
4. Leukocyte Concentrate: 24 hours at 20-24°. 5-30 x 109 granulocytes per unit. Given for ANC<500/mm3 with evidence of infection  
5. Fresh Frozen Plasma: All coagulation factors, and fibrinogen. 1 year at -30º C; 24 hours thawed  
6. Cryoprecipitate: Fibrinogen, Factors VIII, vWF, XIII, fibronectin. Usually administered for factor deficiency (hemophilia A), vW Disease, hypofibrinogenemia, uremic bleeding. 1 year at -30º C, 4 hours if thawed. Usually administered as transfusion of 6 or 10 single units, a cryopool should raise fibrinogen by 45mg/dL

**Massive Transfusion:** To order call TSS at 731-3088
- **Indications:** evidence of significant hemorrhage. Indications include: 1. Persistent hypotension due to blood loss greater than 1500ml. There must be substantial blood loss and a likelihood that blood loss will continue over the
short term.

- **Banked Blood**: low Ca, low pH, low 2,3,DPG, high K
- **"Massive Transfusion Pack"** consists of the following components:
  Plasma: 4 units – Type AB, Rh +/-; Platelets – 1 apheresis; Cryo: 1 pre-pooled 6 pack
- **Hemostasis Goals**: appropriate goals for individual patients may be higher or lower than these numbers, and numerical goals should not take precedence over clinical assessment of the patient:

  | INR < 1.7  | Complications:           |
  | Fibrinogen > 100mg/dL | Hypothermia               |
  | Platelet count > 100,000/mL | Hyperkalemia             |
  | while actively hemorrhaging | Hypocalcemia             |
  | Symptomatic anemia subsides | Transfusion reactions     |
  | Core temperature > 35° C               |

**NovoSeven® Coagulation Factor VIIa** (Recombinant) - indicated for treatment of bleeding episodes in hemophilia A or B patients with inhibitors to Factor VIII or Factor IX. Off label use for uncontrolled bleeding. Requires attending approval and chart documentation.

- **Indication (Trauma)**: Persistent, non-surgical bleeding or massive transfusion, re-operation or death.
- **Criteria to be met PRIOR to administration of rFVIIa**:
  - Surgical bleeding has been addressed.
  - The massive transfusion protocol has been implemented
  - Correction of acidosis to pH > 7.2 (efficacy of rFVIIa is markedly reduced at pH < 7.1)
  - Emergency Hemorrhage Panel (EHP) shows adequate coagulation factors:
    - Fibrinogen should be > 80-100 mg/dL
    - Platelets should be > 75-100,000

To correct coagulation factor deficiencies prior to given rFVIIa:

- For multiple coag deficiencies administer one Massive Transfusion Pack
- For isolated coag deficiencies give individual components:
  - If fibrinogen < 100 mg/dL give 1 cryopool (will increase fibrinogen by 45 mg/dL)
  - If platelets < 75-100K give 1 apheresis platelet (will increase platelet count by 30-60K)
  - If INR > 2.0 (once fibrinogen > 100 mg/dL) give 4 units of plasma
RADIOLOGY FOR THE GENERAL SURGEON

General Rules:

1. When in doubt, call the on-call radiologist or go to the reading room. You can learn a lot.
2. Always get a CXR after a central line placement or change, and follow up on it.
3. Make sure to follow up on official reads. They change and you may not always get a call from radiology.
4. Always check creatinine before ordering an IV contrast study! Hydration is the most important thing – follow bicarb/mucormyst protocol.
5. Bicarb/Mucormyst protocol: 3 Amps Bicarb in 1L D5W at 3cc/kg/hr one hour before CT, 1cc/kg/hr for six hours after CT. Mucomyst 600mg PO BID for 2 doses before AND after CT (if timing allows before).
6. If a patient has an allergic reaction to iodine/shellfish/contrast (and it's not anaphylaxis, instead something like a rash), they can still get contrast, they just have to be pre-medicated with steroids (different protocols at UW and HMC (trauma protocol is shorter), ask radiology for it).

Chest:

- Central Lines: Ideal placement is cavo-atrial junction, on CXR just below the carina to patient's right or about where the RA is visible in most patients. Line is “central” if below the clavicle.
- Chest Tubes: Ideal placement in trauma: posterior and apical, different for thoracic depending on indications. Always get a new CXR when pulling chest tubes or changing to water seal.
- Pneumothoraces: Need to be upright CXR’s or you can miss it (the PTX can hide anteriorly in the supine patient and no pleural reflection will be seen). Clinical picture is most important!! Tiny asymptomatic pneumos (less than 1-2cm) can usually be followed for improvement with daily CXR’s (and letting your senior know of course). **A PTX will always look bigger on CT!
- Pleural Effusions: Lateral decubitus films with the affected side down are great for picking up small effusions. Chest CT’s help to distinguish effusions from collapsed lung.
- Pleural Edema: Early see thickening of interstitial spaces (loss of vascular shadows and Kerly Lines visible), late edema can shows diffuse opacities (like in ARDS: bilateral fluffy infiltrates).
- Pulmonary Embolus: Correct test to order is a CTA of the chest as most are NOT seen on CXR.
- Atelectasis: Seen on CXR as a loss of lung volume or increase in radiographic density. Look for lobar or triangular opacities in the lung fields or obscuring of the diaphragm in basilar atelectasis.

Studies: CXR, CT Chest, CTA Chest (specific for PE)

Abdomen

- NGT/Keo Feeding tubes: Want NGT to be past the G-E jxn in the stomach (tube below the diaphragm on the left side). “Post-pyloric;” crosses midline (look at the spine). Trick: Reglan, time, or if really difficult, fluoro can advance it for you.
- Plain Films: Good for quick look, i.e. for air-fluid levels or dilated bowel in obstruction (abnormal parameters: SB>2.5-3.0cm in diameter, Colon>5cm and Cecum>8cm), free air (perforated viscus until proven otherwise!!), or portal venous gas (associated with bowel ischemia).
- KUB is flat and for tube placement. You will only see free air on an acute abdominal series (flat, upright, decubitus) so order it if it is what you want.
- RUQ U/S: Most helpful for cholecystitis (look for GB wall thickening (>3mm),
gallstones, pericholecystic fluid, sonographic Murphy’s sign, CBD dilatation in the case of choledocholithiasis).

• HIDA: Gold standard, nuclear medicine test to evaluate for acute cholecystitis. Non-filling of the GB confirms cystic duct obstruction. CCK infusion helps to define GB contractility.

• MRCP: an MRI alternative for endoscopic retrograde cholangiopancreatography (ERCP) to visualize the biliary tract and pancreatic ducts.

• UGI: Usually use barium. Series of X-ray images of the esophagus, stomach and duodenum. Use to look for signs of ulcers, acid reflux disease, uncontrollable vomiting, or unexplained blood in the stools. Can also help with outlet obstruction and anatomy (post-bypass stricture).

• Esophogram: Contrast study watching swallowing in esophagus only (post esophagectomy).

• Tube study: Involves injecting contrast through tube to see size of residual collection or presence of any abnormal connections/fistulae

• Barium enema: Contrast injected into rectum. Good for diverticulosis, stricture, lower colon malignancy, anatomy of Hartman’s pouch, strictures.

• CT of the A/P: (the radiologist will frequently protocol these for you anyways if you tell them what you are looking for). Be clear on requisition and call to speak to radiologist if question. **Always check the patient’s creatinine, allergies, po status.

  • When you want PO contrast: To assess for obstruction or anastomotic leak.
  • When you want IV contrast: Helpful for abscesses, looking at walls of viscera (bowel, gallbladder, etc to assess for thickening/perforation/ischemia), and assessing vasculature (AAA’s).
  • When you want Rectal contrast: Only really used in the setting of a “triple contrast CT” in patients with stab wounds to the flank used to evaluate retroperitoneal colonic perforation.

• Liver CT: Triphasic CT with arterial, portal venous, and equilibrium phases.

• EVAR CT: CTA with fine cuts from above diaphragm to below femoral vessels – for planning

• Pancreas Protocol: Need IV contrast to assess necrosis. In trauma may inject some air to fill duodenum

• Mesenteric Duplex: Assesses flow through mesenteric vessels (Celiac, SMA, IMA, renals) – helpful if trying to rule out ischemia or thrombosis (esp. if have elevated creatinine).

Other:
• PET Scan: se FDG PET, often with CT. Shows glucose uptake. Used to look for metastatic disease in certain cancers (also response to therapy).

• MRI: Will often see in Liver Tumor Clinic

• Sestimibi Scan – Technitium 99 nuclear med study for localizing parathyroid adenomas

• Mammography – screening for breast CA (BI-RADS categories indicate needed f/u)

TRAUMA
Unless your trauma patient has a very, very low mechanism that is clearly understood, all patients get a trauma series! (CXR, lateral C-spine, and AP Pelvis) Follow up on Trauma Series. It’s done for a reason!

High Speed Workup: (>35mph, fall greater than 10ft, or high mechanism (pedestrian hit by car, biker or motorcyclist vs. object, vehicle going less than 35 but with high mechanism like roll-over, death at scene, significant damage to vehicle or intrusion)).
2. Non contrast Head CT (only if LOC, intubated, alcohol or drugs on board or clinical indication (facial trauma etc). If patient has obvious facial trauma, add a CT Max/Face (reconfigured images to include the skull/facial bones – goes through mandible).
3. Neck CT for evaluation of C-spine (if already getting head CT or if intubated) otherwise radiology will tell you C-spine series (it’s cheaper and less radiation to the neck). If suspected zone 1 or 3 neck injury needs a CTA in this case.
4. CT A/P (IV contrast) to assess for solid organ injury and free fluid (clear with R3 first before ordering to assure a more urgent form of evaluation of the abdomen in not needed in an unstable pt, i.e. DPL).
5. Spine: C-spine can be obtained from the Neck CT, and if CT A/P is ordered you’ll have your L-spine. Order plain films of the T-spine if cannot be cleared clinically (unless a CT of the chest is ordered, the T-spine can be reconstructed from this).
6. If the mediastinum cannot be cleared by CXR (in other words, you suspect aortic injury and mediastinum is widened, aortic knob is lost, 1st and 2nd ribs are fractured, etc), or you suspect significant injury somewhere in the chest, a CTA of the chest may be indicated.
7. Plain films of any extremity that hurts (or has visible deformity/significant abrasions if pt non-verbal). Remember image a joint above and below the suspected injury.

Low Speed Workup (<35mph, fall less than 10ft, or low mechanism (fall from standing, etc).
1. Trauma Series (CXR, lateral C-spine, AP Pelvis).
2. Head CT only if LOC, alcohol or drugs on board, or significant facial trauma (in that case order max/face in addition to Head CT).
3. Spine series. If no alcohol or drugs on board, can clear T and L spine clinically, but still need radiologic imaging of C-spine. Otherwise T-L plain films.
4. Plain films of extremities as indicated (see above).
5. All other imaging is left to the discretion of the trauma doc/R3/chief (i.e. abdominal pain, distracting injury, etc may still indicate need for CT A/P even though low mechanism).

**Make radiology plan before patient goes to scanner to be sure all appropriate images are done.

Urologic Imaging:
1. Gross Hematuria and no Pelvic Fracture: CT A/P with delayed renal cuts
2. Hematuria + Pelvic Fracture: CT Cystogram.

Ortho Imaging: try to get done in ED if patient stable. If unstable go to ICU.

**When in doubt, just ask your senior or the radiologist and they can tell you what the best study is.

SHOCK:
Inadequate delivery of oxygen to the tissues
Types of Shock
1. Hypovolemic
   Non-Hemorrhagic – absolute or relative (3rd space) fluid loss
   S/Sx: cool skin, decreased CO, increased SVR, decreased UOP
   Tx: Volume resuscitation
   Hemorrhagic – acute blood loss
   Classification
   Class I - <15% blood loss, nl BP, nl UOP, nl pulse pressure, slight anxiety,
decreased cap refill
Class II – 15-30% blood loss, HR>100, changing BP, narrow pulse pressure, mild anxiety, UOP .5ml/kg/hr – give crystalloid
Class III – 30-40% blood loss, HR>120, decrease BP, narrow pulse pressure, confused, UOP< .5 cc/kg/hr - give crystalloid/blood
Class IV - >40% blood loss, HR>140, low BP, np pulse pressure, lethargic, min UOP – give blood

Or
Mild - <20%, cool, thirsty, decreased cap refill
Moderate – 20-40% decrease UOP, increased HR, restless
Severe - >40% low BP, low UOP, confused

2. Distributive/Septic
Sepsis, noninfectious inflammatory response, adrenal insufficiency
*** vasodilate, warm extremities, decreased SVR, nl CO
Tx: IVF, Abx, pressors

3. Cardiogenic
MI, valve failure, conduction defect
*** cool skin, low CO, high SVR, high wedge, oliguria
Tx: inotropes, optimize filling pressures, treat arrhythmias, treat cause

4. Obstructive/Cardiac Compressive
Pericardial tamponade, increased intrathoracic pressure (PEEP, PTX), PE, gravid uterus on IVC
*** distended neck veins, low BP
Tx: IVF, fix problem

5. Neurogenic
*** low SVR, warm skin, low BP, nl UOP, nl CO, tachy/brady
Tx: IVF, vasoconstrictors

6. Anaphylaxis

Shock in Surgery Patients
In OR – Ventilation vs Circulation
Check ET tube – confirm position
Check HR, rhythm – arrhythmia, MI
Check bleeding – surgical bleeding
Check diaphragms/airway pressures - ? ptx
Check for air embolus – place in Trendelenberg, check lines, draw back
Check end tidal CO2 - ? PE
Check for anaphylaxis - ? drugs

0-4 hours post op : Bleeding, MI, Pneumothorax
4-24 hours post op : MI, Bleeding, Infection
>24 hours post op : Infection, MI, PE, GI bleed

ANTIBIOTIC TIPS:
• Aminoglycosides: Inhibit protein synthesis by binding to a portion of the bacterial ribosome. Most of them are bacteriocidal (i.e., cause bacterial cell death).
• Bacitracin: Inhibits cell wall production by blocking the step in the process (recycling of the membrane lipid carrier) which is needed to add on new cell wall subunits.
• Beta-lactam antibiotics: Group of antibiotics which contain a specific chemical structure (i.e., a beta-lactam ring). This includes penicillins, cephalosporins, carbapenems and monobactams.
• Cephalosporins: Similar to penicillins in their mode of action but they treat a broader range of bacterial infections. They have structural similarities to penicillins and many people with allergies to penicillins also have allergic
reactions to cephalosporins.
- Chloramphenicol: Inhibits protein synthesis by binding to a subunit of bacterial ribosomes (50S).
- Glycopeptides (e.g., vancomycin): Interferes with cell wall development by blocking the attachment of new cell wall subunits (muramyl pentapeptides).
- Macrolides (e.g., erythromycin) and Lincosamides (e.g., clindamycin): Inhibit protein synthesis by binding to a subunit of the bacterial ribosome (50S).
- Penicillins: Inhibits formation of the bacterial cell wall by blocking cross-linking of the cell wall structure. The cell wall is a needed protective casing for the bacterial cell.
- Quinolones: Blocks DNA synthesis by inhibiting one of the enzymes (DNA gyrase) needed in this process.
- Rifampin: Inhibits RNA synthesis by inhibiting one of the enzymes (DNA-dependent RNA polymerase) needed in this process. RNA is needed to make proteins.
- Tetracyclines: Inhibit protein synthesis by binding to the subunit of the bacterial ribosome (30S subunit).
- Trimethoprim and Sulfonamides: Blocks cell metabolism by inhibiting enzymes which are needed in the biosynthesis of folic acid which is a necessary cell compound.

These are suggestions of commonly used antibiotics. All antibiotics should be tailored to culture results. Whenever possible send cx before starting antibiotics.

**Pre-Op Antibiotics:** Ancef (non-abd), ancef + flagyl (abd), vanc if MRSA
**Bite:** Timentin/Augmentin
**Cellulitis:** Ancef (non-MRSA); Vanco (MRSA) other choices Bactrim, Clinda, Linezolid
**NSTI:** PCN, Gent (or Cipro), clind, +/- Vancomycin
**Biliary tree:** Unasyn
**Diverticulitis:** Cipro/Flagyl (many choices)
**Intraabdominal Infection:** Unasyn, Zosyn (if think pseudomonas), Imipenem
**UTI:** Cipro or Bactrim
**Community acquired pna:** Moxiflox or Augmentin or Ceftriaxone.
**VAP:** see protocol for each institution
**Open fracture:** cefazolin and gentamycin
**ENT prophylaxis:** Unasyn/Augmentin
**Consider antifungals if foregut perforation or very ill**

**Time Courses:** Often vary so always discuss with attending.
**VAP:** 8 days
**UTI:** Uncomplicated: 3 days; Complicated: (foley, men, manipulated): 7-10 days
**Line infection:** remove line and treat
**Bacteremia:** 14 days
**Intraabdominal abscess:** Until afebrile with normal wbc + 1-2 days

**ICU TOPICS:**
On arrival in the ICU you should familiariz yourself both with the protocols used as well as the data which supports them.

**NEURO:**
**Sedation Protocols:** There are set protocols for nurses to titrate sedation and analgesia in intubated patients. These use the Ramsay Scale and Ventilator Compliance scale to adjust sedation. Propofol, Fentanyl are short term drugs. If greater than 48h change to morphine and lorazepam.
**Sedation Vacation:** In general patients should have a daily sedation vacation which allows sedation to be weaned and reassessed daily. This prevents drug accumulation and shortens ICU and ventilator days. Need direct order to hold.
• Kollef et al. The Use of Continuous IV Sedation Is Associated with Prolongation of Mechanical Ventilation. Chest. 1998;114:541-8
• Kress et al. Daily Interruption of Sedative Infusions in Critically Ill Patients Undergoing Mechanical Ventilation. NEJM. 2000;342:1471-7

**RESPIRATORY:**

**SBT:** Spontaneous breathing trial. Any intubated patient with plan for eventual extubation should have an SBT once a day if they meet criteria. If they pass their SBT in general if the clinical situation allows, they should be extubated. Do not keep patients intubated waiting for OR.

**ARDS:** Criteria: PaO2/FiO2 ratio < 200 (<300 is ALI), bilateral infiltrates on CXR, no evidence of CHF.

*Articles:*

**LPV:** Lung Protective Ventilation. ARDSnet data suggests patients with ARDS do better with lower lung volumes.


**PEEP Ladder:** This is a protocol used by the RTs to adjust the PEEP in relation to a patient’s oxygenation and tidal volumes based on their blood gases. You may have a patient on or off the PEEP ladder.

**Ventilator Associated Pneumonia:**

**Ventilator Associated Pneumonia (VAP) Algorithm**

- Harborview Medical Center

Clinical suspicion of ventilator associated pneumonia based on:
1. Radiographic evidence
2. >1 of following: fever, purulent endotracheal secretions, or leucocytosis
3. No new antimicrobials for ≥72 h

- Hemodynamically stable?
  - **YES**
    - Perform bronchoscopy
    - Bronchoscopy at the discretion of clinician, begin empiric therapy if initial CRP ≤ 6 (without bronchoscopy, re-evaluate at Day 3), and if CRP remains ≤ 6, antimicrobials should be discontinued.
    - ≤ 4 days of hospitalization and mechanical ventilation?
      - **YES (Early VAP)**
        - Empiric Therapy:
          - Amoxicillin-clavulanate, Ceftriaxone, Ertapenem, or Monotherapy of beta-lactam allergy
          - Add Vancomycin if gram positive cocci in culture or gram stain or history of MRSA colonization
        - Definitive Therapy:
          - De-escalate antimicrobial based on sensitivity if BAL ≥ 10^6 CFU/ml or bronch specimen ≥ 10^5 CFU/ml
          - Consider Lertacid in documented MRSA pneumonias
        - Duration of therapy: 8 days except for Pseudomona, in which 14 days is recommended
      - **NO (Late VAP)**
        - Empiric Therapy:
          - Imipenem or Meropenem + Vancomycin + OR Ceftriaxone if poor renal function
        - Definitive Therapy:
          - De-escalate antimicrobial if bronchial wash legion (BAL) ≥ 10^6 CFU/ml or bronch specimen ≥ 10^5 CFU/ml
          - Consider Lertacid in documented MRSA pneumonias
        - Consider extended therapy (15 days) if CPRS > 6 at Day 0
**Clinical Pulmonary Infection Score (CPIS) Calculation**

<table>
<thead>
<tr>
<th>Temperature, °C</th>
<th>Points</th>
</tr>
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<tbody>
<tr>
<td>≥ 36.1 and ≤ 38.4</td>
<td>0</td>
</tr>
<tr>
<td>≥ 38.5 and ≤ 38.9</td>
<td>1</td>
</tr>
<tr>
<td>&gt; 39.0 and &lt; 38.0</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood leukocytes, mm(^3)</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 4,000 and ≤ 11,000</td>
<td>0</td>
</tr>
<tr>
<td>&lt; 4,000 or &gt; 11,000</td>
<td>1</td>
</tr>
<tr>
<td>+ Band forms ≥ 50%</td>
<td>Add 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tracheal secretions</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of tracheal secretions</td>
<td>0</td>
</tr>
<tr>
<td>Presence of non-purulent tracheal secretions</td>
<td>1</td>
</tr>
<tr>
<td>Presence of purulent tracheal secretions</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oxygenation: (\text{PaO}_2/\text{FiO}_2), mm Hg</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 240 or ARDS (defined as (\text{PaO}_2/\text{FiO}_2) ≤ 200, PCWP &lt; 18, and acute bilateral infiltrates)</td>
<td>0</td>
</tr>
<tr>
<td>≤ 240 and no ARDS</td>
<td>2</td>
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</table>

<table>
<thead>
<tr>
<th>Pulmonary radiography</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>No infiltrate</td>
<td>0</td>
</tr>
<tr>
<td>Diffuse (or patchy) infiltrate</td>
<td>1</td>
</tr>
<tr>
<td>Localized infiltrate</td>
<td>2</td>
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</table>

<table>
<thead>
<tr>
<th>Progression of pulmonary infiltrate</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>No radiographic progression</td>
<td>0</td>
</tr>
<tr>
<td>Radiographic progression (after CHF and ARDS excluded)</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Culture of tracheal aspirate</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathogenic bacteria cultured in rare or light quantity or no growth</td>
<td>0</td>
</tr>
<tr>
<td>Pathogenic bacteria cultured in moderate or heavy quantity</td>
<td>1</td>
</tr>
<tr>
<td>+ Same pathogenic bacteria seen on gram stain</td>
<td>Add 1</td>
</tr>
</tbody>
</table>

**Total Score**

ARDs = acute respiratory distress syndrome; CHF = congestive heart failure; \(\text{PaO}_2/\text{FiO}_2\) = ratio of arterial oxygen pressure to fraction of inspired oxygen; PCWP = pulmonary capillary wedge pressure

---

**BAL:** Bronchoalveolar lavage. Should be done on intubated patient’s with suspected pneumonia. Do not start abx until after this is done as otherwise you will have a hard time identifying an organism.

**ENDOCRINE:**

Insulin Therapies:

Articles: Van den Berghe et al. Intensive Insulin Therapy in Critically Ill Patients. NEJM. 2001;345:1359-1367

**Cortisol Insufficiency:**

- Cooper et al. Corticosteroid Insufficiency in Acutely Ill Patients. NEJM. 2003;348:727-34
- Sprung et al. Hydrocortisone Therapy for Patients with Septic Shock. NEJM. 2008;358:111-24
- Oelkers, W. Adrenal Insufficiency. NEJM. 1996;335:1206-11

**SEPSIS:**

**Activated Protein C**

- Abrahão et al. Drotrecogin Alfa ( Activate) for Adults with Severe Sepsis and a Low Risk of Death. 2005; NEJM: 353;13. Pgs 1332-1341

**Necrotizing Fasciitis:** Follow antibiotic protocols outlined in pharmacy section. These patients require serial examinations and white blood cell counts.

**Plasmapheresis:** If needed must call PSBC to arrange.
HEME:

Transfusion: In general in non-bleeding patients the hematocrit is allowed to reach levels of 21 before transfusion is considered as long as patient is asymptomatic. If the patient is having active MI should transfuse to higher level. Otherwise monitor Hct, consider epo.


OTHER

Spine Clearance: Patients should have their spines cleared in a timely fashion so that Collars can be removed. There is a specific protocol for how this is done involving either uprights or CT C spine. Be sure you daily assess your patient’s spine status and update their spine precautions.

OR clearance: Patients may only be cleared for the OR by an Attending, Fellow, or Chief.

Brain Death: One exam may be done by any MD. The other must be done by Neurology, Neurosurgery or Attending.

Comfort Care: This is an important topic to be able to discuss with families. It involves changing the direction of care. There are many people who can help you with these discussions and you should watch how different people address the issue. In general a family conference is a good idea. There are specific order sets that can be put in place once a patient is made comfort care which address sedation, turning off of monitors, ventilator settings etc. discuss with the family how they would like things to proceed.

Lifecenter Northwest: If there is a patient who is critically ill. Lifecenter should be notified (usually this is done by nurses but you should always double check.) You should not approach the family about donation. This is done by Lifecenter. Obviously you can answer questions if they are asked.

Reporting a death: Any death requires you fill out a death packet. You MUST do this. In general you must also call the coroner to report the death (get the name and case #). Try and be specific about cause of death. Additionally you must dictate a death note (like a discharge summary but much shorter). Be sure all family members are notified.

Other Resources:

- McGee et al. preventing Complications of Central Venous Catheterization. 2003. NEJM. 348:1123-33
TRIUMA:
See Trauma Pearls on the Intranet: https://depts.washington.edu/hmctrauma/

ED Resuscitation Protocol:

[Diagram of ED Resuscitation Protocol]
Indications for the Damage Control Approach:* (by Fred Endorf)
1. Inability to achieve hemostasis due to coagulopathy.
2. Inaccessible major venous injury.
3. Time-consuming procedure in a patient with suboptimal response to resuscitation.
5. Reassessment of intra-abdominal contents.
6. Inability to reapproximate abdominal fascia due to visceral edema.

