DUKE RADIOLOGY ROTATION INTRODUCTIONS

The following introductions come from the chiefs of each division and are meant to serve as an introduction to their rotations and to address any preliminary questions about workflow and expectations. As of this writing, they are updated through **August 2023**, and will continue to be updated throughout the year. In addition to these documents, R1s should reference the Duke R1 Survival Guide for additional information passed down from the most recent R1s and senior residents.

Leveled Traumas & Unexpected Finding Navigator (pertinent to all sections, but particularly Body CT and Neuro CT)

Abdominal Imaging (faculty contact Ben Wildman-Tobriner MD)

- Body CT
- Ultrasound
- GI/GU
- MRI

Breast Imaging (faculty contact Sora Yoon MD)

Cardiothoracic Imaging (Chest and CVI) (faculty contact Tina Tailor MD)

Musculoskeletal Imaging (faculty contact Leah Waldman MD)

Neuroradiology (faculty contact Peter Kranz MD)

Nuclear Medicine (faculty contact Olga James MD)

Pediatric Radiology (faculty contact Michael Fadell MD)

Vascular and Interventional Radiology (faculty contact Nick Befera MD)

Veterans Affairs Hospital (faculty contact Sarah Cater MD)

- IT and Access Info
- R1
- R2
- R3
- R4

Leveled Traumas & Unexpected Findings

Leveled Traumas

- **Level 1:** You will get called from the ED Scanner (adjacent to Resus bays). Look at the images, convey findings to the provider and the need for additional imaging (e.g., delays) to the tech. Document salient discussion and who you spoke with in a sticky note / wet read.
- **Level 2 or 3:** You may or may not get a call from the scanner, but if you do the team likely will not be there. All the same, look at the images, convey the need (or not) for additional imaging to the tech, and leave a sticky note (if you spoke with a MD, document it). If you do not get a call from the scanner, look at the study as you normally would, leave a sticky note once you finish up your dictation. As with any other study, if there's an urgent finding, hop on the phone and get in touch with a provider.
- **TLDR:** All leveled traumas need sticky notes right after they are reviewed, only difference is if you are talking to the team while they are at the scanner and including their name in the sticky note. If you talk to anyone on the phone - for leveled traumas or any other study - leave a sticky note.

Unexpected Finding Navigator:

- This Epic tool is meant to be used to notify providers to follow up on unexpected but NON-URGENT findings in outpatient studies. E.g., a 8 mm lung nodule seen at the lung base on a CT AP for an unrelated outpatient CT.
- It is NOT meant for conveying either urgent findings (these warrant a phone call) or for conveying incidental findings on inpatients (page / call the team)

BODY CT

Faculty contact: Ben Wildman-Tobriner MD

Resident Roles: The first year residents are primarily involved in the interpretation of CTs in the reading room. They are advised to review the current and old study as expeditiously as possible, take ten minutes to note the findings on the CT, and then inform the attending that they are ready to read. Each patient's history should be reviewed in Epic. The first year residents are encouraged to interpret at least ten examinations per day. We ask the first year residents not to check CT scans for adequacy or protocol studies during the first two weeks of the rotation although they are encouraged to accompany the second and third year residents or fellow if time permits. The role of the second and third year residents are the same in that they are involved in interpretations of CT scans, checking of scans at the monitor, and interventional procedures. They will also be asked to work the late shift approximately once per week and participate on the interventional service.

Start Time / End Time:

- All of the residents are encouraged to go to morning conference. Therefore, the start time in CT is 8:30am or immediately after conference. If the conference is canceled for any reason, the residents are expected to start in the reading room at 7:30 am. The late shift starts at 3:00pm.
- The "day CT" residents can leave when all examinations performed prior to 4:30 pm have been interpreted. It is imperative that, if necessary, you return to the reading room after 4:30 pm conference to finish up any remaining cases. The "late CT" resident finishes at 10:00 pm. The duties of the late CT resident are outlined in a separate document, but include protocoling studies upon arrival at 2:00 pm; reading, providing a preliminary interpretation, and dictating all studies performed prior to 10:00 pm; and being available for contrast reactions or extravasations from the CT scanners at Duke North and the E.R.

Conferences:

- **Morning General Radiology Conference** (Mon, Tues, Wed, Thurs, Fri; 7:30-8:30 am, Room 1515): Every effort should be made for the residents to attend morning conference. If conference is not held for whatever reason you are expected to join the service at 7:30 am. You should also plan to attend resident hot seat conference (Mon and Fri 12:00-1:00, Room 1515) as clinical duties allow.
- **Abdominal Imaging Teaching Conference** (Tues, Wed, Thurs; 12:00-1:00 pm, Room 1512): Every effort should be made by the attending and fellow to facilitate your attendance at this noon teaching conference. This is a multimodality organ-oriented conference which we hope you will find informative. If this conference is canceled or rescheduled for any reason, it is the responsibility of the resident to return to the reading room for clinical duty.
- **Interesting Case Conferenc**e (Mon, Tues, Wed, Thurs; 4:30-5:00 pm): This conference is to show interesting and challenging cases encountered during the workday. The fellows will go

through the interesting cases added to the "Body conference 2016/2017" folder throughout the week and present these at conference. This is a great learning opportunity for residents and you should plan on attending as clinical duties allow. On Mondays and Thursdays, the conference is dedicated to CT, on Tuesday, the conference is dedicated to Ultrasound, and on Wednesday, the conference is dedicated to MR. Remember that you may be required to return to the reading room after conference to help the attending finish up the days work.

CT Protocols: Bulk protocoling is the duty of the late resident/fellow After arriving at work at 2:00pm, find a computer with Epic access and ensure the protocols are complete for the next 7 days. In addition, day CT residents will often be called to protocol during the day, including inpatient, ER, and same-day outpatient add-ons. Please try to be timely in completing these protocols to help ensure smooth workflow for our technologists. Each indication should be reviewed in Epic, including any prior imaging; if there is any confusion as to the order/indication please call the ordering team to clarify. There are a number of special protocols which can be found online at Duke Rad (http://www.dukerad.radsq.com/index.php?title=Body_CT_protocols)

IV Contrast Administration: Ultimately, IV contrast material administration is the responsibility of the radiologist. Even though our nurses usually take care of starting and maintaining the IVs for CT, if there are questions about IV contrast administration, you may be asked for assistance in making these decisions and/or contacting the ordering physician. If you are changing a study from contrast-enhanced to noncontrast, in general, this should be communicated with the ordering physician.

Adding on a Pelvis to an Abdominal CT: Although in many patients an abdomen and pelvis is ordered together, there are times when an abdomen only is ordered by the referring physician. Please be aware that if an abdomen is ordered and you feel that a CT of the abdomen and pelvis is indicated, then you need to call the referring physician and request that he/she place an order for the pelvis.

M.D. Checks: The technologists are allowed to check and release patients undergoing a CT. If technologists have questions on patients they may, on occasion, ask you to check the scan. Ideally, the first year resident will not check scans until after at least two weeks on the service. Checking them prematurely considerably slows down patient through-put, thus it is mainly the responsibility of the upper level residents (second and third year) and fellows to check the scans.

Leveled Traumas & Unexpected Findings Navigator: There are particular protocols for how to deal with leveled traumas (documentation, discussion etc) and particular uses for the Unexpected Findings Navigator, both of which are described at greater length in their own section, linked here.

Interventional Procedures: All interventional procedures will be performed by either a second or third year resident or fellow in conjunction with the faculty assigned to that service. All procedures are to be

supervised directly by an attending. This includes all percutaneous biopsies and aspirations using either CT or ultrasound guidance.

At the beginning of each day, the scheduled cases for the day should be reviewed with the appropriate attending. The resident assigned to the interventional service on that day is responsible for obtaining the appropriate pre-procedure lab values (PT/INR, platelets), instructing the nurse and/or technologist as to the appropriate approach, consenting the patient, and then doing the procedure with the faculty. Note that when consenting the patient it is important to have not only the informed consent for the procedure signed but also consent for conscious sedation. Thyroid biopsies, thrombin injections, and some superficial biopsies/drains are performed without conscious sedation. For all other procedures the patient needs to be NPO to receive sedation and needs to have a pre-sedation H&P in Epic. Additional details for the interventional resident/fellow are outlined in a separate PowerPoint.

After the procedure, the resident is responsible for skin care, disposing of sharp objects from the tray, and doing the appropriate paperwork including post-procedural orders in Epic and a post-procedural note. An official dictation is also required, with templates found in Powerscribe.

Evening Responsibilities for Late Body CT Shifts: In an effort to prepare each of the residents to take independent call and to enhance the educational experience on the body CT rotation, the following shifts have been created for the residents.

- Shadow Shift (R1) – 5pm to 8pm (2x per rotation)
- Buddy Shift (R2) – 5pm to 8pm (2x per rotation)
- Late CT shifts (R2, R3, R4) – 2pm to 10pm (2-4x per rotation)

Based on conversations with Residency Program Leadership, our desired workflow is that a R1 takes two shadow shifts before successful completion of their R1 Body CT rotation. A R2 should complete two buddy shifts before taking their first late body CT shift in their R2 body CT rotation. Finally, at least two late body CT shifts are required in the R2 rotation before a resident can start taking independent night call.Further description of the shifts is as follows:

Shadow Shift (R1) – 5pm to 8pm (2x per rotation): This shift is intended for the R1 to become familiar with the workflow on the late body CT service. The R1 will be paired with a senior resident or a fellow and will observe and assist that resident/fellow from 5-8pm. The assistance can be in the form of answering the phone, assisting with protocols, calling clinical services, but the focus is on spending some time with the resident/fellow to see how the shift runs. R1s are not expected to dictate cases independently during these shifts. These shifts are assigned at the start of the rotation by Dr. Wildman-Tobriner based on many factors including clinical coverage. Should there be a need to change the shift, Dr. Wildman-Tobriner must be contacted to approve that change.

Buddy Shift (R2) – 5pm to 8pm (2x per rotation): This shift is intended for the R2 to become more familiar with the workflow on the late body CT service in preparation for the late body CT shifts that they will take later during their rotation. The R2 will be paired with a senior resident or a fellow and will assist that resident/fellow from 5-8pm. The assistance can be in the form of answering the phone, assisting with protocols, calling clinical services, but the primary focus of the R2 is on dictating cases independently during these shifts until 8pm. The R2 should feel free to ask the assigned resident/fellow any questions, but the goal of the shift is to closely mimic a late body CT shift, albeit with the limited 3-hour length. The cases interpreted by the R2 on the buddy shift are to be read out with the CT2/CT4 attending on the next clinical day.

These shifts are assigned at the start of the rotation by Dr. Gupta based on many factors including clinical coverage and the service that the buddy shift R2 is on the following day. As such, should there be a need to change the shift, Dr. Gupta must be contacted to approve that change.

Late CT shifts (R2, R3, R4) – 2pm to 10pm (2-4x per rotation): The late CT shift is a responsibility shared by the residents and Abdominal Imaging fellows. This shift runs from 2pm-10pm and the typical workflow is as below:

- 2pm-~2:30pm – Work on abdominal CT protocol list in Epic within 7 days
- ~2:30pm - 10pm: Read studies. If the late CT resident has a batch of cases completed by 4:00 they can read out with an attending prior to 4:30 p.m. conference. We have found that especially for those R2s who are just starting their late CT shifts, these few cases can allow for a “warm-up” or “transition” into their late body CT shift.) The late CT person also covers US and GI-related phone calls and puts wet reads on US between 4/4:30-5 PM.
- 10pm – please sign out to the resident on call before leaving the Hospital. This includes letting them know the last case you have looked at and the first case that they should start with.
- 10pm-11pm – Dictation clean up and catch up from shift

Additional points for late shifts:
You should prioritize the CT worklist in the following way: Trauma > Emergency Department cases> Inpatients > Outpatients with more acute indications (abdominal pain, etc.) > Outpatient Oncology follow-ups > Outside interpretations. At the end of the shift, you should have reviewed, provided preliminary interpretations (“wet reads” with appropriate communication to ordering physicians) and pre-dictated these studies in preparation for your readout with the CT1 attending the next day.

You are responsible for all body CT exams that hit the list before 10pm, though you can coordinate with the NiteLite and Night Sr to handoff slightly sooner. We know that volume can be high during this shift and our goal is not to have you dictate until midnight. To that end, your goal should be to leave the hospital by 11:00pm. Therefore, after you have reviewed all cases that have dropped by 10:00 pm, 1 additional hour is appropriate to stay & finish your work if necessary.

The priority is to dictate all cases from ER/Trauma, inpatient cases, and outpatient cases with more emergent indications (i.e. abdominal pain, rule out appendicitis/diverticulitis, etc.). If that takes longer than 1 hour, you may then "sticky note" any remaining outpatient oncology CTs (instead of rendering full dictations), ensuring that emergent findings have been conveyed to the referring clinician. These will be dictated by your colleagues the following morning. In order to prevent any confusion, please put your name on all studies that you have dictated but leave your name off any studies that you have sticky-noted but not dictated. This will allow the day CT residents/fellows know what to dictate in the AM. This is not expected to be routine, but rather is to be used on nights of heavy volume and is intended to help you leave by midnight.

Your goal should always be to dictate all studies. However, we understand that some nights you will not be able to do that and still leave by approximately 11:00pm, so this is meant to be used as a "pop-off valve." We want to facilitate a balance between completing work from this shift and allowing you enough rest before returning for your readout in the following morning. If you have questions on this, please feel free to reach out to Ben Wildman-Tobriner, MD or Rajan Gupta, MD.

Outside interpretations are a part of our practice now and most of these are non-emergent and can be interpreted during the day CT shift by staff/residents/fellows. On occasion, a clinical service may call and ask for your assistance with such a study. Please assist them by looking at the study and placing a preliminary interpretation ("wet read") in PACS if the study is verified and not a "reference only" scan. Again, usually, no dictation is needed on these cases during the late body CT shift.

If you have any questions at all, please contact Dr. Wildman-Tobriner or Dr. Gupta.

ULTRASOUND

Faculty contact: Ben Wildman-Tobriner

START TIME: All residents are encouraged to go to morning conference, and the start time is 8:30 a.m. or immediately after conference. If the conference is canceled for any reason, residents are expected to start in the reading room at 7:30 a.m.

END TIME: On Monday through Thursday, there is a daily conference at 4:30 p.m., and the goal is to wrap up the work before that time. Rarely, it may be necessary to return to the reading room to finish the day after conference. For NONURGENT cases that come in between 4:15 p.m and 4:30 p.m. or as decided with the attending, it is acceptable to review for any acute findings and wet read, and to dictate and final read the next morning. Please ask for help from more senior members of the team as needed for wet reads.

RESIDENT RESPONSIBILITIES: The typical team is an R1, and R2, a fellow, and the attending. The workflow is different than on other rotations, in that most of the studies are reviewed by a radiologist with the sonographer before they are completed by the sonographer and ready to be dictated. Studies come from three places:

1. In the morning, there are studies on the list from the night before which have been previously wet read by the on-call resident. These can be taken by any team member to be dictated.
2. Throughout the day, the sonographers will call with a new study to be reviewed by one of the radiologists for completeness, technical adequacy, and images that adequately show what the sonographer saw during the examination. See below for additional details on reviewing the studies. If you review a case with the sonographer, it is yours for the dictation and readout.
3. The experienced sonographers will send a select group of study types (e.g., DVT, aortic aneurysm screening, and carotid arteries) when NEGATIVE to the worklist directly without a scan check; these should have a description of the findings in the STUDY NOTES section. These can be acquired and dictated by anyone on the team (and show on the worklist as red icons when available to be dictated).

CHECKING THE STUDY WITH THE SONOGRAPHER: Review the images with the sonographer (on the phone or in person), asking questions to make sure you understand the findings that the sonographer is reporting to you. During the review, it may be necessary to also briefly review the chart of the patient to understand why the study was ordered and the main question to be answered, as well as other radiographic findings from prior studies. TAKE QUICK NOTES WITH THE PERTINENT FINDINGS AS YOU GO so that later when dictating you don't forget what they reported (you can consider using pen and paper, notepad on the computer, or the sticky note function in Epic for this), and ask questions for any clarification of the findings. You can request more images if necessary (see below), and the sonographer will contact you (on the phone or in person) with the additional images for review when they are finished (see examples of studies/scenarios that often result in additional imaging). If you are

unsure about whether additional images are necessary, check with someone more senior (the fellow or attending). Special care should be taken for exams to rule out ectopic pregnancy, suspected ovarian/testicular torsion, and renal/liver/pancreas transplants with greater consideration to consult the fellow or attending before releasing the patient as these may impact surgical management.

