MEMORANDUM FOR: RADIOLOGISTS DEPLOYING TO BALAD AIR BASE

**SUBJECT**: Standard Operating Procedures (SOP) (After Action Report)

23 July 2007

**PURPOSE**: To standardize daily operations in radiology and roles and responsibilities of radiologists

**PROCEDURES**:

1) Mass casualty, surges, trauma codes

   a) Unique radiologic triage in combat operations:
      i) If patient inbound reportedly has UXO (e.g. RPG with unknown explosive status), then patient stays outside facility and EOD is called to manage.
      ii) If Iraqi comes to ER that looks like they had surgery: first step is most junior x-ray tech takes x-ray before anyone else (aside from tech from other department) touches patient.
   b) ATLS imaging algorithms call for Chest, Pelvis, C-Spine. Since we do our C Spines on CT typically, we do Chest and Pelvis plain CR.
      i) Make sure techs push the chest and pelvis first through CR reader, or extremities will hold up processing and your order is off. This needs to be a conscious effort; otherwise you have surgeons (non-ortho) breathing down your neck for the CXR and pelvis, while the ortho docs are in heaven.
         (1) This will make more sense when you confront dozens of traumas within hours.
   c) During trauma codes, ask techs to hold off sending CT's to Medweb until all plain CR is sent and reviewed
   d) Mass casualty, surge information:
      i) See T:\Radiology\Mass Casualty\MCRP Appendix 7 to Annex D Radiology Team
   e) Contrast allergies, pre-medication, see:

      T:\Radiology\CT protocols\Contrast Allergy Pretreatment

   f) Contrast Reaction Treatment:

      i) T:\Radiology\CT protocols\Contrast Reaction treatment Aug 07

   g) Who to notify (and validate notification) when a CT (or both) goes down.
      i) One scanner is inoperable: Notify trauma czar, SOD, ED.
      ii) Both scanners are inoperable. Notify trauma czar, SOD, ED, MCC
      iii) Take names. Let each know when back up. Be prepared to answer to this in the morning meeting (let evening shift radiologist know). Create a running list of events in time order, who notified, what broke, what got fixed when.
      iv) Battle Drill V: learn about this,

2) Unique scenarios in combat:
   a) Military Working Dogs (MWD): Veterinary services is usually run by the Army since AF vets run Public Health.
      i) MWD are diagnosed and treated just like humans, the only difference is sedation, dosages and mixing in with people. The concern is not so much what humans will catch from the dogs, rather what the dogs may catch from humans.
         (1) To enter the dogs into the system, just ask the vet the dogs name. For patient ID: First name: last name "Dog"
      ii) For contrast and exposure, consider pediatric doses, exposures and rates, or by weight.
      iii) Another unique aspect is AP is actually VD (Ventral-Dorsal). This helps with communication with the vet.
      iv) MWD are evaced like any casualty (PRN), the handler goes with.

3) **Daily activities**, shift-unique radiologist roles/ responsibilities:
   a) **Day (7—1500)**:
      i) If patient has a CD and wants their images, you can save as .jpg images.
         (1) For CT data, easier to make a CD off the Phillips (not officially).
         (2) During this rotation, it was decided to not use patient thumb drives since there are some real concerns with viruses (Medweb does not get regular virus updates), files patients (some contractors, Army, may have different rules) may have inappropriate files on their drive that should not be connected to our PC's (this happened during this rotation). Also, we should not take responsibility for patient's personal drives as they may not know how to manage files and have the only copy of something they have worked hours or days on. If we take it from them, we have agreed to be responsible for it; so just don't accept it. Let them know we used to, but now only do CD's (preferably sealed, with HIPAA stickers, compliance, etc.).
      (3) Finish all JPTA notes: this takes priority over outpatients in that surgeons and ICU docs and other staff need to know the latest on all their patients at a glance. Outpatients can wait.
      (4) It is also recommended that techs and radiologists drink enough water during surges and take short food breaks to avoid exhaustion/ mistakes, etc. for the trauma codes to follow. You never know when it may go on for 12 or more hours. It does not do anyone any good to pass out or make mistakes or get kidney stones and be out of commission.
      (5) Provide snapshot reviews to the night shift radiologist of cases where imaging significantly guided life, limb or eyesight guiding therapy, AE or surgical triage.
      (6) Provide any equipment issues to forward to the night shift person to report (or answer to) in morning meeting. For example if a CT or PACS goes down for any length of time, the night shift person needs to answer to that if asked.
      (7) If busy during transition to next shift, stay until workload manageable by the incoming 1500-1100 radiologist.