There are four components of damage control surgery:
1. ER – prompt decision making for immediate operative intervention.
2. OR - rapid surgical control of hemorrhage and contamination alone.
3. ICU- rewarming, resuscitation, correction of coagulopathy, monitoring,
4. OR - reexploration, definitive surgery, possible abdominal closure.
The following is a list of tips for successful damage control laparotomy:
1. Initial damage control operation has five components:
   a. control of hemorrhage,
   b. exploration,
   c. control of contamination,
   d. definitive packing,
   e. rapid abdominal closure.

2. Laparotomy should be performed via a midline incision from xiphoid to pubis. In the setting of severe pelvic fractures, one may consider initially limiting the incision to above the umbilicus.
3. Quickly remove blood and clot to facilitate exposure of bleeding quadrant.
4. Widely retract abdominal wall to allow packing with lap pads in areas of bleeding (some surgeons advocate uniform 4-quadrant packing; others are more specific).
5. Once packed, get information about general sites of bleeding, (retroperitoneum, liver, pelvis, etc)
6. If bleeding seems controlled, allow anesthesia to “catch up”.
7. If no obvious source of bleeding, should suspect retroperitoneal vascular injury. Eviscerate the small bowel, and examine the retroperitoneum, mobilizing retroperitoneal viscera if necessary.
8. Begin removal of packs, starting from furthest away from site of suspected injury. Control hemorrhage by repair if possible, or ligation if necessary.
9. Critical vessels (i.e. SMA, common iliac) may be temporarily shunted using specialized intravascular shunts (Javid; Pruitt-Inahara) or sterile plastic tubing secured with arterial clamps or ligatures. Balloon catheter tamponade described but has variable/ unreliable effectiveness.
10. Temporary aortic occlusion may be necessary- manual compression often adequate and is most effectively done at level of diaphragm. If there has been prior upper abdominal surgery with dense adhesions, may need to get aortic control via thoracotomy.
11. Control contamination by limiting spillage from hollow viscus injury. Clamps, staples, sutures, or resection (without anastomosis) all appropriate. Simple wrapping of injured bowel with laps may be adequate to contain spillage in cases of extensive damage.
12. Damage control packing: Lap pads most effective, intervening layer (i.e. bowel bags, silastic, omentum, dixon mesh) may be helpful in preventing adherence to the liver. It is important to create adequate pressure to stop bleeding, but not too much so that tissue viability is compromised. In general, pack to reconstruct anatomy of injured organ (e.g. Liver), not displace or widen fracture line.
  a. Abdominal closure may be accomplished several ways. Skin only is rapid and effective, can use suture or towel clips, may not be able to accomplish mechanically if edematous viscera.
  b. “Bogota Bag”- silastic sheet or sterile 3-L IV bag sewn to skin as temporary prosthetic, effective but difficult to control effluent from wound.
13. “Vac Pack”- vacuum dressing effective at controlling effluent, consists of bowel bag with perforations placed over viscera, then covered with moist towel, then closed suction drains (i.e. J-P’s) placed on top of towel with an Ioban sheet covering entire apparatus.
14. Liver. Abdominal packing reported to be necessary in 4-5% of all liver injuries. Most can be managed non-operatively. Bleeding not amenable to packing usually signifies large uncontrolled hepatic arterial bleeding. A Pringle maneuver (porta-hepatis clamping) will stop/slow significantly. Treatment requires direct ligation of bleeding vessels, hepatic artery ligation, or angiographic embolization. Bleeding not responsive to Pringle maneuver is hepatic vein or vena cava in origin.
15. Spleen. Attempts at splenorrhaphy in a patient in extremis is silly. Splenectomy should be rapidly performed, followed by direct ligation of splenic artery and splenic vein; packing of splenic fossa rather than complete hemostasis in coagulopathic patient is advised.
16. Small and Large Bowel. Oversew holes or staple off and resect large areas of injury. Do not perform anastomoses at damage control operation.
17. Pancreas. A Kocher maneuver and entry into the lesser sac is required for exposure. Identify areas of injury, drain and pack if needed. Definitive repair using techniques such as pancreatectomy, pyloric exclusion, or Whipple resection should be reserved for reoperation.
18. Urinary System. Severe renal injury (Grade V, extra-Gerota’s contrast or urine extravasation or devascularized kidney) are best treated with nephrectomy if palpable contralateral kidney. Stable perinephric hematoma in conjunction with other severe injuries may be packed and explored later. Ureteral injuries may be temporarily diverted using externalized ureteral stents, or simply ligated with planned post-op percutaneous drainage. Bladder injuries can be drained, with Foley or suprapubic catheter and JP drains
19. Pelvic fractures. If laparotomy gets into expanding pelvic hematoma, best
solution is to pack the pelvis with unmarked gauze and proceed to angiography. Planned retroperitoneal packing largely abandoned with emergence of interventional angiography, though one group had success with planned preperitoneal packing in conjunction with external fixation. (Cothren et al., 2007) 20. Extremity Fractures. Simple ex fix and temporary soft tissue coverage of open fractures, if any immediate treatment at all. Fasciotomy should be used liberally, and always if > 4-6 hours of ischemia. In mangled extremity, guillotine amputation rather than formal stump creation. Major extremity venous injuries may be ligated, arteries may consider temporary shunting.

REFERENCES:

HMC imaging indications for suspected carotid or vertebral artery injuries following blunt trauma

S/Sx
- Hemorrhage of potential arterial origin
- Expanding cervical hematoma
- Cervical bruit, patient < 50 yrs
- Unexplained neurological deficit, TIA, or Horner’s syndrome
- Cerebral infarction on CT or MRI

- Associated Injuries:
  High energy mechanism with:
  a) LeFort II or III fracture, or
  b) Complex mandible fracture, or
  c) Punctate hemorrhage in brainstem, corpus colloscum and/or basal ganglia (GCS <6)
  d) Cervical spine subluxation, or
  e) C-Spine fractures extending into the transverse foramen, or
  f) Vertebral body fracture of C1, C2, or C3
Near hanging resulting in cerebral anoxia
Skull base fracture involving the carotid canal

Zones of the Neck:
Zone 1: clavicle ➤ cricoid; angiography, brochoscopy, esophagoscopy, swallow
Zone 2: cricoid ➤ angle of mandible; operative exploration
Zone 3: angle of mandible ➤ skull base; angiography, laryngoscopy

PEDiATRIC TRAUMA:
Pediatrics Resident available at 559-0888
They should be paged for any pediatric trauma.

***The main rule of pediatric trauma is the Breslow Tape.****
Keep them warm.
Children are very easy to main stem on intubation so be looking for that on exam/CXR.
Bolus 20cc/kg.
1. Trauma resuscitation equipment is available in the ED for children of all sizes. Use the color-coded Broselow tape to assign the child to a length-based color zone. Color-coded drawers and bags in the resus area contain supplies appropriate to the child’s size.

2. Watch the temperature in a resus situation. Children get cold faster than adults.

3. Remember the family. Parents are your best allies in caring for a child. Keep them informed.

4. Pay attention to pain. Most children admitted to HMC have a painful injury or burn. Most need:
   - *Background pain control.* In children this should be scheduled rather than p.r.n. Most kids don’t ask, and we underestimate their pain.
   - *Breakthrough pain control.* Do not be afraid to use opioids in children. PCA is an option for children 10 or older.
   - *Procedural pain control.* If wound care or a procedure cannot be accomplished with meds you are comfortable prescribing, consider scheduling an anesthesia assisted procedure or booking the procedure in the OR as a case.

5. Always dose drugs in mg per kg. Show the child’s weight on every order. The pediatric service can help with selection and dosing of pharmaceuticals.

6. Children admitted to the PICU for non-burn diagnoses will be on a surgical critical care service with a pediatric critical care attending. If you have an unstable child in the unit, please speak to the pediatric critical care attending sooner rather than later.

7. Stable children can be admitted to the PICU if they have monitoring needs that preclude ward status. These might include tracheotomy, frequent neuro checks, continuous oximetry or other indications for close respiratory support (e.g., chest tubes). In general, we err on the side of being conservative.

8. Keep a low index of suspicion for child abuse. If a child’s injuries are not consistent with the history given, or are discrepant with the developmental capabilities of the child, please discuss your concerns with pediatrics.
   
   Unless there are other children in immediate peril, we would like a pediatric attending to review the case before making a CPS referral. We can assist with documentation and social services liaison to insure the child’s safety and keep you out of court.

9. Keep blood draws and painful procedures out of the child’s bed. Use the treatment room.

10. There is a designated pediatric anesthesia provider on-call for anesthesia every day. This person can help with airways, access and sedation issues in children.
BREAST CANCER

Anatomy

Nerves
Long thoracic (serratus ant. -> winged scapula)
Thoracodorsal (lat. dorsi -> weak pull-ups and adduction)
Intercostobrachial nerve (lat. cut. branch 2nd intercostal nerve; sensation medial arm/axilla; just below ax. vein during ALND -> can transect w/o serious consequences)

Lymphatic drainage: 97% to axillary nodes

DCIS
Malignant cells of ductal epith. w/o invasion of basement membrane
50-60% get ipsilateral cancer if not resected; 5-10% get contralateral cancer
Usually not palpable; presents as cluster of calcifications on mammo
Need 2-3 mm margin (some say 5 mm)
Comedo pattern (most aggressive subtype; tx: simple mastectomy)
Increased recurrence risk with comedo type and lesions > 2.5 cm
Tx: lumpectomy and XRT (1cm margins + XRT or simple mastectomy for high-grade, >2.5 cm or multicentricity); no ALND

Invasive breast cancer
Risk ~ 1/8 women (12%)
Screening decreases mortality by 25%
Clinical features: architectural distortion, hard, tethered, indistinct borders
Symptomatic breast mass w/u:
< 30 yo: US; if solid, FNA (exc. bx if FNA non-diagnostic)
If cystic: aspirate: if bloody, exc. bx; if clear and recurs, exc bx.; if complex cyst, exc. bx.
30-50 yo: B mammos and FNA (exc. bx if FNA non-diagnostic)
> 50 yo: B mammos and exc. or core needle bx (not FNA)

Mammography
90% sensitivity/specificity; 10% false +/-
Irregular borders: speculated; multiple clustered, small, thin, branching calcifications
Suspicious lesion on mammo -> needle loc and exc. bx (core needle an option)
Screening mamm: q2-3 y after age 40, yearly after age 50
High-risk screening: begin 10 yrs before youngest age of dx in 1st-degree relative

Node levels (relative to pec minor)
I: lateral II: beneath III: medial Rotter’s nodes: btwn pec major/minor
Standard is to sample level I and II nodes for Stage I and II cancer

Nodes are most important prognostic factor
Bone: most common distant met (also go to liver, lung, brain)

TNM Staging

T1 < 2 cm; T2 2-5 cm T3: >5cm T4: skin or chest wall involvement, peau d’orange, inflammatory cancer
N1: ipsi axillary nodes; N2 fixed ipsi ax. nodes; N3: ipsi internal mamm. nodes
M1: distant mets (includes ipsi supraclavicular nodes)

Stage TNM status
I T1,N0,M0
IIa T0-1,N1,M0 or T2,N0,M0
IIb T2,N1,M0 or T3,N0,M0
IIIa T0-3,N2,M0 or T3, N1-2, M0
IIIb Any T4 or N3 tumors (inoperable)
IV M1 (inoperable)

Cancer risk:
Moderately increased: Early menarche (<12 y), late menopause (>55y), nulliparity or first birth after age 30, radiation, previous breast ca, family hx
Greatly increased: BRCA gene + family hx of breast cancer, DCIS, LCIS, fibrocystic dz w atypical hyperplasia, >=2 1st degree relatives w bilateral or premenopausal breast ca
BRCA I: a/w ovarian (50%), endometrial ca (consider TAHBSO in BRCA I families)
BRCA II: a/w male breast ca, ovarian ca (27%)
5-10% breast ca a/w germline mutation
Test for BRCA if >=3 first degree relatives over 2 generations

Considerations for prophylactic mastectomy:
• Family hx + BRCA gene
• LCIS (risk of IDC is $1\%/\text{yr}$)
• High patient anxiety, poor access for f/u, patient preference

Receptors: Positivity a/w better prognosis; PR+ have better px than ER+, 10% ER/PR-

Inflammatory cancer: considered T4 disease, median survival 36 m; may need CRT, then mastectomy; dermal lymphatic invasion causes peau d’orange

Preop studies: cxr, B mammos, CBC, LFTs; CT A/P if LFTs elevated; CT-H if h/a, bone scan if bone pain or abnormal alk phos.

Surgical options:
• Subcutaneous (simple) mastectomy: used for DCIS, LCIS, not for cancer
• Lumpectomy and SLNB
• MRM (includes axillary node levels I,II)

Contraindications to breast-conserving therapy (BCT): tumor >5 cm, multicentricity, h/o XRT to breast, collagen vascular dz, subareolar tumor, large tumor: breast ratio, diffuse suspicious or indeterminate calc’s

Radiotherapy: contraindications: scleroderma (causes severe fibrosis and necrosis), previous XRT, SLE (relative), active RA (relative)
Indications for XRT after mastectomy: >4 nodes, skin or chest wall involvement, positive margins, T3 (tumor >5cm), extracapsular nodal invasion, inflammatory cancer, N2 or N3 disease

Lumpectomy with XRT:
10% local recurrence rate (usu. w/in 2 yrs, often w distant mets)
Need salvage MRM
Need negative margins after lumpectomy before starting XRT
Chemotherapy (decrease recurrence and improve survival)
Cytophosphamide, mtx and 5-FU (CMF) or Adriamycin and cyclophosphamide (AC) for 3-6 m

Indications (per “Passing Oral Boards”):
Pre-menopausal w >1cm tumor
Post-menopausal w T2 tumor or + nodes

Hormonal therapy:
SERM (selective estrogen receptor modifiers): tamoxifen: decreases annual recurrence risk 50% in ER+ patients; no additional benefit beyond 5 years; 1% risk of DVT and endometrial cancer
Aromatase inhibitors: Arimidex (anastrozole): inhibits estrogen synthesis; proven more effective in ER+ tumors than tamoxifen in ATA-C trial with decreased risk of DVT or endometrial cancer
Heceptin (trastuzumab): monoclonal antibody targeting her-2-neu gene which codes for growth factor overexpressed in 25% of tumors.

Selected NSABP (National Surgical Breast and Bowel Project) Trials:
NSABP B-6: total mastectomy vs lumpectomy vs. lumpectomy + XRT: no difference in survival; addition of XRT decreased local recurrence rate from 40% to 10%
NSABP B-13: surgery alone vs. surgery + adj chemo in node-neg patients with ER-neg tumors: improved dz-free survival w adj chemo
NSABP B-14: surgery alone vs. surgery + adj tamoxifen in node-neg patients with
ER+ tumors: improved survival w adjuvant tamoxifen
NSABP-P1: tamoxifen decreased risk of breast cancer 50% in women at high-risk
NSABP-B-18: neoadj chemo decreased tumor size in 80% and allowed 12% more
BCT in patients with locally-advanced primary tumor

PARATHYROID DISEASE
Anatomy
• Superior parathyroid (4th pouch-thyroid) – in TE groove
• Inferior parathyroid (3rd pouch-thymus) – below inferior thyroid artery
• Most common ectopic site: 1) where it’s supposed to be, 2) thymus, 3) TE groove
• Blood supply: inferior thyroid arteries

1° HPH: □PTH □Ca □PO4
- 80% adenoma,
- MEN 1 (HPT, pancreas, pituitary)
- 15% diffuse hyperplasia
- MEN 2a (HPT, med thyroid, pheo)

2° HPH: □PTH □Ca □PO4 (renal failure)

3° HPH: Diffuse hyperplasia s/p renal transplant

Symptoms: (most asymptomatic) bones, stones, moans, psychiatric overtones. PUD, pancreatitis, constipation, anorexia, myalgias, Hypercholeremic metabolic acidosis, Osteitis fibrosa cystica (“brown tumors”)

Indications for surgery (almost all need surgery even if asymptomatic).
• Medically refractory 2° or 3° HPH
• Ca >1 mg/dL normal
• 24h UCa >400mg
• 30% □CrCl
• Osteoporosis (T-score <2.5)
• Symptoms: stones, bones, moans, groans, psychiatric overtones (most often the psych part)

Workup:
• HPI: Symptoms, stones, osteoporosis, highest Ca and PTH, urine Ca (r/o familial hypercalcemic hypocalciuria)
• PMH & FX of endocrinopathies (MEN 1 or 2a), h/o stones or osteoporosis
• Imaging: Sestimibi to localize parathyroid, +/- ultrasound

Procedures:
Single adenoma: Minimally invasive parathyroid with intraoperative PTH
4-gland hyperplasia: 3½ gland parathyroidectomy (auto transplant in forearm)

Intra-op PTH testing: PTH t½ 3-5min. Need to drop 50%

Post-op care: Hypocalcemia very common (tingling of lips, fingers) due to rebound. Treat with oral calcium carbonate.

Problems:
Sestimibi doesn’t map: redo Sestimibi vs ultrasound vs 4-gland exploration
IOPTH doesn’t drop: re-explore, then 4-gland exploration (can send piece to pathology for ID)

MEN: all autosomal dominant
I: Pituitary adenoma, Parathyroid hyperplasia, pancreatic islet cell tumor (gastrinoma>insulinoma)
II: Medullary thyroid cancer, pheochromocytoma, parathyroid hyperplasia
III: Medullary thyroid cancer, pheochromocytoma, multiple mucosal neuromas

100% have medullary thyroid cancer. The prognosis normally comes from here.

**THYROID DISEASE**

Most patients with a solitary nodule have a benign lesion. Conservative management vs surgical therapy based on; presentation, image assessment, interventional diagnostic methods (FNA, etc.).

**Solitary Nodule:**

![Thyroid disease flowchart](image)

**Diagnostic/Laboratory Evaluation**

1. H&P: endocrine disorders, neck radiation, family history, size and consistency of nodule, palpate anterior/posterior cervical triangles
2. Labs: TSH, free T4, T3 resin uptake, thyroglobulin (well-diff carcinoma), calcitonin (if MCT suspected)
3. Radiologic Evaluation:
   - Ultrasound: pre-op or intra-op, volume, multicentricity, cystic vs solid, cannot predict dx solid nodules
   - Radionuclide Scanning: use is decreasing, “hot” vs “cold” designation is not discriminatory
4. Fine-Needle Aspiration: usually initial diagnostic modality, most accurate for papillary. Follicular ca. cannot be dx by FNA. “benign” = colloid and macrophages on FNA, cannot confirm a benign diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Associated w/ Dx</th>
<th>Confirm Dx</th>
<th>Worse Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papillary ca.</td>
<td>Radiation exposure</td>
<td>FNA or Surgery</td>
<td>male, age &gt; 40 yr, size &gt; 3 cm, tall cell</td>
</tr>
<tr>
<td>Follicular ca.</td>
<td>“Follicular cells” by FNA</td>
<td>Permanent section pathology</td>
<td>male, age &gt; 40 yr, size &gt; 3 cm</td>
</tr>
<tr>
<td>Medullary ca.</td>
<td>MEN IIa/IIb, Elevated calcitonin</td>
<td>FNA or Surgery, Ret oncogene</td>
<td></td>
</tr>
<tr>
<td>Anaplastic ca.</td>
<td>Rapid progression</td>
<td>FNA or Surgery</td>
<td>Diagnosis</td>
</tr>
</tbody>
</table>

Papillary Carcinoma
- Surgical ablation is the main treatment
- For lesions < 1 cm, lobectomy + isthmectomy
- Young patients (< 15 years of age): total thyroidectomy + LND if palpable LNs present
- Patients between ages 15 and 40:
  - if < 2 cm, lobectomy + isthmectomy or total thyroidectomy (controversial)
  - if > 2 cm, total or near-total thyroidectomy
- For any age, if palpable LAD, perform MRND on the affected side
- Adjunctive 131I therapy for large lesions (must have had total thyroidectomy)
- Prognosis: AGES – age, grade, extent, size

**Follicular Carcinoma (FTC)**
- 10% of all thyroid malignancies
- Disease of an older population (often > 50 years of age), F:M = 3:1
- Subtype of FTC w/ oxyphillic cells = Hurthle cells; in pts 60-75 years of age
- LN involvement is unusual (less than 10% of cases). Distant spread more common (lung, bone, etc.)
- FNA and intra-op frozen sections are of limited value
- Treatment primarily surgical
- FNA or intra-op FS reveals a “follicular lesion”
  - < 2 cm, lobectomy + isthmectomy, > 2 cm, total thyroidectomy
  - > 4 cm, risk of carcinoma is greater than 50%
- For patients younger than 40, survival approaches 95% at 5 and 10 years
- Poorer prognosis than papillary carcinoma

**Medullary Carcinoma (MCT)**
- 5-10% of all thyroid malignancies
- Involves C-cells, from neural crest cells. Associated w/ calcitonin secretion (effective marker)
- May occur as sporadic or familial (MEN IIa/IIb)
- Patients w/ sporadic MCT present w/ a palpable mass and/or an elevated calcitonin level
- Screen patients w/ 24-hr urinary catecholamines for pheochromocytoma if MCT suspected
- At least a total thyroidectomy +/- central LND. Any palpable LNs in lateral areas □ MRND
- May monitor recurrence w/ calcitonin levels (basal vs. stimulated)
- Recurrent MCT is usually unresectable, w/ distant metastases (lung and liver)

**Anaplastic Carcinoma**
- Less than 1% of all thyroid malignancies. Most aggressive form
- Most patients are not operative candidates. 50% mortality at 6 months; 11% 3-year survival
- Conservative surgical approach aimed at palliation (e.g., tracheostomy)

**Thyroidectomy:**
- Anatomy: review location of sup/inf artery; sup/mid/inf vein, RLN, SLN, parathyroids
- Risks/Complications: RLN injury (hoarseness, bilateral and can have airway obstruction), Sup laryngeal nerve injury (loss projection), damage to parathyroid glands, bleeding
- Replacement therapy: Cytomel (short term), levothyroxine (long term)

TNM classification system for differentiated thyroid carcinoma

**Definition**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Tumor diameter &lt;2 cm</td>
</tr>
<tr>
<td>T2</td>
<td>Primary tumor diameter 2-4 cm</td>
</tr>
<tr>
<td>T3</td>
<td>Primary tumor diameter &gt;4 cm limited to the thyroid or with minimal extrathyroid extension</td>
</tr>
</tbody>
</table>
T4a  Tumor any size extending beyond thyroid capsule to invade sq soft tissues, larynx, trachea, esophagus, or RLN
T4b  Tumor invades prevertebral fascia or encases carotid artery or mediastinal vessels

Nodes
N1a  Metastases to level VI (pretracheal, paratracheal, and prelaryngeal/ Delphian lymph nodes
N1b  Metastases to unilateral, bilateral, contralateral cervical or superior mediastinal node metastases

Metastasis:
M1  Distant metastases
MX  Distant metastases not assessed

Stages
Stages Patient age <45 years  Patient age 45 years or older
Stage I  Any T, any N, M0  T1, N0, M0
Stage IIA Any T, any N, M1  T2, N0, M0
Stage IIIA T3, N0, M0  T1, N1a, M0
           T2, N1a, M0  T3, N1a, M0
Stage IVA T4a, N0, M0  T4a, N1a, M0
           Any T with N1b
Stage IVB  T4b, Any N, M0
Stage IV C  Any T, Any N, M1

Lymphatic drainage of the neck
I--Submental and submandibular nodes
II--Upper jugulodigastric group
III--Middle jugular nodes
IV--Inferior jugular nodes
V-- Posterior triangle group
VI--Anterior compartment group

MELANOMA
• 3-5% skin cancers, 65% deaths
• Risk Factors: fair complexion, blonde/red hair, family history, h/o blistering sunburn, easy sunburn, previous skin cancer, Familial BK mole syndrome, xeroderma pigmentosum, dyslastic congenital nevi
• Clinical: asymmetry, border, color, diameter
• Work Up: Usually have already had biopsy, consider CXR, LDH, CT C/A/P for more advanced stage
• Nodes: SLNB for patients with lesions >1mm. In axilla must take all levels (1-3). Remove any gross nodal disease. Always check node basins on PE.