COMMON REASONS FOR ADDITIONAL IMAGING:

- Adnexa in evaluations for ectopic pregnancy – if there are findings adjacent to, or in the periphery of, the ovary which could represent an ectopic pregnancy, the sonographer should provide cine loops including ones while trying to separate the structure from the ovary using transducer pressure.
- If there is new hydronephrosis, consider scanning the bladder to see if distended, and have patient void and repeat imaging of the kidney.
- Cine images for things in which the anatomy or relationship of structures is unclear, ideally in two different planes. One example is distinguishing parapelvic cysts from hydronephrosis.
- Missing structures (not due to technical limitations). Have a checklist in your mind for what is needed for each type of study and try to make sure you have everything you need. Ask someone more senior on the team if you aren't sure. Of note, there is a binder in the sonographer work area that contains the up-to-date protocols for each type of study.
- Have structures evaluated in a different plane or patient position to improve visualization (lateral decubitus and breath hold for right liver, porta hepatis and gallbladder). Breathholding and decubitus positioning may also be helpful to optimize renal imaging.

OTHER NONIMAGE INFORMATION TO CHECK WITH THE SONOGRAPHER:

- For palpable lesions and subcutaneous masses or collections, find out if this area is tender, if there are findings of cellulitis, etc. Having contralateral imaging as a comparison can be very helpful.
- For complex vascular anatomy (e.g., dialysis fistula with complications) sometimes it is helpful if the sonographer draws a diagram of the relevant anatomy
- ALWAYS ASK ABOUT THE SONOGRAPHIC MURPHY'S SIGN ON A GALLBLADDER CASE. Nuance includes whether the assessment may be limited (patient has had pain medication or is sedated/intubated).
- Focal tenderness on endovaginal imaging of the pelvis
- Date of last menstrual period for pelvic/early obstetric ultrasound. This will help you evaluate the whether the appearance of the endometrium is appropriate and aid in evaluation of early pregnancy. This is often listed on the first page of the images (cover sheet) or otherwise annotated on the images. Similarly for early pregnancy, the bHCG level will also be a critical piece of data to be considered as the ultrasound is evaluated.

SONOGRAPHER INTERACTIONS: We are heavily dependent on our excellent sonographers for providing good diagnostic images. We have recently lost many experienced sonographers and the current

sonographers are stretched thin and many new sonographers will be straight out of training. Be cognizant that we are all on the same team, and be respectful as we incorporate new, less experienced sonographers into the practice. Particularly, be tactful when asking for additional images, and provide appreciation and feedback for great work. Try to resolve any issues with the sonographers directly. When there is a systems issue, the sonographer leaders are Laura Street and Mary Deerr.

Occasionally, if there is a critical part of an examination that is not well evaluated, it may be necessary to scan with the sonographer if the patient is scanned in north. Another option may be to send a second sonographer to attempt the evaluation, but this should be reserved for critical findings in special circumstances after consulting with the attending. An example would be nonvisualization of the ovaries on pelvic ultrasound when evaluating for ovarian torsion.

PHONE NUMBERS: The sites of the exams and phone numbers include

Duke North	684-7431
Southpoint	572-2076
Cancer Center	613-2088
Duke South	684-7730
DMP	385-1352
Arringdon	385-8708
North reading room	684-7381
D1 intervention	684-7437

CONFERENCES: Attend body conferences, aka Tuesday-Thursday resident conference at noon and Monday-Thursday roll-out conference at 4:30 p.m. (Tuesdays are ultrasound rollout). Keep in mind that someone should be in the reading room available for scan checks at all times; note that the fellows may be out of the room for biopsies or for lunch before or after the noon hour.

SATURDAY SERVICE DAY: Arrive by 7:30 a.m. on Saturday to receive new studies and dictate the overnight cases. You are responsible for anything that comes in before 12. You'll be read out by the body attending who's also reading CT, GI, MR, and doing procedures. Expected to finish around noon.

RESOURCES:

- First year residents should read a general ultrasound book; the one recommended is the Ultrasound Requisites book which was co-edited by Dr. Hertzberg. You can access a full electronic copy on the Expert Consult website with the resident library login (ask an upper year) and one benefit of the digital version is that it includes cines on some of the cases.
- Radiographics and other review articles on ultrasound topics are a good source of information, particularly for the second year residents. There is a collection of journal articles curated for the rotation by Tracy Jaffe and Chad Miller which can be found on the J shared drive (pacsexport) in the folder US articles.

GI / GU

Faculty contact: Ben Wildman-Tobriner

General Information

Section Supervisor – Anthony Twisdale RT(R) – Office 919-684-7278, SPOK 970-3609
Section Coordinator – Shemeaner (Meme) Whitley – Desk 919-684-7257
Radiology Nursing – CT area 684-7328

Checking the Schedule & Adding cases

- At the start of the day, the 3rd year or covering resident – pick up the daily outpatient procedure schedule from the Coordinator's desk (usually Meme). Check in with Meme to verify the schedule is complete, and no add on outpatient orders have posted since printing. Meme will notify residents of any emergent or high priority inpatient imaging requests.
- GI Outpatient exams are typically scheduled between 8:30 AM and 10:30 AM. Procedures may run long or become delayed given day to day events. (Note): During week 1 it is recommended the 1st year resident work closely with the 3rd year resident during procedures.
- Report any add on requests that may bypass the coordinator's desk to the Section Coordinator, and work with the coordinator to triage emergent exams for same day performance. Verify orders have been placed for add on procedures prior to ending discussions with providers.
- Please notify the section coordinator when leaving the area for lunch breaks or conference.
- Notify the Section Supervisor immediately if you experience any issues with technical staff, patients, or require assistance of any kind. Also see the Section Supervisor for any special PPE requests / requirements.

Doing Cases

- Technologists should have patients dressed out and prepared for imaging prior to requesting the resident's presence for examination performance.
- You may be asked to verify the type and volume of contrast to be used for each study.
- Utilize the GI technologist staff's years of experience for successful fluoroscopic studies.
- Residents are required to select their own images from each study in ViewForum for review.
- Call your supervising attending for exam review prior to discharging patients from the area.

A Note about Feeding Tubes (Dobhoffs): XR-Long GI Tube Placement requests / orders, are becoming increasingly prevalent in GI Radiology. Our section recently worked to modify OP scheduling practices to accommodate as many of these procedures as possible. On Mondays and Fridays, we are prepared to accommodate 5 tube placement request each day. On Tuesdays, Wednesdays, and Thursdays, we are prepared to accommodate 3 tube placements requests per day. Please notify our Section Coordinator of any add on feeding tube requests as they are ordered, and assess the patient as a potential candidate for tube bridling.

BODY MRI

Faculty contact Rajan Gupta MD

Resident Roles: The third year residents are primarily involved in the interpretation of MRIs in the reading room. They are advised to review the current and old study as expeditiously as possible, take ten minutes to note the findings on the MRI, and then inform the attending that they are ready to read. Each patient's history should be reviewed in Epic. Residents are encouraged to interpret at least 15 examinations per day. We ask the residents not to check MRI scans for adequacy (for example rectal cancer slice plane or endorectal coil placement) or protocol studies during the first two weeks of the rotation although they are encouraged to accompany fellows if time permits.

Start Time / End Time: All of the residents are encouraged to go to morning conference. Therefore, the start time in MRI is 8:30am or immediately after conference. If the conference is canceled for any reason, the residents are expected to start in the reading room at 7:30 am. The MRI resident can leave when all examinations performed prior to 4:30 pm have been interpreted. It is imperative that, if necessary, you return to the reading room after 4:30 pm conference to finish up any remaining cases.

MRI Protocols: Bulk protocoling is the duty of the MRI fellow, though the MRI resident should participate in protocoling with the resident's supervision. Please try to be timely in completing these protocols to help ensure smooth workflow for our technologists. Each indication should be reviewed in Epic, including any prior imaging; if there is any confusion as to the order/indication please call the ordering team to clarify.

Adding on a Pelvis to an Abdominal MRI: Although in many patients an abdomen and pelvis are ordered together, there are times when an abdomen only is ordered by the referring physician, and the desired protocol also requires a pelvis order (for example inflammatory bowel disease). Please be aware that if an abdomen is ordered and you feel an MRI pelvis is indicated, then you need to call the referring physician and request that he/she place an order for the pelvis.

Combined Abdomen/Pelvis MRIs: In Body MRI, there are some combined abdomen/pelvis protocols that are distinctly different from individual abdomen protocols + pelvis protocols. These are tailored to acquire appropriate images for a clinical indication while keeping scan time at a reasonable duration for a single session (examples include the oncology A/P and the inflammatory bowel disease protocols). When both the abdomen and pelvis are to be imaged, where possible choose one of the combined abdomen/pelvis protocols rather than a separate abdomen protocol and a pelvis protocol. For example, in a patient with rectal cancer not undergoing primary staging of local disease, an oncology A/P MRI should be protocoled rather than a Liver + Rectal Cancer Pelvis.

IV Contrast Administration: Ultimately, IV contrast material administration is the responsibility of the radiologist. Even though our nurses usually take care of starting and maintaining the IVs for MRI, if

there are questions about IV contrast administration, you may be asked for assistance in making these decisions and/or contacting the ordering physician. If you are changing a study from contrast-enhanced to noncontrast, in general, this should be communicated with the ordering physician. You should make sure to familiarize yourself with the latest version of the MRI contrast media guideline on the Department portal.

M.D. Checks: The technologists are allowed to check and release patients undergoing an MRI. If technologists have questions on patients they may, on occasion, ask you to check the scan. Ideally, the resident will not check scans until after at least two weeks on the service. Checking them prematurely considerably slows down patient through-put, thus it is mainly the responsibility of the fellows to check the scans.

Conferences:

- Morning General Radiology Conference (Mon, Tues, Wed, Thurs, Fri; 7:30-8:30 am, Room 1515): Every effort should be made for the residents to attend morning conference. If conference is not held for whatever reason you are expected to join the service at 7:30 am. You should also plan to attend resident hot seat conference (Mon and Fri 12:00-1:00, Room 1515) as clinical duties allow.
- Abdominal Imaging Teaching Conference (Tues, Wed, Thurs; 12:00-1:00 pm, Room 1526): Every effort should be made by the attending and fellow to facilitate your attendance at this noon teaching conference. This is a multimodality organ-oriented conference which we hope you will find informative. If this conference is canceled or rescheduled for any reason, it is the responsibility of the resident to return to the reading room for clinical duty.
- Interesting Case Conference (Mon, Tues, Wed, Thurs; 4:30-5:00 pm): This conference is to show interesting and challenging cases encountered during the workday. The fellows will go through the interesting cases added to the “Body conference 2016/2017” folder throughout the week and present these at conference. This is a great learning opportunity for residents and you should plan on attending as clinical duties allow. On Mondays and Thursdays, the conference is dedicated to CT, on Tuesday, the conference is dedicated to Ultrasound, and on Wednesday, the conference is dedicated to MRI. Remember that you may be required to return to the reading room after conference to help the attending finish up the days work.

Breast Imaging

Faculty Contact: Sora Yoon MD

Teaching resources prior to starting the rotation:

1. Please familiarize yourself with the BIRADS 5th edition Atlas which is on the google drive. Think of this as essentially a reference picture book. It gives a lot of picture examples of the specific BI-RADS terms we use. This is our equivalent to Radiopedia for the other subspecialties. If you would like a dedicated Breast textbook, “Making the Diagnosis” by Jennifer Harvey is a good resource that explains breast imaging at the resident level. A copy is included in the resident textbook google drive.

2. Please check DukeRads Breast Rotation section for additional resources prior to the rotation. You should review these materials prior to beginning your rotation.

3. Visage Teaching Files made by one of the breast attendings (Nguyen). Example cases which give a general overview of the imaging work-up for specific findings and indications that you will encounter while in the reading room or on MRI.

Specifically for the R1s:

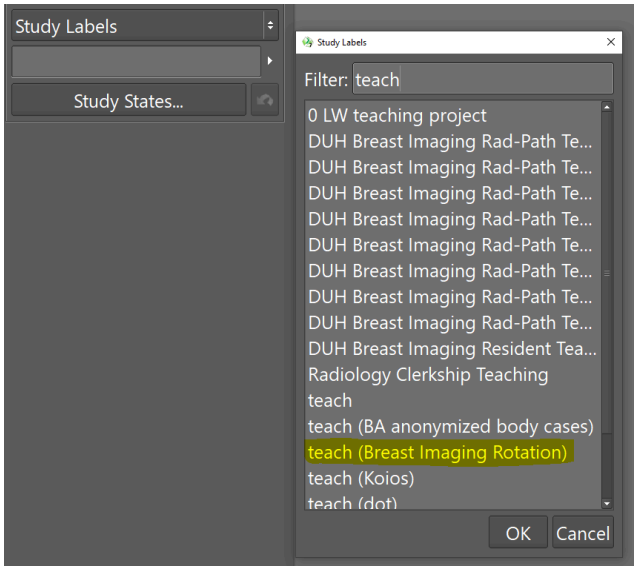
1. Visage Teaching Files (Cases 1-18)

Specifically for the for R2s and R3s:

1. Visage Teaching Files (Cases 19-30)

Instructions on how to access the teaching files are shown below:

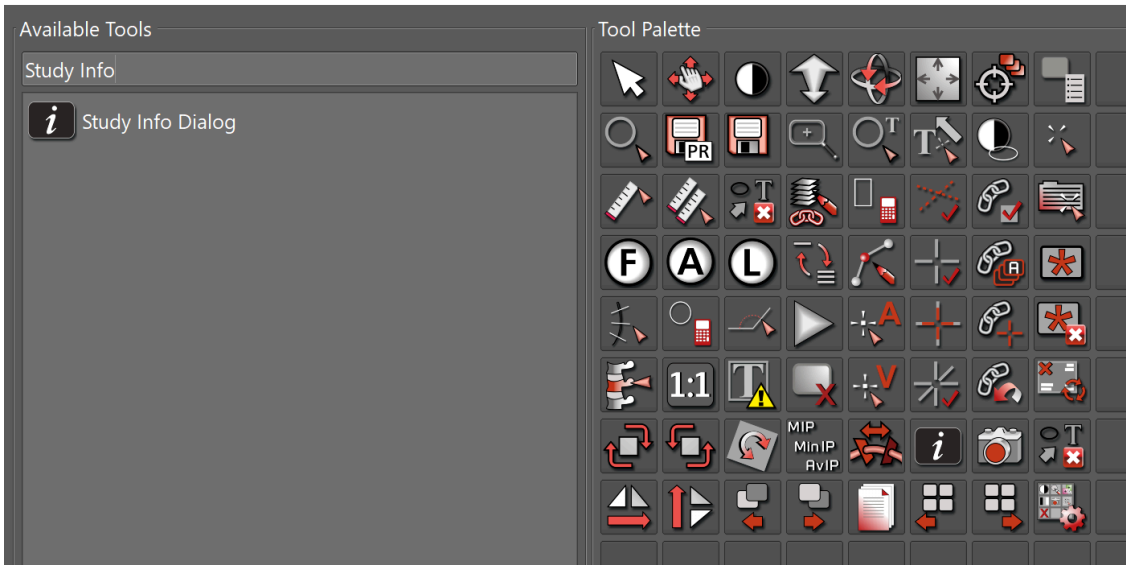
a) In Visage, select the "Study Browser" tab in the top right corner.
b) On the left side, under "Fields" select "Study Labels" if not already pre-populated.
c) Click on the forward arrow next to the text box below Study Labels.



d) Type "teach" and double click the file named "teach (Breast Imaging Rotation)"

e) Then select Query and the list of 30 cases should appear.

f) Make sure you have the “Study Info Dialog” tool so you can read the study comments for each examination within every case.



4. Search pattern videos. These videos will go over a general search pattern for two common breast imaging examinations.

Specifically for the R1s:

1. Screening mammogram search pattern tutorial video made by one of the breast attendings (Nguyen) in the Breast section on Dukerads.

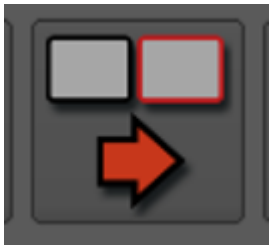
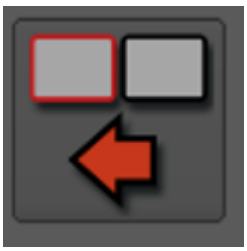
Specifically for the for R2s and R3s:

1. Breast MRI search pattern tutorial video made by one of the breast attendings (Nguyen) in the Breast section on Dukerads.

Worklists: Below are the reading worklists you will need for the rotation.

- Reading Room: DUH BI – Reading Room
- IR: DUH BI – IR
- MRI: DUH BI – MRI
- OSF: DUH BI – Outside Interps
- Screening: DUH BI – Screening

Useful Visage Tools: Below are list of useful visage hotkeys to have for the breast rotation:

- Next layout: 
- Previous layout: 
- Toggle MG/Tomo: 
- Link scrolling: 

- Circle annotation: 

Attire: Residents should appear in clean, professional attire every day they are on our service. Wearing your white coats when speaking to patients is our expectation. Our patient population is anxious and seeing a resident physician dressed professionally puts patients more at ease and increases their confidence in your abilities. On procedure days, please remember to wear close toed shoes.

