دوره آموزش حفاظت در برابر پرتوهای یونیزان در کاردیولوژی، پاییز ۱۳۹۴

سرفصل مطالب:

۱-**فصل های ۱، ۲، ۳، ۴، ۵، ۶، ۷، ۸، ۹ و ۱۳ از کتاب ۱ حفاظت در برابر اشعه (از ۱ تا ۱۳ بجز فصل های ۱۰، ۱۱، و ۱۲)**

۲- **فصل های ۱، ۲، ۳ از کتاب۳ حفاظت در برابر اشعه**

اسکن دو کتاب فوق در سی دی آموزشی دوره ارائه شده است.

۳- **مباحث IAEA Training Material on Radiation Protection in Cardiology:**

این مباحث بصورت اسلاید طبق جدول ۱ در سی دی آموزشی ارائه شده است: دروس ۱ تا ۱۰ بجز درس شماره ۶ در این دوره ارائه می شود.

۴- **همچنین از مطالب آموزشی که بصورت online درسایت IAEA که برای آموزش حفاظت پرتوی به متخصصین قلب طراحی شده است استفاده خواهد شد. این مطالب از طریق لینک های مندرج در جدول ۲ قابل دسترسی است.**

پرینت این مطالب نیز به پیوست ارسال می گردد.

مدرسین: دکتر محمد باقر توکلی- دکتر پروانه شکرانی- گروه فیزیک پزشکی

Table ١. IAEA Training Material on Radiation Protection in Cardiology: slides

S.No.	Topic	Educational objectives At the end of the programme, the participants should know these	Contents
١	**Why talk about radiation protection in cardiology?**	a. Review of severity & frequency of radiation injuries b. What do these injuries teach us regarding the cardiologist's role (Lessons learnt) c. Points-of-view about law suits of severe injury d. Recognising radiation injury & effects	Case reports of radiation induced effects & injuries, severity & frequency, how were injuries initially detected or could not be detected- the path way, are these injuries still occurring, existing database/ estimate of injuries, lessons learnt, lessons and points of views arising from the law suits of severe injuries, how to recognize the radiation injury, common factors associated with injuries, overview of patient dose management
٢	**Talking about radiation dose**	a. How radiation dose can and should be expressed, merits and demerits of each quantity for cardiology practice b. How representative fluoroscopy time, cine time are for dose to the patient and staff c. Simplified presentation of radiation quantities	Quantifying radiation exposure and factors of influence. . Dose Area Product (DAP[١]), cumulative dose (CD) to a reference point, dose mapping, peak skin dose (PSD) at a localized area. Why so many quantities, difference in entrance dose rate in fluoroscopy mode and entrance dose per frame in cine mode, how reasonably can fluoroscopic times and number of frames indicate dose, correlation of fluoroscopy time and number of frames with DAP, CD and DAP vs. CD, CD vs. PSD and DAP vs. PSD. Gaf Chromic media, other films, TLD arrays, Review of recent detection and measurement systems.
٣	**What radiation effects are possible (besides skin injuries)?**	a. Understanding about stochastic and deterministic effects b. Probability of these effects in interventional practice	Stochastic and deterministic effects. Threshold, non-threshold, erythema dose, probability of these effects to patients and among staff engaged in interventional cardiology. Concept of risk and comparison of risk with other risks, Review of reports of effects among workers. Special data and concern in exposures in

