Do you know that the British army equipped its base hospitals in England with X-ray equipment in 1898, when they learnt of its successful use by Surgeon Major Bewoor in the NorthWest Frontiers? Porters carried the accessories to assemble the primitive x-ray unit, in 100-pound boxes. They traveled over virtually road-less terrain over 200 miles into the Khyber Pass region.

(Late) Dr. K.P. Mody, an eminent radiologist, noted that a chemist imported the first X-ray unit into Bombay in 1902. But medical colleges appreciated their importance 16 years later. Lady Hardinge Hospital in Delhi installed the first x-ray unit in 1918. Over the past 100 years, the total number in India grew into about 35,000 or so.

In 1996, Government of Kerala set up the Directorate of Radiation Safety (DRS) as an independent agency directly under the Secretary, Department of Health and Family Welfare (DH & FW) to enforce AERB guidelines on medical x-ray installations in Kerala. AERB has delegated legal authority to DRS to inspect x-ray installations in Kerala.

I was a member of the specialist committee, which prepared a technical report outlining the constitution and functions of DRS.

The State Government instituted a truly innovative legal process to control medical x-ray installations by amending the Electricity Rules. DRS is a shining example of the initiative taken by Kerala Government and is a model for other States to emulate. DRS has performed creditably in carrying out its mandate.

Specialists agree that physicians should recommend medical X-ray examinations only on the basis of qualified clinical judgement. Well-trained professionals should carry them out with the help of optimally adjusted equipment. They are then the most beneficial life saving procedures, we know of today. If that is so, is there any need for caution?

There is irrefutable evidence that high doses of ionizing radiation are harmful to man. But most of the medical diagnostic x-ray procedures expose patients to relatively low doses. We do not know conclusively whether low doses are harmful or not. Since we prudently assume that even small doses can cause some harm, physicians should, in any x-ray examination, expose their patients to doses as low as reasonably achievable without losing clinical benefit.

Physicians role in assuring safety

Physicians have an important role in ensuring safe use of x-rays. Regrettably, some physicians order X-ray examinations routinely. X-ray examinations at times degrade into a comforting ritual! Physicians should carry out medical X-ray procedures only if they give them useful information to treat the patient.

Physicians should buy only AERB approved x-ray equipment. They should comply with all the radiological safety requirements. They must use protective accessories such as gonadal shields, mobile protective barriers, lead aprons, etc, and motivate workers to use these accessories.

Extra care should be taken when a pregnant or a potentially pregnant woman is x-rayed. They must ask whether the patient is pregnant or not. A clinically indicated examination need not be avoided simply because of the implied risk from x-ray exposure. Physicians must use optimally adjusted equipment, employ appropriate technique factors and carry out the procedures with as low a dose as is reasonably achievable.

On April 26, 2002, the US Food and Drug Administration (USFDA) noted that some medical imaging facilities in USA promote and market whole body CT scanning or screening as a preventive or proactive health measure to healthy individuals who have no symptoms or suspicions of disease. FDA warns that for a person without symptoms, CT screening may not reveal serious disease and the potential...
harm to the individual may be greater than the presumed benefit.

CT is a unique tool to diagnose disease, trauma or abnormality and to plan, guide and monitor treatment. But it must not be used indiscriminately.

The dose received by a patient during a CT procedure is generally much larger that that from most conventional X-ray procedures.

In 2001, the American Journal of Radiology published eight articles related to radiation doses in CT scan examinations. The journal noted that many CT scan centres in USA use the same technique factors while examining adults and children. Children then receive significantly greater radiation doses than adults without any additional clinical benefits. Children are more sensitive to radiation than adults.

I brought the US FDA advisory which contained recommendations to reduce radiation risk from computed tomography to children and small adults to the notice of over 400 CT scan users in India. I understand that some radiologists in Kerala implemented the advice from USFDA. For instance, Dr. P. Rajendran, Associate Professor, Department of Radiology, CMC informed me that acceptable CT images are possible with nearly half the radiation dose. Parents may ask the radiographer whether he uses different technique factors while x-raying children and small adults.

Role of the public

Many patients are satisfied only if their physicians recommend an x-ray examination as part of the medical diagnosis. They tend to believe that no examination is complete unless they have been x-rayed! Patients must leave it to the physician to decide.

Crowding near and inside an X-ray room is an unhealthy practice. Very often, the x-ray technologists admit many patients into the x-ray room before starting the examination. Each time the technologist exposes an x-ray film or the radiologist screens a patient, the beam of x-rays directly or indirectly strikes all those present. Patients may receive unnecessary radiation dose during the waiting period. The dose may even be greater than that received during their own examination!

No one believes it. I had convinced the editor of the Readers Digest to publish a message on this practice in that magazine. Patients must insist that they will not remain in the x-ray room when others are examined.

We would like the public to ask those who own and operate x-ray machines whether their unit is an AERB approved one or not. A “type approved” unit has all the built-in safety features. X-ray manufacturers and traders must sell only AERB approved x-ray equipment.

The patient must tell her physician if she is pregnant or thinks that she might be. This must be done before a medical X-ray test is carried out. The physician may cancel the examination. He may postpone it or modify it to reduce the radiation dose. He will exercise better judgement and may proceed with the test, as planned, only if it is essential. At times, the risk of not carrying out a clinically indicated x-ray examination might very well be greater than the risk from radiation.

In summary, x-ray equipment is a very useful tool if it is used with care. Kerala Government has set up an independent Directorate of Radiation Safety to enforce safety guidelines prescribed by the Atomic Energy Regulatory Board. DRS will provide radiation safety related advice and guidance to those who approach the Directorate.

Physicians should buy only AERB approved x-ray equipment. They should comply with all the radiological safety requirements. They must use protective accessories such as gonadal shields, mobile protective barriers, lead aprons, etc, and motivate workers to use these accessories.

Free booklet for Physicians

A WHO booklet titled “A rational approach to radiodiagnostic investigations” lucidly explains the limitations of medical x-ray procedures. Dr. K. S. Parthasarathy secured its copyright and reprinted a booklet titled “Patient Protection in Diagnostic Radiology” published by the International Commission on Radiological Protection (ICRP). If any physician wants a free copy of the booklet, he may write to Secretary, Atomic Energy Regulatory Board, Niyamak Bhavan, Mumbai 400094.