Agenda Item 5a

ISRRT Position Statement:

The implementation and use of Diagnostic Reference Levels (DRLs) in Medical Imaging by Radiographers/Radiological Technologists

The ISRRT considers that the implementation and use of Diagnostic reference Levels (DRLs) is an integral part of a radiographic examination. Radiographers and Radiological technologist have a duty of care to apply appropriate exposure parameters and techniques that result in dose levels that comply with those DRLs established in accordance with national, regional and local authorised bodies and local protocols. As such staff should know national and local DRLs for typical examinations in order that good dose optimization can take place.

DRLs are about typical examinations i.e. samples of examinations and not just about one exam which may have a higher dose because of the patient's size etc. Actual dose quantities delivered for a particular examination should be recorded and compared to the established local DRLs to enable the person delivering the exposure to determine if the dose delivered highlights unusual practice.

Additionally, local assessments should be made at approved intervals for those radiological procedures for which diagnostic reference levels have been established.
Such reviews, undertaken by radiographers and medical physicists working closely, are conducted to determine whether the optimisation of protection and safety for patients is adequate, or whether corrective action is required if, for a given radiological procedure if:

(i) Typical doses or activities exceed the relevant diagnostic reference level; or

(ii) Typical doses or activities fall substantially below the relevant diagnostic reference level and the exposures do not provide useful diagnostic information or do not yield the expected medical benefit to the patient.

Furthermore, where such DRLs have not been established by national or regional authorities' steps should be made locally at the institutional level, to adopt such DRLs methodology currently in use by a recognised authority or professional organisation in another country.

Radiographers and Radiological Technologists have a duty of care to ensure that appropriate techniques and parameters to deliver a medical exposure to the patient is the minimum necessary to fulfil the clinical purpose of the medical imaging procedure (diagnostic and interventional) taking into account the relevant norms of acceptable image quality established by reporting personnel. Such image quality criteria being based on guidance from relevant professional organisations and established relevant diagnostic reference levels.

Local Diagnostic Reference Levels (LDRLs) established for an institution should be subject to internal annual review as well as independent scrutiny and audit undertaken at least every three years.

Background:

The Joint Position Statement by the IAEA and WHO – Bonn Call for Action

The International Atomic Energy Agency (IAEA) held the "International Conference
on Radiation Protection in Medicine: Setting the Scene for the Next Decade" in Bonn, Germany, in December 2012, with the specific purpose of identifying and addressing issues arising in radiation protection in medicine.
The conference was co-sponsored by the World Health Organization (WHO), hosted by the Government of Germany through the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, and attended by 536 participants and observers from 77 countries and 16 organizations. An important outcome of the conference was the identification of responsibilities and a proposal for priorities for stakeholders regarding radiation protection in medicine for the next decade. This specific outcome is the Bonn Call-for-Action.

Action 2 of the Bonn Call for Action calls for the establishment, use of, and regular update of diagnostic reference levels for radiological procedures, including interventional procedures, in particular for children.

The Bonn Call for Action was a response to the IAEA Safety Standards for protecting people and the environment: Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards – General Safety Requirements part 3 No. GSR Part3 published in 2014. The standards describe and define dose constraints and reference levels which are used for optimisation of protection and safety, the intended outcome of which is that all exposures are controlled to levels that are as low as reasonably achievable with economic, societal and environmental factors taken into account.

Section 3.145 on Medical Exposure elaborates on the importance, establishment and operational considerations of DRLs and the need for local diagnostic reference levels.

Diagnostic reference levels were first mentioned by the International Commission on Radiological Protection (ICRP) in 1990 and subsequently recommended in greater detail in 1996. From the 1996 report:

"*The Commission now recommends the use of diagnostic reference levels for patients. These levels, which are a form of investigation level, apply to an easily measured quantity, usually the absorbed dose in air, or in a tissue equivalent material at the surface of a simple standard phantom or representative patient.*

Diagnostic reference level will be intended for use as a simple test for identifying situations where the level of patient dose or administered activity is unusually high. If it is found that procedures are consistently causing the relevant diagnostic reference level to be exceeded, there should be a local review of procedures and the equipment in order to determine whether the protection has been adequately optimized. If not, measures aimed at reduction of doses should be taken.2

Subsequent to this publication the ICRP has published (2018) ICRP Publication 135 – Diagnostic reference Levels in Medical Imaging

The Abstract states:

Abstract *- The International Commission on Radiological Protection (ICRP) first introduced the term 'diagnostic reference level' (DRL) in 1996 in Publication 73. The concept was subsequently developed further, and practical guidance was provided in 2001. The DRL has been proven to be an effective tool that aids in optimisation of protection in the medical exposure of patients for diagnostic and interventional procedures. However, with time, it has become evident that additional advice is needed. There are issues related to definitions of the terms used in previous guidance, determination of the values for DRLs, the appropriate interval for reevaluating and updating these values, appropriate use of DRLs in clinical practice, methods for practical application of DRLs, and application of the DRL concept to newer imaging technologies. This publication is intended as a further source of information and guidance on these issues. Some terminology has been clarified. In addition, this publication recommends quantities for use as DRLs for various imaging modalities and provides information on the use of DRLs for interventional procedures and in paediatric imaging. It suggests modifications in the conduct of DRL surveys that take advantage of automated reporting of radiation-dose-related quantities and highlights the importance of including information on DRLs in training programmes for healthcare workers. The target audience for this publication is national, regional, and local authorities; professional societies; and facilities that use ionising radiation for medical purposes, and responsible staff within these facilities. A full set of the Commission's recommendations is provided.*

References:

Diagnostic reference Levels in Medical Imaging - ICRP Publication 135
http://www.icrp.org/publication.asp?id=ICRP%20Publication%20135

International Basic Safety Standards (BSS), International Atomic Energy Agency (IAEA), General Safety Requirements Part 3, July 2014.
Guidance – national Diagnostic Reference Levels (NDRLs)
https://www.gov.uk/government/publications/diagnostic-radiology-national-diagnostic-reference-levels-ndrls/national-diagnostic-reference-levels-ndrls

IAEA – About Diagnostic Reference Levels (DRLs)
https://www.iaea.org/resources/rpop/health-professionals/radiology/diagnostic-reference-levels/about-diagnostic-reference-levels

IAEA – Diagnostic Reference Levels (DRLs) in medical imaging
https://www.iaea.org/resources/rpop/health-professionals/nuclear-medicine/diagnostic-nuclear-medicine/diagnostic-reference-levels-in-medical-imaging#2

EuroSafe Imaging Strategy and Call for Action - An initiative of the European Society of Radiology (ESR)
http://www.eurosafeimaging.org/wp/wp-content/uploads/2014/08/EuroSafe-Imaging-Call-for-Action-full.pdf

DIAGNOSTIC REFERENCE LEVELS IN MEDICAL IMAGING: REVIEW AND ADDITIONAL ADVICE A web module produced by Committee 3 of the International Commission on Radiological Protection (ICRP)
http://www.icrp.org/docs/DRL_for_web.pdf

Canadian Safety Code 35, which has a good section on DRLs :
https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/safety-code-35-safety-procedures-installation-use-control-equipment-large-medical-radiological-facilities-safety-code.html#sa35

Canadian National Diagnostic Reference Levels for CT:
https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/canadian-computed-tomography-survey-national-diagnostic-reference-levels.html

Note:
Links to external websites may change without notice.