Reporting Time: Residents are expected to arrive on service after morning conference or grand rounds.* If there is no morning conference you can arrive at 8:30 am. The rotation schedule is in QGENDA and should be available 2-4 weeks prior to the start of your rotation. You will be on one of four different rotations: Reading Room, MRI/OSF, Screening, IR1.

Reading Room: The day begins at 8:30 and ends at 5 pm. You should report to the diagnostic reading room following morning conference or at 8:30 if there is no conference. Diagnostic mammograms are read here. New cases are usually announced on Cisco Jabber in the breast reading room chat (Please see April Carnell, our Reading Room coordinator to set this up). When a technologist announces a new case on Jabber, you can reply with the patient's name to claim the case. You can still claim cases even if the faculty jabbers the name first. If you are not actively working on a case, please volunteer to take one. Open the case, preview it, and once you have the history and a plan for how you think the case should proceed, present it to one of the two faculty in the reading room.

First year residents should expect to have one active case at a time in the beginning of their rotation. By the end of your first year rotation, you should aim to handle at least two active cases at a time. In subsequent years, residents should aim to manage 2-3 cases at once. Do not leave for the day without checking with one of the attendings: cases may be going on that you could help with and learn from.

Procedures: The start time is 8:30. *If there are needle localizations starting at 7:30 or 8 am, fourth year residents may be permitted to come to do the early morning localizations in lieu of morning conference with permission of the attending on service. Please inform the chief residents of your absence from morning conference. If the resident is permitted to do the needle localizations, he or she must have reviewed the case and be intimately familiar with what they are localizing and have an idea of the approach, needle size, method, etc. All residents who are on interventional are expected to have reviewed all of the cases at least one day prior to reporting for duty. All residents are expected to dictate all cases in which they were involved in a timely manner.

If you are interested in working with the US breast phantom for ultrasound-guided procedures while on the rotation, email the breast attending Derek Nguyen (derek.nguyen@duke.edu) to schedule a time.

Screening: Residents who are assigned to screening are responsible for screening examinations performed from 7:00 am until 1pm on their assigned day. For each screening exam that you dictate, SAVE do not prelim the examination. The attending may also assign you outside interpretations to read in addition to your screening workload. Screening days are full days, please plan on being on site the entire day. Screening residents may be pulled to other duties on service at any time without notice, if staffing issues arise.

MRI/OSF: R2-R4 residents will be assigned to MRI and will be responsible for MRIs performed from 1:00 pm the day prior to 1:00pm the day of, in addition to outside interpretations. MRI/OSF days can be quite busy, please plan on being on service the entire day. MRI/OSF residents may be pulled at any time to other duties on service should staffing issues arise.

Review the relevant history and pre-dictate the study to review with the attending. You may be responsible for contacting the patient and referring clinician to convey results and recommendations. You may be responsible to contact April Carnell or Gloria Rand (684-7849) to schedule MRI biopsies. You may be responsible to contact Elizabeth Blalock (613-0365) to schedule second look ultrasounds.

The outside film assignments should be sent to you from Elizabeth Blalock by 9 am the morning of your rotation. Make sure that all of the images are available for review if they are not available, contact Elizabeth or April ASAP so that they may get them uploaded from the CD or from Powershare.

Conferences:

- Tuesday: Afternoon case conference; usually at 12:00 but may fluctuate depending on faculty schedule. Assigned faculty or fellows can be found on the Qgenda schedule.
- Wednesday: Multidisciplinary case conferences are every Wednesday at noon. Attendance is required for the Wednesday noon conferences and will be in the breast conference room.
- Thursday: Rad-Path case conference either 12:00 pm or 4:00 pm; time may change based on the status of the reading room.
- Fellow's conferences: Second Tuesday of every month except during Holidays at 4:00 pm. These conferences are not required, but highly recommended.
- Journal Club: Second Wednesday of every month. These conferences are not required, but highly recommended.

Cancer Center Coverage: If you are the resident assigned to "CC" this means you are on page to cover CT and MRI contrast reactions in the Cancer Center that day until 12:00 pm. After noon, nuclear medicine covers contrast reactions.

Should you have any questions please contact Sora Yoon (sora.yoon@duke.edu) or Beverly Harris (919) 684-7645.

CARDIOTHORACIC IMAGING

Faculty contact: Bryan O'Sullivan Murphy MD

Introduction

Welcome to the Cardiothoracic Imaging Division! We are proud to be a growing division that is well staffed with energetic faculty who look forward to working together on your upcoming rotation. This document provides a general overview of expectations, imaging services, and policies. We know there is a lot in here but please try to at least loosely familiarize yourself with it. Most importantly though, remember that you should never be afraid to ask questions!

Where to show up on Day One?

The chest reading room is off of the main hallway Room 1519A (near the GI hall). As you'll see, the room is subdivided and the larger room is generally where CT and CVI folks read, with CXR residents/attendings in the smaller room.

General Philosophy

The CTI rotations are high volume, and thus many cases get read by attendings independently to manage the worklist and get finished at a reasonable hour. However, this is your opportunity to see as many cases as possible and learn as much clinical cardiothoracic radiology as you can during the day. Feel free to help out on any/all worklists that have unread studies – we all love to teach, and the more cases we can read out with the residents the better. If you show up and work hard it will be a fun rotation.

> ***A note re: attending variability in reading films and reporting:** Every attending has their own comfort level re: how sensitive and specific they want to be when reading films. This can be frustrating for residents who are reading out with different attendings every day; it can be particularly difficult early in residency, when first-year residents don't know the individual attendings and their individual styles. Please know that there is no "right" and "wrong" in this process. Part of the learning process of residency is figuring out where *you* want to reside on the ROC curve of sensitivity vs specificity. Being exposed to attendings with differing opinions re: specificity and sensitivity can help you determine how you want to practice when you are finished with residency. The same is true regarding reporting styles. Don't take it personally if someone tells you to phrase your report differently. Take all of that information and develop your own reporting style.

Resident Expectations

The ACGME has set forth expectations for radiology physicians in training including clinical and professional competencies. We expect you to fully participate in the service as a medical professional. General expectations for all trainees on service are as follows:

- Residents are expected to be in the reading room each day following morning conference (8:30 am). If morning conference is not held, residents should be on service at 7:30 am. Please be on time.
- If you have a commitment that will require you to be away from your assigned service (e.g. a meeting, doctor's appointment, etc.), please notify the covering attending as soon as possible (cc'ing Travis and Tina isn't a bad idea either). Vacation and time away are addressed later in this document.
- Communicate professionally with referring clinicians, nurses, technologists, colleagues, and other staff. Remember that everyone is generally trying to do the right thing and that we work in a stressful environment. Conflict can be avoided by taking such an approach as we strive to understand each other. If you feel like you are in an uncomfortable situation for any reason, do not hesitate to bring it to your attending or the division chief's attention.
- Residents should take ownership of their clinical assignment. This includes managing the worklist, triaging cases based upon clinical urgency, addressing protocol and nursing issues, and communicating with ordering providers.
- ***If your worklist is caught up, please help out where needed. We all want to finish on time and have you read out for our daily teaching conference.***
- Demonstrate competency in protocoling cardiothoracic exams.
- Obtain pertinent patient information relative to the interpretation of imaging studies. This means you will need to review the clinical record in EPIC. Do not rely solely upon the study indication.
- Accurately and concisely dictate imaging and procedure reports. *Every attending has different preferences and approaches to interpretation and reporting.* Do not take offense if we make corrections and provide you with constructive feedback on your reports. You will develop your own reporting style over time, but the attending is ultimately responsible for the report content and interpretation. Your report should accurately reflect the points discussed during read out.
- Participate in teaching medical students, clinical observers, and each other. Senior residents specifically have a responsibility to orient junior residents to the rotation and clinical services.

Clinical Services

Radiographs:

- We now have a combined CXR worklist from which you are encouraged to read – DUH Chest All IP OP Chest X-rays.
- There are usually more IP radiographs in the morning from overnight ICU rounds. OP radiographs generally increase in the middle of the day and afternoon.
- If there are multiple residents/fellows on the CXR rotations, please coordinate with each other and come up with a plan for reading the list. You can either sort by time exam was performed (oldest to newest to take care of the overnight ICU radiographs), or sort by acuity level (this is helpful during the day to make sure stat and ED radiographs are read promptly).
- Minimal resident expectations:
    1. Communicate emergent, significant, and unexpected findings (1st-years must have reviewed with an attending)
    2. 1st-year residents should typically read 10-15 cases before reading out with an attending. More senior residents can accumulate 20+ cases before a read out.
    3. As proficiency improves, residents should be able to keep up and manage the worklist independently.

Chest CT:

- We read all dedicated chest CTs for both inpatients and outpatients, including Duke Raleigh outpatient chest CTs. Volumes regularly exceed 120 CT exams per day. Common studies include standard non-contrast exams for the evaluation of nodules, infection, malignancy; lung cancer screening; CT angiograms for the evaluation of pulmonary emboli; and high-resolution imaging for characterization of interstitial lung disease.
- The CT worklist is: **DUH Chest CT & MR**
- In addition to dictating exams and managing the worklist, resident responsibilities include:
    1. Protocol Chest CT exams
    2. Facilitate communication with nurses, technologists, and the referring team
    3. Communicate emergent, significant, and unexpected findings (1st-years must have reviewed with an attending)

Cardiovascular Imaging (CVI):

- We provide interpretation of cardiac CT, vascular CT, and vascular MR imaging. Many residents find this service to be a challenge due to the complex imaging and pathology, however it can also be one of the most rewarding experiences of your rotation and is essential to call preparation.

- Service volume varies from approximately 25-35 exams a day. Mondays and Fridays tend to have the highest volumes. CVI is typically slower in the morning and busier in the afternoon. *If there are no unread studies in the morning please help with the CT list while the late shift resident is being read out.*
- The CVI Worklist is: **DUH Chest CVI CT & MR**
- Resident responsibilities include:
    1. Complete TeraRecon 3D workstation training for R1 residents. This can be scheduled on the morning of the first day of your assigned CVI coverage. Please contact Susan Churchill (susan.churchill@duke.edu) in the Multi-D lab to get this scheduled.
    2. Protocol CVI exams
    3. Facilitate communication with nurses, technologists, and the referring team.
    4. Communicate emergent, significant, and unexpected findings (1st-years must have reviewed with an attending)

Note: Thoracic Intervention:

- Senior residents on service rotate responsibilities with CTI fellows for covering thoracic procedures, which primarily include CT-guided lung biopsies, thoracentesis, and thoracostomy tube placement.
- A fellow or senior resident are assigned to coordinate procedures each day. This does not mean that you need to perform every procedure, only that you will identify who will be involved with each case and will facilitate approval of procedure requests.
- Resident responsibilities for thoracic intervention include:
    1. Review all procedure requests with an attending in a timely manner
    2. Facilitate scheduling and communication with the referring team
    3. Consent patients and document pre-procedure H&P
    4. Perform procedures under faculty supervision
    5. Enter post-procedure orders and a post-procedure note
    6. Dictate the procedure report
- Procedure requests are reviewed every day with available procedure faculty, typically at 12:30 pm. Residents should gain insight into the considerations, approach, and clinical judgment associated with thoracic interventions.

CTI Late Shift:

- *Weeknight Responsibilities:*

    1. The late shift is from 2 – 10 pm.
    2. From 2 – 4 pm, residents are to assist chest CT and CVI services, and read out studies with an attending read until 4 pm. On most days there is a CT3/CVI2 attending who stays a little bit later (4:15-4:30) to help make sure everything is caught up until 4pm.
    3. Dictate inpatient, outpatient, and ED chest and cardiovascular cross-sectional studies* performed from 4 pm until 10 pm or until a volume cap of 25 dictations has been reached (the cap does not include studies previously read out with an attending). Any other cases should be given a preliminary interpretation in EPIC until the end of the late shift.

    *You do not need to dictate TAVR or other elective CVI studies requiring measurements from the 3D lab – a preliminary report is fine. Similarly, especially if it is busy then use your discretion in giving preliminary reports for lung cancer screening CTs or other non-emergent outpatients.

    The late shift resident/fellow should also give a preliminary 'wet read' on all ED CXRs from 4 - 5 pm as the outpatient attending is frequently giving the resident teaching conference or staffing a multidisciplinary conference during that time. These studies will be dictated by the Box resident who starts at 5 pm. The volume is typically 10-12 CXRs.

    4. We do not want the late shift resident staying late dictating studies. If there is a late dump of cases and you have not yet reached the volume cap, do your best to dictate what you can and provide preliminary reads for the rest. You should target being done with your shift no later than 10:30 pm.
    5. Dictated studies will be read out with the attendings assigned to Chest CT (CT 1 attending) and CVI services the following morning after resident conference. The late shift resident is expected to attend the 7:30 am resident conference.
    6. Catch-up all protocol lists (Chest and CVI).
    7. If time permits, dictate inpatient CXRs. This is not always possible, but some shifts are slower than others.

- *Weekend and Holiday Responsibilities:*

    1. The responsibilities for the late shift resident preceding a weekend or holiday are the same as those outlined above.
    2. In addition, the late resident is responsible to dictate all chest and CVI cross-sectional studies performed overnight. The resident should be ready to read out these exams by 8:30 am on Saturday and Sunday, following the attending read

out with the box resident. Depending upon the volume of studies, the senior resident on service may assist with dictating Chest CT and CVI cases in the morning. This should be arranged among the residents.

3. The late shift resident assists with reading additional CT, MR, and CXR studies until the work is done and the shift is complete (finishing close to 12 noon when the day call resident arrives). The morning service day resident may leave if all the work is done before noon.
4. There is no late shift on Sunday evenings. All overnight cross-sectional studies will be picked up on Monday morning.

- *R1 Buddy Late Shift:*
    1. The 1st-year resident on their 2nd CTI rotation will be assigned one buddy late shift from 5 - 9 pm, typically during the last week of the rotation. You will be paired with a senior resident who will orient you to the late shift workflow and responsibilities in preparation for next year.
    2. Although you will not have any dictating responsibilities, you can provide preliminary interpretations that will then be reviewed by the senior late shift resident.
    3. The hours are structured such that you will work a regular day, stay for the late shift, and then work the following day.

Clinical Schedule

Faculty and resident clinical assignments are noted in QGenda. Please review your daily assignments with special attention to late shifts.

We are increasing faculty staffing to help accommodate the higher clinical volumes and still maintain a good educational experience for the residents. In general faculty coverage will be as follows:

Rotation	**Attending**	**Notes**
CT	CT 1	Reads out the late shift resident
	CT 2	
	CT 3/CVI 2	Usually scheduled 5 days per week
CVI	CVI	Reads out the late shift resident
	CT 3/CVI 2	(as above; usually 5 days per week)

CXR	CXR 1	Reads out overnight resident
	CXR 2	
	CXR 3	Morning clinical shift with conference assignments
Biopsy	Procedure/ Float	Helps to decompress worklists between biopsies

Teaching and Educational Materials

- The most effective teaching occurs during read-outs. Please ask questions about the cases you review and from your independent study. Division specific conferences (listed below) are also a great opportunity to learn in a small group environment.
- Books and other educational materials:
    - *Fundamentals of Body CT* (Webb, Brant, Major- 2014) - General introductory text to crosssectional imaging. Ideal to read in your first rotation and review in subsequent rotations. Available in the resident library, but often in demand.
    - *Thoracic Imaging: Pulmonary and Cardiovascular Radiology* (Webb and Higgins - 2010) - A comprehensive textbook that should form the basis of study for your 2nd and 3rd year rotations. Available in the resident library.
    - *Cardiovascular review articles* - PDFs located on the shared drive (ask a senior resident how to access). This folder contains review articles as well as a detailed explanation of CT and MR protocols.
    - *Cardiothoracic Core Lecture Series* - 30 minute video didactics covering core topics in cardiothoracic imaging prepared by expert teachers from the Society of Thoracic Radiology. Several members of our division contributed. These are an excellent supplement to your reading and are highly recommended.
    - *dukerad.com* - The 'Chest' section contains a "tips for reading films" orientation manual as well as a list of additional educational resources, both hard copy and online. There is also a detailed list of protocols for your reference, in addition to helpful resources such as ACR Lung-RADS and Fleischner guidelines.

4 PM Conferences

· Afternoon conferences are a vital part of your learning. Try to anticipate your last readout so that you can make it on time at 4pm. Unless you're dealing with an emergent case, stop what you're doing, attend conference, and pick up where you left off afterwards.

· Our goal is to have all residents attend at least 3 multidisciplinary (MDC) conferences each month. These conferences are your opportunity to sit back and observe how we as radiologists interact with our clinical colleagues. Try to pick up on what is important during discussion and what is extraneous. This can help frame the way you approach and report cases in the future. The general schedule will be as follows and exact days will be listed in qGenda (there may be some rotations where the week varies based on conference cancellations):

- 2nd Wednesday – Thoracic Oncology (TOP) 4:30-5:30pm
- 2nd Thursday – Lung Cancer Screening (LCS) 4:30-5:30pm
- 3rd Thursday – Interstitial Lung Disease (ILD) 4:00-5:00pm

Don't hesitate to reach out to the assigned attending to ask for the list of cases/zoom links prior to the meeting. You may be able to find the cases in the relevant Visage conference folder as well.