   ii) **Evening (1500-2300)**:
         (1) Provide snapshot reviews to the night shift radiologist of cases where imaging significantly guided life, limb or eyesight guiding therapy, AE or surgical triage.
         (2) Provide any equipment issues to forward to the night shift person to report (or answer to) in morning meeting. For example if a CT or PACS goes down for any length of time, the night shift person needs to answer to that if asked.
         (3) Read all exams, which may include providing a protocol for exams, and hand-deliver all reports to the appropriate location/person.
         (4) Enter a note into JPTA on all admitted patients.
         (5) Load patient CDs if one is available.
         (6) Be available to all staff as needed.
         (7) Make CDs of exams as needed
         (8) Pushing exams to LRMC as needed.

   iii) **Night (2300-0830)**: ICU, ward reads, trauma PRN

      (1) The CASF runs start coming in around 2130, with other runs at 0200, 0400.
         (a) Basically a radiologist and tech respond to ER for every helicopter inbound, trauma code or not. This will save you time in the long run by making sure printed JPTA or CHCS notes on prior CT's (about 8 studies per night) and or CD's help prevent further imaging. About 10% of CD's do not work or are incomplete, about 5% are sent prior to the patients showing up by telerad/ Medweb from sites pushing (don't get your hopes up on this one, we have tried).
      (2) **Inpatient census** (no longer required as of June 2007). If you would like a census:
         (a) Early AM (0100), print hospital **inpatient census** from JPTA https://jpta.fhp.osd.mil
         (b) **Reports**, then **24 hr reports**, export to Excel, then trim excess, then sort by ward.
         (c) To sort, need to delete all merged cells
         (d) Print for techs around 0200 (before portables).

(e) The prior radiologists exported /printed this JPTA for ICU portables for techs

(3) There is a meal served starting 0130, recommend eating early (if you can) as the ICU images start rolling in around 0200. I keep some cereal or other food aside since you often do not get time to get to the DFAC with ER, traumas, follow-up head CTs, ICU, etc.

(4) Recommend reading ICU 1 first, then delivering those reports, then working your way down the hall. Hand delivering allows direct feedback to the caring nurse, getting more history, interaction (plus an opportunity to get up from sitting). Don't just leave the reports without handing off to someone and explaining what is going on, especially with positive findings or tube recommendations.

(5) Before the morning CT follow-ups the flight docs will likely want to go over CT findings on anything involving closed spaces (sinuses, all head injuries, lung contusions, BLI, etc.). I found it easier to do a mini-rounds after their first round with JPMRC (Joint Patient Movement Requirements Center, the ones that tell the flight docs to repeat C-Spines) and PAD. JPMRC will kickback any spine controversy (why we put "C, T and L spine negative" in JPTA).

(6) The follow-up head CTs start around 0500.

(7) Morning report (clinical openers): I bring an SOD list of all ED cases/ admits, especially where imaging effected intervention. Occasionally we help get the imaging results strait, but the SOD and trauma czar have reviewed fairly completely.

(a) Clinical openers is where you can get a good feel for what other night duties are important to get the next day started.

(b) This is also where you report any positive TB CXR or CT chest. We had quite a few during our rotation.

