



EUROSAFE IMAGING: MANAGING A SAFE CT SERVICE

WORKFLOW MANAGEMENT (FROM THE INITIATION OF THE CLINICAL REQUEST TO THE TIME THE PATIENT ENTERS THE CT ROOM)

A. DURING SCHEDULING OF THE EXAMINATION

1. Is the relevant clinical information on the request form?
2. Have you used all pre-existing information (including previous exams with all modalities) to be able to estimate the potential additional benefit from a new CT examination?
3. Are 3D-dimensional reconstructions needed for this patient?
4. Is there an evidence-based guideline that fits this patient's clinical needs?
5. Is the benefit of the planned CT greater than the risk for this patient?
6. Is ultrasonography or MRI an alternative for this patient?
7. Is radiation exposure a significant issue in the planned CT examination of this patient; is it minor; or is it negligible?
8. Will the patient be able to cooperate and tolerate the procedure in order for a diagnostic study that is fit for diagnostic purpose to be generated? (Need for sedation or general anaesthesia? Associated risks assessed?)
9. Does the patient have any allergies, or has the patient previously had allergic reactions to contrast agents?

B. PATIENT PREPARATION DURING THE PROCESS OF THE EXAMINATION (check list)

BEFORE THE EXAMINATION

1. Identify the patient! (Verify that the correct patient gets the correct imaging test.)
2. Whenever possible, the patient should be given a full explanation of the procedure and consent to it.
3. Check if the correct protocol to answer the clinical question in this case has been defined.
4. Check female patients of child-bearing age for potential pregnancy.
5. Inform the patient about radiation and the benefit vs. risk relationship.
6. Ask the patient if they have any allergies, particularly whether they have had reactions to previous use of contrast agents.
7. Check the relevant lab parameters related to renal function.
8. If an IV contrast enhanced study for fast contrast bolus injection is planned, check the caliber of the cannula. Is the caliber correct for the desired infusion rate?
9. If the patient will need to perform an action, train them before using radiation (e.g. inspiration – expiration).
10. Check if the patient is positioned optimally to avoid discomfort and subsequent motion.
11. Check if the extremities are in the correct position (e.g. arm elevation to enable dose modulation to work accurately).
12. Check if the patient is positioned centrally in the gantry, at the isocenter.

AFTER THE EXAMINATION

1. If additional scans are needed:
 - Can this be achieved through a few sectional slices instead of spiral/helical scans?
 - Is lower image quality (at reduced dose) sufficient for this additional information?
2. Report any incidents during the exam (e.g. contrast extravasation, allergic reaction); if any, give appropriate recommendations to the patient.
3. Encourage the patient to drink fluids after the contrast enhanced CT study, unless the patient has cardiac failure or any fluid restriction.

SELF-ASSESSMENT FOR THE CT RADIOGRAPHER

a. How can you minimise the body volume exposed and reduce the areas that are exposed repeatedly?

- Can the anatomical z-axis coverage be reduced in this patient?
- When using two scans for adjacent regions: is the overlap minimal?
- Have you used all options to minimise the number of scan phases of the same anatomical region (e.g. by using biphasic contrast injection)?

b. How do you adapt the scan parameters to your individual patient?

- Can the standard tube energy value of 120 kVp be reduced?
- Does the shortest gantry rotation period available provide the image quality needed to answer your diagnostic question?
- Can you use thicker slices for standard 2D diagnosis (2/5mm) as long as you have noisy (<1mm) thin images available for specific questions and for 3D analysis?
- Have you included tube current modulation? (Knowing exactly how it works for your specific scanner in xyz axes, for ECG triggering and for organ dose reduction.)
- Is your protocol adapted to the individual body size (weight, diameter) or patient type (adult/child)?
- If available, do you use iterative reconstruction and accordingly reduce exposure?

c. Contrast injection protocol

- When use of a contrast agent is justified, do you use the best contrast timing and injection speed/volume/concentration to achieve your diagnostic goals?
- As mentioned under a), do you check the possibility of using biphasic injection?
- Can you decrease kVp to profit from increased radiation absorption by iodine?

SELF ASSESSMENT QUESTIONS FOR RADIOLOGY DEPARTMENTS

1. Are all of your medical professionals who are involved with CT scanning adequately trained? Is this training adequately documented in departmental files?
2. Do they know about radiation risks and methods for avoiding them?
3. Are they trained to a level that corresponds to their level of responsibility?
4. Do radiologists and radiographers have a good knowledge of the components and functions of the scanner they use?
5. Have you oriented your referrers in justification, and have you given them evidence-based decision support? Or is justification carried out by radiologists, and how is this process documented?
6. To what extent are Diagnostic Reference Levels (DRLs) used in your department?
7. Do you apply existing national or international DRLs in your own working practice?
8. Do you periodically compare your exposure metrics (CTDI_w, DLP) to DRLs?
9. Have you established your own local DRLs for all standard CT protocols?
10. Are the DRLs available to your staff at the scanning console?
11. Have you defined measures for cases in which statistics of any protocol are beyond the 75th percentile, and do you verify the success of these measures?
12. How are patients' doses recorded, and are they available for subsequent audit?