· Monday Rollout – you should see multiple attendings and fellows dial into this conference every Monday. We are encouraging more discussion among everyone so don't be afraid to speak up. This is a chance for you to see a mix of cases – classics, zebras, things where nobody knows what's going on. Hint – preview the cases beforehand (or review afterwards) in the CTI rollout folder. Look at the case, read the report, check the clinical/op/path notes – one of the best ways to learn.

- Peer learning conference – Last Monday of even-numbered months (Aug, Oct, etc). This will take the place of the regular rollout.
- Cardiac case conference – First Monday of even-numbered months. This will be focused on cardiac and coronary CTAs.

**Any Monday where regular rollout doesn't occur (e.g. those listed above or holidays) then rollout will take place the next day (Tuesday) at 4pm.

- Special teaching conferences may include journal club, cardiac MRI training, vascular post-processing on TeraRecon, or topical discussions (e.g. Lung Cancer Screening, TAVR interpretation, etc.)
- Fellows and senior residents on service participate in multidisciplinary conferences on a rotating basis and are paired with a faculty member for presentation.
- Senior residents have a responsibility to assist in orienting, training, and teaching junior residents.

- Medical students rotate through the Cardiothoracic Division. They are typically paired with a resident. It is an excellent opportunity for you to share your medical knowledge and enthusiasm for Radiology!

Educational Materials

The following are recommended resources for independent study during your Cardiothoracic rotation:

- *Fundamentals of Body CT* (Webb, Brant, Major- 2014) - General introductory text to crosssectional imaging. Ideal to read in your first rotation and review in subsequent rotations. Available in the resident library, but often in demand.
- *Thoracic Imaging: Pulmonary and Cardiovascular Radiology* (Webb and Higgins - 2010) - A comprehensive textbook that should form the basis of study for your 2nd and 3rd year rotations. Available in the resident library.
- *Cardiovascular review articles* - PDFs located on the shared drive (ask a senior resident how to access). This folder contains review articles as well as a detailed explanation of CT and MR protocols.
- *Cardiothoracic Core Lecture Series* - 30 minute video didactics covering core topics in cardiothoracic imaging prepared by expert teachers from the Society of Thoracic Radiology. Several members of our division contributed. These are an excellent supplement to your reading and are highly recommended.
- *dukerad.com* - The 'Chest' section contains a "tips for reading films" orientation manual as well as a list of additional educational resources, both hard copy and online. There is also a detailed list of protocols for your reference, in addition to helpful resources such as ACR Lung-RADS and Fleischner guidelines.

Multidisciplinary Conferences

Senior residents (R3 and R4) will share responsibilities with our fellows for staffing multidisciplinary conferences. These are assigned in QGenda, so please check the schedule.

For your assigned conference, please contact the staffing attending to obtain a list of patients/ cases. These should be reviewed with the attending prior to conference so that you are familiar with the conference format and key points of each case.

Conferences that may be staffed by residents include:

- *Pulmonary Medicine Rad-Path Conference* - (Wednesdays, 8:30 am) Weekly multidisciplinary conference involving Pulmonary Medicine, Radiology, and Pathology. The conference is presented in a case-based format with the Cardiothoracic service presenting the imaging. Typically just two cases are presented.

- *Thoracic Oncology Program (TOP) Conference* - (Wednesdays, 4:30 pm) Weekly multidisciplinary conference involving Radiology, Thoracic Surgery, Interventional Pulmonology, Medical Oncology, Radiation Oncology, and Pathology. Review of 5-8 cases that are presented to discuss imaging and clinical management.
- *Interstitial Lung Disease (ILD) Conference* - (Thursdays, 4:00 pm) Weekly multidisciplinary conference involving Pulmonary Medicine, Radiology, and Pathology. Review of 6-8 cases for the Duke Interstitial Lung Disease group with clinical and pathologic correlation.

See this PDF from the division for complete rotation information.

Musculoskeletal Imaging

Faculty contact: Emily Vinson MD

Topics for MSK Radiology Residents

General Workflow

A. If there is no morning conference, the work day begins at 8am.
B. Assignments
    - First Rotation: Primarily plain films (PF). Starting week 2, pick up one MRI per day (knee or shoulder). Starting week 3, pick up one trauma T and L reformat per day. Ask the appropriate fellow for help picking up non-PF cases.
    - Second Rotation: PF MWF / MR TTh

- Third Rotation: PF TTH / MR MWF

We have attendings assigned to PF or MRI (listed in Qgenda). If they don't reach out to you, please reach out to them!

First years: Unless otherwise instructed, staff out all PF and MR with your PF attending. Staff out trauma spines with the fellow on CT.

C. Worklists
   - Sorting: Sort by the "sort" column at the top left. Read top down.
   - PF List = DUH MSK XR Studies
   - MR List = DUH MSK MR
   - CT List = DUH MSK CT

Priority as follows:

Priority 1 = leveled trauma
Priority 2 = ED
Priority 3 = ICU inpatient/urgent discharge
Priority 4 = urgent outpatient (urgent care)
Priority 5 = ASAP outpatient (same day appointment)
Priority 6 = routine inpatient
Priority 7 = routine outpatient (appointment next day)
Priority 8 = routine outpatient (ortho follow-up).

f. Please staff out all ED cases within the hour – let your attending know you have cases to read out!
g. Priority 6 studies can have more urgent findings than 4s or 5s, so be mindful.

D. Templates
   a. PF
      - **Always use the generic MSK template for ALL STUDIES ("macro MSK"), even if it auto-populates with something else!**

Note on VIEWS vs IMAGES:
A "view" is a patient position, an image is a single film. You may have more images than views, but never vice versa. A different projection or position counts as a different view. Often technologists send two images of the same view (if the first wasn't satisfactory or if the whole bone can't fit in one picture ie femur).

It's essential to dictate the correct number of views, but you do not need to dictate the total number of images. Some attendings may want you to do this, however. (If additional images are added to the jacket later for example, you have a record of how many you saw at the time of dictation).

The number of views must be exact, it can never have the words “minimum” or “plus” in it. The title may, but as long as you have the correct view number in the line below the title (as it is set up in the “macro MSK” template), you are fine.

Finger XRs must indicate what finger was imaged. Please use only the correct terminology (thumb, index, long, ring, and small).

It is our responsibility to ensure that our body of work is the highest quality possible. Our dictation is our work product. Plus, addendums are annoying.

- Resident reports should always have separate findings and impression sections (when you graduate to fellowship, you can combine them)

- Check sidebar in powerscribe for available studies to link. For example, if you are reading an outpatient right knee radiograph, try to pick up a left knee and bone length to help reduce redundancy of effort. For trauma, please only link studies of contiguous body parts on the same side. For outpatients, it is okay to link bilateral hands or bilateral feet. We realize this is confusing, so please ask if you aren’t sure!

- CT
    - Trauma template: MSK CT trauma Spine
- MRI
    - All templates should begin with MSK MR ___. **Please delete all templates without this heading.**
    - Technique for all non-contrast MRI should read: Non-contrast multiplanar, multiecho imaging of the [_] was performed, including T1-weighted and fluid sensitive sequences.
    - Technique for all contrast MRI should read: Multiplanar, multiecho imaging of the [_] was performed, including fluid sensitive and pre and postcontrast T1-weighted sequences; IV contrast was administered to potentially improve disease detection.
- Procedures
    - Templates: “MSK arthrogram” “MSK CT biopsy” or “MSK ultrasound biopsy”

Expectations

- First Years
    - 30-40 PF/day by the end of the rotation
    - 1 MR/day starting week 2
    - 1 CT trauma/day starting week 3
    - 2-3 arthrograms by the end of the rotation (watch first, then may perform)
- Second Years
    - 50 PF/day
    - 8-10 MR/day

    - 5-6 arthrograms and/or fluoro-guided aspirations by the end of the rotation (1-2 per week)
- Third Years
    - 75 PF/day
    - 10-15 MR/day
    - 2-3 advanced procedures (CT guided or fluoro small joints) by the end of the rotation
- Plain Films
    - All studies through priority 7 should be read and staffed out until a 5pm EPIC timestamp.
    - Lower priority studies (priority 8) should ideally by read and staffed out until a 4pm EPIC timestamp.
- Cross Sectional
    - All outpatient CTs and MRs with end time stamp prior to 4pm must be staffed out by the end of the workday.
    - Trauma T and L's are read up to timestamp 5pm.
- Procedures
    - Please be proactive about seeking out procedures (find the procedure fellow). Arthrograms typically take place at 9am, 1pm, and 2pm. CT guided procedures are often at 10:30am or noon.
    - Realize that at the beginning of the year when the fellows are still learning you may not get as much hands on experience as you might like.
    - Dictate all procedures that you personally perform.
- The Phone
    - Please answer it when it rings unless you are reading out.
    - If you have any questions regarding what the call is about, ask a co-resident or fellow. If nobody is available, get a name/number to call back and seek out an attending.
- Protocoling
    - Usually the Float/AM ER/CT fellow's responsibility. However, often ED or inpatient studies need to be protocoled on the fly. Please confirm the patient age and ordering physician to make sure MSK will be reading the study prior to protocoling it. If you have any questions, please ask. There is almost never a reason to protocol a CT with and without contrast in the MSK setting.
    - We don't use a lot of MRI IV contrast in MSK. Tumors may or may not get contrast. Osteo cases usually do not need contrast. If called or asked about administering contrast, please ask a fellow.

Reporting

- Please refer to template section above.
- Make sure the procedure title at the top of the report matches what was performed PRIOR to preliming the report. Once the study is prelimed, the procedure in EPIC cannot be changed by

the technologist. Call the tech if there is a discrepancy. For CT and MRI, non-contrast or contrast MUST be in the title as well as in the technique.

- Please ensure the side is correct in both the title of the report, throughout the dictation, and on the screen! Sometimes a study is labeled right and the technologist images the left side. Mistakes happen, find them.
- Report Structure
    - Radiographs
        - Findings should include a comment on alignment, presence/absence of fracture, joint spaces, and soft tissues.
        - Impression should answer the clinical question as briefly as possible. This depends on who is ordering the study – pay attention to who is asking the question and what they want to know. Example: Radiographs of the bilateral hands ordered by a rheumatologist should not have an impression that reads “no acute fracture.”
- Contacting the referring clinician
    - Acute findings including fracture, dislocation, soft tissue gas etc require speaking to someone on the phone (if they don’t already know about it). Document who you spoke to, date, and time in the report.
    - EPIC chat or in-basket messages may be used but you must confirm receipt of your message if it is an urgent finding prior to preliming the report.
    - Findings requiring non-urgent follow up may be placed in the “unexpected findings” folder in EPIC.
    - Look for telephone numbers in EPIC (ordering person is always the one to call first) or on the DukeRads website (for clinic numbers).
- Compliance Issues
    - Exact number of views must be listed (no “minimum”)
    - Retained objects sticky notes: second year or above. Please use the template named “CR Retained Foreign Object”
    - “Time out” for procedures: identity verification for all patient procedures confirming correct patient, correct procedure, correct site, and allergies.
    - Handwashing/sanitizing for every patient interaction.
    - Procedure note in Epic chart within 15 minutes of procedure (preliminary Powerscribe dictation counts).
- Teaching and Learning
    - Divisional Conferences
        - Resident noon conference: Tues-Thurs. Please seek out the attending listed in Qgenda if you haven’t already heard from them.
    - Independent Learning – reading List below

Suggested Reading

Fundamentals of Skeletal Radiology (the 'pink book')

- Ch 1: Unnecessary Examinations
- Ch 2: Benign Cystic Lesions
- Ch 3: Malignant bone tumors
- Ch 4: Don't touch lesions
- Ch 5: Trauma
- Ch 6: Arthritis
- Ch 7: Metabolic Bone disease

Greenspan's Orthopedic Radiology (older edition is fine)

- Ch 4: Trauma
- Ch 5: Upper Limb I: Shoulder Girdle and Elbow
- Ch 6: Upper Limb II: Distal Forearm, Wrist, and Hand
- Ch 7: Lower Limb I: Pelvic Girdle and Proximal Femur
- Ch 8: Lower Limb II: Knee
- Ch 9: Lower Limb III: Ankle and Foot
- Ch 10: Spine

MSK Requisites

- Ch 24 Arthroplasty

2nd year:

MSK MRI Anderson, Helms, Major

- Ch 1: Principles of MSK MRI
- Ch 2: Marrow
- Ch 3: Tendons and Muscles
- Ch 4: Peripheral Nerves
- Ch 5: MSK Infections
- Ch 8: Trauma
- Ch 10: Shoulder
- Ch 13: Spine
- Ch 15: Knee

Requisites

- Ch 22: AVN
- Ch 23: Miscellaneous joint disorders
- Ch 48: Arthrography

3rd year:

MSK MRI Anderson, Helms, Major

Ch 6: Arthritis and Cartilage
Ch 11: Elbow
Ch 12: Wrist and Hand
Ch 14: Hips and Pelvis
Ch 16: Foot and Ankle

Arthritis in Black and White, Brower and Flemming

Requisites:

Part VI, Tumors
Part V, Metabolic Bone disease

Optional reading: Fundamentals of MSK Ultrasound

IV. Resources
A. DukeRads website: www.dukerad.radsq.com
B. "Smart web" paging system: link from DukeRads

NEURORADIOLOGY

1. General

· Start time: promptly at 8:30am for daytime shift, 3:30pm for late shifts

· Location: DMP reading room for all rotations except MR1 resident, who reads from the cancer center reading room. Late shift CT resident should work from the main DMP reading room in order to be available to respond to incoming calls and stroke codes.

· Jabber: All residents should log onto Jabber promptly upon arrival in order to communicate with the reading room coordinator and remote attendings

· LP/Myelo coverage: R1 procedure resident should communicate with the CT/MR/Myelo attending at the beginning of the day to identify which case will be done by the resident/attending (usually the 10am or 11am case)

· Hand off to evening shift: daytime fellows and residents will be responsible for reading studies timestamped 3:29pm and earlier. Daytime housestaff should not leave for the day until all studies done before 3:30pm are claimed/dictated. Late shift housestaff are not to read studies done before 3:30pm in order to allow clean hand-offs between shifts. Late shift CT residents are responsible for studies time stamped through 9:59 PM, at which point the night shift will take over.

· Professionalism: all residents are expected to communicate respectfully to all DUHS staff, including nurses, technologists, medical assistants, non-clinical staff, other clinical services, and all radiology faculty, fellows and co-residents. Communications that are disrespectful, overly brusque, or that belittle others will not be tolerated under any circumstances. All visitors to the reading room should be made to feel welcome. Consulting services who visit the reading room or call should be addressed immediately and should receive prompt, enthusiastic, and courteous attention.

· Lunch: Residents are encouraged to coordinate lunch with their conference/procedure schedules, and with the fellows in the reading room in order to ensure some continuous presence in the reading room for urgent cases and phone calls.

· Cleanliness: the reading room is to be kept tidy. Residents are asked to dispose of any trash at the end of their shift, and to refrain from leaving other personal effects in the reading room (including blankets, pillows, speakers, etc.).

2. Conference

i. Daily Neuro teaching conference: 12pm-1pm, Tues-Thurs.

· Location: Cancer Center Conference room, 1st floor, 1N07 – see appendix 3 for a map

· Inform fellow when leaving and returning to ensure coverage of urgent studies

· Return promptly from conference, especially on Wednesdays, as this is the day fellows have their conference at 1pm. Continuous coverage in the reading room for stroke codes and other urgent studies

· All residents are expected to attend conference if they are not on the late shift rotation. Plan your clinical duties and hand-offs of care such that you are present for conference promptly at 12pm. It is your responsibility to be on time to conference and you will be expected to be present and ready to learn.

ii. Roll-out

· Interesting case "roll-out" conferences are held Tuesday and Friday 8:30-9:30 AM over zoom; residents on service should receive zoom invitations from Babbie Williams or one of the administrative assistants. All residents are expected to attend roll-out when not assigned to the late shift that day. If more than one resident is logged on from a single computer, please include all their names in the zoom window so that faculty know which residents are present.

3. Weekend Service Days

· Start time: residents are expected to be in the reading room no later than 7:30 am Saturday and Sunday (must be present to cover urgent cases after overnight resident departs)

· Neuro residents will read all CT studies timestamped until 11:59 am. Make sure to communicate hand off to the senior resident as a courtesy at noon.

· Responsibilities also include assisting with procedure requests that come in before noon on Saturday and Sunday, including LP/myelogram requests and aspiration/biopsy requests. These requests should be promptly coordinated with the attending on call for the weekend.

· Residents will stay until all studies timestamped before noon are dictated and read out with the on-call attending.

· When R2 and R3s are assigned to weekends, they will cover the CT service days by themselves. R1 residents will cover the service days together with their co-R1 resident. Both R1 residents are equally co-responsible for coverage of studies and are expected to be physically present both Saturday and Sunday. However, they may divide duties among themselves, as long as both are present during

morning readouts. While one resident is reading out cases with the attending, the other should be covering any new incoming phone calls and new studies on the worklist.