(8) ICU rounds: 0800 or right after morning report in radiologist reading station. I list the ICU CXR's I read that night on the SOD sheets in the order I read them. I started by

(9) Nights are a good time to work on LOE and award bullets, SOP, AAR and other administrative duties.

(10) The quietest time seems to be between 0430 and 0500, I was able to get two 40 minute naps during the first month (we were relatively slow our first month before the Arrowhead Ripper Offensive).

(11) The flight commander goes to 2/3's of the flight commanders meeting (chaired by the squadron commander) during the entire rotation. During our rotation they were Monday mornings 9-10. When the flight commander works nights, it was easy to stay an extra hour or two since they were staying for the clinical openers and ICU rounds.

(a) When the flight commander works days, the night radiologist stays to cover the dept. (outpatients, ER and trauma codes) while the flight commander goes to the meeting.

(b) Occasionally there are other morning meetings (to provide for those on shifts).

(c) When the flight commander works 3-11, then the night person can go to the meetings while the day radiologist covers the department. The flight commander can come in early for late afternoon meetings on that shift.

b) Reporting, outpatients:

i) Keep it simple, I minimize to findings that matter. I discourage reporting on appropriate age related changes (DJD). I make it known to the ordering providers that I do not report on these and discourage ordering of LS spine plain CR to R/O DJD, or "scoliosis," etc.

c) Administrative:

i) **Counting**: (this is done for monthly exam tracking)

(1) The counting is done by the night shift radiologist for CT and the day R.T. shift leader for plain film, ER, routine, US. This is recorded in a small green binder by pen/ tickmark.

(2) Documents for entering into XL (from the book) are on

T:\Radiology\Rad Numbers\2007\Imaging_Numbers_May-Sept_07

There is also an informative email in the Rad Numbers folder as to the history and reasoning behind the current counting system.

Need to also update the Ancillary slide monthly, first week of each month.

(3) Head =1, C spine = 1, CAP = 3, Stone protocol = 2 (abd, pelvis), face and brain = 2
(4) Panscan (Head, cspine, CAP) = 5. Pan with CTA (circle of Willis and neck vessels).
(5) If spending time doing reconstructions, count as an additional exam.
(6) Example, if doing a CTA, add 2 to Pan scan
(7) Count outside CT's sent by telerad or CD same way. Put in CD reads in book.
(8) Pelvic, transvag counts as an additional

ii) Clinical openers presentations:
(1) You need to check T:/EMDSS/Saturday Clinical Openers regularly to see when radiology is presenting. It will come without warning, so you need to check periodically.

iii) Identification:
(1) All Iraqi locals have a trauma number assigned to them when they arrive in Balad. Iraqi non-locals also have a number assigned, however it is a 9 digit number. The first 3 digits indicate where they are from.
(2) ALL Americans/Coalition Force use the full name and SSN. The last 4 numbers are not acceptable for any identification in Radiology, except Iraqi locals.
(3) Note: it is not acceptable to use "bay #'s" in that it only leads to confusion, more time consumption for other patients to follow in that several patients may end up in the same bay during surges. If anyone (like an ER doc or staff) asks for a CXR (or other), let them know you need PAD to give them a number first, or it will not do the patient (and those to follow) any good.

iv) If you want to look up patients after discharge, look up last 4 and/ or name in Medweb, get the date they arrived, put\ that in JPTA then find their records in retrospect under patient search.

d) Radiology trauma **protocols** (see 1.a, above)
i) Protocolization (Radiologist and RT respond to trauma codes; radiologic triage)
(1) Doctor orders imaging studies, with guidance from radiologist.
(a) Does this by filling out imaging request (519), or verbal order to RN who fills it out.
(i) 519 has what patient needs completed (CT, CXR), and a brief history as to what the radiologist is to look for. If this is not followed to the letter, confusion could arise as to what patient needs what study and for what reason. An analogy with pharmacy would be a doctor ordering morphine for a patient.