		c. Special concerns in children, young females and pregnant women	children, young females, pregnant women. What radiation may not do (allaying unnecessary fears)
٤	**Angiography equipment**	a. What are equipment standards for cath equipment (FDA, IEC), particular needs for paediatric patients!! b. Comparative features of available angiography equipment c. Dose variations in cine and fluoro modes	Equipment standards for cath equipment, FDA, IEC and other recommendations. What to look for while establishing a Cath lab, Dose display and dose limitations, on line systems, on line QC data, filters, pulsed fluoroscopy, features such as automatic dose control. Importance and examples of commissioning (characterization of the X-ray and imaging systems –including software) and constancy checks. Comparative features of available equipment in market in terms of radiation dose. Specific needs for pediatric patient, What information can be available from the DICOM header.
٥	**Patient dose management- equipment & physical factors**	a. Physical factors and challenge to dose management b. Understanding the role of operator in patient dose management c. How to manage patient dose using equipment factors	How does X ray beam vary in intensity and quality with different factors such as kVp, filtration, using different modes of operation of pulsed fluoro, field of view & magnification, distribution of radiation dose in patient as a result of technique factors e.g. distance of X ray tube and image intensifier from patient, beam angle, quantum noise control, unnecessary body mass in the X ray beam.
٦	**Standards and guidance**	a. Standards and guidance provided by international organizations b. Who is responsible for what? c. What actions are needed by cardiologist	Requirements of the International Basic Safety Standards (BSS), ICRP recommendations, WHO guidance, review of other relevant documents of the FDA, NCRP, EC, IEC standards. How can these standards and recommendations be applied? Requirements on patients' and workers' protection. Issues of responsibility
٧	**Occupational exposure and protective devices**	a. How effective are individual protective items in cath lab b. How to monitor personnel dose c. How to estimate personnel effectiveness	Limits of radiation exposures as prescribed by ICRP & BSS, Concept of time, distance & shielding, Lead apron, gloves, glasses, and shields-their effectiveness in quantitative terms and methodology of estimating effectiveness. Different methods for

			occupational exposure monitoring. Practical advice for staff protection.
٨.١	**Image quality in cardiac angiography**	a. How can image quality of cardiac angiographic images be assessed b. How useful can the quality criteria be	Variation in patient doses as a result of image quality, need for defining the image quality and the development of quality criteria, review of work of EC & details of DIMOND quality criteria, experience on the use of quality criteria.
٨.٢	**Impact of optimisation in newer technologies**	a. What benefit of digital flat panel technology be expected on patient dose b. How to translate this into practice c. Experience with optimisation	Anticipated per frame dose reduction with digital flat panel, survey of practice and experience with dose reduction, optimization to achieve to anticipated benefit
٨.٣	**Can cardiac procedures be graded in complexity and related with dose**	a. Complexity related factors in cardiac interventions b. Relationship of patient dose with technical and clinical factors c. Development of complexity index and its utility	Factors pertaining to patient and the procedures having bearing on fluoroscopy time and patient exposure, complexity index, experience with the use of this index.
٩.١	**Examples of good & bad practice**	a. How wedge filter and filed size affect skin dose b. When and how to use the wedge filter	Examples of good and bad practices dealing with the use of wedge filter and of field size
٩.٢	**Example of practice of radiation protection**	a. How awareness of radiation protection and close cooperation with medical physics / radiation safety staff helps b. Avoidance of skin injuries	A retrospective study to demonstrate how awareness of radiation safety as a result of close cooperation with medical physics/ radiation safety personnel helps to avoid skin injuries in interventional procedures for many years.
١٠	**Radiation risks in paediatric interventional**	a. Unique considerations in paediatric patients having bearing on patient dose b. How can dose be managed in paediatric patients	What are unique consideration of pediatric patients having bearing on patient dose, long term risk probability and epidemiological evidence of radiation risk, management of

	cardiology		patient dose

Table ٢. IAEA Training Material on Radiation Protection in Cardiology: Text

Radiology Quantities and Units	https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/١_Radiology/QuantitiesUnits.htm
Fluoroscopy	https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/١_Radiology/Fluoroscopy.htm
patient-staff-dose-fluoroscopy	https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/٤_InterventionalRadiology/patient-staff-dose-fluoroscopy.htm
fluoroscopy-staff-protection	https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/٤_InterventionalRadiology/fluoroscopy-operating-theatres/fluoroscopy-staff-protection.htm
fluoroscopy-patient-protection	https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/٤_InterventionalRadiology/fluoroscopy-operating-theatres/fluoroscopy-patient-protection.htm
skin-injuries	https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/٥_InterventionalCardiology/skin-injuries.htm
erythema	ttps://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/٥_InterventionalCardiology/erythema.htm