· Neuro weekends are busy, sometimes with 100+ CT exams to be read out on Sunday morning. Residents should plan on arriving early on Sunday morning, in order that all cases are dictated and ready to be read out starting at 8:30am.

4. Protocols & Procedures

i. Stroke codes

· All residents should review the procedures for handling stroke codes on an annual basis. These will be emailed to you and can also be found in Appendix 1.

· Per Joint Commission regulations, R1 residents are not allowed to independently offer preliminary interpretations on stroke codes. Wet reads documenting communication must include the name of a resident of year R2 or higher or fellow. R1s are, however, strongly encouraged to review stroke codes in real time in parallel with an upper-level resident in order to become familiar with the procedure and comfortable with interpretation.

ii. LP/Myelograms

· The R1 Procedure/CT resident should be familiar with the procedures for preforming and covering lumbar punctures and myelograms as well as the pre-procedural checklist found in appendices 2a and 2b

· If there is no covering APP listed on QGenda for the Myelo service because of vacation or holidays, the R1 resident should sign on to the functional pager for the service. The functional pager can be found by typing “LP/myelo” into the Group field of the Pagingweb.

· The LP/Myelo schedule can be checked by contacting the GI desk (the E-hall where fluoro procedures are done), and/or by looking at the schedule for the E3 room in Epic (click on schedule tab in Epic, create a new schedule report on the right hand side of the screen for yourself using the following procedure: Click “Create” under the General tab, fill in a nickname for the location such as “E3” Click on the Configuration tab set the radio button at the bottom to “resource” search for “DUKE NORTH GI” Highlight “Duke XR GI E3” Click the button that says “Add ” to move it to the right column click Accept. The schedule will now be listed under the drop-down that says “My schedule.”

· Responsibility for checking and dictating post-myelogram CTs belongs to the R1 Procedure/CT resident. She/he may delegate that responsibility to a fellow when going to conference, but the

coordination of that coverage handoff is the responsibility of the resident. When called to check myelograms by CT techs, the resident should do all of the following:

- Understand why the study is being done by looking in the chart

- Make sure they are sure about what parts of the spine need to be covered by the scan

- Make sure that contrast opacification of the thecal sac is adequate in all areas of interest. In cases where it is not, promptly seek guidance from the Myelo attending as to how to remedy the situation.

- Make sure the scan is free from motion. Ask CT tech to repeat parts of the scan where motion is present.

- Dictate the study and read it out with the Myelo attending that same day

· It is useful to know which studies have been ordered/the amount of CSF needed for the requested laboratory studies prior to beginning a lumbar puncture to ensure that the correct tests are sent and that the correct number of vials are available prior to beginning the procedure. Usually, the fluoro techs are a great source for asking questions regarding whether the studies have been ordered correctly etc.

5. Year-specific Goals & Responsibilites

R1 – CT
Goals: · Studies: Be comfortable reading all neuro CT exams including brain studies, CTA, spine, neck, facial bones, and CT perfusion · Volume: Be able to read at least 25-30 studies/day by the end of your rotation · Knowledge: Read at least 1 hour per evening. Be prepared for interpretation of all neuro topics, especially those that you will cover on late shift as an R2 including stroke, trauma, and other emergencies, including infections. · Be familiar with all Neuro CT protocols and when to use them. Understand when contrast is needed in CT studies Responsibilities: · Share clinical coverage of CT worklist

- Assist with protocoling studies. Make sure the CT protocol list is caught up on a daily basis.
- Ask questions about things you don't understand or aren't sure about.
- Do NOT independently Wet Read stroke codes

R1 – Procedure & CT

Goals:

- Perform 1 fluoro-guided procedure per day with the Myelo attending
- Check and dictate all myelogram procedures done under fluoro (except those done specifically for spontaneous CSF leak, which are handled by the DMP Spine Intervention Attending)
- Be prepared to perform fluoro-guided LPs independently by the end of your R1 year
- Studies: Be comfortable reading all neuro CT exams including brain studies, CTA, spine, neck, facial bones, and CT perfusion
- Knowledge: same as R1 CT rotation. Additionally, understand technique, indications, and contraindications for LP and myelogram procedures.

Responsibilities:

- Cover LP and Myelograms, as outlined in section 4.ii. and Appendix 2
- When not actively performing or coordinating procedures, read from the CT worklist. You should be able to read ~20 diagnostic scans in addition to performing your procedural responsibilities by the end of your rotation.
- Ask questions about things you don't understand or aren't sure about.
- Do NOT independently Wet Read stroke codes

R2 & R3 – Late CT and MRI

Goals:

- Studies: Be comfortable reading all neuro MR exams
- Volume: Be able to read at least 30 MR studies/day by the end of your rotation
- Knowledge: Be familiar with all neuroimaging topics as outlined by the ACR study guide for the radiology board exam. Be familiar with neuro MR protocols and when to use these protocols.

Responsibilities:

- Share clinical coverage of MR worklist on MR rotation.
- Cover CT worklist on the Late Shift. Read out with the late attending or Wet Read studies up until 10pm.
- Review CT protocols when arriving for late shift. Make sure the protocol list is caught up.
- Help cover stroke codes and trauma code CTs when the fellow is out of the reading room.
- Provide guidance to R1 residents.

Appendix 1: Stroke Code Procedures

All residents MUST be intimately familiar with all steps in handling stroke codes as outlined below:

- The CT tech should call you from the CT scanner while the patient is still on the table to have you check the scan.
- Results should be communicated to the responsible physician in no more than 5 minutes from the time the tech calls
- The need for a CTA should be assessed for all stroke code patients with the stroke team when reviewing the findings of the initial CT.
    - Specifically, if the patient is a candidate for intra-arterial (i.e. catheter-directed) therapy, a CTA combo should be performed. This is often a decision made based on the time from the patient's onset of symptoms, and therefore must be made by the clinical service.
    - If a CTA is necessary, it should occur while the patient is on the table before the patient is sent back to the ED/floor.

- The wet read of the initial non-contrast CT should NOT be delayed by the reading of the CTA. Report the results of the non-contrast scan immediately, and place a wet read in Epic, even if the CTA results are not yet ready.

· The first communication should be documented in an Epic wet read note including the SPECIFIC NAME of the physician receiving the results and the EXACT TIME of the communication.

- It is NOT sufficient to say it was discussed with "the ED resident" or to give the time as "at the time of this note" or something similar.

· The tech should receive closed-loop communication by the radiologist instructing them as to whether the patient needs a CTA, and if not, providing instructions to release the patient back to the ED/floor. They will be waiting to hear back from you before they release the patient.

· If you are dictating a stroke code where the wet read was done by someone else, you must include the NAME & TIME of that first communication in your final dictation.

· All stroke code cases are reviewed by the hospital stoke team, and if the required documentation is missing from either the sticky note or the final report, you can expect to receive a request to make an addendum to the report. Failing to include the sticky note information (person contacted and time of contact) in the final report for a study prelimed by another resident is the #1 reason for being contacted to provide an addendum. If you receive a request to make an addendum, please be courteous and complete it quickly.

· R1 residents are not permitted to independently provide preliminary interpretations for stroke codes. They may review in parallel with an upper level resident or fellow, but communication with the stroke team must be performed by the upper level.

Appendix 2a: Coverage of Myelography Procedures

Purpose: To delineate and define the specific roles specific to those individuals performing and/or coordinating LPs, Myelograms and Cisternograms.

General coverage

1. The APP (NP or PA) will cover the performance of fluoroscopy-guided lumbar punctures (LPs), Myelograms, and Cisternograms from 8 AM-4 PM, Monday through Friday. They will independently perform, dictate, and bill for the procedural component of these studies. The APP will not be responsible for the interpretation of any accompanying cross-sectional diagnostic imaging (i.e., post-myelogram CT or CT cisternogram).
2. The attending radiologist assigned to the myelogram rotation on the schedule will be serve as the Back-up supervising physician and will be immediately available for consultation and/or assistance. The attending radiologist will only be directly involved with individual cases when requested by the APP .

1. When the APP is not on the clinical work schedule (because of vacation or other absence), the attending radiologist assigned to the myelography rotation will assume all responsibilities for coverage of LPs and Myelograms previously covered by the APP
2. The attending radiologist will perform and/or directly supervise all procedures performed on patients 12 years of age and younger, if the APP is not credentialed to participate in procedures on these patients.

Pre- and Intra-procedural issues

3. The APP will be responsible for screening patients on whom they will be performing procedures for suitability and appropriateness. This includes review of the medical indication for the procedure, review of any contraindications to the procedure, and assessment of relevant laboratory or imaging studies. If they have questions or concerns about whether a study is safe or appropriate, they may consult with the attending radiologist at their discretion.
4. Residents assigned to the myelography rotation ("Myelo resident") will perform one procedure per day under the supervision of an attending radiologist. Determination of which procedure the resident/attending will perform will be coordinated between the APP and the Myelo resident. APPs will not supervise residents in performing procedures. In the event that there is not an assigned Myelo resident, the APP will perform all procedures that day unless instructed otherwise by the attending radiologist.
5. The APP should list their name as the provider on consent documents. The APP will dictate the procedure report independently in full and personally enter notes in the electronic medical record related to the procedure.

Post-Procedural Issues

6. Once a LP, myelogram, or cisternogram has been completed, the *APP will be the primary person responsible for the post-procedural care of the patient*, including placement of orders, management of recovery area care, and assessment of post-procedure complications or adverse reactions. They may call the attending radiologist for help, if needed, and transfer care as appropriate. They will also receive instructions for the management of adverse reactions and the procedure for initiating a code.
7. For patients undergoing a myelogram or cisternogram, the APP will be responsible for making sure that a protocol sheet is completed and sent with the patient to the CT scanner. The fluoroscopy technologist transporting the patient will be responsible for handing this off to the CT technologist. The protocol sheet will list the imaging procedures to be performed (including anatomic areas to be scanned) and the pager of the radiologist or radiology house staff to be contacted for a scan check after completion of the scan.
    1. The CT technologist will document the name of the checking physician on the sheet, and mark that the scan is completed. The sheet will then be sent with the patient to the recovery room. If the protocol sheet is missing, the CT technologist will call the APP or covering radiologist to confirm the information. Standard scan protocols will be used for these studies unless otherwise specified.

2. The recovery room nurse will not discharge the patient if the CT scan is not marked as completed. After the patient is discharged, the sheet will be filed in the recovery room for at least 1 week.

8. After completion of the imaging, the CT technologist will call the physician listed on the protocol sheet for a scan check. The checking physician will confirm that:
    1. the appropriate anatomy has been covered based on the indication for the study and orders provided in the EMR
    2. that the scan is suitable diagnostic quality (i.e. free of motion, proper technique, etc.)
    3. that sufficient contrast has reached the area of interest. In any case where contrast has not

migrated to the appropriate area, the checking physician should provide feedback to the APP or physician performing the procedure, including what maneuvers are needed to allow migration of the contrast to the appropriate level.

9. *If the scan is not adequate for any reason, it will be the responsibility of the checking physician to make provisions to remedy the issue.* The remedy may involve the APP (e.g. if the patient has to go back to the fluoro table for additional maneuvers), but ultimate responsibility for assuring the completion of diagnostic imaging will be with the checking physician.
    - If the remedy for an inadequate scan will affect the recovery room process or alter the expected discharge time of the patient, the checking physician should communicate with the APP to make sure they are aware.
    - The Myelo resident will be the usual person responsible for checking scans. Backup contact instructions will be listed on the protocol sheet in the event that the Myelo resident is unexpectedly not available.

Appendix 2b: Checklist for procedures

RECEIVING THE REQUEST/PRE-PROCEDURE

- Ensure that you understand why the procedure is being done and what the exact goal of the imaging or intervention is. This is best done by direct communication for inpatient procedures, and by careful review of the chart for outpatient procedures. DO NOT perform any procedure where you are not completely clear about the purpose.
- For LP requests, has the procedure been tried at bedside? If not, why not? If so, why did it fail?
- Review contraindications to the procedure, including:
    - Inability to provide informed consent/obtain consent from legal designee.
        - § If the patient cannot consent, who is the legal person to provide consent? Is that person present at the hospital, or do we have contact info for them?

- Medical conditions that result in unsafe procedural environments (such as hemodynamic instability) or inability to undergo the procedure in question (such as inability to lie flat, prone, etc.)
- Coagulopathy (review labs to check INR/PTT and platelets, review medications including heparin for DVT prophylaxis) – see Appendix 4
- For LP/myelograms, make sure that recent head imaging shows no mass effect or recent fundoscopic exam shows no papilledema. If these are not available, inform the attending before proceeding.
- For LP/myelograms, review any available spine imaging to determine the position of the conus, and make sure it is not low-lying, and plan the level of access.

- Assess the need for sedation. If moderate sedation is needed, make sure to:
  - Perform and document a H&P (find a template in Epic using the dot phrase ".radpre"). Make sure to complete all parts of the physical exam that you document.
  - Obtain written informed consent for the sedation (a different consent form from the procedural consent)
  - Confirm that the patient has been NPO (solid foods x 8 hours, liquids x 2 hours)
  - Coordinate well in advance with the nursing staff or anesthesia to make sure they are available and aware
- Assess whether the patient is pregnant, if applicable
- Determine if any samples will be collected (such as CSF sample, biopsy specimens, etc.) and make sure the tech staff is aware that his will happen. If path specimens will be collected, make sure path support is available.
- For lumbar punctures, does an opening pressure need to be obtained?
- Make sure there is an order for the procedure. *NB:* LP orders need to be XR lumbar puncture, *not* IR lumbar puncture.
- Communicate with the tech or staff coordinating the equipment (such as Meme on the GI hall for fluoro-guided procedures, or the J-hall or DMP CT coordinator for CT-procedures) to determine when the procedure can happen
- Ensure that the attending is aware of the procedure, any contraindications, and the expected timing of the procedure

INTRA/PERI-PROCEDURE

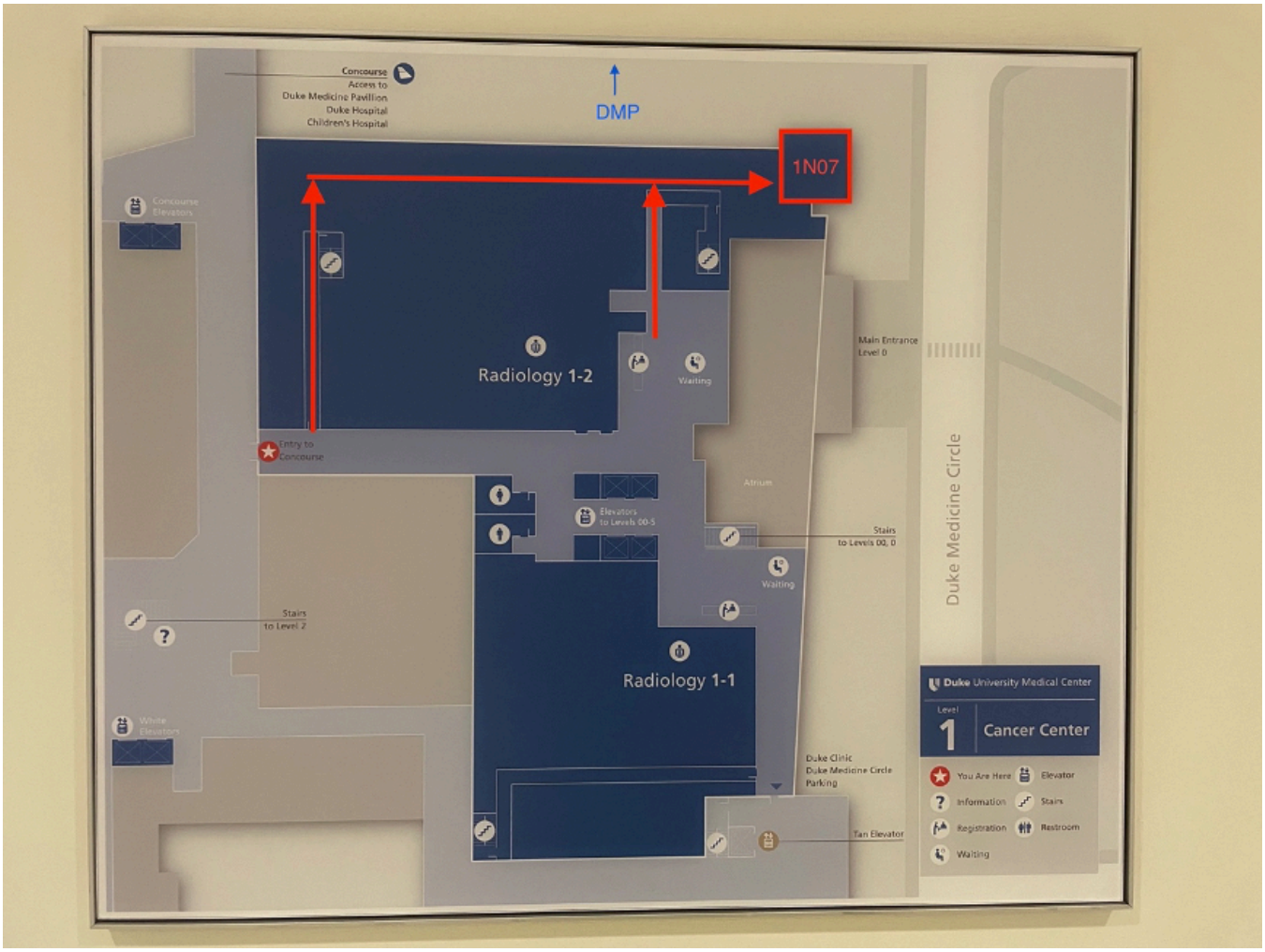
- Make sure that you understand all the steps of the procedure and ask for help promptly if you do not.
- Obtain written informed consent. Include discussion of risks in all consents. If unsure of what risks to discuss, ask your attending.
- Explain to the patient what they should expect during the procedure and what they should do after the procedure. Make sure all of their questions are answered.
- If the procedure is an outpatient procedure, ensure the patient has a driver

- Perform a “time out” with the patient, attending (when directly supervising/involved in the procedure), and all other involved staff in the room. Do not under any circumstances proceed with the procedure unless the time out is completed.
- Ensure that all syringes and medications are properly labelled. Never use any medication that is unlabeled.
- Talk to the patient during the procedure to make sure they are comfortable and know what to expect next.