Clark’s Levels:
Level I: in situ., epidermis only
Level II: Invasion to papillary dermis, not yet to papillary-reticular interface
Level III: Fills papillary dermis, does not penetrate reticular dermis
Level IV: Invasion into reticular dermis
Level V: Invasion into subcutaneous tissues

Breslow Depth:

<table>
<thead>
<tr>
<th>Breslow Thickness</th>
<th>Approximate 5 year survival</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>In situ</td>
<td></td>
<td>0.5cm</td>
</tr>
<tr>
<td>&lt;1mm</td>
<td>95-100%</td>
<td>1cm</td>
</tr>
<tr>
<td>1-2mm</td>
<td>80-96%</td>
<td>2cm</td>
</tr>
<tr>
<td>2.1-4mm</td>
<td>60-75%</td>
<td>2cm</td>
</tr>
<tr>
<td>&gt;4mm</td>
<td>50%</td>
<td>2cm</td>
</tr>
</tbody>
</table>
Tumor (T) classification

Tis     Melanoma in situ
T1   < or = 1.0 mm  a: without ulceration and level II/III*/
                   b: with ulceration or level IV or V*
T2   1.01-2.0 mm  a: without ulceration/
                   b: with ulceration
T3   2.01-4.0 mm  a: without ulceration/
                   b: with ulceration
T4   >4.0 mm  a: without ulceration/
                   b: with ulceration

Node (N) classification

N1  One lymph node  a: micrometastases
    b: macrometastases
N2  2-3 lymph nodes  a: micrometastases
    b: macrometastases
    c: in-transit mets
N3  4 or more metastatic lymph nodes, or matted lymph nodes, or in-
    transit with metastatic node(s)

Metastasis (M) classification

M1a  Distant skin, subcutaneous, or lymph node metastases, normal LDH
M1b  Lung metastases, normal LDH
M1c  All other visceral metastases, normal LDH, Any distant metastases,
     elevated LDH

Sites of Metastatic Disease: skin, LN, liver, bone, lung, brain, viscera

Stage  Clinical stage grouping*
IA   T1a    N0    M0
IB   T1b or T2a N0    M0
IIA  T2b or T3a N0    M0
IIB  T3b or T4a N0    M0
IIC  T4b    N0    M0
III  Any T   N1-3  M0
IV   Any T   Any N Any M1

Treatment: surgery, interferon (poor options)

Studies:
WHO 1998 - margins
Swedish Melanoma Study Group 2000 - margins
French Cooperative Group – 2003 - margins
Melanoma Intergroup Trial – 1996 – ELND, margins
British Melanoma Group – 2004, margins
MSLT-I – 2001: prognosis and impact of SLNB

ENDOCRINE PANCREAS

• 1/3 non functional of which 90% malignant, metastasize to liver
• 2/3 functional, respond to debulking, metastasize to liver first
• light up on arterial phase of CT scan

Insulinoma: most common, evenly distributed through pancreas, 85-95% benign, 10% multiple

• Whipple’s triad: hypoglycemia symptoms, relief with glucose, fasting hypoglycemia
• Dx: monitored fast to await neurologic symptoms of hypoglycemia, measure insulin and c-peptide.
• Localization: contrast CT (fine cuts), EUS, octreotide scan, selective arteriography, calcium angiography, intra-operative US.
• Tx: enucleate if <2cm, formal resection >2cm. Medical Tx (limited): diazoxide, verapamil, octreotide
**Gastrinoma:** severe PUD due to gastric acid hypersecretion, most common islet cell tumor with MEN 1, 50% malignant, 50% multiple; gastrinoma triangle
- Symptoms: refractory ulcer disease, diarrhea
- Dx: check fasting gastrin level and basal acid output (distinguish from atrophic gastritis, H2 blockers, PPIs), secretin stimulation test (distinguish from retained antrum, G cell hyperplasia, GOO). Expect elevated gastrin, elevated BAO, and increase with secretin
- Localization: CT scan, octreotide scan, EUS, selective angiography +/- secretin injection
- Tx: Medical: H2 blocker, PPI. Surgical: enucleation or formal resection if >2cm. If cannot locate tumor – duodenostomy and explore. Debulking helpful.

**VIPoma:** Sx: achlorhydria, hypokalemia, diarrhea. Dx: exclude others, check VIP level. Malignant. Located distal pancreas. Tx: Octreotide helps diarrhea. Tx: surgical resection or debulking.

**Glucaagonoma:** Sx: DMII, anemia, stomatitis, weight loss, necrolytic migratory erythema. Dx: glucagon level, skin rash biopsy. Majority located in distal pancreas and are malignant. Image with CT. Tx: resection. Rash resolves with resection.


**Carcinoid Tumor:** Hormone secreting tumor that can occur anywhere along foregut/midgut/hindgut structures.
- Dx: elevated serotonin or urine 5-HIAA. Imaging includes: MIBG, Octreotide scan, CT, CXR, US depending on location.
- Location:
  - Appendix: most common. 1/300 appys. <1cm - appendectomy, 1-2cm – selective R hemicolectomy, >2cm (>30% risk of mets) or involving base or lymphatics - R hemicolectomy
  - SI: often multiple primaries, resect with node. Prognosis is based on size of tumor.
  - Rectal: 2nd most common. Rarely symptomatic, hormonally inactive, Tx: resection
  - Carcinoid Syndrome: Due to liver mets – flushing, diarrhea, asthma. Tx: octreotide/resection

**ADRENAL TUMORS**

GFR: glomerulosa (aldosterone), fasciculate (glucocorticoids), reticularis (anrogens/estrogens)
- Cushings syndrome, Addison’s disease, Conn’s syndrome

**Pheochromocytoma:** chromaffin cells, oversecrete catecholamines, majority in actual adrenal medulla. HTN most common symptom. Associated with many genetic syndromes (MEN). Work-up: urine catecholamines, VMA, plasma metanephrines. Imaging: CT identifies 95% greater than 1cm, MIBG scan. Tx: surgical excision - unilateral unless familial (then explore bilateral), alpha blockade pre-op to control HTN.
- 10% rule: extra-adrenal, children, bilateral, malignant, familial

**Incidentaloma:** 1-2% of CTs show adrenal mass (5% will be primary adrenal tumor or met). Ask: functional? Malignant?, metastatic? Concerning if large (>4-6cm), enlarging, clinically active. R/o pheo, adrenocortical functioning tumor, mets. If solid, non-functional, and <4-5cm can watch with serial CT (Ann Intern Med 98:940, 1983).
Metastasis: breast ca > melanoma > renal > lung
Adrenal carcinoma: rare, >6cm are usually carcinoma, often metastatic on presentation. 50% functional Complete resection is only chance for cure.

Imaging characteristics (Young, Up to Date)
Benign adenomas
• Round and homogeneous density; smooth contour and sharp margination
• Diameter less than 4 cm; unilateral location
• Low unenhanced CT attenuation values (<10 HU)
• Rapid washout
Pheochromocytomas
• Increased attenuation on nonenhanced CT (>20 HU)
• Increased mass vascularity
• Delayed washout
• High signal intensity on T-2 weighted MRI
• Cystic and hemorrhagic changes
Adrenocortical carcinoma
• Irregular shape, calcification
• Inhomogeneous density - central areas of low attenuation due to tumor necrosis
• Diameter usually >4 cm. Unilateral location. Evidence of local invasion or metastases.
• High unenhanced CT attenuation values (>20 HU), Inhomogeneous enhancement on CT
• Delayed washout
• Hypointensity compared with liver on T-1 weighted MRI
Metastases
• Irregular shape and inhomogeneous nature
• Tendency to be bilateral
• High unenhanced CT attenuation values (>20 HU) and enhancement with intravenous contrast on CT
• Isointensity or slightly less intense than the liver on T-1 weighted MRI.

RETROPERITONEAL SARCOMA
• 50% in extremities
• S/Sx: asymptomatic mass, GI bleeding, obstruction, neurologic defecit (compression)
• Usually hematogenous spread or direct extension/compression
• Liposarcoma most common
• Goal is for macroscopically negative margins

AJCC staging system for soft tissue sarcoma
Grade G Histologic grade of malignancy
G1 Low, well differentiated
G2 Intermediate, moderately well differentiated
G3 High, poorly differentiated

N Regional Lymph Node
N0 No histologically verified metastasis to regional lymph nodes
N1 Histologically verified regional lymph node metastasis

T Primary Tumor
T1a Superficial tumor*
T1b Deep tumor*
T2 Tumor greater than 5 cm in greatest dimension
T2a  Superficial tumor
T2b  Deep tumor
M  Distant Metastasis
M0  No distant metastasis
M1  Distant metastasis

Stage grouping
Stage I  T1a, b N0 M0, G1, T2a, b N0 M0, G1
Stage II  T1a, 1b N0 M0,G2-3, T2a N0 M0, G2-3
Stage III  T2b N0 M0, G2-3
Stage IV  Any T N1 M0, Any G, Any T N0 M1, Any G

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LUNG CANCER
Leading cause of cancer deaths.
Nodal involvement strongest predictor of survival. Brain most common site of metastasis

Solitary Nodule: >3cm or growing concern for malignancy, also look at calcifications. Smaller or stable in size for >2y are more likely benign. Can follow with CXR or CT.

PFTs
Need predicted post-op FEV1 >0.8 (at least 40% predicted), DLCO post-op >11-12 ml/min/mmHg CO (50% predicted), post-op FVC >1.5L

NSCLC: 80% of all lung cancer. Adenocarcinoma (30%) most frequent, peripheral, distant mets. Squamous more central, local recurrence.
• Stages I-IIIA: Resectable
• Stage IIIB/ IV: Often nonresectable
For early disease, goal is complete resection
• Lobectomy with 1 cm normal bronchus margin, sleeve resection if upper lobe involved
• Pneumonectomy with or without sleeve for proximal bronchial lesions
For advanced disease:
• Preoperative chemoradiotherapy
• Solitary brain/adrenal metastasis candidates for resection
• Laser resection of proximal obstructing tumors may palliate

Small Cell: Treatment typically chemoradiotherapy. For early disease T1-T2 lesions: Resection with chemotherapy may improve local control and survival. Resect small peripheral tumors with aggressive postoperative chemotherapy to increase local control.
• 20%, neuroendocrine origin. Paraneoplastic: ACTH, ADH
• Usually unresectable at diagnosis, tx medically

TNM staging system for lung cancer
Primary tumor (T)
T1 - Tumor <= 3 cm diameter
T1a - Tumor <= 2 cm in diameter
T1b - Tumor >2 cm in diameter
T2 - Tumor >3 cm but <= 7 cm
T2a - Tumor <= 5 cm
T2b - Tumor >5 cm
T3 - Tumor >7 cm or: Invades: chest wall, diaphragm, phrenic, mediastinal pleura, pericardium, main bronchus <2 cm from carina, Atelectasis/obstructive
pneumonitis of entire lung. Separate tumor nodules in the same lobe
T4 - Tumor invades mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body, carina, or with separate tumor nodules in a different ipsilateral lobe

Regional lymph nodes (N)
N1 - ipsilateral peribronchial and/or ipsilateral hilar lymph nodes
N2 - ipsilateral mediastinal and/or subcarinal lymph node(s)
N3 - contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s).

Distant metastasis (M)
M1a - tumor in contralateral lobe; pleural nodules, pleural or pericardial effusion
M1b - Distant metastasis

Stage groupings
Stage IA: T1a-T1b N0 M0
Stage IB: T2a N0 M0
Stage IIA: T1a-T2a N1 or T2b N0
Stage IIB: T2b N1 or T3 N0
Stage IIIA: T1a-T3 N2 M0
   T3 N1 M0
   T4 N0-N1 M0
Stage IIIB: T4 N2 M0
   T1a-T4 N3 M0
Stage IV: Any T Any N M1a or M1b

OR: Start with bronch/med to assess nodes and respectability

Indications
Stage I/II (now combined with chemotherapy)
Stage IIIA: Surgery with chemoradiation
Solitary brain or adrenal metastasis

Contraindications
MI in previous 3 m
SVC syndrome
Bilateral endobronchial tumor
Contralateral lymph node metastases
Malignant pleural effusion
Distant metastases (except brain or adrenal)
FEV1 (0.8 L), Paco2 > 45, Pao2 < 50 (relative)

Prognosis: Perioperative mortality 2% for lobectomy, 6% for pneumonectomy NSCLC 5-year survival rates
• Stage I: 43–64%
• Stage II: 20–40%
• Stage IIIA: 15–25%
• Stage IIIB: 5–7%
• Stage IV: < 2%

ESOPHAGEAL CANCER
Epidemiology: 1% of all malignant lesions and 6% of GI tract cancers
• Adenocarcinoma #1 esophageal ca, lower 1/3 esophagus
• Squamous cell occurs in upper 2/3
• RF: Associated with alcohol and tobacco use, Barrett’s, male
Metastases to lymph nodes are present at the time of diagnosis in 80% of cases. Lung, bone, liver, and adrenal glands are frequent sites of distant metastases.

**S/Sx:** Dysphagia, initially during ingestion of solid foods and later of liquids, weight loss and inanition.

- Classic radiographic outlines: Irregular mucosal pattern with narrowing, shelf-like upper border or concentrically narrowed esophageal lumen.
- Definitive diagnosis established by endoscopic biopsy or cytologic studies.
- Hoarseness most often reflects spread to the recurrent laryngeal nerves.

**Work-up:**
- Chest film: A column of air or air-fluid level in the esophageal lumen.
- Barium swallow: Narrowing of the lumen at site of lesion and proximal dilation.
- Esophagoscopy with biopsy: Provides a tissue diagnosis in 95% of cases.
- CT scan: Distant mediastinal and celiac axis nodal metastases.
- Bronchoscopy: Distortion of the bronchial lumen, blunting of the carina, or intrabronchial tumor.

**Resectability:**
- Unresectable: distant mets, supraclavicular nodes, nodal dz outside area resection, short life expectancy.

**Neoadjuvant:** Preoperative radiation may convert an unresectable growth to a resectable one.
About 50% of tumors are resectable at presentation and about 75% following neoadjuvant therapy.

**Operative Treatment:** Esophagectomy, for cure or palliation, should be undertaken in suitable candidates without distant metastases with a life expectancy more than a few months.
- Esophagectomy: Ivor Lewis, Transhiatal (+/- lap assisted), three hole.
- Transhiatal: Start in abdomen, mobilize stomach/esophagus, pyloromyotomy, blind dissection of esophagus in chest, cervical anastomosis, place J tube and close.
- Mortality: 5% from surgery, curative in approx 20%.
- Right gastroepiploic becomes primary blood supply to gastric conduit.
- Other conduits: stomach, colon, jejunum.
- Get swallow on approximately day #7 to rule out leak, or watch drain with po intake.

**Complications:** Bleeding, leak, arrythmias (a fib common), aspiration pneumonitis, fistula.

**Adjuvant therapy:** Adjuvant radiotherapy has not increased the overall cure rate.

**Prognosis:** 5-year survival rate after curative resection is about 30% for patients with squamous cell carcinoma and 10% for patients with adenocarcinoma.

**TNM staging for esophageal cancer**

**Primary tumor (T)**
- **TX**: Primary tumor cannot be assessed.
- **Tis**: Carcinoma in situ.
- **T1**: Tumor invades lamina propria or submucosa.
- **T1a**: Tumor invades mucosa or lamina propria.
- **T1b**: Tumor invades submucosa.
- **T2**: Tumor invades muscularis propria.
T3  Tumor invades adventitia
T4  Tumor invades adjacent structures

Regional lymph nodes (N):
N1  Regional lymph node metastasis

Distant metastasis
Tumors of the lower thoracic esophagus:
M1a  Metastasis in celiac lymph nodes
M1b  Other distant metastasis
Tumors of the midthoracic esophagus:
M1a  Not applicable
M1b  Nonregional LN and/or other distant metastasis
Tumors of the upper thoracic esophagus:
M1a  Metastasis in cervical nodes
M1b  Other distant metastasis

Stage grouping
Stage 0   Tis    N0    M0
Stage I   T1    N0    M0
Stage IIA T2 /T3  N0    M0
Stage IIB T1 /T2  N1    M0
Stage III T3 /T4  N1    M0
Stage IVA Any T    Any N M1a
Stage IVB Any T    Any N M1b

GERD

Symptoms:
Typical symptoms: Heartburn, Regurgitation, Water brash, Chest pain, Dysphagia
Atypical symptoms: Chronic nausea, Asthma, Aspiration, Cough, Hoarse throat, Globus hystericus

Pathophysiology
• GERD occurs physiologically in healthy individuals
• Barriers include: LES, Intraabdominal segment of esophagus, Diaphragmatic crura, Phrenoesophageal membrane, Angle of His, Esophageal clearance of acid
• Lower esophageal sphincter (LES): High-pressure zone. Intrinsic musculature of distal esophagus, sling fibers of cardia, Diaphragm, Abdominal pressure

Diagnosis/Preop Testing
• Anatomic delineation
  • Esophagogastroduodenoscopy (± biopsy): rule out other disease, biopsy
  • Contrast radiographs (barium swallow, upper gastrointestinal series): demonstrate anatomy
• Physiologic examinations
  • 24-h pH testing: # reflux episodes, % time with pH<4, symptom correlation, DeMeester score
  • Esophageal manometry: LES pressure, relaxation, peristalsis, transit time. Nl: LES 15–25 mm Hg (never > 45 mm Hg) with normal relaxation with swallowing. Mean distal esophageal peristaltic wave 30–100 mm Hg (never > 180 mm Hg). Simultaneous contractions occurring after < 10% of wet swallows. Monophasic waveforms (with no more than two peaks)
  • Scintigraphy (esophageal/gastric emptying)
  • Impedance
  • Laryngoscopy - if laryngeal symptoms--may see inflammation of the laryngeal mucosa.

Treatment
• Lifestyle modifications
• 6 wk acid suppression treatment with 2x dose PPI (PPI: more effective than H2-blocker)

**Surgery**
• Indication for operation: Severe esophageal injury, Medical tx failure (incomplete resolution, relapse), Long-term PPI (costs equal at about 10 years).
• Presence of Barrett's-- controversial indication. Antireflux surgery results in regression of intestinal metaplasia in up to 35%, regression of low-grade dysplasia in up to 75% of pts. Surgery: reduces progression of intestinal metaplasia to dsplasia vs medical tx. But: No prospective randomized trial proving medical or surgical tx prevents progression of Barretts to adenocarcinoma.
• Relative contraindications: Previous upper abdominal surgery. Severe obesity
Consider bariatric surgery--often eliminates GERD. Stricture & shortening of the esophagus (hard to create good wrap)
• Goals of surgery: Fundoplication using the fundus, not the body. Fundoplication should sit within the abdomen without tension. Close crura to prevent migration of fundoplication into chest. Partial fundoplication less resistance--> less postop dysphagia, but more reflux, ? Higher chance of disruption of wrap.
• Fundoplication failures: Disrupted wrap, sliding hiatal hernia with stap in the abdomen, “slipped fundoplication: onto prox stomach. Often used stomach rather than fundus, intrathoracic migration of fundoplication

**Barrett's Esophagus**
• Replacement of injured squamous cells in distal esophagus with columnar metaplasia
• GERD: injures the epithelium and provides abnormal environment that stimulates columnar cell metaplasia
• Barrett's identified in 1/10 with erosive esophagitis, 1/3 with peptic esophageal stricture.
• Most adenocarcinoma of distal esophagus arrises from Barretts epithelium.
• Natural history of dysplasia in Barretts not clear, can be difficult to differentiate from normal Barrett's. But: 1/3 of patients with high grade dysplasia have/ will develop
• Preop Eval/Tx: Like GERD w/u: contrast esophagram most important. Manometry to determine motor function. pH study if not planning antireflux procedure.
• Open or Lap reduction. Lap: less periop morbidity. Recurrence rates unclear: 30-40% lap vs 15-20% open. Usually asymptomatic.

**Motility Disorders**
• Achalasia: Triad: Dysphagia, regurgitation, weight loss. Loss of intermyenteric ganglion plexus leads to dysfunctiona/absent peristalsis, impaired LES relaxation to food bolus, increased LES resting pressure . normal or > 45 mm Hg.
• DES: Simultaneous (nonperistaltic) contractions, Repetitive (≥3 wk), Increased duration (>6 sec), Spontaneous contractions, Intermittent normal peristalsis. Contractions possibly of increased amplitude
• Nutcracker esophagus: Mean peristaltic amplitude (10 wet swallows) in distal esophagus > 180 mm Hg. Increased duration of contractions (>6 sec) frequent. Normal peristaltic sequences
• Hypertensive LES: LES pressures > 45 mm Hg but with normal relaxation. Normal esophageal peristalsis
• Vigorous Achalasia: Repetitive simultaneous contractions in body of esophagus (as with diffuse esophageal spasm). Partial or absent LES relaxation (as with achalasia)

**GI BLEED**
ABCs and distinguish upper from lower GI Bleed (NG tube, EGD)
Upper GI Bleed:
RF: previous UGI bleed, PUD, NSAIDs, smoking, liver disease, varices, splenic vein thrombosis, sepsis, burns, trauma, vomiting
W/U: ABCs, Place NG tube and lavage. EGD and treatment, protonix gtt
EGD: band, sclerotherapy, injection, cautery, biopsy for H pylori
DU: if bleeding at time EGD go to OR, if unstable go to OR
Varices (liver failure): EGD, vasopressin, octreotide, correct coags
β balloon tamponade
TIPS
OR
Duodenal Ulcers: increased acid, 1st portion duodenum, anterior more common (free air), posterior bleed from GDA, epigastric pain radiating to back, diagnosis by endoscopy
• Tx: H2 blocker, PPI, H pylori treatment
• OR if: perforation, protracted bleeding, intractability, possible cancer, obstruction
• Bleeding most common complication: OR if hypotensive, >6 units in 24h.
Perform duodenostomy and GDA ligation
• Perforation: Graham patch and PPI (if on PPI need acid reduction surgery)
Gastric Ulcer: men, epigastric pain relieved with eating, 70% on lesser curve, higher bleeding mortality
  Type I – lesser curve, decreased mucosal protection
  Type II – 2 ulcers (lesser curve and duodenal), high acid
  Type III – prepyloric, high acid secretion
  Type IV – lesser curve in cardia, decreased mucosal protection
  Type V - NSAIDs
OR for bleeding, perforation, intractability, malignancy, obstruction
Non-healing – biopsy for cancer, repeat EGD on medical management to assure healing
Acid surgery options: Truncal vagotomy, selective vagotomy, Billroth I, Billroth II
Gastritis: Type A (fundus) – pernicious anemia, autoimmune; Type B (antral) – H pylori
Esophageal/Gastric varices: most likely with liver disease (see portal HTN)
Other: Cancer, esophageal tear

Lower GI Bleed:
#1 rule out UGI bleed
Causes: UGI bleed, diverticulosis, angiodysplasia, cancer, hemorrhoids, ischemic colitis, inflammatory colitis
Work-Up: Assure ABCs, r/o UGI bleed, anoscopy (r/o hemorrhoids), colonoscopy (requires prep but can treat), angiography (if brisk bleeding), tagged RBC scan (if cannot localize source)
Other work-up for stable unclear source: Meckels scan, capsule endoscopy, push enteroscopy, repeat EGD
OR if unstable or not responding to therapy. If not localized will get subtotal colectomy.
Diverticulosis: 75% stop on their own, disrupted vasa rectum, recurrent bleeds should have resection if source localized.
Angiodysplasia: often recur, usually venous bleeding

Portal Hypertension:
Pre-sinusoidal – portal vein thrombosis, hepatic fibrosis, schistosomiasis
Sinusoidal - cirrhosis
Post-Sinusoidal – Budd Chiari (hepatic vein occlusion), CHF
Normal portal vein pressure <12 mmHg
Leads to: esophageal varices, ascites, splenomegaly, hemorrhoids, hepatic encephalopathy
Work-up: ABCs if bleeding, MELD or Child, underlying etiology, EGD, US to
**GASTRIC CANCER**

- **40%** in antrum
- Risk factors (combination environmental and genetic): polyps, tobacco, gastric operations, atrophic gastritis, H pylori, pernicious anemia, nitrosamines, type A blood
- Two types: intestinal (more common) better prognosis; diffuse (genetic)
- Work-up: EGD, biopsy, EUS, CT A/P.
- Surgical Tx: total gastrectomy if proximal, sub-total gastrectomy if distal. Extent of lymph node resection controversial (Japanese data vs. Western data)

**TNM Staging for Gastric Cancer**

**Tumor (T) stage**

<table>
<thead>
<tr>
<th>Stage</th>
<th>T1s</th>
<th>T1</th>
<th>T2</th>
<th>T2a</th>
<th>T2b</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>T1s</td>
<td>in situ: no invasion of the lamina propria</td>
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<tr>
<td>T1</td>
<td>Tumor invades lamina propria or submucosa</td>
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<tr>
<td>T2</td>
<td>Tumor invades muscularis propria or subserosa</td>
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<td></td>
</tr>
<tr>
<td>T2a</td>
<td>Tumor invades muscularis propria</td>
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<td></td>
</tr>
<tr>
<td>T2b</td>
<td>Tumor invades subserosa</td>
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<tr>
<td>T3</td>
<td>Tumor penetrates serosa (visceral peritoneum)</td>
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<tr>
<td>T4</td>
<td>Tumor invades adjacent structures*</td>
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</tbody>
</table>

**Nodal (N) stage**

<table>
<thead>
<tr>
<th>Stage</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph node(s) cannot be assessed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in 1 to 6 regional lymph nodes</td>
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<tr>
<td>N2</td>
<td>Metastasis in 7 to 15 regional lymph nodes</td>
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<tr>
<td>N3</td>
<td>Metastasis in more than 15 regional lymph nodes</td>
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</tbody>
</table>

**Metastasis (M) stage**

<table>
<thead>
<tr>
<th>Stage</th>
<th>M1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mx</td>
<td>Presence of distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>

**Stage grouping**

<table>
<thead>
<tr>
<th>Stage</th>
<th>T1</th>
<th>N1</th>
<th>N2</th>
<th>T2a/b</th>
<th>N0</th>
<th>T3</th>
<th>N1</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1A</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
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<tr>
<td>Stage 1B</td>
<td>T1</td>
<td>N1</td>
<td>M0</td>
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<tr>
<td>Stage II</td>
<td>T1</td>
<td>N2</td>
<td>M0</td>
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<tr>
<td>Stage IIIA</td>
<td>T2a/b</td>
<td>N2</td>
<td>M0</td>
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<tr>
<td></td>
<td>T3</td>
<td>N1</td>
<td>M0</td>
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<td></td>
<td>T4</td>
<td>N0</td>
<td>M0</td>
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</tbody>
</table>
Stage IIIB   T3    N2    M0
Stage IV    T1-3  N3    M0
T4    N1-3  M0
Any T   Any N  M1

Other: MALT (treat H pylori), GIST (resection, Gleevac), lymphoma (chemo/rads)

**Stomach Reconstructions:**
Billroth I: antrectomy with gastroduodenal anastomosis
Billroth II: antrectomy with gastrojejunal anastomosis
Roux-Y gastro-jejunoanastomosis: Roux limb to esophagus/stomach pouch, BPD limb to remnant stomach

**PANCREATIC CANCER**
- Pancreatic CA is 5th cause of death
- Adenocarcinoma most common, 65% in head, neck, uncinate

**Pseudocyst**
- 2/2 inflammation and necrosis; single or multiple; inside or outside pancreas. Most communicate with duct. Fluid with pancreatic enzymes. Walls formed by adjacent structures. Tx: watch or drain once mature.