ii) Inject in arm opposite majority of injury (minimize beam-hardening/ great vessels).
iii) Utilization: Panscan/ blast protocol. Consider pain distraction, and contrast, in that, someone from a blast may not feel his lumbar vertebral fractures. Saves everyone time if we just go for the pancan.

e) **Oral contrast** for CT: take cold water bottle, add 1/3 bottle oral contrast with flavor of choice.
i) Drink half bottle in first half hour, then save lower 1/5 for just prior to scanning.
ii) Note: there is no barium for GI studies. For intussuception, we would likely use air enema reduction.

f) **CT Myelogram**:
i) Lumbar Technique:
(1) Stop medications that lower seizure threshold 24-48 hours prior
(2) Prone or oblique bolstered position
(a) Sterile prep of L1 to L3 level

(b) In prone position insert styleted spinal needle 2-3 cm off midline at L2-3 level angled to course under the ipsilateral lamina under fluoroscopy.
(c) In oblique bolstered position insert needle straight down in a bull's eye fashion into the spinal canal through the boneless region under the lamina under fluoroscopy.
(d) Remove stylet to confirm free flow of CSF out of hub after tactile sensation of passing the posterior longitudinal ligaments and thecal sac is felt.
(3) Inject myelographic contrast under fluoroscopy to ensure free flow in thecal space.

ii) Cervical Technique:
(1) Stop medications that lower seizure threshold 24-48 hours prior
(2) Place patient in prone position and ensure true lateral view on fluoroscopy.
(3) Sterile prep of C1 – C4 on lateral neck
(4) Place styleted spinal needle under fluoroscopy using bull's eye technique anterior to the spinal lamina line at C1-2, staying in the posterior third of the spinal canal.
(5) When needle on AP fluoroscopy is medial to lateral margin of dens, remove needle to check for free flow of CSF
(6) Inject myelographic contrast under fluoroscopy to ensure free flow in thecal space.
(a) **DO NOT INJECT UNLESS FREE FLOW OF CSF IS SEEN**
(b) **INJECTION IN TO THE CORD CAN CAUSE PERMANENT PARALYSIS**

iii) Myelographic Contrast
(1) Dose: 3.06 g limit of intrathecal iondinated contrast medium in adults, 2.94g limit in children
(2) Concentration: 300 mg / ml (**10cc**) limit in adults, 210 mg /ml limit in children.
(a) Fluoroscopy should be used to determine correct amount of contrast administered
(b) Patient with small thecal sacs require less than those with capacious ones
(c) 200 cc / ml concentration for - pediatric patients, cervical , thoracic and lumbar myelograms
(d) 300 cc / ml concentration for- total columnar myelography or cervical myelogram from lumbar injection.
(3) Manufactures:
(a) Use only contrast approved for intrathecal injection
(b) Risk of arachnoiditis and nerve injury with non-approved contrast that is not free of preservatives or is not ultrafiltered
(c) Bracco
(i) Isovue-M 200 or Isoview-M 300
(d) GE Healthcare
(i) Omnipaque 180 or 240 or 300. (**Do Not Use 140 or 350**)

iv) CT Protocol
(1) Select slice thickness depending on region on interest and dose requirements depending on body habitus
(a) Slice Thickness - 1mm , Increment - 1mm, Collimation -16 x 0.75, Pitch 0.69
(b) Slice Thickness - 2mm, Increment - 1mm, Collimation -16 x 1.5, Pitch 0.95
(2) Coronal and Sagittal Reconstructions

v) Postprocedure Orders
(1) Restrict activity for 24 hours with no heavy lifting or bending
(2) Vigorous rehydration.
(3) Elevation of head to limit contrast flowing intracranially. (increased risk of seizure)
(4) Resumption of restricted medications after 24 hours.
(5) Epidural blood patches for CSF leaks very effect at relieving spinal headaches.