POST-PROCEDURE

- Ensure the patient is in good condition prior to returning to recovery or the floor.
- Place appropriate orders in the chart for recovery. Order sets may be copied from other residents, or if in doubt, ask an attending.
- Make sure that all samples collected are physically handed off to a responsible party and that the plan is clear for how those samples will be transported for analysis. Never leave samples in the room without clear communication of who is taking responsibility – it is highly likely that they will be lost.
- Discuss any complications or post-procedural concerns or instructions with the care team, including the primary covering provider AND the nursing staff if applicable.
- Be available by pager to respond to any post-procedural concerns from recovery

Appendix 3: Conference Room Map



Appendix 4: Neuroradiology anticoagulation guidelines

The following hold times are listed for procedures that are considered MODERATE risk for adverse bleeding events (including interventions in the epidural space such as lumbar puncture, and most biopsies)

- Lovenox (Enoxaparin)- 12 hrs
- Plavix (Clopidogrel)- 5 days
- Coumadin (Jantoven, Warfarin)- 5 days
- Pradaxa (Dabigatran)- 48 hrs
- Aggrenox (ASA and Dipyridamole)- 48 hrs
- Xarelto (Rivaroxaban)- 48 hrs
- Arixtra (Fondaparinux sodium)- 24 hrs

- Effient (Prasugrel)- 7 days
- Eliquis (Apixaban)- 48 hrs
- Brilinta (Ticagrelor)- 5 days
- Trental (Pentoxifylline)- 3 days
- Ticlid (Ticlopidine)- 7 days
- Pletal- 48hrs

NUCLEAR MEDICINE & RADIOTHERANOSTICS

Faculty contact: Olga James MD

::Schedule::

Start Time (residents): All of the residents are encouraged to attend 7:30 morning conference. The residents are expected to be in their designated RR at 8:30am or immediately after the conference. Should the conference be canceled for any reason, the residents are expected to start in the reading room at **8:30 am.**

Start Time (mini-fellows): The mini fellows are exempt from the 7:30 conferences and expected to report to service at 7:30 when covering DMP, therapy or "slasher". Mini fellows covering PET are expected to answer clinical questions from the technologists usually starting at 7am or a little earlier. Mini fellows assigned to the radiopharmacy are to report to the radiopharmacy at 6:00 am and finish the day at 2pm. Please contact radiopharmacy at 684-1234 for directions and location. Tech day should start at 7 am in the Cancer Center for the QA/QC for one hour (contact 613-2086), after that the mini fellows will have DMP time with the techs learning to protocol, division clinical flow, technical aspects, and meet with Emily Albrecht concerning protocolling and troubleshooting. PA time will include observing and performing lymphoscintigtraphies and lymphangiographies, overview of clinical information in regards to Lu-177 DOTATATE and PSMA therapies, cardiac stress testing appropriateness when applicable to the trainee. After August, mini fellows are expected to assume protocolling responsibility with the exception of therapies.

Late shift: The late shift starts at **1:00 pm** and the late PET resident will be expected to dictate all of the studies on the General NM and PET list that evening. The last readout of the day will be around 5 pm, with any additional dictations picked up afterword to be readout the next day with CT attending (usually 8:30 am). No more than 5 PETs will be left to be read out the next day. The exception is on Fridays, on which all studies will be dictated and read out (possibly remotely) before heading home.

Of note, dictations done after the end-of-day read-out should be preliminary signed and should include as impression #1: ***Please note that this is an afterhours preliminary resident report to facilitate communication. This study has not yet been reviewed by an attending physician.*** This disclaimer will be removed at the time of final sign off.

End Time: the residents are to check with the attending of their designated rotation prior to leaving. Residents ARE NOT to grant permission to other trainees to leave the service without an attending's approval. Generally, residents will be able leave when all examinations performed prior to 4:30 pm have been interpreted.

::Resident responsibilities::

1st year residents will be assigned to interpreting general nuclear medicine studies from the DMP, Cancer Center and DRAH. They are expected to review current study and comparisons when available, utilize all available correlative imaging, review clinical history in EPIC, and interpret the study based on available clinical information. First year residents are not expected to do MD checks and troubleshooting during the first two weeks of rotation. During the first two weeks of rotation, the first year residents are to accompany the other residents or attendings to become familiar with the rotaion flow and processes.

2nd-4th year residents: MD checks. Technologists often contact the residents in the DMP RR regarding the quality of the study and potential need for additional imaging prior to releasing the patient. Administration of Lasix and review of CXR prior to VQ scan approval are additional responsibilities handled by the residents.

Slasher resident: Expected to work from the DMP, participate in helping with the list PET/CT included, assist the first year resident, participate in therapies by reviewing the history and imaging, and accompanying the designated attending and fellow.

PET RR: are responsible to cover CC extravasation and anxiolysis requests between noon and 5pm. Inpatient PET requests are expected to be reviewed by the resident and discussed with the referring service. Please note, the time and date of inpatient PET will be determined by the technologists following approval of study for appropriateness and urgency (684-7971); the date of the study is not to be communicated to to the clinical services by the resident

::Conferences::
Morning General Radiology Conference: (Mon, Tues, Wed, Thurs, Fri; 7:30-8:30 am, Room 1515): Every effort should be made for the residents to attend morning conference. If a conference is not held for any reason, you are expected to join the service at 7:30 am. You should also plan to attend resident hot seat conference (Mon and Fri 12:00-1:00, Room 1515) as clinical duties allow.

NM Teaching Conference Conference: 12:00 -1:00 pm. Schedule will be emailed monthly by Gloria Irving: Your attendance of the lectures online and in person are expected. Of note, the completion of Radiation Safety and Nuclear Medicine Physics Didactics is a part of the graduation requirement for all residents.

Interesting Case Conference: Mondays 8:30 - 9:30 am. Residents are expected to present 1-2 interesting cases during the previous week, and present them to the group along with key learning points. Cases should be placed into the conference folder in VISAGE.

Pediatric Radiology

Resident Roles:
R1: R1 residents will primarily read plain films on their first peds rotation. Each R1 is assigned a 1 week of palin films, 1 week of fluoroscopy/plain films and 1 or 2 weeks of ultrasound depending on time of the year/experience. R1 residents should continue to pick up plain films while on ultrasound. Of note, reading a high volume of plain films will help prepare the resident for independent call.

R2 & R3: R2 and R3 residents will predominantly be assigned to ultrasound and cross-sectional (CT, MR) imaging. Residents are expected to help with the plain film list as well. Opportunities for interventional procedures will depend on the presence or absence of a fellow or mini-fellow, with the fellow given priority for these cases. MD checks for cross-sectional studies are primarily the responsibility of R2 and R3 residents. An R1 resident who has rotated on Body and Ultrasound may perform MD checks on CT and US respectively, if comfortable.

Start Time: All of the residents are expected to attend the morning conference and then report to the pediatric radiology reading room at 8:30. If there is no morning conference or grand rounds, residents are expected to start in the reading room at 8:00 am.

End Time: Residents can typically expect to finish the work day at 5 pm.

Interventional Procedures: The pediatric radiology fellow (or mini-fellow) has the right of first refusal on all interventional procedures, but R3, R2, and less frequently R1's will also have opportunities. The common procedures performed in pediatric radiology include renal and liver biopsies, abscess drainages, and targeted biopsies (such as thyroid fine needle aspirations. Nearly all peds procedures are performed with ultrasound guidance and all are supervised directly by an attending. The trainee performing a procedure is responsible for consenting the patient (typically the parents for peds cases) and checking labs to ensure a safe procedure.

Fluoro cases
All radiologists should be familiar/comfortable with performing a pediatric upper GI series, contrast enemas, and VCUGs. *If assigned to Fluoro/IR, the resident will participate, in conjunction with the Fluoro/IR attending, in the multidisciplinary "Tumor Board" conference which takes place on Wednesdays at 4 pm*. R1 residents will be called to assist in "G-tube checks," even when not on fluoroscopy week, because this is the one exam residents will be expected to perform independently on call. R2 and R3 residents may not be scheduled for a dedicated week of fluoroscopy, but should seek participation in 5 UGIs, 2 VCUGs (one male, one female) and 1 contrast enema during the rotation. *When there is an intussusception reduction case, all of the residents on service should observe and/or participate in the case!*

CT Protocols: The resident or fellow assigned to cross-sectional imaging is responsible for protocolling pediatric cross-sectional cases, and should seek assistance in protocoling these case from the attending pediatric radiologist on service, especially during the initial week. The volume of cases needing protocols is less than some other services but may require greater attention.

Conferences: Residents on the peds service are expected to attend the resident morning conference from 730 – 830 am as well as the "Hot Seat" conference on Mondays and Fridays from 12 -1 pm. A pediatric-specific unknown case conference will be held on Tuesday, Wednesday and Thursday at 12:15, residents may leave the clinical service at noon to get food to bring back for the conference. The conference is led by the attending assigned to fluoroscopy, so the time may vary if there is a biopsy or drainage procedure during that time. Residents and staff should work together to ensure timely readout of morning cases to permit timely start of lunch and case conference. Additionally, there will now be a 30 minute lecture with the theme of "Pediatric Emergencies" beginning around 2 pm on Fridays given by the "Reading Room" attending.

Documentation: Calling and documenting the report of critical findings: Be sure to document what findings specifically were reported, who they were reported to, who reported them, and at what time. When you document the name of the person that you spoke with you need three items: First name, Last name, and title (MD, RN, RT).

If you leave a message regarding a patient that is NOT in an ICU with someone that is not an MD, a readback should be performed. It is surprising how often critical information is missing when the person reads back the message.

Weekend service days: Residents assigned to a weekend pediatric service day should arrive at 7:30 am. Clinical responsibilities will depend on the attending and the level/experience of the resident and should be discussed at the start of the day. The resident can expect to leave by noon.

Recommended Reading:

- Electronic versions of books may be accessed through the Clinical Key service of Duke Library (https://mclibrary.duke.edu/clinicalkey)
- R1: Fundamentals of Pediatric Imaging by Lane Donnelly; Core Radiology (pediatric section) by Jacob Mandell
- R1-R3: Pediatric Radiology: The Requisites by Michele Walters, Richard Robertson
- R4+: Pediatric Radiology: Practical Imaging Evaluation of Infants and Children by Edward Lee.
- Archived video lectures on the DukeRads website also provide good overviews and an introduction to fluoroscopy.
- Recommended question banks (if accessible): Radprimer, Board Vitals

Updated 8/24/2023 MFF

Vascular and Interventional Radiology

Welcome to Vascular and Interventional Radiology! We're a busy, clinically oriented service that operates in many ways like a surgical subspecialty service. The doc below lays out the basics of how the service runs and how to run it well, but if you have any questions - and you will have them - don't hesitate to ask upper level residents, fellows, or attendings. It's a hard service and we're here to help.

WHAT KIND OF PROCEDURES DO WE DO:

Most common, usually non-emergent:

- Central line placements (Port, 'Hickmans' [a tunneled central line for meds], 'Permcaths' [tunneled line for dialysis, apheresis]). We *can* place non-tunneled central lines, but there is a medical procedure team that can (and generally should) do this (though we do occasionally place 'Vascaths' - non-tunneled dialysis / apheresis lines)
- G tubes, GJ tubes, J Tubes. Nutrition is never emergent
- Tube exchanges (checking and exchanging existing PercChole, PBD, PCN, clogged GJ Tubes)
- For slightly more detailed descriptions of these procedures and their attendant risks (for consenting purposes), check out our brief procedure document.

Urgent / Emergent: PercChole placement (Percutaneous Cholecystostomy); PBD placement (Percutaneous Biliary Drain); PCN placement (Percutaneous Nephrostomy); Arteriograms (and embolizations) for active arterial bleeding, including UAEs (Uterine Artery Embolizations) from OBGYN

Exotic, generally elective: TIPS (Transjugular Intrahepatic Portosytemic Shunt, though these can also be urgent / emergent), vertebral kyphoplasties, JTubes, among others

GENERAL LOGISTICAL INFO:

- Inpatient rounds at 0645 (run by fellows), followed immediately by outpatient rounds (run by 1st call resident)
- Cases are added / scheduled in IRGlance (https://irglance.duhs.duke.edu/sign_in) - ask one of the technologists in the work area to give you access
- 1st call holds the pager from 0630 to 1830, or slightly earlier if cases finish before then. To sign in, dial 970-7930 on a hospital phone, *, #, 1, 5, 1, followed by your pager number.
- For any case, the following has to occur: Add to IRGlance, obtain consent from patient (or patient's consenting party), and add a presedation H&P to Epic. More on this below
- There is usually a dedicated inpatient / consult attending (in QGenda), who both follows up on patients from the inpatient list that need to be followed (after fellows see them in the AM) and is your go to for complex new consults (see below). There is also a call attending, who will be the one in-house doing late cases

RESIDENT ROLES

1. First call (aka, pager resident):

During rounds: Sit in the hotseat (right-most computer), run outpatient rounds

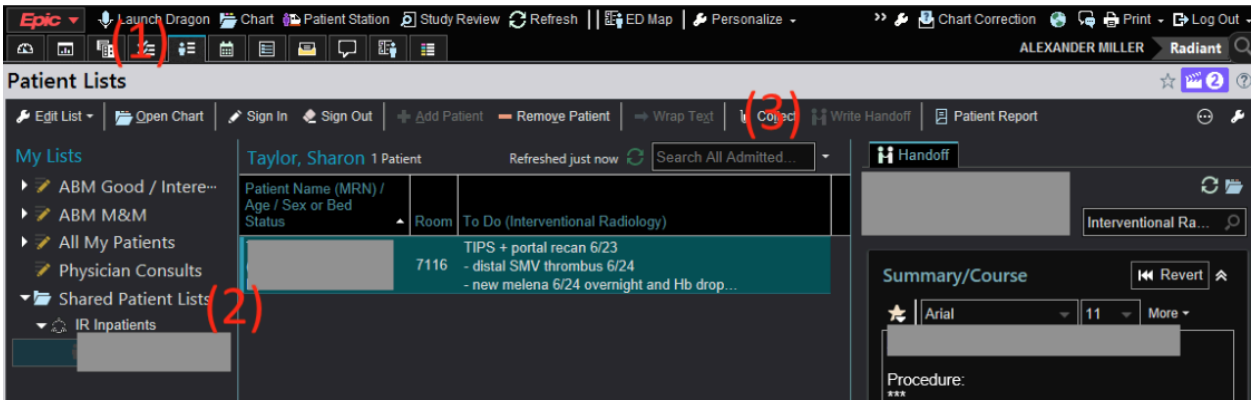
During the day:

- Hold the pager from 0630 to 1830 (or last procedure if earlier), respond to pages and add and any vanilla line placements or tube exchanges to the schedule per usual. For more complicated cases (like a new PCN, new GTube, new PBD), run it by the consult / call attending (it can be either the 1st call or 2nd call discussing with the consult attending, ideally 2nd call)
- Knock out routine H&Ps and consents as able, prepping IR glance, etc. We have a new Brief Procedure description document that is great for talking about procedures (and their risks) that you might not be familiar with. But also don't hesitate to ask fellows to help you out.