**Cystic Epithelial Tumors**: majority resected due to malignant potential. Good prognosis overall.

1. **Serous Cystadenoma (#2)** – majority benign, spongy, loculated. Females > Males. Any location. Many small glycogen rich cysts, epithelium denuded so decreased ability to identify with FNA. Rarely malignant. If know pathology can watch if remains <2-3cm. If pathology unclear or growing □ resect.
2. **Mucinous Cystadenoma/Adenocarcinoma (#1)** – columnar epithelium with varying atypia. All should be resected as most malignant at time of dx. Often cause obstructive symptoms. Cyst fluid will have CEA and CA 19-9. Resect if > 2cm.
4. **Papillary cystic neoplasm** – rare, found in women in their 20s-30s, usually in body or tail. Locally aggressive. Borders sharp and circumscribed on CT. Resect.

**Solid Epithelial Tumors**
1. **Ductal Adenocarcinoma (75%)** - infiltrative, obstructs ducts, causes desmoplastic reactions; usually have LN mets at time of resection; Mets to liver (80%), peritoneum (60%), lungs (70%), adrenal. Involvement of SMV/portal collaterals = usually unresectable.
2. **Adenosquamous Carcinoma** - variant of above with glandular and squamous tissue
3. **Acinar Cell Carcinoma (1%)** - >10 cm, eosinophilic granules, smooth/lobulated.
4. **Giant Cell Carcinoma (5%)** - >10cm, large pleomorphic cells, poor prognosis

**S/Sx:** Pain, weight loss, jaundice, back pain (suggests invasion), DM

**Diagnostics**
1. Labs – CBC, LFTs, INR, CA 19-9 (correlate with prognosis, can use to monitor)
2. Transabdominal US – reveals mass in 60-70%
3. CT – helpful to look at size, invasion (vessel involvement), and metastasis
4. ERCP – allows for imaging and biopsy – use if symptomatic and negative CT
5. Endoscopic US – detects small lesions, evaluate lymph node/vessel involvement, can also do FNA
6. MR
7. Staging laparoscopy – particularly for lesions in body/tail. Check peritoneum and liver for mets – if present poor prognosis and consider avoiding operation.

Treatment
- Distal pancreatectomy for distal lesions
- Whipple (+/- pylorus sparing) for head of pancreas lesions
  - Unresectable: Vessel involvement (SMA, PV, HA, SMV (consider resection)), metastatic disease
- Initial portion of case assesses resectability:
  - check liver, omentum, peritoneum – send frozens
  - check LN (if outside resection – celiac/para-aortic)
  - check local respectability – severe vascular involvement
- Mortality 2-4%, 5y survival 10-20%
- Complications: delayed gastric emptying, leak, abscess, fistula, marginal ulcer

Primary Tumor (T)
- Tis in situ (includes the “PanInIII” classification)
- T1 Tumor 2 cm or less in pancreas only
- T2 Tumor more than 2 cm in pancreas only
- T3 Extends beyond pancreas, no vessels
- T4 Involves the celiac or SMA (unresectable)

Regional Lymph Nodes (N)
- N1 Regional lymph node metastasis

Distant Metastasis (M)
- M1 Distant metastasis

STAGE
- Stage 0 - Tis; Stage IA - T1; Stage IB - T2; Stage IIA - T3; Stage IIB - T1-T3, N1;
- Stage III - T4, Any N
- Stage IV Any T Any N M1

GALL BLADDER DISEASE
Cholelithiasis: 10% population, RF: >40, female, obesity, pregnancy, rapid weight loss, TPN. Cholelithiasis itself is not a surgical emergency and patients may be scheduled on an elective basis.
Cholecystitis: obstruction of cystic duct leads to gallbladder distension and inflammation
- S/S: RUQ pain, Murphy’s, nausea, vomiting
- W/U: cbc (high wbc), lfts (high AP), RUQ US (95% sensitive), US: stones, wall thickening (>4mm), pericholecystic fluid, dilated CBD (>8mm □ CBD stone)
- HIDA: technetium excreted into biliary system, GB not seen □ cystic duct obstruction
- Tx: Abx - Unasyn; Lap chole +/- IOC, if too ill – percutaneous cholecystostomy tube

Acalculous cholecystitis: due to bile stasis, occurs after trauma/burns/TPN □ cholecystectomy/chole tube
**Biliary pancreatitis:** NPO. Allow amylase to normalize prior to lap chole. Consider pre-op ERCP/sphincterotomy (usually only finds stones in 10-15%) These patients should get intra-operative cholangiogram.

**Choledocholithiasis:** CBD stone.

**Cholangitis:** sepsis related to infection of biliary tree
- Sx: fever, RUQ pain, jaundice. These patients can be very sick and require aggressive resuscitation. Consider having them on surgical service +/- ICU.
- Tx: Antibiotics (Unasyn), ERCP and sphincterotomy for drainage. Later lap chole.

**Pre-Op ERCP:** jaundice, gallstone pancreatitis, cholangitis, stone in CBD on US
- sphincterotomy

**Lap Chole:** (first done in 1987)
- Prep: Decide if you are doing ERCP and if patient on correct table. Place monitors (10 and 2 or over pt head), Operating surgeon on pt left. Check for 10mm 30 degree scope, endo catch, clip applier, cautery, equipment for cholangiogram.
- Port Placement: 10mm at umbilicus (camera); 10mm midline below xiphoid (working port); 2 5mm ports laterally below costal margin (retractor) – these should be lateral and a fist breadth apart.

**Biliary Tract Complications:** serious complications <2% of time
- Common bile duct injury – (0.5%) – must expose “critical view of safety”.
- IOC: If cannot identify structures convert to open.
  - Class I: Injury CBD
  - Class II: Injury CBD above cystic duct
  - Class III: Transection CBD
  - Class IV: Transect hepatic duct
- If recognize intra-operatively control, drain, refer to hepatobiliary surgeon. Type II and IV require hepaticojejunostomy. Type I and II may be able to be repaired. This should not be done by inexperienced surgeon.
- If find post-operatively minor leaks treated with drain +/- ERCP with sphincterotomy (usually Duct of Lushka or cystic duct), larger injury to CBD or hepatic ducts requires referral to hepatobiliary surgeon and delineation of anatomy (consider ERCP or PTC).
- Bile Leak: due to biliary tree injury. Start with percutaneous drainage ERCP/sphincterotomy
- Intestinal injury – during entry, adhesiolysis, or to duodenum during GB dissection
- Bleeding - may require conversion to open for control. Identify all structures before you place clips.

**IOC:** Intraoperative Cholangiogram: delineates anatomy. Some perform it as routine, some perform selectively. You want to 1. Identify cystic duct, CBD, Both hepatic ducts 2. See duodenum fill 3. No filling defects (would indicate stone).

**Post-Op:** Elective patients may go home the same day.

**Choledochal cysts**
Due to risk of malignant conversion these cysts should be surgically excised.

Type I: Dilation of hepatic and CBD - hepaticojejunostomy
Type II: Diverticulum of CBD - hepaticojejunostomy
Type III: Intraduodenal CBD dilation - may be able to do local excision and reimplantation vs hepaticoj
Type IV: Intrahepatic and extrahepatic bile duct dilation - hepaticojejunostomy
Type V: (Caroli disease) Intrahepatic bile duct dilation only – lobectomy or may require liver transplantation

LIVER TUMORS
Falciform: separates medial and lateral left lobe, remnant umbilical vein
Cantilions Line: line from middle of gallbladder fossa to IVC – separates right and left lobe
Portal triad enters segment IV and V
Gallbladder under segments IV and V
Pringle: inflow control: clamp porta hepatis. You will still have bleeding from hepatic veins.
Portal vein: right (V, VI, VII, VIII), left (II, III, IV)
Hepatic vein: left (II, III, IV), middle (inferior IV, V), right (VI, VII, VIII)

Evaluation:
3. Imaging: 4-phase CT to obtain diagnosis, MRI if necessary, biopsies rarely done. PET.
   HCC: US: Insensitive
   CT: Enhance in arterial phase, portal phase washout. Unenhanced is hypodense
   MR: T1: hypo/hyperintense, Gadolinium: Similar to CT
   Mets: US: Insensitive
   CT: Does not enhance
4. Labs: LFTs, creatinine, albumin, INR, AFP/CA 19-9/CEA if necessary.
5. Compute Child-Pugh class (Albumin, Bilirubin, INR, Ascites & Nutrition) and MELD score (INR, bilirubin & creatinine) along with cardiopulmonary status to assess operative candidacy.
6. Treatment depends on lesion, symptoms and patient: symptoms or concern for malignancy warrant intervention (resection, enucleation, embolization, RFA, or marsupialization), otherwise follow with serial imaging after stopping OCPs.
7. Benign lesions:
   Hemangiomas (peripheral intensity w/centripetal fill-in): benign, do not biopsy. Leave alone unless symptomatic. Kasabach-Meritt syndrome
   Cysts: leave alone unless bleeding or infected
   FNH (central scar): hypervascular on CT/MRI, conservative treatment
   Adenomas: women, OCPs, 80% symptomatic, bleeding risk, hypervascular on MRI, stop OCPs, resect
8. Malignant lesions are either primary: hepatocellular carcinoma, cholangiocarcinoma (Klatskin), cystadenoma, cystadenocarcinoma or secondary: mets from colorectal, pancreatic or other cancer.

9. Resection is goal for malignant lesions but must assess patient (Child C (~B) and MELD >14 = high-risk OR patients) and liver reserve first (CT volumetric analysis, indo-cyanine green study or portal wedge pressure (<10 good)).

10. If resection not possible because of patient or liver reserve, consider embolization, RFA, TACE, PEI, chemotherapy or transplant.
   - TACE: Transarterial chemoembolization
   - RFA: Radiofrequency ablation (percutaneously, laparoscopically, open)
   - PEI: Percutaneous ethanol injection (<3cm)

11. Transplant for HCC indications: 1 tumor <5cm or 3 tumors each ≤3cm (Milan criteria) and transplant wait-list is based on MELD score (extra points for tumor)

### CLIP scoring system for HCC

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child-Pugh stage</td>
<td>A / B /C</td>
</tr>
<tr>
<td>Tumor morphology</td>
<td>0 / 1 / 2</td>
</tr>
<tr>
<td>Uninodular and extension 50 percent</td>
<td>0</td>
</tr>
<tr>
<td>Multinodular and extension 50 percent</td>
<td>1</td>
</tr>
<tr>
<td>Massive or extension &gt;50 percent</td>
<td>2</td>
</tr>
<tr>
<td>Alpha-fetoprotein &lt;400 / &gt;400</td>
<td>0 / 1</td>
</tr>
<tr>
<td>Portal vein thrombosis</td>
<td>No / Yes</td>
</tr>
</tbody>
</table>

### Okuda staging for HCC

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor size*</td>
<td>&gt;50 percent</td>
<td>50 percent</td>
</tr>
<tr>
<td>Ascites</td>
<td>Clinically detectable</td>
<td>Clinically absent</td>
</tr>
<tr>
<td>Albumin</td>
<td>&lt;3 mg/dL</td>
<td>&gt;3 mg/dL</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>&gt;3 mg/dL</td>
<td>&lt;3 mg/dL</td>
</tr>
</tbody>
</table>

### Surgical Therapy:

**Pre-Op:** Pre-Op labs, assess ability to resect (proximity to vessels), functional reserve, lap vs open

**Intra-Op:** Patients need A line, CVP monitoring (keep low), blood in house, will always reassess lesions in OR with US

**Post-Op:** ICU, serial Hct, Coags, check LFTs qod or less, CVP monitoring, RFA pts get fevers

### Complications: Bleeding, bile leak, ascites, pleural effusions

### Preoperative Assessment of Patients with Liver Disease (By Rachel Thompson, MD)

1. Patients with cirrhosis have a significantly higher perioperative mortality risk.
   - Child’s Class C patients have extraordinarily high mortality especially in abdominal surgeries.
   - MELD scores have been associated with surgical risk. In cholecystectomy and cardiac surgery a preoperative score ≥ 8 was considered high risk.
2. Emergency surgery in pts with cirrhosis is high risk and likely require postoperative ICU monitoring.
3. Surgical factors associated with increased risk include: duration of surgery, intraoperative hypotension, and surgery on the liver, biliary, cardiovascular or respiratory systems.
4. Consider avoiding surgery, especially in Childs’ Class C patients.
5. Monitor patients with cirrhosis closely pre and postoperatively.

Assessing Patient Specific Risk
In general patients with liver disease are at higher risk for perioperative complications and mortality. It is important to note that the majority of studies evaluating patient specific risk in patients with liver disease have focused on patients with cirrhosis or end-stage liver disease. Thus, much less is known regarding the risks for patients with more mild liver disease. Two risk stratification schemes predominate in the literature with regards to assessing perioperative risk of patients with cirrhosis—the Child-Pugh score and the MELD score.

Child-Pugh Score. The Childs-Pugh Classification (CPC) was developed empirically in 1973 among patients with bleeding esophageal varicies.(1) CPC relies on albumin, protime, bilirubin, ascites, and encephalopathy to assess severity of liver disease. Subsequently, CPC has been shown in multiple studies to correlate with the perioperative mortality of patients undergoing extrahepatic abdominal surgery. (2,3,4) Perioperative mortality rates by class were similar across these studies:

<table>
<thead>
<tr>
<th>Class</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7-10%</td>
</tr>
<tr>
<td>B</td>
<td>23-30%</td>
</tr>
<tr>
<td>C</td>
<td>75-84%</td>
</tr>
</tbody>
</table>

MELD Score. The Model for End-stage Liver Disease (MELD) was developed in 20005 primarily to aid in stratifying patients post TIPS procedure and calculate three month survival rates. Variables found to be related to mortality included: cause of liver disease, bilirubin, INR, creatinine. An elaborate equation was developed relating these variables to mortality. A subsequent study evaluated the MELD as predictive of 3 month survival in end-stage liver disease and found cause of disease not to alter survival.6 In both studies the patient population had advanced stage liver disease.

Subsequent studies have been performed evaluating MELD as a risk predictor for surgical morbidity and mortality.7 Generally speaking, it has faired as well as the CPC and some might argue it is even better.8,9 A MELD score ≥ 8 was predictive of poor outcome in patients with liver disease when undergoing cholecystectomy and cardiac surgery.

Assessing Surgery Specific Risk

Emergency Surgery. Emergency surgery carries a higher risk for all patients. A patient with cirrhosis undergoing emergency surgery also faces a higher perioperative risk of morbidity and mortality. One study demonstrated a significant increase in mortality risk for emergent versus elective surgery [EM group: 1 mo = 19%, 3 mo = 44%; E group: 1 mo = 17%, 3 mo = 21%, P <0.05].8 Emergent laparotomy in trauma patients with cirrhosis has been associated with increased risk of death and serious complications, as well as increased length of ICU stay regardless of severity of injury.10

Extrahepatic Surgery. In recent years several studies have evaluated the risks of nonhepatic surgery in patients with cirrhosis. In 2003, del Olmo and colleagues reported that the duration of surgery and presence of postoperative complications were significantly associated with perioperative mortality independent of severity of cirrhosis.11 Ziser et al (1999) found that surgery on the respiratory system and the presence of intraoperative hypotension are also associated with perioperative complications and mortality.12

Biliary Surgery. Biliary surgery is generally thought to carry an increased perioperative risk for patients with cirrhosis compared with controls.13,14,15 In
the case of cholecystectomy, a question that comes up often is if the laparoscopic
might be less risky than open. For Childs’ Class A and B patients laparoscopic
cholecystectomy has been shown to be equally in patients with cirrhosis and
controls.15

Risk Reduction

- Avoid surgery if appropriate, especially in Class C patients or patient’s with
  MELD score ≥ 8
- Be careful with neuromuscular blocking agents and sedatives
- Optimize medical therapy of cirrhosis
- Correct protime, platelets 50-100K (100K especially for cardiovascular,
  neurologic or spinal surgery; specific recommendations vary)
- minimize ascites to decrease risk of wound dehiscence or abd wall herniation
- monitor and correct electrolytes, check renal function preoperatively
- address increased nutrition
- Provide adequate monitoring post-operatively
- ICU after trauma surgery suggested, may also be appropriate following higher
  risk surgeries
- Monitor for hepatic dysfunction

References
3  Mansour A et al. Surgery. 1997; 122:730

DIVERTICULITIS

Essentials of Diagnosis:
- Acute abdominal pain
- Left lower quadrant tenderness and mass
- Fever and leukocytosis
- Radiological signs

Signs and symptoms: Acute attack similar to appendicitis but in the LLQ. Pain,
  cramping, or aching. Dysuria may be present. Mild abdominal distention with
  constipation, loose stool, or both. Flatus may relieve pain. Patients may also
  present with free perforation and peritonitis. Alternatively, the course may
  be very insidious and patients may present with complications as their initial
  complaint.

Pathophysiology: erosion of the diverticular wall by increased intraluminal
  pressure or inspissated food particles. Inflammation and focal necrosis result.
  Diverticula are located at the edge of taenia coli.

Differential Diagnosis: appendicitis, colonic obstruction with strangulation,
  perforated malignancy, Crohns, UC, vascular insufficiency and others.
**Imaging:**

*X-ray:* AAS may show free air if free perforation. Colonic obstruction, SBO, or LLQ mass may be seen.

*CT scan:* preferably with PO and IV contrast is the test of choice and should be obtained early. Pericolic fat stranding, perforation, abscess, or fistula may be seen. *Barium enema:* contraindicated acutely, however, water soluble contrast can be used. May be performed a week after episode if quick recovery. May show mass, sinus tracts, abscess, fistula, or stricture.

**Complications:** Free perforation, abscess, fistula, obstruction

**Hinchey Classification:**

I. pericolic or mesenteric abscess  
II. walled-off pelvic abscess  
III. generalized purulent peritonitis  
IV. generalized fecal peritonitis

**Treatment:**

*Uncomplicated:* 70-100% will resolve with bowel rest and antibiotics. Reliable patients with support and without comorbidities may be treated as outpatients on clear liquid diet.

- Antibiotics based on gram neg. and anaerobes
  1. Cipro 500mg PO BID and Flagyl 500mg PO Q8 for 7-10 days  
  2. Augmentin PO BID and Flagyl 500mg PO Q8 for 7-10 days  
  3. Bactrim and Flagyl may also be used

Failure to improve or worsening symptoms should prompt surgical intervention. Recurrence rate is 30% after 1 attack. Number of attacks prior to resection controversial.

*Colonoscopy* 4-6 weeks after resolution required to evaluate colon.

*Complicated:*

- **Diffuse peritonitis** – NPO, resuscitation, broad spectrum antibiotics (eg: Zosyn), and ex-lap. 6% mortality for purulent peritonitis, 35% for fecal peritonitis
- **Obstruction** - rarely complete, treat acute episode, resection if concern for malignancy
- **Free perforation** – rare, but 20-30% mortality, requires surgical intervention, usually 2 stage
- **Abscess** – 16% of patients without peritonitis. Percutaneous drainage and antibiotics. Some may require one stage surgery later. For abscesses <4cm in size, antibiotic treatment alone may be sufficient.

**Surgical Options:**

- **One stage** – primary resection and anastomosis can be performed in elective cases and when no contamination has occurred.
- **Two Stage** - For emergent operations or gross contamination a two stage (Hartman procedure) should be performed. Resection and Hartman pouch or mucous fistula with re-anastomosis at second procedure.
- **Three Stage** – classic operation with 1) transverse colostomy and abscess drainage 2) left colectomy 3) takedown of colostomy performed at three separate operations. Carries higher mortality and rarely done now.

Prior to takedown of colostomy, colon should be evaluated by colonoscopy.

**Reading:**

1. The American Society of Colon and Rectal Surgeons (www.fascrs.org)  
2. The American College of Gastroenterology (www.acg.gi.org/)  
**IBD**

**Crohn’s Disease**
Predominant sx = abd pain (though can be identical to UC), granulomas (pathognomonic, but only in 35%)

*Medical tx* = antimotility, sulfasalzine, 5-ASA, abx (flagyl, cipro), steroids, antimetabolites, anti-TNF tx (remicaid, infliximab)

*Complications*: ulceration, perforation, fistula, stricture
CD of the terminal ileum may present w/ acute RLQ pain and tenderness c/w a dx of appendicitis. TI is grossly inflamed with an edematous mesentery, lymphadenopathy and fat stranding. DDx for terminal ileitis include Yersinia and Campylobacter infections (Mesenteric fat stranding is generally not observed in infectious ileitis)

*Indications for surgery*: can’t cure CD with surgery – be conservative, don’t excise more than necessary. OR for Obstruction, abscess, fistulae (symptomatic), cancer/dysplasia, side effects of medical tx, failure of tx.

  - Colonic dz = total proctocolectomy/end ileostomy, subtotal colectomy/ileorectal anastomosis, segmental colectomy
  - Peri-anal CD (tx medically 1st, surgery only if abscess, fistula, stricture, poor function) = fistulotomy, seton or advancement flap, abscess drainage, anal dilatation, temp/perm fecal diversion

Resection, diversion or bx should be avoided in the untreated pt. with terminal ileitis b/c the dx can be made with stool cx or endoscopy. In the absence of acute involvement of the appendix or cecum, appendectomy can be performed safely.

**Chronic UC**
Most common form of inflammatory colitis, not transmural, presents w/abd pain and bloody diarrhea (relapsing pattern).

*Medical tx* 1st line: steroids, sulfasalazine, 5-ASA and abx with remission in the majority. Up to 30% will require surgery.

Significant risk of malignant degeneration in areas of chronic inflammation, if pancolonic the risk is approx. 0.1%-0.2%/year or 2% at 10yrs and 8% at 20yrs. Because inflammation is confined to mucosa, perforation, fistulas and strictures are uncommon (if stricture develops, malignant until proven otherwise), perianal lesions are also uncommon.

*Extraintestinal manifestations*: pyoderma gangrenosum (UC > CD), erythema nodosum (CD > UC), iritis/conjunctivitis (CD > UC), arthritis, ankylosing spondylitis (UC > CD), sclerosing cholangitis (UC), anal fissures/fistulas (CD), pararectal abscess (CD), anemia (both)

*Indications for operation*: Urgent = ongoing hemorrhage (massive hemorrhage rare), colonic perforation, fulminant UC (>10 bloody stools/day, fever, tachycardia, anemia, colonic distension), toxic megacolon (more common in UC, presents w/sepsis, tachycardia, fever, acidosis, leukocytosis, and transverse colon >6cm, treatment includes ICU, broad abx, fluid and electrolyte replacement, serial abd xrays, colectomy if no improvement in 24-48hrs). Elective = failure of medical tx (most common), intolerable side effects, dysplasia, carcinoma, stricture

*Choice of operation*: toxic megacolon, fulminant colitis, bleeding or perforation = subtotal colectomy w/end ileostomy. Elective = panproctocolectomy and continent reconstruction with ileoanal j-pouch (aka, ileal pouch anal anastomosis)
or IPAA), or panproctocolectomy with permanent end ileostomy (especially if the former is contraindicated, also safest and 100% curative)

**Surgical complications:** mortality <1% (even emergent), morbidity up to 25%, in addition to standard complications, autonomic nerve damage (ED, bladder dysfunction), infertility, stoma related complications, SBO (20%), early and late pelvic pouch complications (pelvic sepsis/leak 8-10% and pouchitis 25-30% respectively). Pouchitis = malaise, watery diarrhea, rectal bleeding, incontinence. Tx w/flagyl or cipro.

**COLORECTAL ADENOCARCINOMA**

**Presentation:** abdominal plain, bleeding (melena – r colon, bright red – l colon), nausea, vomiting, anemia, fatigue, change in bowel habits, no symptoms, colon screening pick up

- 90-95% adenocarcinoma; other = lymphoma, sarcoma, carcinoid, adenosquamous
- Familial: 10-15%; FAP, HNPCC

**Screening:** DRE: cheap, easy; FOBT: cheap, shown to decrease mortality; Rigid Sigmoidoscopy: to 25 cm; Flexible Sigmoidoscopy: to 35-65cm, picks up 70%; Barium Enema: see apple core, good for r colon, bad for rectum; Colonoscopy: to 180cm, best screening, ~1-3% complication rate

- Recommend: At 50y start FOBT with flex sigmoidoscopy every 5 years, +/- Barium enema every 5-10 years, or colonoscopy every 10 years

*** If 1st degree relative with colon ca start at age 20, if polyp check yearly till clear and then q 3-5y, for UC start screening 8-10y after diagnosis.

**Workup:**

Perform: CBC, LFTs, CEA, consider CXR, CT A/P (metastatic disease)

- Rectal Ca: rectal exam (determine size, location to sphincter, mobility), rectal US (determine T/N stage)

Local invasion -> intramural, moves lateral in transverse direction

Metastasis to lymph nodes first

Hematogenous spread: #1 liver (portal system) #2 lungs, rectum to systemic to lungs. (if isolated resect)

**Staging Systems:**

Dukes/ Aster-Coller: older staging system

TNM staging system for colorectal cancer

**Primary tumor (T)**

| Tis    | Carcinoma in situ |
| T1     | Tumor invades submucosa |
| T2     | Tumor invades muscularis propria |
| T3     | Tumor invades muscularis propria into subserosa, or non-peritonealized pericolic/ perirectal tissues |
| T4     | Tumor directly invades other organs or structures, and/or perforates visceral peritoneum |

**Regional lymph node (N)**

| N1     | Metastasis in 1 to 3 regional lymph nodes |
| N2     | Metastasis in 4 or more regional lymph nodes |

**Distant metastasis (M)**

| M1     | Distant metastasis |

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tis</th>
<th>N0</th>
<th>M0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>T1-2</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage I</td>
<td>T3</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IIA</td>
<td>T4</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IIB</td>
<td>T1-2</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T1-2</td>
<td>N1</td>
<td>M0</td>
</tr>
</tbody>
</table>
Stage IIIB  T3-4    N1    M0
Stage IIIC  Any T    N2    M0
Stage IV    Any T    Any N    M1

Surgical Options
- Polyp – endoscopic polypectomy, if invade muscularis mucosa □ surgical resection
- Adequate operation has 5cm margins, in distal rectum may have as little as 2 cm.
Pre-Ops: assess sphincter control, distance from anus to counsel on indicated resection, mark stoma site
Position: Consider whether will need to be in lithotomy, need for stents

Operation:
- Lesion and lymphatic drainage basin resected, adherent visceral structures resected en bloc
- Abdominal exploration carried out to search for other lesions (liver metastasis)
- Avoid spillage or unnecessary manipulation of lesion
- Rectal cancer: Type of operation (abdominoperineal resection vs low anterior resection) determined by distance from anal verge and ability to achieve margins (at least 2 cm)
- Right-sided lesions: Resection includes distal ileum, ileocolic, right colic, and right branch of middle colic vessels
- Transverse colon lesion: Transverse or extended right colectomy
- Left-sided lesions: Takes inferior mesenteric artery (IMA) at its origin
- Rectal cancer excision depends on size and proximity to sphincter: Local excision, LAR, APR
- APR if cannot spare sphincter muscles
- TME technique used for distal resections
- T1 rectal lesions can have local excision if near anal verge

Complications: anastomotic leak, damage to nerves for bladder control, impotence, recurrence pre-sacral venous bleeding (thumbtack into sacrum or pack)

Neoadjuvant Therapy (for rectal cancer)
- Guidelines issued by the NCCN recommend patients with T3 or T4 (can consider T2 also) rectal cancer be considered for preoperative combined therapy with 5-FU plus radiotherapy.
- Preoperative radiotherapy increases 5-y survival and decreases local recurrence in rectal cancer
- Preoperative therapy used to promote tumor regression, control margin disease, and possibly convert to a sphincter-sparing procedure.
- Preoperative compared to postoperative therapy is associated with a more favorable long-term toxicity profile, and lower local recurrence rates
- Advantages of neoadjuvant therapy include a greater degree of local control, increased likelihood of sphincter saving surgery, and a lower risk of chronic anastomotic stricture.