g) **PACS Admin**:
i) Medweb **Windows login**: When you see DoD prompt, just hit return.
(1) There is no logon or password. If you are asked one, hard reboot.
(2) then**, Medweb login**: username: raddoc, Raddoc0!
(3) For PC's around the facility, providers can use the following indirect link to Medweb:
(a) http://153.29.184.10/cobalt/
(i) **Login the same as above**: username: raddoc, Raddoc0!

ii) To read studies on Medweb, search by usual criteria on top bar. Click on ball by patient name to open. Play with tools to become familiar; fairly intuitive really.
   (1) Tools: example, **magnifying** glass, click magnifying glass, then crop what you want magnified, then push down on scrollbar to move magnified image.
   (2) Preset windows (lung, bone, abd, ect.) are on a small dropdown bar above the tools.
iii) When patient is **transferred** and has CD, import into Medweb then give CD back to patient
   (1) Insert CD, **open acrdir.exe** folder on desktop, select "My Computer" click on name, if asked do you want DICOM, select yes, send, then send again, don't pay attention to status bar when it stays on. Remove disk and give back to patient.
   (2) When asked to burn a CD for a patient being transferred: let them know we can push to LARMC, but go ahead and make one. Let them know the department or function asking for a CD needs to provide the CD (per previous rotations). Radiology does not have funding for CD's. To burn a CD:
      (a) Click the CD or envelope on the Medweb icon on the patient line.
      (b) Save DICOM to PC, to desktop, then drag the folder to the CD ICON on taskbar.
   (3) If study has not been sent across (tech got busy with something else), to send to get read:
      (a) Validate study icon, then send study icon, the click Medweb on the window
iv) **Phillips workstation**: from cold boot, or just turning on, Username md (should default), pass: leave blank, just hit return.
   (1) License agreement window, just hit yes.
   (2) **Saving studies on Philips**:
      (a) Batch tab, degrees, # of images (or essentially frame rate)
      (b) Select X vs. Y axis; save batch as…click save, label.
      (c) To select multiple images (rather than whole study)
      (d) Batch, slelect first image, click "From" then stop at last image, click "To"
      (e) Save batch with floppy icons below batch window.
v) Telerad: Pushing exams to LARMC from Medwed: 2 options:
   1) Get a manifest for the shifts from the FCC located in the same office as the PAD. They print a finalized list after the flight leaves which may be mid morning.
      a) For each patient, find the last 4 of the SSN from JPTA
      b) Enter the last 4 into Medweb's Find and search at least week
      c) If anything comes up, push to LRMC:
         i) For each exam, click on the folder icon ($4^{th}$ from left)
         ii) Select "DICOM storage device" ($4^{th}$ icon down) and then "Next"
         iii) Select "LRMC" from the drop down menu and then "Finish"
         iv) Select "Finish"
   2) Check in JPTA for aerovac'd patients.
      a) Under Reports, select "Evac and Transfer Reports"
      b) Find all patients going to LRMC
      c) Find films in Medweb and push as in 1b & c above
      d) In addition, read all inpatient JPTA notes to find if they will be aerovac'd and send images as above.

vi) When done reading plain CR and CT, check off "read" in Medweb to track what is completed.
vii) To move images from wrong folder
(1) Close image folder, delete, then resend from Orex, change, modify then send

h) List of bases, station names, phone #'s: see above chart

i) Ultrasound: how to use after hours
i) Turn on Sonosite (power button with circle).
ii) Patient button, enter name, SSN exam type
iii) Select transducer
iv) Perform the US
v) At the end of exam, to save import to PACS:
(1) Click "Patient" then "End exam" (tab under screen), then "Done"
(a) You will then see blank entry for next patient