TLDR: Captain of the ship, you'll know the schedule and what's going on better than anyone else

2. Second call (aka, consult resident)

During rounds: Sit at the computer adjacent to the hotseat, and during inpatient rounds jot down any updates to the inpatient list in the 'X cover to do box' in the Interventional Radiology handoff, remove patients from list if agreed on. Also pull up images for anything that will need to be reviewed, ideally on either the large diagnostic monitor (a different workstation), or on the TV (also a different workstation)



During the day:

- Technically manages all of the more complicated case requests (beyond central lines, tube exchanges). This ends up being somewhat split between 1st and 2nd call, with the prevailing notion being that 2nd call resident does as much as they can to assist 1st call resident (in this and all instances). For these notes we'd use the consult template and feed in a little more history and slightly more fleshed out plan. Even for patients that we're consulted on and don't do a procedure, leave a consult note if there was significant discussion.
- Knock out as many consults (inpatients and outpatients) as possible - again, you are the 1st mate to the 1st call.
- Help out 3rd call with line pulls if they are scrubbed in a case and you have the bandwidth.

TLDR: Do everything you can to make the job of 1st call easier

3. Third call (aka, procedure resident)

During rounds: Sit at the single-monitor workstation, which is connected to the big TV, and pull up any relevant imaging for both inpatient and outpatient rounds (the mouse for the small TV has really gone to shit and you have access to Visage, so you can show things on a bigger screen in a better way).

During the day:

- Scrub cases! Specifically, you should get at least 1 central line (Hickman, Permcath, Port) per day. There will be a fellow / attending designated in QGenda as the teaching fellow. To hit the ground running, please view the 'Central Line Basics' powerpoint we put together.

- If not scrubbed in a case and line pull comes up, knock it out.

4. Everybody (all residents) -
Pitch in on preparing the IR Glance list, pick off outpatient consents and H&Ps

GENERAL CHANGES FROM YEARS PAST

Monthly schedule: Like in year's past, the breakdown of each resident's time in each role goes as follows: R1 (2 weeks 1st call, 1 week 2nd, call, 1 week 3rd call); R2 (1 week 1st call, 2 weeks 2nd call, 1 weeks 3rd call); R3 (1 week 1st call, 1 week 2nd call, 2 weeks 3rd call). The R3 on service will work with the R1 and R2 to figure out who does what each week, with only limitation being that the R1 cannot be 1st call the first week on service. Vacation while on service comes out of your 3rd call time.

UNLIKE in year's past, when the preceding week's 1st call would come in the last Sunday of the rotation to prepare the list, perform consents, and then again on Monday morning to run the list (even though they were on a different rotation), the 1st call will now coming the the Sunday PRECEDING their week of 1st call, such that they've prepared the list and done the consents for the patients they'll be presenting on Monday morning.

Additionally, as of **January 2023**, when placing orders for G/GJ tubes, the ordering team should now be the ones to order placement of the NGT, administration of barium, and morning KUB (you just need to talk them through it when taking the consult). **Also,** see section below on discussions with team when they want a G / GJ tube (punchline, they probably just need a GTube)

Consult notes: We're trying to appear as more of a clinical service, a component of which is producing slightly longer / more thoughtful consult notes for anything beyond vascular access, fistula shit, and line replacements (e.g., bleeders/GTubes/PCNs/PBDs). To assist in this, there are microphones for each of the computers, for which I'd recommend dictating the longer bits of the note (PMH, A&P) into Powerscribe and copying it into Epic. If Powerscribe isn't on your desktop, you can log into it via https://vwp-psapp.dhe.duke.edu/PS360ReportingClient/Client/Nuance.Powerscribe360.application

Consent forms: Bad news – all consents are generic now. Basically you need to write in the patient last name and MRN on only the front page of the consent (techs will print out stickers). There are stamps for the most common procedures (2 lines you have to fill in) and an adjustable date stamp (3 lines). There are also stamps for the attending line, but I usually just wrote it in.

Etc: In the vein of looking more like a clinical service / putting patients at ease when talking to them about procedures, we'd ask that you wear a white coat into the room when talking to / doing a procedure on patients (not unlike mammo). We have extras if you need them.

TECH UPDATES:

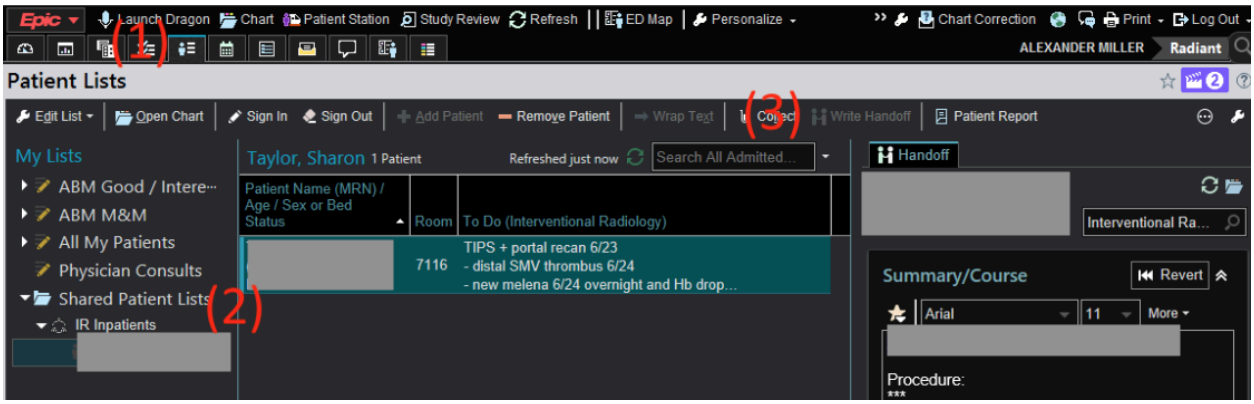
1. As of June 2022, all IR procedures are dictated directly into Epic, including line pulls. Like with Powerscribe, a report should automatically be generated that you then fill in. You'll find your 'cases' (ie, line pulls), in the DUH Neuro/Vasc IR worklist. Same as before, let the techs know when the line's been pulled.

2. Computers now have microphones for dictating directly into Epic to expedite consult notes. If you can't find Powerscribe on the desktop, go to https://vwp-psapp.dhe.duke.edu/PS360ReportingClient/Client/Nuance.Powerscribe360.application

3. All 4 computers have Visage and external monitors for image viewing. If for whatever reason you can't find it, you can download the thin Visage webclient from **https://riv.dhe.duke.edu/**, and when asked for 'Server information" type in **riv.dhe.duke.edu**

4. There are generic IR templates for pre-sedation H&Ps and Consults: **.DukeIRHP** - use this for standard pre-sedation cases. For consults, add 'Consult' to the title of the note and flesh out the history and plan a touch more.

5. You should have access to the IR inpatient list that the fellows reference during inpatient rounds. Under the 'Patient list tab' it should be under shared list, click Handoff to see it. Make sure you have Interventional Radiology selected (not radiology) - it has a section that the fellows can update directly with information about the case and what they want the inpatient team to follow up on.



TEACHING / CASE UPDATES:

Residents work hard on this service and deserve an equal measure of procedural teaching. In truth, this section has not always met that measure, but we're implementing changes this year to try to correct it:

- **IR Procedure guide.** This is an in-house tutorial that goes through the steps of all our most basic procedures: Permcaths, Hickmans, and Ports. Seeing a case is not the same as doing one, but this will hopefully get you up to speed much faster and help consolidate the step of the procedure in a meaningful way in the short time you have on service.
- **Procedure description guide.** High level overview our most common procedures (and attendant risks) for purposes of patient consents.
- **SIR Website**: Another great resource with procedure guides for higher level cases
- **BackTable VI:** Similar if not slightly better than SIR for videos of all stripes

ETC:

- If there isn't a dedicated consult attending, talk to the call attending regarding consults.
- If you have a Sub-I: You can train them up and deploy them for independent line pulls and consults.

IR WORKFLOW TIPS

PREPPING IR GLANCE / ROUNDS

- My personal way of updating entries in IRGlance - both as a space saving syntax and to know that I've update the case - is as follows: ##M/F (procedure) - Briefly why the procedure, any important details around it, and labs and a/c status if a high bleeding risk case. For example:
    - 67F tunneled apheresis catheter - MM, planned ASCT [low bleeding risk procedure, doesn't need bleeding risk details].
    - 80M GTube placement - Venting GTube (malignant SBO), no pre-procedure barium (CT window looks good), PLT 100, no a/c. [by contrast, this is a high bleeding risk procedure and can have some variability to it)
        - This is less important for routine cases like central lines, but for anything more complicated having these details is immensely helpful
- To avoid rounding sheets with outrageously small font, select the 'copy from 1 sided to 2 sided option' on the copy machine in the backroom
- During inpatient rounds, one of you should update the IP List (now available to you under the 'Patient Lists' tab > Shared lists > Interventional Radiology) with pertinent discussion.

CONSENTS & PAPERWORK

- For inpatient consents, you only need to put the patient's name and MRN on the front-facing sheet - the scheduler will print out the formal sticker.
- If a patient has an H&P by us in the last 90 days, it should be visible under the notes tab, and you can duplicate it by selecting 'Copy' from the top bar and making the handful of changes necessary

Talking to patients about moderate sedation: The only commonality about moderate sedation between patients is the combination of medications given (Versed and Fentanyl), beyond that the patient experience can vary widely. The goal is patient comfortable during the procedure - I always tell patients that an uncomfortable patient makes for a harder procedure - but ultimately the patient's hemodynamics dictate how much we can safely give, and in patients not naive to benzodiazepines and opioids, the amount of medication needed to 'make them fall asleep' would probably require starting pressors and/or intubating them. All that is to say when you talk about moderate sedation, it's hard to make guarantees exactly what state they'll be in. Rather than say they'll fall asleep, you can say the goal is to make them sleepy and comfortable, but that we need to do so safely, and if they are feeling any discomfort to let us know because we have both systemic medications as well as local anesthetic we can use to achieve that.

CONSULT-SPECIFIC DISCUSSION POINTS

We want a GJ tube: But why! Seriously, GJ tubes outside of Duke are a very rare entity (the rest of the world gets by on GTubes), but we do a TON because of all the lung transplants we do, and given that aspiration can lead to rejection we oblige their requests for GJs. By virtue of having GJs floating around, everyone wants them. Only real indications for GJs (over just a G) are gastric dysmotility, pancreatitis, and florid (and documented) reflux that leads to aspiration. Short of that they should just get a G. TL:DR, GJ tubes are harder to place and prone to clogging, creating lots of work for all parties. So when

teams calling ask for a GJ, ask them those questions, and you can reassure them that we place GTubes on such a trajectory that we can easily convert them to GJs.

We want a GTube / GJ Tube in an ICU patient: See prior paragraph re: GJ tubes. After that, ask if we can wait to place it until the patient is on the floor (intubated patients generally don't mind having tubes down their noses). The rationale is that there is WAY higher mortality associated with G/GJ tubes in ICU patients than floor patients.

Patient has bacteremia and have a line in place, can you take it out today and replace it 2 days later: The idea of line holidays is one that ID loves, but has no evidence (like much of ID, it turns out). And we have a lot of patients with terrible access, and giving up a line might mean losing that vessel. All this is to say that we can often do over-the-wire exchanges and not lose access, so worth asking if they are amenable to it (less so with fungemia, usually yes with bacteremia).

We want to stop anticoagulation on pretty much all of our patients, right? ACTUALLY NOT. There are plenty of high-bleeding risk procedures where this definitely is the case (solid organ biopsies, GTubes, among others - there's a sheet in front of the resident desk), but the vast majority of our procedures don't require any pausing of anticoagulation, like, at all (e.g., central lines, exchanges). Further, there are some procedures for which we ACTIVELY WANT the patient to be anticoagulated, e.g.: pulmonary thrombectomies, IVC filter removals, AVF declots.

A medicine team wants a procedure but have no idea why or when they need it (ie, consulting service request via a medicine primary team): Not uncommon, especially if it's a surgical consulting team. If this happens, by all means talk to the primary team to get details about the patient, but have a very low threshold to just page the consulting service directly to discuss - either the name of the consulting resident or the consulting functional pager will be in their note. E.g., a medicine team wants an inpatient AVF declot - which we are loathe to do - because vascular surgery or nephrology asked for it. Just page consulting teams teams to get a better sense of the urgency and alternative options.

IR PROCEDURAL TIPS

LINE PULLS

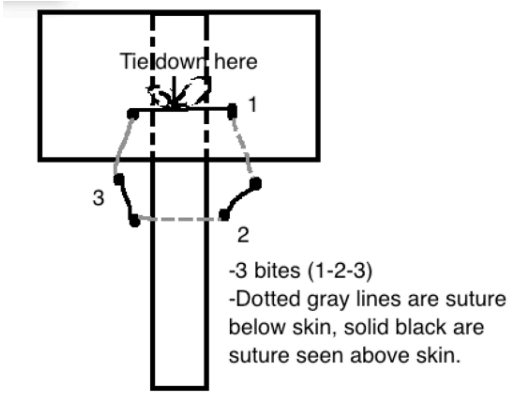
Won't come out**:** If they are newish (<2 months) and difficult to remove its likely sticking where the cuff is trying to come out of the skin - either pull harder or numb that area and dilate with Kellys. If older, it's likely a fibrin sheath anchoring it from the cuff proximally. Besides dissecting proximally to it (using Kellys to spread tissue about adherent to the cuff, even using scissors to cut the fibrin [but not the catheter, duh]), you can do some hydrodissection by essentially sticking down around the cuff with the 25g lido needle and injecting (don't puncture the tubing, but if you're on the cuff that's real hard to do).

Won't stop bleeding: There is basically no PLT or INR that we won't pull a line. If you suspect it's going to be awhile holding pressure, ask the team to have either a nurse or MD available to take over if it doesn't stop after 5 minutes. After pulling the line, put patient as upright as they'll tolerate (reduce venous pressure) and keep pressure both on the venotomy and along the tunneled tract.

GJ TUBE SHENANGIANS

For leaking G / GJ tubes: The disc likely just needs to be cinched down. You can do this at any age of the tube, but be more mindful if it's in the first few weeks (tract less mature / robust). To do this, pinch the tube just distal to the disc and push it down. The procedure note should have the distance.

J Port of a GJ is clogged: Assemble a 10cc Luer lock syringe (standard syringe - can get a Medallion syring also, ask fellows or techs), a Christmas tree adapter, 2 blue surgical towels, and room temperature tap water from the patient's room. The most important thing is to wrap and squeeze the part of the shared tube closest to you while injecting. If not - and you can watch it - it will balloon up as you inject and you won't be able to generate sufficient pressure to bust the clot. So wrap it, squeeze it, and slam the plunger - make sure there's no air in the syringe (air is compressible and will rob you of valuable mmHg of pressure). Some folks like to do moderately vigorous pushing and pulling of fluid first to try to loosen the clot. Your choice on this.

EXISTING TUNNELED LINES: **It won't stop bleeding:** They probably need a purse string stitch. You can vask a fellow to do this, or you can do it yourself. See the diagram to the right, but it is 3 suture bites that all together go circumferentially around the cross section of the tube, as to bunch of tissue around it. Use a non-absorable suture, add to IR glance as it needs to be checked / removed in 2 days	

INTERESTED IN IR?? Great choice! The application to IR fellowship is much different than for DR fellowship and the pathways into it are variable (e.g., Integrated, ESIR, Independent). These are confusing, and if you're at all interested in IR fellowship at Duke (or anywhere), reach out to Brendan Cline by the end of your R2 year (or earlier if interested).

VA Rotation - IT and Access Info

Reading room entry codes: Usually the room number backwards.
Wifi: Network: Guest-VA; Password: Welcome1

Computers: A little planning ahead will help you avoid IT issues at the VA. Please review these points and consider dropping by the VA a few days before your scheduled rotation to test your access.

- All VA extensions use the code 17-XXXX.
- Dial 17-5812 for the nationwide VA IT clearinghouse. They will be able to help you solve most IT problems that come up after your initial credentialing.
- Your computer access and CPRS verify code typically expire after 90 days. If you have not logged in recently, you probably need to get these items reset by calling 17-5812.
- For any issues that cannot be resolved by VA IT, call Sibyl Pearce at 17-2188 or Marcia Saunders at 17-4577, or message them on Teams.

PIV Cards: Your PIV card is needed for computer access at the VA. Please make sure your card is not expired. The PIV office is now conveniently located next to the brown elevators on the ground floor. You can even make appointments online if there is need (Sibyl, Marcia, or one of the attendings can show you how). If you are unable to obtain a working PIV before the start of your rotation, you can get a temporary exemption by calling IT at 17-5812. This will allow you to log in using a username and password until your card is ready.

Powerscribe: Powerscribe should open automatically on your PACS station. If needed, you can sometimes log into Powerscribe manually using this method:

- user: vhadur[5 letters of last name][first initial]
- pw = [firstname, lower case][first 3 digits of SSN]

If that does not work, try restarting the computer. If that does not work, please contact Sibyl.

CPRS:

- Link is available under VA Shortcuts > CPRSChart DUR. The easiest way to log in is via your PIV card. You can also choose to sign in manually:
- Access Code (username): Usually some combination of your name and SSN, such as [Initials][Last 4 of SSN]. Get it reset by calling 17-5812.
- Verify Code (password): Set by you. Expires after 90 days. Get it reset by calling 17-5812.