Adjuvant Therapy (colon or rectal cancer)
- Postoperative chemotherapy (5-fluorouracil) and radiation beneficial for stage II rectal cancer or greater in terms of local control and survival
- Stage II colon cancer; efficacy of chemotherapy unclear, radiation generally not used
- Stage III colon cancer Oral levamisole and IV 5-fluorouracil established benefit

Prognosis
- Results for surgical treatment better for colon cancer than for rectal cancer
- Low rectal cancers worse prognosis than high rectal cancer
• 5-year survival per Dukes stage: A (80%), B (60%), C (30%), D (5%)

**Numbers:**
- 10% of lesions are not resectable at time of operation
- 20% of patients have metastatic disease at operation
- Curative resection can be performed in about 70% of patients
- Operative mortality, 2–4%
- Overall survival (all stages), 35%
- Prognosis adversely influenced by complications
- Prognosis may be adversely affected by perioperative blood transfusion
- 90% recurrences occur with first 4 years after surgery

**Prognosis**
Colon cancer — Five-year survival rates
Stage I (T1-2N0) — 93 percent
Stage IIA (T3N0) — 85 percent
Stage IIB (T4N0) — 72 percent
Stage IIIA (T1-2N0) — 83 percent Rectal: 55%
Stage IIIB (T3-4 N1) — 64 percent Rectal: 35%
Stage IIIC (N2) — 44 percent Rectal: 25%
Stage IV — 8 percent

**ANAL CANCER (Squamous Cell)**
Associated with HPV and XRT
Often present with pain, bleeding, obstruction
Nigro protocol: pre-op chemoradiation; first line tx. XRT + 5 FU and Mitomycin.
Good response with treatment – 80% cure rate.
Surgical resection only if locally persistent or recurrent disease
If surgical resection □ APR
Some patients require diverting colostomy +/- mucous fistula pre therapy if pain/obstruction.

**Anal Cancer TNM staging system**

**Primary tumor (T)**

<table>
<thead>
<tr>
<th>Tis</th>
<th>Carcinoma in situ</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Tumor 2 cm or less in greatest dimension</td>
</tr>
<tr>
<td>T2</td>
<td>Tumor more than 2 cm but not more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumor more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T4</td>
<td>Tumor of any size invades adjacent organ(s), eg. vagina, urethra, bladder (involvement sphincter muscle(s) alone not T4)</td>
</tr>
</tbody>
</table>

**Lymph node (N)**

<table>
<thead>
<tr>
<th>N1</th>
<th>Metastasis in perirectal lymph node(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2</td>
<td>Metastasis in unilateral internal iliac and/oringuinal lymph node(s)</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis in perirectal and inguinal lymph nodes and/or bilateral internal iliac and/or inguinal lymph nodes</td>
</tr>
</tbody>
</table>

**Distant metastasis (M)**

<table>
<thead>
<tr>
<th>M1</th>
<th>Distant metastasis</th>
</tr>
</thead>
</table>

**VASCULAR DISEASE**

**Aneurysms**

**Abdominal Aorta**

- 95% below renals, 25% involve iliacs, 4% associated with peripheral aneurysms
- Normal size approximately 2-3cm, size increase about 0.5cm/year
- 75% found incidentally, 50% palpable on PE
- Rupture rate (5y): 5-6cm - 25%, 6cm - 35%, 7cm or larger 75%
- Survival rate (5y): 6% for aneurysms >6cm
• Asymptomatic: w/up with CTA to evaluate for open vs endovascular repair. Can follow at intervals with US or CTA. Consider repair once reaches approx 5 + cm.
• Symptomatic – repair at time of presentation.
  • Ruptured: stabilize and take to OR
    • HD stable: get CTA to evaluate for endovascular repair
    • HD unstable: directly to OR
• EVAR: plan with CTA or IVUS; measure neck (need 1.5cm), landing zones, tortuosity
  • Endoleaks: Type 1: from proximal or distal attachment site (fix); Type 2: from collateral flow (IMA or lumbar; may fix or observe), Type 3: , Type 4:
  • Require f/u imaging at regular intervals
  • Complications: renal insufficiency, ischemic colitis, LE ischemia, paraplegia, hemorrhage, sexual dysfunction.

Thoracic Aorta: 50% TAA, 25% ascending
• Usually incidental finding, symptoms are chest pain radiating to back
• Imaging: ECHO, CTA, MRA
• Proximal arch repairs require bypass (CT surgery), repair at > 5.5cm
• Descending repair at >6cm
• Options: Open repair (thoracoabd incision), Debranching/hybrid procedure, TAG
• Complications: MI, valve damage, stroke, paraplegia (consider lumbar drain or distal perfusion), bowel ischemia, renal failure, LE ischemia
• Peripheral artery aneurysms
• 90% are femoral or popliteal, usually associated with another aneurysm
• Popliteal: 50-70% bilateral, 50% associated with AAA. Clinically are asymptomatic or most commonly present with thromboembolism. Tx: Proximal and distal ligation and bypass.
• Femoral: 70% bilateral, 80% with AAA. Tx with aneurysmectomy and vein patch or end-end repair
• Visceral artery aneurysms: Uncommon; splenic 60%, hepatic 20%
• Splenic: women of childbearing age; risk rupture 5-10%, 95% of ruptures during pregnancy
• Repair if symptomatic, pregnant, or going to become pregnant

Occlusive Arterial Disease
Acute Limb Ischemia: consider CTA, ECHO, angiogram

1.) Embolism vs. Thrombosis
   Arrhythmia (a fib)  No arrhythmia
   No h/o claudication  Claudication
   Normal contralateral pulse  No contralateral pulse
   No findings of ischemia  Findings of chronic ischemia

   2.) Arterial emboli: heart source vs. peripheral plaque
       • pain, pallor, pulseless, parasthesia, paralysis, poikylothermia
       • CFA most common site obstruction -> embolectomy vs IR
       • Ischemia >4-6h consider fasciotomies

   3.) Blue toe syndrome: flaking of plaque from larger vessels (aortoiliac), often have great pulses.
   4.) Acute thrombosis: h/o poor perfusion, claudiation
      Limb threatened □ heparin, thromvectomy
      Non-threatened □ angio, thrombolytics

Chronic limb ischemia:
Signs/Symptoms PVD: pallor, dependent rubor, loss hair, slow cap refill, bad nails, claudication, buttock pain.
Natural History: 2%/y gangrene risk and 1%/y amputation if pt has claudication
Symptoms occur one level below lesion:
  • Buttock and hip - aortoiliac disease
  • Thigh — common femoral artery
  • Upper two-thirds of the calf — superficial femoral artery
  • Lower one-third of the calf — popliteal artery
  • Foot claudication — tibial or peroneal artery
  • Leriche syndrome: buttock claudication, impotence, no femoral pulse

Exam: Check all pulses (helps determine level), remember a duplex produces a signal not a pulse, check ABIs. Evaluate skin, cap refill.

ABI: Must measure on any claudicator or non-healing wound.

  Highest leg pressure (DP or PT) / highest arm pressure (L or R)

  • The normal ABI is 1.0 to as high as 1.3, since the pressure is higher in the ankle than in the arm. Values above 1.30 suggest a no compressible calcified vessel.
  • ABI below 0.9 has 95 percent sensitivity for detecting angiogram-positive peripheral arterial disease and is associated with ≥50 percent stenosis in one or more major vessels.
  • ABI of 0.40 to 0.90 suggests arterial obstruction with claudication.
  • ABI below 0.4 represents advanced ischemia.
  • ABI below 0.3 have rest pain
  • Inaccurate in patients with diabetes due to incompressibility
  • ABI often drops with exercise in claudicators (can do exercise ABIs)

Duplex peripheral arterial waveforms (Up to Date graphic)
Aorta ➤ common iliac ➤ internal/external iliac ➤ common femoral ➤ profunda/SFA ➤ popliteal ➤ anterior tibial (first branch, lateral, to DP) then tibioperoneal trunk ➤ PT (medial), peroneal (middle)

Imaging: Duplex, CTA, MRA, Angiogram (also allows intervention)
Medical Management: ASA, Statin, exercise program (develops collaterals), BP control, stop smoking
Surgical Indications: rest pain, ulceration or gangrene, lifestyle limitation, atheromatous embolization
  Options: Vein (1st choice), PTFE (peripheral bypasses), Dacron (big vessels), Cryovein
PTFE significant decrease in patency if crosses knee
Profunda rarely with significant disease, can be used for bypass if needed
Aortoiliac disease – need aortobifem or IR intervention
Iliac disease – angioplasty, aortobifem, fem-fem
Fem-Pop – patency better if for claudication vs salvage
Fem-Distal – usually for limb salvage, do not use synthetic grafts
Extra-anatomic: fem-fem, ax-fem – usually avoiding infected or hostile sites

Patency:
Inflow disease:
  * Aortobifemoral, aortoiliac, or aortofemoral — 85 to 90 percent at five years
  * Femorofemoral — 70 percent at five years
  * Axillofemoral — 50 to 80 percent at three years
  * Axillofemoral-femoral — 65 percent at five years
Outflow disease:
  * Femoropopliteal vein graft above or below the knee — 65 percent at five years
  * Femoropopliteal synthetic graft — 50 percent (AK) and 33 percent (BK) at five years
  * Femorotibial vein graft — 75 to 80 percent at five years
  * Femorotibial synthetic graft — 25 percent at three years (should not be used for claudication)
Complications: LE swelling (reperfusion), technical failure, thrombosis, recurrent atherosclerosis, compartment syndrome, wound infection, myocardial infarction

Amputations: Indications: gangrene, non-healing ulcers, unrelenting pain not amenable to surgical treatment
• 50% mortality in 3 y for AKA, BKA
• Before amputation think of functional needs of the patient
• BKA: 5% mortality, 70% walk with prosthetic, 80% heal
• AKA: 90% heal, only 30% walk

Mesenteric Ischemia
• Mortality 50-70%, embolic (50%) vs. thrombotic (25%) vs. low flow
• Do not delay seeing these consults
• CT: bowel wall thickening, vascular occlusion, intramural air

Acute: Most common source emboli is cardiac, most often SMA. W/up can be with duplex, CTA, lactate
  Tx: #1 Resuscitation (very sick), abx, heparin, embolectomy, resection infarcted bowel.
Chronic: Present with weight loss, pain with eating, food fear. Must have 2/3 vessels occluded to get symptoms
  Tx: thrombectomy, PTA, SMA bypass depending on conditions

CAROTID DISEASE:
Stroke: Initial mortality 20-30%, if recover 1/3 will be normal, 1/3 mild deficits, 1/3 major deficits, and 50% will die of recurrent stroke within 5y.
• Presentation: asymptomatic (bruit or screening), symptomatic: TIA, amaurosis fugax (same side as lesion), stroke, global ischemic events
• Dx: Carotid duplex (know level of stenosis and velocities), CTA, MRA
• Asymptomatic carotid stenosis: CEA if > 80% stenosis (non-urgent), can consider if >70% (less clear for benefit esp for women).
• Symptomatic carotid stenosis: CEA if > 70% stenosis, or >50% with ulcerated lesion or persistent symptoms on ASA
  • If carotid occluded surgical intervention not generally warranted
  • Medical Management: ASA/Aggrenox/Plavix, Statin, no smoking, BP and cholesterol controlled.
  • CEA: Treatment of choice. Need center with low stroke rate and mortality to be worthwhile (<3%).

  • General or local anesthesia, consider monitoring (TCDs, EEG)
  • Dissect carotid without manipulating bulb
  • Systemic heparinization (pt also can be left on ASA)
  • Consider stump pressure, shunting (if stump pressure <50)
  • Dissect out plaque, patch angioplasty (vein patch vs bovine pericardium)
• Carotid Stent: Unclear role, reserved for patients who are not operative candidates
**Complications**
- Stroke, MI (most common), nerve damage (hypoglossal, RLN, SLN), 15% restenosis
- **Major Trials**: VA Cooperative, ECAS, ACAS, NASCET, CREST, EVA-3S

**VENOUS DISEASE**

**DVT**: covered elsewhere
- Most common in calf
- Remember pts with h/o DVT needed compression stockings to prevent post-thrombotic complications
- Tx: 1st coumadin for 3-6m, 2nd coumadin for 1y, 3rd or PE lifelong coumadin, placebo filter is can’t anticoagulate
- Can get UE DVTs especially with line history

**Varicose Veins/Venous Insufficiency**
- Edema and ulcers occur as pressure of venous column pushes against the skin
- Work up with duplex of superficial and deep systems as well as perforator valves
- Ulcer: Due to valve incompetence, Tx Unna Boot to heal ulcer, may require stripping.
- Venous Insufficiency: S/S: aching, foot swelling, brawny discoloration. Ulcers over malleoli. Tx: compression stockings, ambulation but not standing, stripping
- **CEAP Classification**: C = Clinical grade (0-6) E = Etiology (congenital/primary/secondary) A = Anatomic (sup or deep) P = Pathophys dysfunction (reflux or obstruction)
  
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>No signs</td>
</tr>
<tr>
<td>1</td>
<td>Telangiectasias</td>
</tr>
<tr>
<td>2</td>
<td>Varicose veins</td>
</tr>
<tr>
<td>3</td>
<td>Edema w/o skin change</td>
</tr>
<tr>
<td>4</td>
<td>Skin changes</td>
</tr>
<tr>
<td>5</td>
<td>Healed ulceration</td>
</tr>
<tr>
<td>6</td>
<td>Active ulceration</td>
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</tbody>
</table>

**AV Fistulas** (see KDOQI guidelines)
- Goal: access placement before needed, use autologous vessels when available
- Patients should be referred for surgical treatment when dialysis is likely to be necessary within 1 year.
- W/u: H and P, line history, access history, visible arm veins??, consider vein map.
  - Check upper extremities pulses, Do Allen test
  - Look for veins, previous surgical scars, scars from previous central lines
  - Right or left handed? Try to place AVF in non-dominant arm.
- Choices: radiocephalic □ brachiocephalic □ basilic transposition □ other arm □ Forearm loop □ other
- Usually 6+ weeks to mature before use if native vein. Can use PTFE sooner 10-14 days
- Bleeding: may occur after dialysis (heparinized), gentle pressure (don’t occlude fistula), DDAVP, gel foam

**Important Studies**:
- There are only a few studies you need to know for most of vascular surgery:
  - Pulse exam – check carotid bruit, compare UE pulses and BP, feel for AAA, check femoral, popliteal, DP, PT pulses/signals, do ABIs
  - ABIs: leg pressures/arm pressures
  - Arterial Duplex – evaluate flow velocities and patencies of vessels
  - Venous Duplex – look for DVTs, incompetent valves, vein map
  - Angiogram – allows both mapping of vessels, assessment of disease, intervention (chk Cr)
  - CTA – endograft planning, carotid evaluation, AAA evaluation, map peripheral disease, not great for distal vessels, check kidney function
  - MRA – used for carotid disease, mapping peripheral
PROCEDURES:

**NG Tube:** (May be OG tube if intubated)
- Indication: Ileus, SBO, Feeding, UGI bleed, Gastric Outlet Obstruction, Acute gastric dilation
- Contraindication: Recent esophageal/gastric surgery (check with attending), basilar skull fx.
- Materials: NG tube (14-18Fr, larger is easier to place), 60cc cath tip syringe, cup water, lubricant (+/- lidocaine)
- Technique: Patient should be positioned sitting if awake
  - Measure distance – mouth to earlobe and down to anterior abdomen
  - Lubricate tube
  - Have patient sit with chin touching chest as insert NG into nare (ask about deviated septum etc)
  - Advance tube aiming straight back, once hits back of the throat have the patient swallow the tube down as you advance – the water can help here
  - Confirm placement by injecting air into port while listening over epigastrium. Have tubing ready for set-up in case there is a large amount of output.
  - Carefully tape tube in position keeping off nares – they an cause serious erosions.
  - NG Tubes should be flushed by you when you see patient. Water into clear port, then air into blue port. If there is gastric contents in blue port the tube won’t work so flush out with air. No liquid should be placed in blue port nor should it be capped (the nurses do this a lot!!)
- Complications: Erosion of nare, gastritis (be sure on GI prophylaxis), epistaxis (remove tube if perisists).
- Tricks: Cool the tube in ice water before placing (stiffens), give patient some sedation (with stat nurse) to help them relax a bit, use a larger tube.

**Feeding tubes:** Usually placed by nursing, much thinner, need radiographic confirmation of placement, should not be used for drainage only for feeding/meds.

**Foley:**
- Indication: Placed for monitoring of resuscitation or in patients or bladder drainage. Should place in any case longer than 3-4 hours or any patient with epidural.
- Contraindication: trauma patients with blood at meatus, high riding prostate, urethral damage
- Complication: UTI, bleeding
- Materials: Sterile gloves, foley kit (16-18F, larger if blood clots) – if have difficulty consider coude catheter
- Technique: Prep with betadine swab (in kit), check balloon, lube catheter, insert
  - For men: Must hub catheter before inflating balloon (and see urine in tubing). Remember to replace foreskin
  - For women: Inflate balloon once you see urine. Remember urethra is most anterior.
- Tricks: spasm: inject 10cc of 2% lidocaine jelly into urethera and avancd catheter slowly, consider larger (if BPH) or smaller (if stricture) catheter, if still having problems ask Urology to help.

**A Line:**
- Indication: Monitoring of blood pressure, allows for frequent arterial blood draws
- Site: radial>ulnar>femoral>dorsalis pedis>brachial (talk to chief/attending before trying femoral or brachial)
- Contraindication: positive Allen Test
- Technique: Should be done with full sterile technique even though anesthesia colleagues completely ignore this.
• Materials: sterile field/gown, several a-line kits, lidocaine, suture, needle driver, a-line set-up (nurse)
• Position: Dorsiflex wrist, place towel underneath wrist, secure hand and arm to armboard/table with tape.
• Steps:
  1. Prep and drape in sterile fashion after wrist secured
  2. Palpate pulse
  3. Inject wheel of lidocaine over site of pulse, superficial. A lines hurt.
  4. Position catheter at 45 degree angle and keeping finger over pulse and advance slowly until you see a small amount of blood return in the hub of the catheter
  5. If you do not get blood withdraw slowly and change angle slightly
  6. If you do see blood and it continues slide the wire forward and then advance the catheter over the wire, or if no wire present advance the catheter over the needle. If you meet resistance the needle may be in the artery but not the catheter so bring the catheter back and try to advance system forward 1-2mm before trying to thread catheter again.
  **Do not push against resistance you will tear the artery and make it harder later.
  7. If no blood comes out of the catheter once advanced and needle is out you are not in the artery. Withdraw slowly. If you get blood return at any point consider threading wire and re-advancing. NEVER use the needle to do this. If there is no return remove and hold pressure.
  8. Do not make patient into pin cushion. The artery will go into spasm. The best thing to do is to stop and try again later or consider another site.
  9. If successful hook up to pressure bag. Suture a-line in place on both sides.
  10. Note: Femoral a-lines are a different kit with longer catheter and wire (check packaging). You should consider site rite for femoral artery. A-lines in the foot are really not very good for BP measurement.

**PICC Line:** Long, thin catheter which is inserted in basilic or cephalic and provides central access for medications/TPN. This is not an appropriate line for resuscitation or CVP monitoring. It is placed by the PICC nurse. Check with CXR. Good for long term inpatient or outpatient therapies.

**Central Venous Catheter:**
There will soon be a course through ISIS that you will need to complete to place central lines.
On every floor in every hospital there should be a line cart with equipment needed, an US, and a checklist.
Sterile technique and consent are MANDATORY.
**Lines of choice are IJ or Subclavian with US guidance.**

**Indications:** Poor peripheral access, CVP monitoring, need for large volume resuscitation, inotropic meds, TPN
**Contraindications:** Coagulopathy (INR>1.5, plt<50), venous thrombosis, untreated sepsis
**Types of Lines:** Triple Lumen (16g and 2x18g), Double lumen (14g and 16g), Cordis (7.5F, good for rapid volume delivery, need for SWAN), Groshong (plasmapheresis or dialysis), Mehurkur (dialysis), Hohn catheter (tunneled line), Hickman (tunneled line, can be single or double lumen), Port-c-Cath (tunneled with subcutaneous access port).
**Locations:** Internal jugular, Subclavian, Femoral (last choice unless ongoing CPR)
**Equipment:** sterile gown/gloves/mask/hat and drape, chloraprep, Site-Rite, appropriate line kit, lidocaine (usually in kit), flush, probe cover for site-rite, nurse for assistance, monitors (EKG and pulse ox), end pieces for catheter, dressing
**Positioning:**
  • Subclavian: Supine, Trendelenberg, towel between scapula, traction on
ipsilateral arm, head turned away.

- IJ: Supine, Trendelenberg, head turned away
- Femoral: Supine, flat

**Techniques:** Given for TLC – all lines use Seldinger technique.

**IJ:**
1. Prep neck, set up equipment, place flush in tray, don sterile gear, drape patient with full body drape
2. Set up Site Rite and locate IJ vessel. This line should always be done under US guidance.
3. Prepare line by flushing all ports. Place equipment on field in easy reach
4. Attach insertion needle to 5cc syringe loosely. Puncture skin and advance catheter while aspirating. Should be done under US guidance until see needle entering vessel (vein is the compressible vessel). If done without Site-Rite: Palpate carotid pulse and aim just lateral and towards ipsilateral nipple. Start at apex of SCM triangle.
5. If get arterial blood (bright, pulsatile) – withdraw and hold pressure. If no blood – withdraw and re-aim (pass to someone else after three attempts). If there is a question you can transduce the line to see waveform. If venous return (dark, non-pulsatile) proceed.
6. Introduce wire – should pass with no resistance. Watch for PVCs. Once in place remove needle leaving wire.
7. Use scalpel to make small incision in skin at wire entry site. Advance dilator over wire and then remove.
8. Insert catheter over wire. (ALWAYS have a hold of the wire). Once catheter in place remove wire. Flush all ports by first aspirating then flushing saline.
9. Suture in place, apply sterile dressing and get a CXR.

**Subclavian:**
1. If have Site Rite place in sterile sleeve and use to locate subclavian vessels.
2. If no Site Rite: Place index finger at sternal notch and thumb at intersection of clavicle and 1st rib (about 1/3 distance out on the clavicle).
3. Anesthetize area with lidocaine.
4. Prepare line by flushing all ports. Place equipment on field in easy reach
5. Attach insertion needle to 5cc syringe loosely. Puncture skin and advance catheter while aspirating. Keep horizontal to floor at all times. Advance towards sternal notch until at clavicle. Then pull back slightly and lower entire needle (horizontal) under the clavicle before advancing to vein.
6. If venous access obtained proceed with wire and Seldinger technique as outlined above.
7. If arterial access – stop, hold pressure
8. If no venous blood obtained withdraw needle, re-aim and try again. After three attempts someone else should takeover.
9. A CXR must be obtained after line placement or even line attempt.

**Femoral:**
1. Use Site-Rite or palpate pulse in groin below inguinal ligament and aim just medially
2. Anesthetize with lidocaine.
3. Insert needle at 45 degree angle until see blood return. Follow steps above.

**Complications:** If you ever have a question or problem call the chief/attending.

IJ: Carotid cannulation, infection, pneumothorax air embolus, malposition,
dysrhythmia
Subclavian: artery cannulation, pneumothorax, infection, air embolus, malposition
Femoral: artery cannulation, infection, must stay flat while line in.
*** If you realize the line is in the artery after it has been dilated. Don’t panic. Leave line in place and call for help.

**Tricks:**
- Never push wire against resistance. If it does not thread pull the wire out, recheck you are still in the vessel by aspirating. Then try to advance again.
- Have an assistant available to hold US.
- Never let go of the wire – ever!
- A patient with a Cordis may never go the the floor – they need a change over wire to TLC or removal.
- To resuscitate a patient you need a Cordis.
All lines must have documented procedure note on the chart.

**Articles:** *Preventing Complications of Central Venous Catheters.* McGee et al. 2003. NEJM 348;12 1123-33 There is a video on Access Surgery as well.

