1. Objective

To ensure that radiation doses to patients are maintained as low as reasonably practicable (ALARP) to achieve the image quality or satisfactory test result required for successful clinical diagnosis.
To ensure that activities administered for radionuclide therapy are optimal to achieve successful treatment with a minimal risk of side effects.

2. Responsibilities

The operator has prime responsibility for ensuring that all aspects of a medical exposure are optimised.

Service Leads are responsible for putting procedures and associated Clinical Protocols in place to ensure that all exposures are optimised. These should include a requirement for a review of imaging protocols used at least every two years and whenever any new equipment or procedure is introduced.

Service Leads are responsible for ensuring that existing equipment remains appropriate for use, and with the assistance of Modality Leads, that each exposure is optimised and ALARP.

Service Leads are responsible for ensuring there is a robust training programme in place in line with EP-2 and a QA programme is in place in line with EP-20.

Local Managers are responsible for putting procedures in place to provide charts of exposure or administered activity for an appropriate range of examinations.

A Medical Physics Expert (MPE) will contribute to the optimisation of exposures and the application and use of Diagnostic Reference Levels (DRL).

Services will establish Image Optimisation Teams (IOT) who will be responsible for reviewing patient dose audits and survey findings in order to advise on and implement dose optimisation. The IOT will be multi-disciplinary and may consist of radiologists, radiographers, clinical technologists, MPEs and other Clinical Scientists.

The practitioner in consultation with a suitable MPE is responsible for ensuring that appropriate systems are in place for radionuclide therapy.

3. Employer's Written Procedures

Procedures and associated Clinical Protocols will identify exposure factors or administered activities that will be used for average patients and indicate modifications to account for heavier or lighter patients.

DRLs will be established in accordance with EP-11. Exposure charts including DRLs should be prepared for each imaging modality (or, where appropriate, each X-ray room and mobile X-ray unit), or charts of administered activity for each Nuclear Medicine department, and be readily available to operators performing exposures. These should be reviewed at appropriate intervals to ensure that they are fully optimised.

The IRMER practitioner and operator will pay special attention to medical exposures

- of children;
- that are part of a health screening programme;
- that involve high doses to the individual being exposed e.g. foetal exposures >10mGy and examinations exceeding minimum threshold for tissue reactions;
- of patients who are pregnant or for whom pregnancy cannot be excluded;
- of individuals who are breastfeeding/chestfeeding and who are administered a radioactive substance. In such situations, the exposure of both the individual and the child will be taken into account.

Specific imaging protocols for children with an appropriate range of ages and/or weights must be provided in departments where paediatric exposures may be undertaken.

A formal procedure should be in place for making and accepting amendments to procedures and Imaging Protocols.

4. X-ray Exposure Optimisation

Exposure factors should be set with reference to European and national recommendations and other relevant guidelines.

Service Leads in consultation with MPEs will arrange for the automatic exposure control devices in every X-ray room to be set up in a manner that will maintain the radiation dose to the patient at an acceptable level, while delivering the necessary level of image quality for the clinical task.

Measured doses and dose related parameters should be checked and compared with DRLs whenever practicable.

The Service Lead will make arrangements for periodic local audits on factors such as dose-area product and screening time to be performed and compare values with the DRL, in order to improve operator performance. Results of such local audits should be reported to the IOT.

Should a patient dose survey identify that any dose quantity is consistently exceeding the diagnostic reference level (DRL), then the Service Lead should take account of any recommendations made in order to reduce the radiation dose below the DRL. This should be done in consultation with a diagnostic radiology MPE and be discussed at the IOT.

Optimisation is undertaken for concomitant exposures for patients undergoing radiotherapy.

Should a high dose trigger level be approached or exceeded then appropriate action will be considered in order to minimise and optimise the additional dose to the patient while ensuring the clinical objective.

5. Nuclear Medicine Optimisation

Administered activities for each type of diagnostic examination should be set with reference to the Notes for Guidance issued by the Administration of Radioactive Substances Advisory Committee (ARSAC).

Any increase in administered activity above the DRL must be performed in accordance with the Notes for Guidance issued by ARSAC.

Administered activities for each therapeutic treatment should be prescribed by the referrer and justified by the IRMER practitioner to provide optimal treatment response. Activities should be checked by the entitled operators.

For high dose examination/treatment of individuals who are breastfeeding/chest feeding, consideration is given to delaying the procedure, the use of alternative radiopharmaceuticals and/or interruption of breastfeeding/chestfeeding where appropriate.

The practitioner for any radionuclide therapy ensures that systems are in place to stop and start the patient's medication in accordance with the protocol for the therapy procedure.

Where appropriate, written instructions and information setting out the risks associated with the exposure and specifying how doses resulting from the patient's exposure can be restricted will be provided to the patient, parent or appropriate person in accordance with EP-6.

6. Research

For all research projects involving the use of ionising radiation, the Chief Investigator will ensure

a) Individuals will participate voluntarily

b) Participants will be informed in advance of the risks of the exposure to which they will be subjected

c) A dose constraint will be established for individuals who will not experience a direct medical benefit

d) Individual target doses will be established for those participants who are expected to experience direct medical benefit.