Sign order code: Used to sign notes and place orders in CPRS. Set by you (again, usually a combination of your name and SSN). Get it reset by calling 17-5812.

McKesson: The Visage of the VA. Controls are very different from across the street, recommend going to DukeRads for tips on how to optimize the settings for easier navigation / image manipulation. Highlights are below, accessed by selecting the **Preferences** button on the top bar of McKesson and going to **Shortcuts**.

- Power scrolling: If you don't want to use the scroll wheel for everything, press down the scroll wheel once, they move the mouse and you should be in power scroll mode. There is a separate Power Scrolling menu under preferences, make sure the Power Scroll mode is set to proportional and the Mouse control is set to Mouse Click.
- Zoom/pan: There isn't a slick way to zoom in with a single mouse button, I have my Interactive Zoom in place set to Shift+Right drag and Pan to Ctrl+Right drag
- Triangulation pointer: Listed under Link > Interactive scroll to point. Mine is set to Ctrl+Shift+Left drag.
- Linking studies: Under Link > Link All you can link sequences within the same study (I have this set to S for Sync). If you want to compare across studies, you'll use the Precise Registration tool (this should be default set to P). If you're using these, also worth mapping 'Unlink' to break the linking (set to U).
- Window-level: The VA defaults don't match the Duke defaults (ie, 1 as soft tissue, 2 as lung, 3 as liver, 4 as bone) – you can change these to match here
- Layout: You'll usually start with 8 images. To quickly change the screen layout you can modify the hotkeys for 'screen layout' – I have my 1 x 1 image set to Shift+1, 2x1 set to Shift+2, etc. Layout >Cycles series forward and cycle series backward. Moves you to the next 8 MR sequences. I set mine to V and Shift V, fwiw
- Annotations: Clearing everything except for Arrow (A), Distance (D), ROI (R), and eraser (E). Once you've started using one of these tools, you can close it by clicking the button again (e.g., click D, do your measurements, click D again to exit it)
- Re-orient: Only really relevant to MSK MR, worth setting to these the different arrow keys

Templates: Alex Miller made up a bunch of templates that pretty closely emulate what we have across the street and account for the weird formatting that reports show in CPRS and include fields for total DLP (for CT) and contrast amount / GFR (for MR). The nomenclature is MR _____ (liver, MRCP, abdomen, prostate) and ultrasound _____ (liver, scrotum, leg, arm). Similar story for CTs: body belly, body belly non-con, CT chest, CT chest PE, CT chest pulmonary vein. The notable exception is lung cancer screening, which you MUST use the nationally standardized template, which is something like **lpop LCS final**. Sarah Cater also has a bunch of very useful templates that you should consider.

Wifi: Again, network is Guest-VA, password is Welcome1

Microsoft Teams: This is the Jabber equivalent at the VA and can be loaded up on your side computer (where you log into CPRS). If it's not already installed, do the following: File explorer > This PC > (C:) OSDisk > Program Files (x86) > Teams Installer > Teams

CPRS Note Templates: You will only ever need 4. To make them easily available everytime you make a new note in CPRS, go to Options > Notes > Default note templates (or something to that effect), and add the following 4 templates: Radiology, Radiology-Post Procedure Note, Pre-Procedure Assessment, Central Line Placement/Removal. When you got to create a new note, these should be right at the top of the list.

VA Rotation - R1s

READING ROOM LOCATION: Third floor of the Durham VA, room F3135, closest to the brown elevators:
HOURS: 8:30 am – 4:30 pm

CONFERENCES

- Typical Duke conference and hotseats
- Additional teaching conferences are given in the department every Tues, Weds, and Thurs at noon for the R1 and R2
- Keep a list of cases that you thought were interesting. We will ask you and the R2 to each present 6-7 cases in a conference at the end of the month (usually on a Weds) along with educational information/teaching points. Don't count on PACS or Powerscribe to keep up with cases you have read. You can write the cases down or send them in a Teams chat, which is secure and chats are saved. We will provide instructions on how to display your cases either in a Teams virtual meeting or in person in the conference room (depending on the COVID situation).
- Typically, we buy lunch for all the residents on the last Thursday of the rotation.

RESPONSIBILITIES

- Plain films (to include chest, MSK, and abdomen).
- Worklist is DUR-CR,CF.
- Your attending for the day is the "Clinic" attending.
- Please go at a pace that is challenging but comfortable. We want you to take enough time to look up your patient and generate a good report that is free of errors. Most residents start slow and build up speed through the month. Residents are also understandably faster at the end of the year compared to the beginning, and we understand that.
- Your list is a shared list; you, your attending, and other attendings will grab studies off it throughout the day, to keep things manageable.
- If you wish, you may pick up a couple of CTs at the end of the month for additional experience.
- You are expected to answer the phone (17-4215), please forward to your attending while you are away at conference.

WORKLIST PRIORITY

- Prioritize ER studies first, followed by stat inpatients, followed by non-stat inpatients, followed by outpatients.
- Studies completed prior to 4:30 pm must have a final report

IT ORIENTATION

- It can be difficult adjusting to the different programs/software at the VA. An orientation will be performed by Sarah Cater as a noon lecture at the beginning of the rotation each month, focused on tips and tricks. Bring your questions.
- The “IT info” and “How to communicate” documents on DukeRads should also be very helpful.

VACATION

- Vacation and parental leave are permitted; however, requests will continue to be decided at the discretion of the residency program. Overall resident vacation time cannot exceed the total allotted time allowed by the VA.

VA rotation – R2

The day starts at 8:30. The rotation involves covering the fluoro schedule, which consists of GI studies and joint injections or aspirations. We ask that residents review the procedures beforehand, gathering pertinent history and looking at prior images, and then going over this information with the GI/MSK attending as necessary. MSK MRI cases come from the Durham and Greenville MRI lists. We do not cover spine MRI. The rotation also covers MSK CT cases on the Durham CT list as well as lower extremity CTAs (i.e. runoffs).

Leaving routine late afternoon cases for the next day is up to the attending and generally based on the next day’s fluoro schedule. On Mondays, the list can be large with weekend cases and often the attending will read it down to a manageable level and then show you whatever interesting or otherwise educational cases they came across.

Residents are also responsible for fielding protocol questions from the MRI and CT techs and protocolling joint injection requests, which are filed in a bin just outside the reading room. On the bulletin board, there is a list of joint injections that we do under fluoro and those that we don’t. If there are any issues with a protocol, please ask the attending. When dictating joint injections, there is often a second fluoro order on the case in Powerscribe. Be sure to add that order to your report when you see it.

A typical day has 3-4 fluoro cases in the morning and 1-2 in the afternoon. We do not cover myelograms or LPs. During the mornings, try to read some MRI between cases, particularly inpatient cases so that they can be staffed promptly.

At the end of the day, you should get a schedule for the next day’s cases. Go over that before you leave and make sure everything is in order and you know what to expect. Be especially aware of barium swallow exams that are requested as timed barium swallows. We have a separate protocol for those, which the techs or attending can guide you through.

Keep a list of cases that you thought were interesting. We will ask you and the R1 to each present 6-7 cases in a conference at the end of the month (usually on a Weds) along with educational information/teaching points. Don’t count on PACS or Powerscribe to keep up with cases you have read. You can write the cases down or send them in a Teams chat, which is secure and chats are saved. We will provide instructions on how to display your cases either in a Teams virtual meeting or in person in the conference room (depending on the COVID situation). Typically, we buy lunch for all the residents on the last Thursday of the rotation.

Teaching conferences are given in the department every Tues, Weds, and Thurs at noon during the rotation for the R1 and R2.

Other sundry info:

- Include DLP for CTs (should be on the last page in the study)
- Include patient GFR for any MRs with contrast (should be a note in CPRS)

VA rotation – R3

READING ROOM LOCATION: Third floor of the Durham VA, room F3101, closest to the brown elevators:

HOURS

- A senior resident (R3 or R4) MUST arrive by 8:00 am and STAY until 5:00 pm. This is because someone needs to be present in the reading room in the event of a contrast reaction. (This does not have to be the same resident every day, please decide amongst yourselves based on schedule/moonlighting obligations.) The techs will call to make sure someone is there before starting to give contrast in the morning.
- Expectation is that both R3s will be present in the RR at least until 4:30 pm every day.
- If one R3 is covering for the other (for occasional appointments, etc.) that is fine, but please take care of both lists when this occurs (i.e. dictate your CTs and US).
- Consider arriving early on Monday mornings as many outpatients are scanned over the weekend, and the lists will be longer.

CONFERENCES

- R3s do not typically attend Duke teaching conferences.
- The exception is board review, when attending coverage is always provided.
- CT resident “interesting case” conference is the last week of the rotation (usually the last Thursday, from 12-1 pm) - and often a great culmination of your learning experience. Lunch will be provided. Please save your interesting cases so you can show them off with a teaching point or two.
- The US/MR resident does not do a case conference.

DIVISON OF LABOR – CT RESIDENT

- Responsible for all chest, body, and CVI CTs (with the exception of runoffs; as a historical quirk, these go to the R2 and GI/MSK attending) - worklist is DUR CT Body.
- In progress studies can be seen on the DUR In Progress list, but please do not dictate from this list, as it interrupts the tech review process.
- Responsible for all CT protocols: paper outpatient requests are in the folder by the door, please write down your chosen protocol and sign each one, paying close attention to the reason for the study and relevant background information (yes, this may require logging in to CPRS).
- Add on patients will be protocolled over the phone, your tech will call you.
- You can add or subtract contrast and body parts as you wish, no need to call providers for permission. Our referring providers know that we intend to perform the most appropriate study, and we take responsibility for the risks.

- Answering the phone (17-6622), this is a shared responsibility with the US/MR resident.
- You will occasionally need to consent patients for contrast administration or allergies.
- Specific to the VA: **Include DLP in your dictations** (should be one of the pages in the study)

DIVISON OF LABOR – US/MR RESIDENT

- Responsible for all US and body MR (including Greenville) - worklist is DUR US/MR.
- You will need to know how to mark prostates in DynaCad for this rotation. Please contact Sarah Cater to learn how, if needed.
- Responsible for all MR protocols: paper outpatient requests are in the folder by the door, please write down your chosen protocol and sign each one, paying close attention to the reason for the study and relevant background information (yes, this may require reading the chart).
- Add on patients will be protocolled over the phone, your tech will call you.
- You can add or subtract contrast and body parts as you wish, no need to call providers for permission. Our referring providers know that we try to perform the most appropriate study, and we take responsibility for the risks.
- You will occasionally need to consent patients for contrast administration or allergies, and may be asked to place orders for sedation.
- Answering the phone (17-6622), this is a shared responsibility with the CT resident.
- Please try to help with the CT list when caught up.
- Occasionally, the US/MR resident may be asked to cover procedures if the R4 is unavailable. This is a rare occurrence, and we will do our best to make sure the workload is manageable.
- Specific to the VA: **Include GFR in MR studies with contrast** (there should be a note in CPRS)

WORKLIST PRIORITY

- Prioritize ER studies first, followed by stat inpatients, followed by non-stat inpatients, followed by outpatients. Lung cancer screening studies are the lowest priority.
- Studies completed prior to 4:30 pm must have a final report (per “Reviewed on” time in McKesson).
- Most ER/stat studies performed after 4:30 pm can roll over to the moonlighting fellow, who arrives at 5 pm. However, if the study cannot wait due to acuity, please contact Danielle (Tues-Friday) vs. the day’s Clinic attending (all Mondays, or days when Danielle is off) for a read out.

VACATION

- Vacation are parental leave are permitted; however, requests will continue to be decided at the discretion of the residency program.
- Overall resident vacation time cannot exceed the total allotted time allowed by the VA.

VA rotation – R4

HOURS

- Please arrive by 8:00 am, as the first procedure is usually scheduled for 8:30 am.
- We average 2-4 procedures per day, though it varies considerably.
- You can depart for the day once all planned procedures are completed. Sometimes, this is as early as noon. However, you are responsible for any add-on procedures until 5 pm (when the moonlighter takes over).
- It is therefore crucial that if you leave early, provide your contact information (cell phone number, pager) to both the techs and your colleagues in the reading room, in the event of an afternoon add-on. You are expected to come back in if this occurs.

RESPONSIBILITIES

- All body procedures, US- and CT-guided. You will also do lung biopsies, bone biopsies, and bone marrow biopsies.
- Schedule is written on the white board outside of CT. You can also call US and CT for the schedule or stop by the CT and US work areas.
- Your attendings will be a mix of Duke body attendings and VA staff attendings. As you know, individual comfort levels with different procedures vary, so you may occasionally work with more that one attending on the same day (for example, if there is a lung biopsy on a Duke day, then you would do that procedure with a VA staff attending).
- Occasionally, US-guided cervical lymph node and parotid biopsies are scheduled to be performed by the neuro fellow/attending (usually Wiener or Malinzak). Please check with your attending if there is a question about who is doing what.
- A big part of the rotation will be managing the service, i.e. keeping the outpatient schedule moving while fielding inpatient requests and determining if they are appropriate.
- When you get a procedure request, please read CPRS and discuss the finer details with the ordering provider before presenting the request to your attending ASAP. Please do not wait until the end of the day to announce that there is an inpatient in need of a procedure.
- Outpatient procedure approvals: paper requests will be left on your desk daily. Please review with your attending and write down the chosen procedure protocol (i.e. US vs. CT guided), then sign each the paper with your name and your attendings name and give to the techs.
- Answering the phone (17-6622), this is a shared responsibility with the R3s. Please note, you are expected to cover the phone when the R3s have required lectures over the noon hour

PROCEDURE WORKFLOW

- Consents are performed in the room next to the reading room. We have a computer-based consent system (**from CPRS, Tools>iMed Consent Web)**
- Pre-procedure notes are required for all sedation procedures, to be co-signed by your attending. IRU orders need to be placed after sedation procedures as well. Every procedure needs a short CPRS post-procedure note. Please see dedicated documents on how to enter orders/notes at the VA for full details. **(From Notes > Pre-Procedure Assessment).** Once you've done the note, remember to go to **Action>Sign Note**
- Each procedure needing pathology should have a pathology information sheet filled out with site and clinical information.
- After each procedure, do a post-procedure note in CPRS **(Notes > Radiology-Post Procedure, remember to go to Action>Sign note once you're done)** and dictate the procedure in Powerscribe. Please remember to dictate all of your procedures. Nursing will give you a piece of paper with sedation information on it after the case is completed. Remember how many biopsies were taken, drain size, etc. for your dictation.
- You'll also need to enter **post-procedure notes**, which include:
    - '99 - Word Processing order' for the Versed and fentanyl doses if they were given
    - 6 - Procedures, and then whatever corresponds to the procedure'
    - 'Moderate Sedation' orders which will specify when you can d/c from IRU
- If you want to save the commonly used notes (ie, Pre-Procedure Assessment and Radiology-Post Procedure), go to **Tools > Options > Notes > Configure Document List Preferences**, and from the 'Document Titles' search bar, search for and add Pre-procedure Assessment and Radiology-Post Procedure. Radiology can also be used as a generic note for extravasations, etc. For IR, you'll also want to add 'Central Line Placement / Removals'

BUT WAIT: Patient can't consent for themself! It's not like across the street where you can just phone consent without issue. Here's how to do it:
>>Ideally, have the patient's HCP or next of kin with you in person to do the consent, in which case they can sign. If the HCP or next of kin is not available in person to sign, then you may (1) have another physician or (2) one of the moderate sedation nurses (17-6337) witness the telephone consent conversation. >>Click on the patient facesheet in upper left of screen, scroll down until your see **'Next of Kin'** and give that person a call**.** On the iMed consent form input name of the witnessing physician or nurse under the field 'VA employee witnessing surrogate consent,' select 'yes' for the question regarding whether the VA employee witnessing the consent can sign with the practitioner.' The consenting physician and the witness will both sign the form in the end.
Previously the telephone surrogate consent required the **AOD** to be the witness, however, this method is currently being phased out. Although, it is still a viable alternative (albeit a more difficult one).
>>Click on the patient facesheet in upper left of screen, scroll down until your see **'Next of Kin.**
>>Call them, give the them the one-liner on what's going on, tell them they'll be getting a phone call
>>Call the AOD (17-6888 or 17-6226 or 17-6250)

NUCS

- Reading nucs is no longer a requirement for the R4 on their procedure rotation at the VA. However, if you need additional nucs time as a graduation requirement, then we are happy to work you in to get you that experience. This need is something you should have discussed with the program director. VA attendings should be contacted well ahead of time to ensure everyone is aware that you will need to be included in nuclear medicine activities while here.

- If you are doing Nucs, however, you may need to update your lists to see all the PETs. You should have a DUR NM+PET-CT list available. If you don't, get onto Microsoft teams and message Sibyl Pearce to let her know.
- To view SUV information on PETs, you'll need to use MedView (pictured below). You may also find it useful to make your own MPRs given that only axials are provided (also pictured below)

MedView: Where you can get SUV info fo

1: See report
2: Create your own MPRs