**SWAN:**
- Placement should be cleared by Chief/Fellow/Attending
- You must have monitoring and a nurse who knows how to set up and use a SWAN.
- Indications: No clear indication – used for monitoring hemodynamics and volume status in patients with confusing pictures.
- Complications: Pulmonary infarction, arrhythmias, balloon rupture, ptx, pulmonary artery rupture, knotting of catheter, infection, damage to cardiac valves.
- Technique: (brief) – read about this extensively before doing and have someone present who is experienced.
  1. Have Cordis introducer and Swandom. Prep and drape area. Nurse should prepare SWAN.
  2. Test catheter – check all three ports, inflate balloon, check whip, check monitor.
  3. Place swandom over the catheter. Pass into Cordis with balloon down.
  4. Once at 20cm have nurse inflate balloon (say balloon up). Continue to advance watching wave forms as you pass through SVC, RA, RV to PA.
  5. By around 50m (depends on size of patient) you should see PA waveform. When wedge the wave form will flatten. Deflate balloon (say balloon down) and the waveform should reappear. This is the wedge position. Leave balloon down.
  6. If you reach 60-70vm and you still haven’t seen PA wave deflate balloon, pull back and start over.
  7. The balloon should be up whenever you advance and down whenever you pull back.

CO = HR x SV
SV is determined by preload, afterload and contractility
CI = CO / BSA  SVI = SV / BSA
SVR = [(MAP–CVP)/CO] x 80  RVSVI = 0.0136 (PAP – CVP) x SVI
PVR = [(PAP – PAWP) / CO] x 80  LVSVI = 0.0136 x (MAP – PAWP) x SVI

**Chest Tube (Tube Thoracostomy)**
A video and complete description is available online from the New England Journal at: N Engl J Med 2007;357;e15. (http://content.nejm.org/cgi/content/short/357/15/e15.)
**Common indications**
Drain air (pneumothorax, tension pneumothorax), blood (hemothorax), water (effusion), or pus (empyema).

**Size selection**
Sizes generally range from 24Fr to 36Fr.
- Pneumothorax, simple effusion – 24Fr, 28Fr
- Large air leak, large effusion – 32Fr, 36Fr
- Blood, pus, complex effusion – 36Fr
- Trauma use 36 Fr

**Technique:** Be sure you have consent, chest tube tray, tube, local anesthetic, sterile gown/gloves
- **Positioning:** supine, ipsilateral arm behind head, wide sterile field, keep nipple visible.
- **Anesthesia:** Good local anesthetic is key, Consider some sedation if possible for awake patients.
- **Incision:** ~2cm (enough for the tube and your finger); anterior axillary line, roughly parallel to nipple or at most one rib space below (4th or 5th intercostal space).
- **Dissection:** Use curved Kelly or small scissor bites to tunnel up one rib space. Penetrate pleura bluntly, controlling Kelly tip, hugging the top of the rib to avoid neurovascular bundle. Verify entry by inserting finger into chest, sweeping away adhesions. Insert tube with Kelly, manually verifying placement in chest. Default position is posterior, apical. Secure with large suture (type of stitch varies by service/attending). Most common dressing is dry gauze covered with foam tape. Post-procedure CXR is mandatory!

**Pleurevac basics**
Standard 3-chamber unit: right side (largest) chamber collects fluid directly from patient. Central chamber is filled with water to create a water seal (typically 2cm), which allows air to escape from patient but does not let air back in when negative pressure is created (i.e. during normal inspiration). Water in this chamber should rise and fall with respiration. The left chamber is for suction control. Normally this is created by filling the chamber with water to the -20cm mark, and then applying suction, which causes air to bubble through the chamber; note that the level of water in the chamber, not the amount of wall suction or the rapidity of the bubbling, is what controls the suction level
- **Testing for air leak:** Bubbles in central chamber indicate an air leak, either from the patient or the system. To test for system leak, temporarily clamp tube at skin level; if bubbles persist, look for leak in system.
- **Water seal/gravity drainage:** If suction not needed, disconnect suction chamber tubing from wall suction device and leave open. Clamping this tube prevents air from escaping and can lead to tension pneumothorax.

**Removal**
Timing depends on original purpose for tube. In general, should be no air leak, chest x-ray showing complete expansion of lung, drainage less than ~150ml/day (variable by attending). Chest tubes for empyema stay in longer. Optimal method of actual removal is unsettled, but most favor pulling tube (rapidly!) at end-inspiration or with patient bearing down, in order to minimize chance of residual pneumothorax. If tube secured with U-stitch, will require one person to pull tube and another to tie the suture. Cover with occlusive dressing.

**Thoracentesis:**
**Indication:** diagnostic, therapeutic drainage of pleural effusion
**Contraindication:** coagulopathy, if only small volume consider US guidance, uncooperative.
**Position:** Sitting erect at edge of bed, rest arms and head on table or lateral recumbent.
**Equipment:** Thoracentesis kit, sterile gear, Vacuum bottles

**Technique:** Need informed consent. Prep and drape patient in sterile fashion.

1. Percuss to locate effusion (or have US mark). Choose rib space below top of effusion and anesthetize with lidocaine. Be sure to cover skin, subq, and periosteum. Then carefully walk needle OVER the rib until aspirate pleural fluid – pull back and anesthetize pleura.

2. Following same path and using 2 handed stabilization technique insert thoracentesis needle. Once in pleural cavity as identified by withdrawal of pleural fluid insert wire and then catheter using Seldinger technique.

3. Connect extension tubing to the catheter and connect ther side to vacuum bottles.

4. Pt may cough as fluid comes off and lung reexpands. Be careful to remove large volumes slowly (even consider chest tube) to avoid expansion pulmonary edema.

5. When finished withdraw catheter, place dressing, obtain CXR.

6. Send fluid for -> cx, gram stain, cytology, glucose, protein, LDH, etc. as indicated.

**Complications:** Intercostal bleed, pneumothorax, inadequate drainage (try different patient positions)

**DPL:** Blunt Abdominal Trauma – see algorithm in Trauma section

**Indication:** Unstable trauma patient

**Contraindication:** Need for laparotomy. Pregnant. Careful in cirrhotics, obese (consider open technique), prior surgeries (use open technique), retroperitoneal injury (may get false positive).

**Position:** Supine. Must have NG tube and Foley in place. If pelvic fx go above umbilicus.

**Equipment:** Sterile gown/gloves, chloraprep, DPL kit, access to open tray, 1L NS, tubing

**Technique:** Prep and drape. Anesthesia with lidocaine with epi.

1. Percutaneous: Make a small knick in skin below umbilicus with knife. Use towel clamp to elevate umbilicus. Insert needle with attached syringe (with NS) through fascia and peritoneum into abdomen (3 pops). Pull back on syringe to see bubbles, inject small amount to see saline drop in. The pull back twice with syringe. If get 10cc blood _> grossly + -> OR. Otherwise thread wire and using Seldinger technique insert catheter into abdomen. If resistance may net be in and try again. If continued trouble at any point convert to open. Once catheter in place attach tubing and instill 1L NS – watch for airleaks. Once at 800cc drop bag to floor while holding catheter and allow to drain back out. Manipulation of tubing can help. Again if problems consider converting to open. Once have all saline back send specimen to lab. If positive and unstable -> OR. If stable consider CT if DPL negative or pending.

2. Open: Small incison through linea alba. Incise fascia and peritoneum and grab with Allis clamps. Introduce dialysis catheter towards pelvis. Again gross blood or enteric contents -> OR. Otherwise attach tubing and instill 1L warm NS. Once at 200cc left drop bag and allow to drain out. Send specimen to lab. Close fascia with 0 Vicryl.

**Positive if:** RBC >100,000 (may not do to OR if solid organ injury known), WBC >500, amylase >175, food particles or bacteria present.

**Complications:** Bladder, bowel, arterial injury, peritonitis, wound infection

**Paracentesis:**

**Indication:** diagnostic, ascites, SBP

**Contraindication:** coagulopathy, pregnancy, infected skin, bowel obstruction

**Position:** Supine, have pt empty bladder before hand

**Equipment:** Paracentesis kit (on 4SE) (needle and tubing), lidocaine, vacuum bottles, chloraprep
**Technique:** Consider US guidance. If large volume choose site lateral lower quadrant or infraumbilical. (watchout for epigastrics.)

1. Prep and drape
2. Anesthetize with lidocaine 1%
3. Introduce catheter and needle until able to withdraw fluid then advance catheter over needle and withdraw needle. If diagnostic aspirate 20-30cc then remove.
4. If therapeutic attach catheter to tubing and hook to vacuum bottle.
5. If flow decreases manipulate catheter or have patient change position. Once finished remove catheter and cover with dressing.
6. Be sure to send fluid for gram stain, cx, protein, glucose, LDH etc.

**Complications:** hypotension, bleeding, bowel perforation, ascites leak, bladder perforation.

**Tips on bedside Port-a-Cath/Hickman removal:**
- Often asked on Consult service to remove Hickman or Port from infected Heme-Onc patient. Staff with Chief and attending.
- Need informed consent
- Be sure pt has adequate platelets >50 and coagulation factors have been checked. This must be corrected by primary team before you do anything (can take awhile)
- Ask OR for the Hickman Line tray – ensures you have all the instruments you might need.
- Bring someone to help you as well as letting the nurse know you will need her to be available.
- Infiltrate area and track with local anesthetic. Use sterile technique
- Patient must be in Trendelenberg to prevent Air embolus
- Remember: key to Hickman is freeing up cuff (done with a mosquito) – do not pull hard. You don’t want to break the catheter. For Ports need to cut the sutures holding it in place.
- If line breaks: Outside skin put clamp on it to avoid bleeding/air embolus. If under skin call IR.
- Send the line for culture.
- Hold pressure over the site where the line enters the vessel not where it leaves chest.

**Abscess:**
- Drainage is treatment of choice.
- Never stick your fingers in an abscess (you risk getting stuck w/ broken needle bits).
- Patient’s generally need to go to the OR for:
  - Deltoid abscess - deeper than expected and complicated to adequately drain at bedside.
  - Large abscesses.
  - Abscesses that appear to involve a joint - (orthopedics needs to be called).

**To drain an abscess:**

1. Gather: I&D kit (scalpel, hemostat, gauze, drape), Q-tips, 2L NS w/ irrigation tip, sterile gloves, hat, mask w/ face shield, lidocaine w/ epi, 10cc syringe, 18g needle to draw up, 2 inch 22-25g needle for lido, betadine/chlorprep, packing tape or gauze, tape.
2. Anesthetize circumferentially w/ lidocaine + epi, be sure to go deep as well. Lido must be in viable tissue to work. Consider supplementing with IV pain medications.
3. Incise w/ scalpel over area of maximal fluctuance. Make incision large enough for easy dressing changes by patient (err on the larger side). If it hurts, they won’t do it.
4. Probe cavity w/ hemostat and or qtip to break up loculations and check
5. Irrigate w/ 2L NS. Face shield is absolutely necessary.
6. Pack w/ gauze or packing tape depending on wound cavity size. The goal is to keep the entire pocket open to heal from the bottom. Need someone at home to help with this or ED f/u.
7. Patients should have CBC and blood cultures sent. All should receive dose of abx in ED. If WBC>12 need IV abx and consider admission. If surrounding cellulitis consider abx regardless of wbc count

**Recognizing necrotizing fasciitis (NSTI):**
- Cellulitis appearance w/ purplish discoloration.
- Generally non-blanching.
- Usually WBC >20
- Often ill appearing, decreased blood pressure, exquisite tenderness, low sodium, increased Cr
- For Fournier’s (NSTI in scrotal region) – urology should also be involved

**Initial treatment of NSTI:** Need operative debridement quickly.
- PCN 4 million units IV - Gentamycin 5mg/kg IV (May use Cipro if renal problems)
- Clindamycin 800-1200mg IV ± Vancomycin 1g IV

**VATS: Video-Assisted Thoracoscopic Surgery (adapted from ACS Surgery)**
An online description and video of VATS decortication can be found at: [http://www.ctsnet.org/sections/clinicalresources/thoracic/expert_tech-33.html](http://www.ctsnet.org/sections/clinicalresources/thoracic/expert_tech-33.html)

**Operative Preparation and Positioning**
Pre-op check list
- Confirm double lumen ET tube with Anesthesia!
- Must be prepared for rapid conversion to thoracotomy, if needed (discuss with patient pre-op)
- If conversion likely, consider preoperative epidural placement

In general, lateral decubitus position (shoulders and hips perpendicular to floor) offers best exposure and also allows conversion to thoracotomy if needed. Exact positioning and padding varies by attending, but consider the following:
- Head will need to be propped on pillow/towels/donut
- Axillary roll to prevent brachial plexus injury
- Arms extended (use airplane or pillows for upper arm) or both bent (praying position)
- Rolls on either side of torso to prevent turning
- Tape over hip (and sometimes shoulder)
- Upper leg bent with pillow between knees
- Break in table should be slightly above iliac crest; flex table to open intercostal spaces
- With table flexed, reverse Trendelenburg puts lateral chest wall parallel to floor

**Equipment**
Thoracoscopy is similar to laparoscopy with the notable exception that insufflation is generally not required, and traditional laparoscopic trocar cannulas are replaced with shorter, blunt thoracoports that have a corkscrew configuration to stabilize them in the chest wall.

**Port Placement**
The number, size, and location of incisions will vary depending on the case. The primary strategy is to place the instruments and the thoracoscope so that all are oriented in the same direction, facing the target disease within a 180 degree arc. The incisions should also be placed widely distant from each other so that the
instruments do not crowd one another.

For most procedures, the videothoracoscope is inserted through a thoracoport placed between the mid axillary and the posterior axillary line at the seventh or eighth intercostal space. Instruments are introduced through two additional thoracoports: one placed at approximately the fifth intercostal space in the anterior axillary line, and the other in the fifth space, parallel to and about 2 to 3 cm away from the posterior border of the scapula. If the procedure is converted to a thoracotomy, the two upper incisions can be incorporated into the thoracotomy incision. The lower incision can be used as a chest tube site. When a patient is being operated on for an apical lesion (e.g., bullae causing a spontaneous pneumothorax), the camera port can be placed at the fifth or sixth intercostal space, and the two instrument ports may also be moved higher. Depending on the location of the lesion being removed, a fourth port incision may be helpful to permit the introduction of additional instruments.

When the lung must be palpated so that a small or deep-seated lesion can be located or when complex video-assisted procedures are being performed, a small (4 cm) intercostal incision is added to the three port incisions. This utility thoracotomy, or access incision, is usually placed in the mid axillary line or in the auscultatory triangle. All of the above may be modified for the location and size of varying lesions.

Inferior and anterior port sites may be used for chest tubes at the completion of the case. Depending on the underlying pathology, anywhere from one to three tubes of varying size and shape (straight versus right-angled) may be used. Usually there is one apical and posterior and one along the diaphragm.
DR ROSS' GUIDE TO RAPID SEQUENCE INTUBATION:

Emergency Airway Algorithm
UWMC

Developed by – Brian K. Ross, Phd, MD
Dept. Anesthesiology

Patient Needs Intubation
Failure of airway maintenance or protection?
Failure of ventilation or oxygenation?
What is the anticipated clinical course?

YES

Unresponsive
Near Death
Agonal, Arrest

YES
Most Qualified
Intubates Immediately

NO

Assess For Difficult Airway
Receding Jaw
Short ‘Bull’ Neck
Abnormal Facies
Mallampati III or IV
< 3 finger breadths thyromental distance
< 3 finger breadths upper and lower teeth
(i.e. small mouth opening)
Prominent Incisors
Presence of Upper Airway Obstruction

YES
Call Anesthesia STAT

B L S
O E H
N M O
E O R
S N T

NO

Rapid Sequence Intubation
Seven “P’s”
Trainee intubator with qualified trained back-up
Back-Up plan in place
Anesthesia called but not necessary to wait for their arrival

Seven P’s
Preparation
Pre-oxygenation
Pre-treatment
Paralysis with induction
Protection and positioning
Placement with proof
Post-intubation management

2/7/06
Does Patient Need Intubating:
Failure of airway maintenance or protection?
Failure of ventilation or oxygenation?
What is the anticipated clinical course?

Emergency Airway Algorithm

Unconscious Near Death Agonal, Arrest
No
Yes
Most Qualified May Intubate

Difficult Airway
No
Yes
Call Anesthesia STAT

Trainee May Intubate With Backup

Rapid Sequence Intubation

minus 10 min
Preparation
Monitoring – ECG, SpO₂, BP
Laryngoscope and bag-valve-mask system
Endotracheal tube (6.5-7.0), stylet, syringe
Medications
LOAD
Induction Agent (etomidate, thiopental)
Post-intubation sedative
Suction – Yankauer and ET tube suction catheter
IV – free flowing, dedicated, resuscitation fluids
Assess for difficult intubation (LEMON, BONES)
Immediate access to rescue devices

minus 5 min
Pre-oxygenation
100% O₂ via BVM x 5 min; 8 VC breaths

minus 3 min
Pretreatment
LOAD

time 0
Paralysis + Induction
induction agent IV push, immediate paralysis

plus 15 sec
Protection
apply Sellick’s maneuver

plus 45 sec
Placement
assess mandible for flaccidity, place ETT, confirm

plus 60 sec
Post-Intubation
monitor hemodynamics and sat
sedation and long term paralysis if indicated
appropriate ventilator settings

2/7/06
Difficult Airway Assessment

BONES - assesses potential for difficult mask ventilation
  B  Beard
  O  Obese
  N  No teeth
  E  Elderly (> 55 yo)
  S  Snorers

LEMON - assesses potential for difficult airway
  L  Look at head and neck
  E  Evaluate 3-3
  M  Mallampati
  O  Obstruction
  N  Neck mobility

SHORT - assess potential for difficult cricothyrotomy
  S  Surgery (previous)
  H  Hematoma
  O  Obese
  R  Radiation
  T  Tumor

Look For:
  Receding Jaw
  Short ‘Bull’ Neck
  Abnormal Facies
  Mallampati III or IV
  < 3 finger breadths thyromental distance
  < 3 finger breadths upper and lower teeth (i.e. small mouth opening)
  Prominent Incisors
  Presence of Upper Airway Obstruction

PEARLS
  • during RSI, BVM patient only if desaturation to < 90%
  • all drugs are IV push except fentanyl which should be given slowly over
    1-2 minutes monitoring closely for respiratory depression
  • patients with increase age, decrease cardiac output or
    hypovolemia/hypotension should receive smaller doses of induction agents
  • Sellick’s maneuver (CRICOID pressure): applied with thumb and long finger at
    onset of decrease LOC, maintained until ETT placement confirmed with ETCO2
    detector and cuff inflated

Contraindications for Succinylcholine
  • Spinal cord injury, stroke (denervation UMN, LMN): > 7 days – 6 months
  • Neuromuscular disease, myopathies: indefinitely as long as disease is active
  • Renal failure (i.e. elevated creatinine, elevated potassium)
  • Burns: > 24 hr old – until healed
  • Muscle damage (crush): > 7 days – completely healed muscle
  • Intra-abdominal sepsis: > 7 days – resolution of infection
  • History of Malignant hyperthermia (MH)
### DRUG DOSES

#### Pretreatment (LOAD)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose/kg</th>
<th>Dose mg (70 kg adult)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine</td>
<td>1.5 mg/kg</td>
<td>100 mg</td>
</tr>
<tr>
<td>Opioid (fentanyl)</td>
<td>3 µg/kg</td>
<td>200 µg</td>
</tr>
<tr>
<td>Atropine</td>
<td>0.02 mg/kg</td>
<td>N/A</td>
</tr>
<tr>
<td>Defasciculating Agent (pance/vec)</td>
<td>0.01 µg/kg</td>
<td>1 mg</td>
</tr>
</tbody>
</table>

#### Induction Agents

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose/kg</th>
<th>Dose mg (70 kg adult)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etomidate</td>
<td>0.3 mg/kg</td>
<td>20 mg</td>
</tr>
<tr>
<td>Propofol</td>
<td>2-2.5 mg/kg</td>
<td>150 mg</td>
</tr>
<tr>
<td>Midazolam</td>
<td>0.3 mg/kg</td>
<td>20 mg</td>
</tr>
<tr>
<td>Ketamine</td>
<td>1-2 mg/kg</td>
<td>100 mg</td>
</tr>
<tr>
<td>Thiopental</td>
<td>3 mg/kg</td>
<td>250 mg</td>
</tr>
</tbody>
</table>

#### Paralytics

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose/kg</th>
<th>Dose mg (70 kg adult)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Succinylcholine</td>
<td>1.5-2 mg/kg</td>
<td>100 mg</td>
</tr>
<tr>
<td>Rocuronium</td>
<td>0.6-1 mg/kg</td>
<td>70 mg</td>
</tr>
<tr>
<td>Pan/Vecuronium</td>
<td>0.15 mg/kg</td>
<td>10 mg</td>
</tr>
</tbody>
</table>

#### Pretreatment

- **L idocaine** for reactive airway disease or increased ICP
- **O pioid (fentanyl)** when sympathetic responses should be blunted (increased ICP, aortic dissection, ruptured aortic or berry aneurysm, ischemic heart disease)
- **A tropine** for children ≤ 10 years old or second dose of succinylcholine
- **D efasciculation** for increased ICP > 5 yr/20 kg, penetrating eye injuries

#### Generic Sequence: (for 70 kg adult)

- minus 5 min 100% oxygen
- time zero etomidate 20 mg
- succinylcholine 100 mg

#### Increased ICP:

- minus 5 min 100% oxygen
- minus 3 min lidocaine 100 mg
- vecuronium 1 mg
- fentanyl 200 µg
- time zero etomidate 20 mg
- succinylcholine 100 mg

#### Asthma/COPD

- minus 5 min 100% oxygen
- minus 3 min lidocaine 100 mg
- ketamine 100 mg
- time zero succinylcholine 100 mg

#### Fatal hyperkalemia Risk: (burns/crush injuries > 72 hrs, denervation injuries)

- minus 5 min 100% oxygen
- time zero etomidate 20 mg
- rocuronium 70 mg

2/7/06
Always discuss DVT prevention plan on rounds to be sure patient has appropriate prophylaxis.

Monitor platelet count for patients on heparin. Think about HIT.

Be sure and clear prophylaxis with consulting services especially in trauma patients.

Most elective cases should get Heparin in pre-op. Check orders and MAR.

Some services have specific DVT prophylaxis guidelines:
- Obesity Surgery: Always get Lovenox for 1 month post-op
- Colorectal Cancer and some others: 1 month qday Lovenox post-op
- Vascular surgery: Often operates on Plavix

Hypercoagulable Work-Up:
Labs: PT, PTT, Fibrinogen, Protein C, Protein S, Antithrombin III, Prothrombin mutation, Activated Protein C resistance (Factor V Leiden), Lupus anticoagulant, anticardiolipin antibodies, antiphospholipid antibodies, homocysteine
Virchow’s Triad: Hypercoagulability, venous stasis, endothelial injury

<table>
<thead>
<tr>
<th>Prevention of DVT / PE in Selected Clinical Groups (for Cost Information)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical Group</strong></td>
</tr>
<tr>
<td>Medically ill: Mod. Risk - Malignancy w/ Reduced mobility</td>
</tr>
<tr>
<td>Medically ill: High Risk - ICU Patients, Obesity, Hypercoagulable states, Previous DVT, OR 2 or more DVT risk factors</td>
</tr>
<tr>
<td>Medically ill: Special Cases: Uncompensated CHF, Active Malignancy, Ischemic Stroke, Trauma / Ortho Surgery</td>
</tr>
<tr>
<td>Neurology: Ischemic Stroke</td>
</tr>
<tr>
<td>Neurology: Hemorrhagic Stroke (When clinically stable and hemorraghes on CT are stable)</td>
</tr>
<tr>
<td>Trauma: Low Mod. Risk, including non-High Risk states (eg. single system, non-orthopedic) and no DVT risk factors</td>
</tr>
<tr>
<td>Trauma: High Risk - Injury, venous injury, use of femoral line and/or DVT risk factors</td>
</tr>
<tr>
<td>Spinal Cord Injury (When clinically stable and hemostasis is evident)</td>
</tr>
<tr>
<td>Neurosurgery – Head Injury or bleed (When clinically stable and hemorraghes on CT scan are stable)</td>
</tr>
<tr>
<td>Neurosurgery – Elective (Generally considered safe 48 – 72 hours after surgery)</td>
</tr>
</tbody>
</table>
Insulin Therapies:

- There are several ways to replace insulin in both type 1 and type 2 diabetes. Recall that individuals with type 1 diabetes have absolute insulin deficiency and insufficient insulin replacement may lead to ketoacidosis which has a 5% mortality. Furthermore, those with type 2 diabetes develop severe insulin deficiency in the perioperative period and are actually at risk for DKA.
- All hospitals have insulin protocols for both Insulin drips for those patients who are not eating as well as Subcutaneous Insulin orders for those patients who are eating. Anyone with history of DM or elevated blood glucose >150 post-operatively should have a plan for glucose control. Use pre-printed orders!
- The pharmacists are a great resource for help in creating an insulin regimen.
- Keep in mind what a patient’s oral hypoglycemics are and that you should be cautious starting them before they are taking a full diet.
- Intravenous insulin replacement is ideal for those individuals NPO or who are clearly too sick to eat.
- Subcutaneous insulin should be used for all other patients, including all patients with type 1 diabetes (T1DM), patients with type 2 diabetes (T2DM) who take insulin at home, and those people with T2DM who develop hyperglycemia in the hospital with levels consistantly above 180 mg/dL before eating.
- Under routine circumstances, there is no reason to administer insulin gtt at the same time as SC insulin.
- For those receiving SC insulin, separate out basal insulin (insulin used to suppress hepatic glucose production) and prandial insulin (mealtime insulin which will dispose glucose into muscle).
  - The basal insulin are generally NPH, ultralente, and glargine (Lantus). UW uses GLARGINE or NPH for basal insulin needs
  - Prandial insulins are generally regular, lispro (Humalog) and aspart
“Correction doses” of insulin are generally used before meals to treat pre-meal hyperglycemia.
- A rule of thumb, this is best done with lispro or aspart but can be used with regular insulin. For a typical person with T1DM a conservative dose would be 1 unit/50 mg/dL above 180 mg/dL while for T2DM a typical starting dose would be 1 unit/30 mg/dL above the target. There are huge variations with these corrections doses however.
- UW uses REGULAR insulin for drips

Many patients are quite aware of these issues and it is reasonable to always discuss diabetes management issues with your patients if appropriate. For example, there are many with T2DM who may take 5 units for every 20 mg/dL above target. These people are often receiving > 100 units/day at home.
- When transitioning someone from an Insulin gtt to SC insulin in general you should add up the total amount of insulin given over a 24h period. Take half of this and give it as long acting insulin (glargine or NPH). The other half should be divided into short-acting insulin given at meal times. In addition there should be a sliding scale correction.