j) **Volume imaging** with Philips workstation
i) Bring up study, select volume, rt click, bone removal, remove residual
ii) Sculpting, exclude or include field selection
iii) Unclick "Show Couch"
iv) For CTA of brain, can do MIP
v) **Vessel tracking**:
(1) Select AVA icon under analysis, click on the one sequence you want to analyze (CTA carotid), click solid arrowhead to right of "Bone Removal" for "Vessel Extraction."
(a) Then click the Add vessel icon, enter a name (helpful for multiple), swap axial on side windows (for example), click on "Seed" icon, plant seeds in center of vessel along the desired track. Can select auto or manual track (if not clearly identified).
vi) Virtual bronchoscopy:
(1) Analyze (select one series), then groups, then thorax, then three folders Icon,

k) How to generate "**Rich-man's 3-D x-ray**" for inlet, outlet views.
i) On the directory (before opening CT), select analysis, pick coronal (on icons of spinal cord graphic), pick # of images
ii) Click on **MPR** (stick figure), select rotate, anatomy icon to pivot.
iii) Pull trans scout line to center of ROI, **select thickness** (1cm), select number of images (4), magnify, select curved arrow to oblique (takes a moment)
iv) To save file, save series to Medweb… label
v) AVA is volume rendering
vi) To change thresholds, select icon with 3 folders (who knows why)

4) Educational

a) Each Saturday at 0715, EMDSS presents a 5-10 minute topic at the morning stand-up.
i) Normally the first briefing for each flight is a general overview providing a general awareness of capabilities and procedures.
ii) The schedule is located at:
(1) T:/EMDSS/Saturday Clinical Operners
(2) Please access the file, and populate accordingly.

b) About three times during the rotation, one of the radiologists presents an academic topic (in addition to above), again, 5-10 minutes. Example briefings are at the following location:

T:\Clinical Openers\Clinical Openers Specialty Presentations

This is also where you will be asked to save your presentation the day before at the latest. Be sure to associate any videos (i.e. 3D, CT scrolling) with your presentation, PRN.

5) Unique terms to combat radiology:

a) Fatally injured:
i) KIA = Killed in Action (don't even make it to hospital, i.e. decapitiated)
ii) DOA = Dead on Arrival (no such thing in combat)

   iii) DOW = Died of Wounds (if make it to hospital): don't want these to count up
   iv) This matters for JTTS Joint Theater Trauma System
 b) "Make a hole" need to know this since not knowing could put you in the way of trauma progress.
   i) Basically means move out of the way, a patient litter needs to move through (for example).

6) Process, utilization review:
 a) Left over plain films and CD's: No matter how hard we try and give these to the nurses, the PAD, etc. they still make their way back to us. MSgt Candelario can help us develop a solid SOP statement on disposition for those that do not make it (validated by PAD).

 b) Radiology exams done routinely just because. Okay, did what I could to mitigate doing a CXR every time a patient is transferred from ER to OR, to ICU to ward. I lost that one, we will continue to do them on intubated patients. On the C spine and head CT on all blast patients, nobody has produced documentation or audit trail on that, so jury is still out. If you hear of that, go ahead and do, but take names (politely) ask for policy (JPMRC AFI, etc.) or any documentation.

7) **Accountability**
 a) After alarm red, 100% accountability is required.
 b) Find phone and call radiology at 443-8527
 c) MCC at 443-8508, or go to DFAC to sign in
 d) When paged, shift NCO will contact down the roster (not recall); send runners PRN
 e) Pages will have number to call (likely radiology), then followed by one of the following
   i) 100 = need 100% accountability of all personnel
   ii) 411= just looking for info, call when able
   iii) 911 = report ASAP (or call to find out, if able)

8) REFERENCES:


 a) After Action Report, AEF cycles 6/7, 7/8 (great references)
 b) Protocols, other items on shared drive: T:\Radiology\xxx
 c) We could not find a prior SOP.
 d) Balad phone book
 e) Mirvis Stu, Shan, "Imaging in Trauma and Critical Care"


| | Colonel Les Folio, USAF, MC, SFS<br>Radiology Flight Commander |
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