If you make someone NPO you must be sure to hold any long acting insulin or diabetic medications.

Patients on TPN:
- Do not add insulin to TPN bag until the patient is stable on an insulin drip & TPN

Calculate the last 12 hours of the stable insulin drip, multiply x 2, and add 80% of the calculated dose to the next night’s TPN bag
- DISCONTINUE the insulin drip upon initiation of the TPN
- Cover hyperglycemia with the SQ insulin algorithm
- Increase the amount of insulin in the TPN daily until the patient is euglycemic (80-150)

Patients on continuous tube feedings
- Do not change to SQ insulin until the patient is stable on an insulin drip & TF
- Calculate the last 12 hours of the stable insulin drip, multiply x 2, and divide ÷ 4 for q6h doses of REGULAR insulin (due to ever-present possibility of poor TF toleration)

Nocturnal tube feedings
- NPH and regular 0.1unit/kg EACH at start of tube feed - a second dose of regular insulin may be added 4-6 hours into the tube feeding time if the patient remains significantly hyperglycemic
- adjust doses in 2 unit increments until you achieve euglycemia
- use NPH insulin for morning basal insulin needs

Prandial insulin General Rule: prandial insulin should be approx 1/3 of basal insulin for each meal
- if fasting and nonfasting glucose is elevated without periods of hypoglycemia adjust basal AND prandial
- if nonfasting glucose is elevated but fasting is not, adjust prandial insulin.
- For someone on the surgery service who likely will require insulin as an outpatient but is not on insulin at admission, please consult with Cindy Sayer ((206)-598-6913 Pager-206-559-1170) , the medicine consult team, or the endocrine consult team. This would be particularly appropriate if all glucose levels are 200 mg/dL or the HbA1c is above 8% already on oral agents.
PORTABLE TRAUMA DOC
By T. Yen, Van Eaton 8/01, E Williams 10/05, K Keys 1/08

IVDA Abscess
- Tetanus, Clindamycin 900mg iv x1 (or Vancomycin)
- D/c w/ Bactrim bid, dsg bid, wound check ucc in 1 wk
- If T>38 / cellulitis: cbc, bld cx, WBC >10 admit IV abx
- New heart murmur = medicine admit
- GS consult for
  - Necrotizing fascitis
    - Penicillin 4 million units
    - Gent 5mg/kg
    - Clinda 800-1200mg q6h
    - +/- Vancomycin 1g q12h
  - BIG, perirectal, deltoid abscess

Stable Intubated Blunt Trauma
- ABCs, expose, restrain
- Confirm ET tube, 2 large bore ivs (≥18g) or cordis
- Trauma series, trauma labs
- Rectal, foley, ogt
- CTH, CTMW, TLS (unless CT A/P, then CT T-spine)
- X-ray anything with evidence of trauma
- Hgb x3 and q1h, repeat for >1pt drop
- Utox/udip, if + send u/a, hematuria w/u
- if >2 RBC/hpf
- Abdominal diagnostics per GS

Stable non-intubated blunt trauma
MVC> 35mph / falls >10ft
As above except:
- CTH (& CTMW) for: LOC, altered MS, intoxicated, high force mechanism
- C-spine XR (unless CTMW done)
- TLS
- X-ray anything that hurts
- Gen surg abd diagnostics for: abd pain, intoxicated, altered MS, distracting injury, LOC, mechanism

MVC < 35mpg / falls ≤10ft
- C-spine films, x-ray anything that hurts
- Hgb x2, repeat for >1pt drop
- Utox/udip, if + send u/a, hematuria w/u
  - if >2 RBC/hpf
- Palpate TLS -> off backboard, unless needs Tspine

Criteria for CTA Neck
- C1 to C3 fracture
- C spine subluxation
- Transverse foramen involved
- Hangings

Hematuria
- With pelvic fx = CT-Cysto
- Gross = CT Abd w/delayed renal cuts
  - Micro >30rbc/hpf
  - Micro >2rbc/hpf & sbp ever <90
  - Micro >8rbc/hpf & mechanism
Detailed neuro exam with rectal tone

- If abnormal, consult with neurology
- If normal, proceed to usual care

Robaxin 1g po x 1 & Toradol 30mg IV x 1

- NSAIDs, back school, ice

- Robaxin 1g po qid x 3 days

- If neuro deficits, Solumedrol 30mg/kg loading dose, then 5.4mg/kg x 24-48 hours

- For intoxicated patients
- 2-point restraints (locked if necessary)
- Thiamine 100mg IM
- BAL
- Evidence of head injury = assault workup
- Haldol iv/im in 5mg increments prn
- X-ray anything with evidence of injury

- Detailed neuro exam when patient cooperative
- EtOH falls by 50/hr. Discharge when BAL < 150 and patient walking & talking
- Lacerations
- Document tetanus < 5y ago or give booster
- Document distal neurovascular exam

- Anesthetize, irrigate with 1-2L warm NS


- Bite - keep open. Timentin 3.1g iv x 1, augmentin 875 po bid x 7 days

- Neurology Admits:
  - Acute stroke (call for initial exam, prior to neuro consult)
  - Sedative intoxications (not b-blockers, ASA, Tylenol)

- Infection of nervous system
- EtOH withdrawal
- Infection of nervous system
- Traumatic brain injury
- Confusion or altered level of consciousness
- "Tight" posterior fossa

- "Tight" posterior fossa
- Remember: permissive hypertension, HOB > 30 if possible
- Medicine/geriatric (> 65) pre-op consults
- Medicine consult 0800-1600 M-F
- ER attendant 1600-0800 or weekends
- Trauma Code (by phone): 3 or more yellow trauma simultaneously

- Do not close if open or infected
- Hyperflexion (C5) (hand/foot tendon involved?)
- Unrelated direct injury (ENT)可通过
- Explore joint space involvement (ortho) Pedal

- Anesthesia intubation / cricoid (2) vs. meanwhile NS
- Anesthesia intubation / cricoid (2) vs. meanwhile NS

- Trauma Code:
- P = medics on phone, R = medics on radio

- "TD for medic (#) , then "TD standing by for medic #." Report everything back (starting with "TD for medic #...")

- Phone = "This is (name), ER Trauma Doctor at Harborview Medical Center." "This is Dr. Smith, the trauma doctor. I understand you have _________. Permission for _____. Trauma doctor standing by."
bad auto vs ped/bike, MCC > 20 mph or w/ separation of rider / motorcycle

- Trauma patients at the extremes of age: < 5 or >65 yrs
- Trauma + significant co-morbidity

**Kids** (Braslow tape on all kids)
- Peds consult all kids < 15
- 20cc/kg IVF x 2-3 resusc, then blood.
- Must be d/c’d to somebody (< 15)
- Runaway children
  - May be sent to current living situation if able to contact that place. May send via cab.
  - If no home, send to juvenile detention
- Kids from out of town to juvie if nobody to claim them

**Dispo**
- Women go via cab or stay in ED for bus in AM.
- Cabs for 5-7 mile radius, otherwise bus
- Can order food, warm breakfast

**Helpers**
- Paramedic students: start IV’s, sew lacs, ABG’s w/ obs
- MA: Draw blood, set up for traumas

**Transport**
- All vent patients flown
- During rush hour, fly
  - Valley Monroe
  - Valley Renton

- Everett Hosp
- NGT, foley all flights. Chest tube any PTX.

**Copass**
- Call for the following
  - Police or fire patient
  - Peers (resident, etc)
  - Death in the ED
  - Mistakes
  - Harborview employee
  - Politician

<table>
<thead>
<tr>
<th>Face</th>
<th>5.0 dermalon / nylon</th>
<th>5d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalp</td>
<td>4.0 dermalon / nylon</td>
<td>7d</td>
</tr>
<tr>
<td>Extremity</td>
<td>4.0 dermalon / nylon</td>
<td>10-14d</td>
</tr>
<tr>
<td>Over joint</td>
<td>3.0 dermalon / nylon</td>
<td>10-14d</td>
</tr>
<tr>
<td>Oral mucosa</td>
<td>3.0-4.0 chromic</td>
<td>Absorb</td>
</tr>
<tr>
<td>SQ</td>
<td>4.0 dexon/vicryl</td>
<td>Absorb</td>
</tr>
</tbody>
</table>

**GCS**
- Eye Response
  - 4 = open spont.  2 = open to pain
  - 3 = open to verbal  1 = no respons
- Verbal Response
  - 5 = oriented, converses  2 = incomprehensible
  - 4 = disoriented, converses 1 = no response
  - 3 = inappropriate responses
- Motor Response
  - 6 = obeys commands  3 = decorticate to pain
  - 5 = localizes to pain  2 = decerebrate to pain
  - 4 = withdraws from pain  1 = no response
**PHARMACY PEARLS FOR THE SURGICAL RESIDENT**

please page the Surgery pharmacist with any questions
William Frieze, Pharm.D. 540-2149
Susie Lee, Pharm.D
Megan McMurray, Pharm.D

**DVT prophylaxis guidelines**

<table>
<thead>
<tr>
<th>Category I: fractures of long bones, pelvis, spine (with or without neurologic deficits)</th>
<th>LMWH + SCD + duplex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category II: age&gt;40, major venous injury, prolonged immobilization, CNS injury (GCS&lt;10 without CNS bleed), femoral venous lines, multisystem injury, previous history of DVT, oral contraceptive agents/estrogens, active malignancy</td>
<td>UFH sq + SCD</td>
</tr>
<tr>
<td>Category III: CNS injury (GCS&lt;10 w/CNS bleed), non-operative hepatic or splenic injury</td>
<td>SCD</td>
</tr>
</tbody>
</table>

LMWH = low molecular weight heparin (e.g. Enoxaparin 30mg subcutaneously q12h OR 40mg subcutaneously q12h for OBSE)
UFH sq = unfractionated heparin sq (Heparin 5000units subcutaneously q8h)
SCD = sequential compression device
*Please consult with Neurosurgery & Ortho Spine before initiating chemical DVT prophylaxis in patients with head trauma &/or spine fractures.

**Department of Neurosurgery (attending-dependent) guidelines for duration of seizure prophylaxis**

- Subdural hematoma: 1 week
- Epidural hematoma: 1 week
- Gunshot wound to head: 1 week (or longer)
- Cerebral contusion(s): 1 week
- Craniotomy: 1 week
- Cranietomy: 1 week
- Subarachnoid hemorrhage: 6 weeks
- Traumatic subarachnoid hemorrhage: 1 week
- Intracerebral hemorrhage: 6 weeks
- Intraventricular hemorrhage: 6 weeks
- Arteriovenous malformation: 6 weeks
- Brain Tumor: 6 months to years
- MCA aneurysm clipping (ruptured or unruptured): 6 months
- Aneurysm clipping (other than MCA): 6 weeks
- Injury localized to posterior fossa: no seizure prophylaxis

**Recommendations for dosing of phenytoin:**

Loading dose* (adults) = 17 mg/kg IVPB infused at rate < 50mg/min
(pediatrics) = 15-20 mg/kg (rate as above)

Maintenance dose (adults) = 5 mg/kg qhs IVPB or PO
(with tube feeds, double PO/IV dose & divide q12h)
(pediatrics) = 3-5 mg/kg IVPB/PO q12h

*monitor patients for s/sx of infusion-related reactions (i.e. hypotension, EKG abnormalities, bradycardia)

**Choice of agent(s) for management of ICU sedation/analgesia**

**OPIOIDS/ANALGESICS**

- Morphine 2-10mg IVP q1h PRN Preferred agent for most patients
- Fentanyl 25-100mcg IVP q30min PRN Alternative if: HD instability, Renal insufficiency
SEDATIVES/ANXIOLYTICS
Lorazepam  1-4mg IVP q1h PRN  Preferred agent for most patients
Midazolam  2-5mg IVP q30min PRN  Alternative for short procedures or short-term sedation
Propofol  0.5mg/kg bolus followed by infusion @ 10-100mcg/kg/min  

ANTIPSYCHOTICS
Haloperidol  2-10mg IVP q1h PRN delirium  Adjunctive therapy decreases benzo requirements.
Quetiapine  25-50mg PFT q6-8h PRN delirium
*considered chemical restraint on floor

These agents not yet approved for use in the ICU population, but may be considered as alternatives to haloperidol in patients with refractory agitation/psychosis.
Risperidone  1-2mg PFT q12h PRN delirium  (or on a routine basis)
Olanzapine  5-10mg PFT qhs PRN  (or routinely for more stable effect)

NONDEPOLARIZING NEUROMUSCULAR BLOCKERS
*Titrate to endpoint = TOF of 1-2/4 twitches +/- RR, plateau pressure, etc.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Kinetics</th>
<th>Dosing*</th>
<th>Adverse effects/Comments</th>
</tr>
</thead>
</table>
| Pancuronium   | Lasts 75-90 min 80% renal clearance | 0.1mg/kg bolus IVP, then 0.05 mg/kg IVP q1-4 hours -OR- 1mcg/kg/min infusion | Tachycardia
                    |                              |                              | IOP
                    |                              |                              | Bronchospasm
                    |                              |                              | Avoid in HD instability |
| Pancuronium Vecuronium | Lasts 20-30 minutes 35% renal clearance 50% biliary clearance | 0.1mg/kg bolus IVP 0.8-1.2 mcg/kg/min infusion | Polyneuropathy |
| Cisatracurium | Lasts 25-90 minutes Hoffman degradation | 0.1-0.2 mg/kg bolus IVP 1-3 mcg/kg/min infusion | $$$$ |

Reversal of narcotic overdose:
Naloxone: 0.1-0.2mg IVP (1 ampule = 0.4mg) – may repeat q5min to achieve reversal. If multiple doses are required or unsuccessful, consider initiating continuous infusion at a rate of 0.05-0.1mcg/kg/min – titrate to RR (or other MD specified response). No max rate.

Reversal of pure benzodiazepine overdose:
Flumazenil: 0.2mg IVP q1min up to a total of 1mg. This series may be repeated at 20 minute intervals in the setting of continued benzodiazepine toxicity &/or re-sedation. Avoid in patients with history of or risk of seizures.

AntiMicrobials:
<table>
<thead>
<tr>
<th>DOSING RECOMMENDATIONS</th>
<th>Adjustment for renal insufficiency</th>
<th>Adjustment for renal failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin 15-20mg/kg IVPB q24h</td>
<td>15-20mg/kg IVPB x1 check random level in 2 days &amp; re-dose when &lt;5μg/mL</td>
<td>Drug not recommended (consult RPh)</td>
</tr>
<tr>
<td>Amphotericin B 0.5-1.5mg/kg IVPB q24h</td>
<td>Not recommend Lipid complex (Abelcet) preferred (5mg/kg q24h)</td>
<td>Drug not recommended</td>
</tr>
<tr>
<td>Ampicillin 1 or 2 gm IVPB q6h</td>
<td>1 or 2 gm IVPB q8h or q12h</td>
<td>500mg or 1gm IV q24h (schedule after HD)</td>
</tr>
<tr>
<td>Ampicillin/Sulbactam (Unasyn) 1.5 or 3 gm IVPB q6h</td>
<td>1.5 or 3 gm IVPB q8h or q12h</td>
<td>1.5 or 3 gm IV q24h (dose after HD)</td>
</tr>
<tr>
<td>Amoxicillin 250mg or 500mg PO q8h</td>
<td>250mg or 500mg PO q12h</td>
<td>250mg or 500mg PO q24h</td>
</tr>
<tr>
<td>Amoxicillin/Clavulanate (Augmentin) 875mg PO q12h</td>
<td>500mg PO q12h</td>
<td>500mg PO q24h</td>
</tr>
<tr>
<td>Azithromycin 500mg IVPB/PO x1 on day 1, then 250mg IVPB/PO q24h x4days</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Micafungin 100mg IVPB q24h</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Cefazolin 1 or 2 gm IVPB q8h (q6h for obese)</td>
<td>1 or 2 gm IVPB q12h</td>
<td>for GFR&lt;30 only 1gm IVPB q24h (give after HD)</td>
</tr>
<tr>
<td>Cefepime 1 or 2 gm IV q12h (q8h if neutropenia)</td>
<td>1 or 2gm IVPB q24h</td>
<td>500mg or 1gm IVPB q24h (supplement 500mg after HD)</td>
</tr>
<tr>
<td>Cefotetan 1 or 2 gm IVPB q12h</td>
<td>1gm IVPB q12h</td>
<td>500mg IV non-HD days; 1gm IV post-HD</td>
</tr>
<tr>
<td>Ceftazidime 1 or 2 gm IVPB q8h</td>
<td>1 or 2 gm IVPB q12h (or q24h for GFR&lt;30)</td>
<td>1gm IVPB q48h (give dose after HD)</td>
</tr>
<tr>
<td>Ceftriaxone 1 or 2 gm IVPB q24h (q12h for severe infections/meningitis)</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Drug</td>
<td>500mg PO q12h</td>
<td>500mg PO q12h (give dose after HD)</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><strong>DOSING RECOMMENDATIONS</strong></td>
<td><strong>Adjustment for renal insufficiency</strong></td>
<td><strong>Adjustment for renal failure</strong></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>500mg PO q12h</td>
<td>For GFR &lt;30 only: 500mg PO q24h 400mg IV q24h</td>
</tr>
<tr>
<td></td>
<td>400mg IV q12h</td>
<td>400mg IV q24h</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>600 or 900mg IVPB q8h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150/300/450mg PO q6h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(900mg-1200mg IV q6h – nec fasc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>No change</td>
<td>250mg or 500mg IVPB/PO q6h</td>
</tr>
<tr>
<td>500mg or 1gm IVPB/PO q6h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluconazole</td>
<td>200mg IVPB q24h</td>
<td>100mg IVPB q24h</td>
</tr>
<tr>
<td>400mg IVPB/PO q24h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td>5mg/kg IVPB x1; consult Rx recommendations RE: drug levels</td>
<td>Drug not recommended</td>
</tr>
<tr>
<td>5-7mg/kg IVPB q24h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imipenem/Cilastatin</td>
<td>500mg IVPB q8h or q12h</td>
<td>250mg IVPB q12h</td>
</tr>
<tr>
<td>500mg IV q6h (1gm IV q8h or q6h for obese)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levofloxacine</td>
<td>500mg IVPB x1 as load, then 250mg IVPB q24h</td>
<td>500mg IVPB x1 as load, then 250mg IVPB q48h</td>
</tr>
<tr>
<td>500mg or 750mg IVPB q24h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linezolid</td>
<td>No change</td>
<td>No change (give dose after HD)</td>
</tr>
<tr>
<td>600mg IVPB/PO q12h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meropenem</td>
<td>500mg or 1 gm IVPB q12h</td>
<td>500mg IVPB q24h (give dose after HD)</td>
</tr>
<tr>
<td>1gm IVPB q8h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metronidazole</td>
<td>No change</td>
<td>500mg IVPB/PO q8h or q12h</td>
</tr>
<tr>
<td>500mg IVPB/PO q8h or q6h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minocycline</td>
<td>No change</td>
<td>(CrCl &lt;30) 200mg IV/PO x1, 100mg qday</td>
</tr>
<tr>
<td>200mg IV/PO, then 100mg q12h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nafcillin</td>
<td>For Hepato-renal failure: 500mg or 1gm IVPB q4h or q6h</td>
<td></td>
</tr>
<tr>
<td>1 or 2 gm IVPB q4h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Penicillin G
2-4 million units IVPB q4h or q6h (4 MU IVPB q4h for nec fasc)

1 or 2 MU IVPB q4h or q6h (2 MU IVPB q4h for nec fasc)
1 MU IVPB q6h (give dose after HD)

Piperacillin/Tazobactam (Zosyn)
3.375 gm IVPB q6h or 4.5 gm IVPB q8h

2.25 gm IVPB q6h
2.25 gm IVPB q8h (0.75 gm IVPB after each HD session)

Ticarcillin/Clavulanate
(Timentin) 3.1 gm IVPB q6h

2 gm IVPB q6h
2 gm IVPB q12h & give 3.1 gm IVPB after each HD

Tigecycline
100 mg IV, then 50 mg IV q12h

No changes
No changes

Tobramycin
5-7 mg/kg IVPB q24h

5 mg/kg IVPB x1; check random level in 1-2 days; re-dose when <1 μg/mL
Not recommended

Trimethoprim/Sulfamethoxazole
15-20 mg/kg TMP/day divided q6h
2 DS tabs q12h (MRSA S&STI)

10 mg/kg TMP/day divided q12h
15-20 mg TMP/kg before HD & 10 mg TMP/kg p/HD

Vancomycin
15 mg/kg IVPB q12h (typical dose = 1 gm IVPB q12h)

15 mg/kg IVPB q24h
15 mg/kg IV x1, check random level in 2-3 days; re-dose when <10 μg/mL

Voriconazole
6 mg/kg IV q12h x2 doses, then 4 mg/kg IV q12h (round to 100 mg increments); 200 mg PO q12h

Give dose PO ONLY (IV form has toxic vehicle)
Hepatic failure: 100 mg PO/IVPB q12h

Antibiotic prophylaxis
Orthopedic injury:
Cefazolin 1 g IV q8h
[+/- Gentamicin 5 mg/kg IV q24h for open fracture & normal SCr]

Perforated viscus: Cefotetan 1-2 g IV q12h
Bite wounds/LeForte/Mandibular fx: Unasyn 1.5 g IV q6h or Augmentin 875 mg PO q12h

LeForte/Mandibular fx w/PCN allergy: Clindamycin 600 mg IV q8h

Empiric antibiotic therapy
Necrotizing fascitis: Penicillin G 4 million units IV q4h (see chart for renal adjustment)
Clindamycin 900-1200 mg IV q6h
Gentamicin 5 mg/kg IV q24h (see chart for renal adjustment)
(Vancomycin 15 mg/kg IV q12h – for IVDU, previous MRSA
Ventilator associated PNA:
*Begin immediately if patient is hemodynamically unstable & infection is likely
*Await bronchoalveolar lavage & initiate antibiotics afterward if possible

Early-onset VAP (< 4 days of hospitalization and mechanical ventilation)
Unasyn 3gm IV q6h -OR- Ceftriaxone 2gm IV q24h -OR- Moxifloxacin 400mg IV q24h (PCN- allergic)

Late-onset VAP (> 4 days of hospitalization or mechanical ventilation)
Imipenem 500mg IV q6h -OR- Meropenem 1g q8h
CONSIDER (+/-) Amikacin, Gentamicin, Tobramycin -OR- Levofloxacin, Ciprofloxacin, Moxifloxacin
*please see antibiotic dosing chart for initial dosing of these agents
AND
Vancomycin 15mg/kg q12h for GPC in clusters on Gm stain or H/O MRSA colonization
Linezolid 600mg IV q12h if MRSA is isolated on quantitative bronchoscopy

DURATION: 8 days (except 15 days for pseudomonas infection)
NOTE: recommendations are subject to adjustment as bacteriologic environment of the ICUs evolves.

Antimicrobial spectrum of topical wound care agents

<table>
<thead>
<tr>
<th>Agent</th>
<th>MOA</th>
<th>Effective against</th>
<th>Available as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Sulfadiazine</td>
<td>Cell wall inhibitor &gt;efficacy during eschar separation</td>
<td>Staph, strep, E. coli, proteus, pseudomonas, enterobacter, klebsiella, some yeast (+/- varicella)</td>
<td>Cream</td>
</tr>
<tr>
<td>Bacitracin</td>
<td>Prevents cell wall synthesis/ alters membrane permeability</td>
<td>GPC (staph, strep), corynebacterium, treponema, actinomyces, clostridia, meningococci, neisseria, haemophilus</td>
<td>Ointment, solution</td>
</tr>
<tr>
<td>Sulfamylon (Mafenide)</td>
<td>Inhibits bacterial folic acid synthesis; inhibits plasmin- mediated fibrinolysis</td>
<td>E. coli, haemophilus, pseudomonas, streptococci, staphylococci (MRSA), anaerobes</td>
<td>Solution, Cream</td>
</tr>
<tr>
<td>Dakins solution</td>
<td>Bactericidal: oxidizes microbial enzymes</td>
<td>Staphylococci (MRSA/MRSE), Enterococci, streptococci, E. coli, klebsiella, enterobacter, serratia, proteus, pseudomonas</td>
<td>Solution</td>
</tr>
<tr>
<td>Silver nitrate</td>
<td>Liberates silver ions to precipitate bacterial proteins</td>
<td>Gram+/Gram – bacteria</td>
<td>Solution, stix</td>
</tr>
</tbody>
</table>
Mupirocin (Bactroban) Binds RNA-synthetase to arrest protein synthesis MSSA, MRSA, MRSE, group A strep, strep pyogenes, H. flu, neisseria Ointment, cream

Intravenous Immune Globulin
Typical dose for streptococcal, staphylococcal or clostridial necrotizing fascitis = there is none… (doses in clinical/anecdotal literature range from 50mg/kg up to 3gm/kg)
HMC standard: 1gm/kg IV infusion x1 dose
May repeat x1 if patient has clear hemodynamic response to 1st dose
Cautions: may cause or exacerbate renal insufficiency/renal failure may cause hypotension/febrile response

Activated Protein C (drotrecogin alfa/Xigris®)
Please see HMC protocol orders… NOTE: must be approved by ICU attending.
**Standard dose:** 24mcg/kg/hr x 96 hours total infusion time. Recommend holding infusion a minimum of 90 minutes prior to OR (ideally, hold > 2 hours). Check coags (PTT/INR/platelet count) at least q4h initially, then adjust monitoring to patient response/clinical scenario.

Guidelines for the Diagnosis and Treatment of Clostridium difficile Associated Diarrhea
**Diagnosis**
- Suspect C. difficile in any patient with a history of previous antibiotic use and >3 loose stools/day
- Send stool sample for antigen, toxin A & toxin B
- Possible results for stool sample:

<table>
<thead>
<tr>
<th>Toxin --</th>
<th>Toxin +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigen --</td>
<td>Unequivocally negative--no treatment</td>
</tr>
<tr>
<td>Antigen +</td>
<td>Difficult to interpret. If clinical suspicion high, treat pending Toxin B result</td>
</tr>
</tbody>
</table>

**Treatment**
- Discontinue antibiotics if possible
- Institute supportive measures (rehydrate, correct electrolyte imbalances)
- Avoid use of antiperistaltic agents (causes retention of toxin)
- Start antibiotic treatment if diarrhea is severe or if evidence of colitis is present:

1st Line: metronidazole 250mg po QID or 500mg po TID x10 days considered first line due to equal efficacy, lower cost, and prevention of vancomycin resistance
If the patient is pregnant, cannot tolerate treatment with metronidazole, does not respond to treatment with metronidazole after 3 days, or there is evidence of diarrhea being caused by Staphylococcus aureus: vancomycin 125mg po QID x10 days
If the patient cannot tolerate oral therapy or lacks oral access, consider: metronidazole 500mg IV QID x10 days and/or intracolonic vancomycin (ICV).
Dosing ranges from 100mg QID plus 100mg after each loose stool to 250-1000mg in 1-2L of saline q4-12hr clamped for 60min. ICV only effective for treating left-sided colon disease.

For severe infection:
- Begin with metronidazole as first line therapy, but switch to vancomycin 125mg po qid if patient does not appear to be responding. Escalate at 48 hour intervals up to 500mg po qid if diarrhea, fever and leukocytosis fail to abate
- Severely ill patients who do not respond to oral vancomycin alone may benefit from the addition of IV metronidazole
- Defervescence should occur within 48 hours and diarrhea should resolve within 4 days

H. pylori treatment regimens

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DURATION</th>
<th>COST</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin 1g q12h Clarithromycin 500mg q12h Pantoprazole 40mg q12h</td>
<td>10 days</td>
<td>~$130</td>
<td>1st line therapy</td>
</tr>
<tr>
<td>Bismuth subalsicylate 2 tabs q6h Metronidazole 500mg q8h Tetracycline 500mg q6h Pantoprazole 40mg q12h</td>
<td>7 days</td>
<td>~$85</td>
<td>2nd line therapy after failure to cure</td>
</tr>
<tr>
<td>Clarithromycin 500mg q12h Metronidazole 500mg q12h Pantoprazole 40mg q12h</td>
<td>10 days</td>
<td>~$130</td>
<td>Lack of cure results in single or double Abx resistance</td>
</tr>
<tr>
<td>Bismuth subalsicylate 2 tabs q6h Metronidazole 500mg q8h Tetracycline 500mg q6h</td>
<td>14 days</td>
<td>~$30</td>
<td></td>
</tr>
</tbody>
</table>

H. pylori resistance rates:
Amoxicillin, Tetracycline = rare
Clarithromycin ~10%
Metronidazole = 30-50%

Pre-medications for contrast allergy
- Prednisone 50mg PO – OR – Methylprednisolone 40mg IV at 13 hours, 7 hours & 1 hour prior to contrast infusion
- Diphenhydramine 50mg PO/IV at 1 hour prior to contrast infusion
- (+/-) Ranitidine 50mg IVPB at 1 hour prior to contrast infusion

Ordering and monitoring loop diuretic infusions
- Please give STARTING RATE as well as “Not to exceed” RATE on the order
-Titrate infusion to either an hourly net-negative balance OR a 24-hour net-negative balance (nursing may weigh in on the ease of one versus the other method)

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSING</th>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furosemide (Lasix®)</td>
<td>Start: 2mg/hr –THEN – Titrate by 1-2mg/hr increments q2h – NT E 20mg/hr without notifying HO</td>
<td>BUN/SCr K+, Cl</td>
</tr>
<tr>
<td>Drug</td>
<td>β1</td>
<td>β2</td>
</tr>
<tr>
<td>------------------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Epinephrine 2-30mcg/min</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Dopamine 2-20mcg/kg/min</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Dobutamine 2-20mcg/kg/min</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Norepinephrine 2-30mcg/min</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Phenylephrine 20-200mcg/min</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Vasopressin 0.04-0.08U/min</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Vaso/Venodilators**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Arterial</th>
<th>Venous</th>
<th>Mechanism</th>
<th>CO</th>
<th>SVR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitroglycerin 0.1-0.4 mcg/kg/min (25-100mcg/min)</td>
<td>+</td>
<td>++++</td>
<td>Direct venodilator</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Nitroprusside 0.25-10mcg/kg/min</td>
<td>++++</td>
<td>++</td>
<td>Direct dilation</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Milrinone 0.3-0.75 mcg/kg/min</td>
<td>++++</td>
<td>+</td>
<td>Phosphodiesterase inhibitor</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Epoprostenol 1ng/kg/min (q15min)</td>
<td>++++</td>
<td></td>
<td>Prostacyclin; dilates pulm &amp; arterial beds</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
# Management of arrhythmias

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE</th>
<th>USE</th>
<th>PEARLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diltiazem</td>
<td>0.25mg/kg IV bolus (~20mg)</td>
<td>Rate control</td>
<td>t1/2 = 4hrs; bolus before rate</td>
</tr>
<tr>
<td></td>
<td>MRx1 after 15min Infusion @ 5-15mg/hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esmolol</td>
<td>200-500mcg/kg loading dose 50-300mcg/kg/min infusion</td>
<td>Rate Control</td>
<td>Cardioselective antagonist.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Slows conduction through AV node. Very short t½β-</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>5-10mg IVP q4-6h Rate control</td>
<td>Rate Control</td>
<td>Cardioselective β-antagonist.</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>150mg IVPB over 10min, then infusion: 1mg/min x6h, then 0.5mg/min x18h (maintenance=0.5mg/min) Conversion (not seen acutely); prevention of recurrence</td>
<td>Class III/blocks β-receptors &amp; Na+/K+/Ca++ channels</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>10mcg/kg loading dose (1/2 dose 1st, then ¼ q6h x2) (Standard=0.5/0.25/0.25mg q6h) maintenance=0.125-0.25mg qd Rate control</td>
<td>Rate Control</td>
<td>AV nodal conduction, sympathetic tone. Loading dose is in renal dysfunction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Anticoagulation therapy**

**Unfractionated heparin:** please see HMC heparin infusion protocol order form. Form must include patient’s total body weight, predicted body weight & adjusted body weight (for obese patients).

**Enoxaparin:** 1mg/kg total body weight subq q12h (round to the nearest 10mg increment). Not recommended for patients with renal insufficiency/renal failure due to unpredictable clearance (bleeding risk). antiXa level = 4hr peak (5mL in blue top)

**Lepirudin:** Indicated for full anticoagulation in patients with HIT. Avoid in patients with renal problems.

- **Dosing:** 0.4mg/kg loading dose, followed by infusion @ 0.15mg/kg/hr (decrease bolus to 0.2mg/kg in the setting of renal insufficiency; start infusion @ 0.075mg/kg/hr).
- Hold infusion > 120 minutes prior to procedures.
- Please choose argatroban (below) if GFR<30.
- Monitor PTT q4h after any change in rate (target PTT = 60-80), otherwise q24h.

**Bivalirudin:** Alternative for full anticoagulation in patients with HIT. Preferred over lepirudin in patients with renal insufficiency/failure.

- **Dosing:** no bolus for this indication. Begin infusion at 0.15mg/kg/hr. Monitor PTT 2h after initiation and 2h after any change in infusion rate.
Target PTT = 60-80
Hold infusion > 90 minutes prior to procedures.

Note: may increase INR in combination with warfarin. A valid INR may be obtained by holding infusion 2 hours before checking INR
Refer to pharmacy anticoag guidelines or pharmacist for recommendations regarding transition to warfarin.

Warfarin: Starting dose should be chosen based upon patient’s predicted sensitivity (please see HMC guidelines for oral anticoagulation). Monitor INR daily during initial warfarin titration. ACCP Chest guidelines recommend overlapping warfarin with other form of full anticoagulation for 48 hours after INR is therapeutic.

Patients may not be discharged on Warfarin without a primary care provider who is willing to follow his/her INR for the duration of therapy, as well as a follow-up visit arranged, and teaching completed.

Hypercoagulability workup

<table>
<thead>
<tr>
<th>Factor V Leiden</th>
<th>Factor IIa mutation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein C&amp;S serum titer</td>
<td>Antiphospholipid antibody levels</td>
</tr>
<tr>
<td>AT3 deficiency</td>
<td>Factor VIII levels</td>
</tr>
<tr>
<td>Homocysteine level</td>
<td></td>
</tr>
</tbody>
</table>

*AT3, Protein C, Protein S = altered by heparin therapy

Medications to control surgical bleeding

Consider the physiologic basis of coagulopathy in order to maximize therapeutic efficacy of the chosen agent.

Vitamin K (phytonadione): 5-10mg IVPB over 1 hour (may repeat q24h) – no acute hemostatic effect. Unlikely to be effective in the absence of a prolonged protime.

Aminocaproic Acid (AMICAR®): note – not indicated in the setting of fibrinolytic hemorrhage (competitive inhibitor of plasminogen activators). 5gm IVPB loading dose over 30min, followed by infusion at a rate of 1gm/hr x8 hours or until cessation of hemorrhage.

Aprotinin: (maintains platelet function/preserves platelet membrane receptors; reduces activity of free plasmin). Primarily indicated for intraoperative use during bypass/transplantation/vascular repair.

1 million units IV x1, followed by 250,000-500,000 units/hr infusion.

2 million units IV as x1 dose.

Desmopressin: (general endothelial stimulant – increases factor VIII activity, release of activated plasminogen; increases platelet adhesion). Indicated for prevention of uremic bleeding. 0.3mcg/kg IVPB 30min prior to procedure (may repeat at time of closure if 6 hours has passed).

Conjugated estrogens: (thought to increase factor VIII & vWF). 100mg IVP x1 prolonged effect on bleeding time (10-15 days)

Recombinant factor VIIa: Must haveT > 35°C, pH>7.2, fibrinogen>80-100mg/dL & platelets>75-100k + persistent coagulopathy despite having received 1st round of blood products per Massive Transfusion Protocol. Dose: 4.8mg IV bolus. May repeat q2h as needed to control hemorrhage (most patients respond to 1-2 doses).

[note: average cost (to HMC) per dose ~ $4300]

Bowel programs for regularity/to avoid ileus

Docusate 250mg po/pft bid
Senna 1-2 tablets po qday-bid -OR- 5-10mL pft qday-bid
Psyllium 1 packet po/pft bid
Milk of magnesium 30mL (or 10mL of concentrate) po/pft qday-qid
Bisacodyl 10mg PO/PR qday-bid

More aggressive alternatives available - please ask pharmacist for consultation.
Pre-operative bowel preparation regimens
- Go-Lytely (polyethylene glycol) 4L to be consumed 12 hours prior to operation.
- Fleet Phosphasoda 1-2 bottles

Stress ulcer prophylaxis
Sucralfate 1gm PFT/NG q6h
Ranitidine 150mg PFT/NG q12h -OR- 50mg IV q8h (q24h for renal failure)
Protonix 40mg po/IV qday

Enhancement of GI motility
Metoclopramide 10mg IV/PO/PFT q6h
Erythromycin 250mg PFT/IV q6h

Management of severe, refractory constipation/ileus
1. Naloxone 4mg po/pft q6h x24-48h
2. Neostigmine 2mg IVP x1 (MR x1 if ineffective)
   **patient must have telemetry monitoring due to risk of bradycardia/nodal blockade

Protection from radiocontrast-induced nephropathy
Hydration: D5W (or sterile water) w/150mEq NaHCO3 @ 3mL/kg/hr x1h before, 1mL/kg/hr x6h post contrast
+/- Acetylcysteine (Mucomyst) 600mg PO/PFT bid x2doses before & 2doses after CT

Steroid equivalents

<table>
<thead>
<tr>
<th>Drug</th>
<th>Equivalent dose</th>
<th>GC (potency)</th>
<th>MC (Na+ retaining)</th>
<th>t1/2 plasma biological (min)</th>
<th>(hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone</td>
<td>0.75mg</td>
<td>20-30</td>
<td>0</td>
<td>110-210</td>
<td>36-54</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>4mg</td>
<td>5</td>
<td>1+</td>
<td>78-188</td>
<td>12-36</td>
</tr>
<tr>
<td>Prednisone</td>
<td>5mg</td>
<td>4</td>
<td>1+</td>
<td>60</td>
<td>12-36</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>20mg</td>
<td>1</td>
<td>2+</td>
<td>80-118</td>
<td>8-12</td>
</tr>
<tr>
<td>Cortisone</td>
<td>25mg</td>
<td>0.8</td>
<td>2+</td>
<td>30</td>
<td>8-12</td>
</tr>
<tr>
<td>Fludrocortisone</td>
<td>N/A</td>
<td>0</td>
<td>4+</td>
<td>210</td>
<td>18-36</td>
</tr>
</tbody>
</table>

Methylprednisolone for spinal cord injury/traumatic optic neuritis
SCI: If within 3 hours of injury - 30mg/kg IVPB bolus x1, followed by 5.4mg/kg/hr infusion x23 hours
TON: 30mg/kg IVPB bolus x1, followed by 5.4mg/kg/hr infusion for up to 72 hours

Steroid administration for septic shock/relative adrenal insufficiency
Cortisol stimulation test:
1. check baseline cortisol level
2. Cosyntropin 250mcg IVP x1 over 2min
3. repeat cortisol level @ 30min & 60min after Cosyntropin given
4. Interpretation: adequate response = change of >9 points
Treatment: Hydrocortisone 50mg IV q6h [+ Fludrocortisone 50mcg pft/po daily per study criteria]

Management of ICU-related anemia
Epoetin alfa 40,000 units subQ qweek [Darbepoetin 100mcg subQ qweek]
Ferrous sulfate 300mg PFT/324mg PO TID (if tolerated)  
(note: may bypass iron supplement initially if patient has received a recent PRBC load)

Agitation/Storming management in head-injured patients
Lorazepam or Midazolam 0.5-4mg IV q4h prn
Propofol 5-80mcg/kg/min
Haloperidol 5-10mg IV q30min until sedated, then 5-15mg IV q1h prn agitation
Propranolol 10mg PO/FT tid-qid – titrate up to 520mg/day for effect & as tolerated

Perioperative pain management

*IM administration will provide a longer time to onset of action as well as peak effect.  #No Data

Ordering and interpreting drug levels
Vancomycin:
- Levels not indicated if patient is of normal weight and renal function
- Consider TROUGH level if patient >65years, SCr>1.2, obesity or TBW<50kg, or failure to clinically improve on current regimen after 48-72 hours
- ORDER Vancomycin trough to be drawn before the 4th scheduled dose
- Therapeutic trough = 5-10mcg/mL  Bacteremia, UTI, Intraabdominal infection; 10-15mcg/mL Osteomyelitis, CNS infections, endocarditis [above ranges are rough guidelines – please consult RPh with questions or for clarification/special populations]

Gentamicin/Tobramycin:
1) traditional dosing: check PEAK & TROUGH levels around the 4th scheduled dose. Trough should always be <2mcg/mL.  Peak = 3-4mcg/mL.  Gram + synergy,
   - UTI 5-7 mcg/mL
   - Intraabdominal infections 8-10 mcg/mL
   - Pneumonia 8-12mcg/mL
   - CSF infection

2) extended interval dosing: this is controversial, particularly in the trauma population. May check Peak & Trough around the 2nd scheduled dose
   - True troughs (i.e. at 23 hours) should be undetectable  - Peak levels should be >13-14 and <20
   - Consider checking RANDOM level 18 hours after the dose to approx a detectable trough level

Amikacin:
1) traditional dosing: check PEAK & TROUGH levels around the 4th scheduled dose
   - Trough should always be <8mcg/mL       - Peak levels range from 15-30mcg/mL
2) extended interval dosing: (see above remarks)
   - True troughs (i.e. at 23 hours) should be <5mcg/mL- Peak levels should be 30-40mcg/mL

Phenytoin (considerations for short-term use in trauma/seizure prophylaxis):
   Generally, total phenytoin levels are obtained daily with AM labs
   Target total phenytoin level = 10-20mcg/mL
   Target FREE phenytoin level = 1-2mcg/mL

Vaccines for splenectomized patients
Please order to be administered on day of day prior to discharge (optimal time = 14days post-op):
Meningococcal vac 0.5mL SQ x1,  Pneumococcal vac 0.5mL IM x1,  Haemophilus B vac 0.5mL IM x1
Antioxidant vitamin protocol

All surgical, trauma & burn patients ( >16 yoa) admitted to the ICU will receive:
Vitamin C 1 gram IVPB tid x2days, then pt/d PO tid x5days
Vitamin E 1500 IU pt bid x7days
Selenium 400 mcg IVPB daily x2days, then pt/d daily x5days

Please discontinue high-dose antioxidants on transfer to general surgical floor.

Formulary options for electrolyte replacement

Intravenous: Potassium Chloride
- Potassium Phosphate (40mEq = 33mmol PO4)
- Sodium Phosphate (40mEq = 30mmol PO4)
- Calcium Gluconate (4.5mEq = 1amp = 1gram)
- Magnesium Sulfate (8mEq = 1amp = 1gram)
- Sodium Acetate (as additive to TPN only)
- Sodium Bicarbonate (as additive to large volume IVF only)

Oral: Potassium Chloride 10mEq increments (tablets/liquid/powder)
- Potassium Phosphate (NeutralPhosK) powder packets (14mEq/packet)
- Sodium/Potassium Phosphate (NeutralPhos 7mEq/packet)
- Sodium Phosphate (Kphos Neutral) 250mg tablets
- Sodium Bicarbonate 650mg tablets
- Calcium Carbonate 500mg tablets & 1.25gm/5mL oral suspension
- Calcium Acetate 667mg tablets
- Magnesium Oxide 400mg tablets

Electrolytes
- CaCl: 20mg/kg slow IV/IO push
- Mag Sulfate: 0.2-0.4mEq/kg IVPB over 10-20 minutes (max = 2gm)
- NaHCO3: 1mEq/kg IVP

Formulary options for common vitamin & element supplementation

Ascorbic Acid (Vitamin C): 250mg & 500mg oral & chewable tablets
- 500mg/5mL syrup, 500mg injection
- 400 IU tablet

Cholecalciferol (Vitamin D): 400 IU tablet

Retinol (Vitamin A): 25,000 unit capsule & oral solution

Opioid Equivalence Onset Peak Effect Dosing Note Interval

- Codeine: IV*: 130mg 10-30min 30-60min q4-6hr
- PO: 200mg 30-45min 60-120min q4-6hr

- Fentanyl: IV*: 0.1mg <5min ND# q1-2hr SR product: Duragesic TD q72hr
- PO: 0.2mg 5-15min 20-30min procedural duration of oral pain =1-2hr

- Hydromorphone: IV*: 1.5mg 10-15min 15-60min q2-4hr
- PO: 7.5mg 15-30min 45-90min q4hr

- Meperidine: IV*: 75mg 5-15min 30min q2-4hr do NOT use if
- PO: 300mg 10-45min 30-60min q2-4hr CrCl<30mL/min

- Methadone: IV*: 10mg 10-20min 15-60min q3-4hr effects of dose chang
- PO: 15mg 30-60min 2-4hr q4-8hr may not be seen for 48hours

- Morphine: IV*: 10mg 5-10min 20-60min q3-4hr SR product: MS
- PO: 30mg 15-60min 60-120min q3-6hr Contin q8-12hr

- Oxycodone: PO: 30mg 15-30min 45-60min q3-6hr

Tocopherol (Vitamin E): 400 IU & 1000 IU capsule
- 50 IU/mL oral solution

Ferrous Sulfate: 324mg EC tablet & 300mg/5mL oral solution

Ferrous Gluconate: 300mg tablet

Zinc Sulfate: 220mg capsule

PEDIATRIC DOSING/EMERGENT SITUATIONS

Atropine: IV/IO/ET: 0.02mg/kg/dose (max=0.5mg) mxr5min to 1mg total

Adenosine: IV: 0.1mg/kg rapid IVP (max=6mg) may repeat w/0.2mg/kg IVP

Epinephrine: IV/IO: 0.01mg/kg (may up to 0.1-0.2mg/kg)
- ET: 0.1mg/kg

Flumazenil: IV: 0.01mg/kg/dose (max = 0.2mg) q1min up to 5 doses
Glucose: IV/IO: 0.5 to 1 g/kg (max conc = 25%)
Lidocaine: IV/IO: 1mg/kg rapid IV/IO push followed by gtt
Naloxone: IV/IO: birth to 5 years (up to 20kg): 0.1mg/kg
>5 years (>20kg): 2mg
•dose to be administered in 0.01mg/kg increments up to maximum dose listed above

Analgesics/Sedatives
- Fentanyl: 1-3 mcg/kg/dose IVP q30-60 minutes
- Morphine: 0.05-0.1mg/kg/dose IVP q2-4 hours
- Oxycodone: 0.1-0.2mg/kg/dose PO q4 hours
- Acetaminophen: 10-15mg/kg/dose PO q4-6 hours
- Lorazepam: 0.05mg/kg/dose PO/IVP q4-8 hours
- Midazolam: (>6 months) = 0.02-0.05mg/kg/dose IVP (max = 5mg)
  (>6 months) = 0.2-0.5mg/kg/dose PO (max = 15mg)
- Diazepam: 0.1-0.3mg/kg/dose IVP

<table>
<thead>
<tr>
<th>Opioid</th>
<th>Equivalent Dose</th>
<th>Onset</th>
<th>Peak Effect</th>
<th>Dosing Note</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>PO: 15mg</td>
<td>5-10min</td>
<td>30min</td>
<td>q2-4hr</td>
<td>CrCl&lt;30mL/min do NOT use if CI&lt;0.51L/min</td>
</tr>
<tr>
<td>Morphine</td>
<td>IV: 10mg</td>
<td>2-4hr</td>
<td>60-120min</td>
<td>q4-8hr Continuously q1-2hr</td>
<td></td>
</tr>
<tr>
<td>Codeine</td>
<td>IV*: 130mg</td>
<td>10-30min</td>
<td>30-60min</td>
<td>q4-6hr</td>
<td>SQ Product: Duragesic TD q72h</td>
</tr>
<tr>
<td>Codeine</td>
<td>PO: 200mg</td>
<td>15-30min</td>
<td>90-120min</td>
<td>q4-6hr</td>
<td>q1-2hr procedural duration of oral pain = 1-2hr</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>IV*: 50mg</td>
<td>5-15min</td>
<td>30min</td>
<td>q2-4hr</td>
<td>Continuously q1-2hr</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>PO: 150mg</td>
<td>10-30min</td>
<td>45-90min</td>
<td>q4hr</td>
<td>Continuously q1-2hr</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>IV*: 1.5mg</td>
<td>5-15min</td>
<td>20-30min</td>
<td>q2-4hr</td>
<td>ND#</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>PO: 7.5mg</td>
<td>10-15min</td>
<td>45-90min</td>
<td>q4hr</td>
<td></td>
</tr>
<tr>
<td>Meperidine</td>
<td>IV: 75mg</td>
<td>5-15min</td>
<td>30min</td>
<td>q2-4hr</td>
<td></td>
</tr>
<tr>
<td>Meperidine</td>
<td>PO: 300mg</td>
<td>15-30min</td>
<td>60-120min</td>
<td>q2-4hr</td>
<td></td>
</tr>
<tr>
<td>Methadone</td>
<td>IV*: 10mg</td>
<td>10-20min</td>
<td>15-60min</td>
<td>q3-4hr</td>
<td>effects of dose change may not be seen for 48 hours</td>
</tr>
<tr>
<td>Methadone</td>
<td>PO: 15mg</td>
<td>30-60min</td>
<td>2-4hr</td>
<td>q4-8hr</td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>PO: 30mg</td>
<td>15-60min</td>
<td>60-120min</td>
<td>q3-6hr</td>
<td>Continuously q8-12hr</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>IV: 30mg</td>
<td>15-30min</td>
<td>90-120min</td>
<td>q4-6hr</td>
<td></td>
</tr>
<tr>
<td>Fentanyl</td>
<td>IV*: 0.1mg</td>
<td>&lt;5min</td>
<td>ND#</td>
<td>q1-2hr</td>
<td>SR Product: Duragesic TD q72h</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>PO: 0.2mg</td>
<td>5-15min</td>
<td>20-30min</td>
<td>q2-4hr</td>
<td>q2-4hr</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>IV*: 1.5mg</td>
<td>5-15min</td>
<td>30-60min</td>
<td>q2-4hr</td>
<td></td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>PO: 7.5mg</td>
<td>10-15min</td>
<td>45-90min</td>
<td>q4hr</td>
<td></td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>IV*: 1.5mg</td>
<td>5-15min</td>
<td>30-60min</td>
<td>q2-4hr</td>
<td></td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>PO: 7.5mg</td>
<td>10-15min</td>
<td>45-90min</td>
<td>q4hr</td>
<td></td>
</tr>
<tr>
<td>Meperidine</td>
<td>IV: 75mg</td>
<td>5-15min</td>
<td>30min</td>
<td>q2-4hr</td>
<td></td>
</tr>
<tr>
<td>Meperidine</td>
<td>PO: 300mg</td>
<td>15-30min</td>
<td>60-120min</td>
<td>q2-4hr</td>
<td></td>
</tr>
<tr>
<td>Methadone</td>
<td>IV*: 10mg</td>
<td>10-20min</td>
<td>15-60min</td>
<td>q3-4hr</td>
<td>effects of dose change may not be seen for 48 hours</td>
</tr>
<tr>
<td>Methadone</td>
<td>PO: 15mg</td>
<td>30-60min</td>
<td>2-4hr</td>
<td>q4-8hr</td>
<td></td>
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<td>PO: 30mg</td>
<td>15-60min</td>
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<td>&lt;5min</td>
<td>ND#</td>
<td>q1-2hr</td>
<td>SR Product: Duragesic TD q72h</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>PO: 0.2mg</td>
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