The Healing Arts Radiation Protection Act (HARP), administered by the Ministry of Health and Long-Term Care, was passed in 1980. The regulations (X-ray Safety Code) made in 1985, and applicable to the dental profession, were developed by the Dental Advisory Committee to the HARP Commission whose membership included practising dentists and dental educators. This legislation specifies operator qualifications and technical performance standards for x-ray machines and outlines the procedures and tests that are deemed necessary and their frequency in order to ensure the highest possible level of patient and operator safety.
OPERATOR QUALIFICATIONS
Under the HARP Act, the following operator qualifications with regard to patient safety are outlined:

- No person shall operate an x-ray machine for the irradiation of a human being unless he or she meets the requirements set out in the regulations.
- Under the Act, dentists and dental hygienists are deemed to have met the required qualifications and requirements.

Dental assistants, however, must have taken appropriate training in x-ray safety in order to take radiographs, and must present proof of successful completion of such a program, when requested to do so by X-ray Inspection Service inspectors. At the present time, most current Level I and Level II dental assisting programs in Ontario provide the appropriate training. A listing of programs that have already been approved by the HARP Commission, including private dental assisting programs, co-op high school dental assisting programs, and out-of-province programs can be obtained from the school itself or the X-ray Inspection Service.

REGISTRATION OF X-RAY MACHINES
All dental x-ray machines must be registered by the owner and new installations must be approved by the Director of X-ray Safety with the X-ray Inspection Service (XRIS) of the Ministry of Health and Long-Term Care. Plan approval ensures both patient and staff safety from unnecessary radiation exposure. Approval consists of a plan of your office layout accompanied by the required additional forms and information. Under the Act, written approval to install and operate the x-ray machine must be made, in writing, by the provincial Director of X-ray Safety.

Registration and approval forms can be found online at http://www.health.gov.on.ca/en/public/forms/xray_fm.aspx.

If you have recently renovated your office or purchased an existing practice and made renovations, it is important that you re-submit your plans for approval. If you have purchased a practice from another dentist and do not renovate, the pre-existing plans, if already approved by the Director of X-ray Safety, will suffice. The College recommends that when you inform the College of any change to the ownership to the x-ray machines, you also contact XRIS about the change.

The HARP Act authorizes that inspectors may, at all reasonable times, enter and inspect the premises. Inspectors do not have to make an appointment, but may provide dentists with a one-week window for office inspection visits. This is done through correspondence. The College recommends that you have all the necessary paperwork, including any forms or plans associated with the installation and
X-ray Safety Requirements for all Ontario Dentists

operation of dental x-ray machines, readily available at the office. The inspector visits your dental facility on average once every three to five years and on average for less than an hour or two, depending on the number of x-ray machines, size of your practice and availability of required documents.

If an inspector visits your office and finds that the plan does not conform to the approved plan, he or she will issue an order indicating that you are in violation of the HARP Act. This can result in a stop use order preventing further use of the x-ray equipment. The dentist-owner of the practice must submit a new plan with the actual layout for approval, or redesign his or her office to match the approved plan on file with the Ministry.

More information on the approval process can be obtained from:

X-ray Inspection Service (XRIS) Licensing,
X-ray and Lab Inspections Unit
Ministry of Health and Long-Term Care
55 St. Clair Ave. W, 8th Floor
Toronto, ON M4V 2Y7
416-327-7937

PATIENT SHIELDING
The HARP Act requires that protective accessories are available for use by persons who may receive exposure to x-rays. The College recommends the use of both gonadal and thyroid shielding devices where possible and practical.

QUALITY ASSURANCE REQUIREMENTS
A key component of the HARP Act is the requirement that a Photographic Quality Assurance Program (QA) relative to x-ray shall be instituted in every dental office. Photographic Quality Assurance is defined as a program of activities designed to ensure that diagnostic imaging is carried out with the maximum benefit to the patient, at a minimum of risk. The goal of the program is to confirm that the dentist is providing the highest quality care possible with respect to the use of x-rays.

In a dental facility, the primary objective of a Photographic QA program is to ensure that:

- Every imaging procedure is necessary and appropriate to the clinical problem at hand and is prescribed by a dentist.
- The images generated contain information critical to the solution of that problem.
- The examination results in the lowest possible radiation exposure, cost and inconvenience to the patient consistent with the diagnostic information requirements.
- Repeat films and exposure will be kept to a minimum.
- Accurate functioning of the x-ray equipment will be monitored.

RADIATION PROTECTION OFFICER
The responsibility for ensuring that quality assurance testing is carried out rests with the Radiation Protection Officer, who must be a dentist qualified to take x-rays. He or she is also responsible for all other matters of radiation safety related to the taking of x-rays in the dental office, such as ensuring that only HARP qualified personnel are permitted to take radiographs, and that the office has received Ministry of Health and Long-Term Care's approval for the installation of x-ray equipment.
PRESCRIBING OF DENTAL X-RAYS
The HARP Act requires that dental x-rays be prescribed by a dentist before they can be taken. A clinical rationale for taking the x-ray or x-rays, therefore, must first be determined by the dentist. The HARP Act precludes taking a set number of exposures or time sequence radiographs (i.e. every six months, every year etc.) without an individualized prescription for a particular patient, which is based on the results of a clinical examination.

IN CONCLUSION
The guiding principle behind the HARP Act is that every dental patient in Ontario has the right to expect a high quality x-ray examination with as small an amount of risk as possible. The Quality Assurance Program described in this article, as well as the other elements of the legislation, is meant to assist Ontario dentists in achieving this goal.

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PHOTOGRAPHIC QA TESTING
The HARP Act also sets out certain requirements for photographic quality assurance tests for dental offices, clinics and facilities. The minimum requirements of an acceptable photographic QA program include the following:

ANNUAL TESTING
- patient entrance exposure measurements
- collimation testing
- half value layer testing

These tests must be carried out every 12 months and upon alteration or servicing of the machine. They can be accomplished by using a mail-in testing service, if available, or by arranging for a qualified service technician to come to the dental office.

DAILY TESTING
- photographic quality control testing

For conventional dental x-ray units, these tests must be performed every operational day and can be carried out by keeping a log referring to the number of films processed and the change cycle of the processing solutions, using a thermometer in the manual processing tank or a back-up thermometer in automatic processors, and recording and logging the temperature on a daily basis. It may also be helpful to compare the quality of a test film each day (the first exposure of the day) with that of a reference radiograph that was processed when film quality was known to be optimal. A step-wedge can also be used. Any variance from the ideal should be noted and corrected. For offices using digital radiography, daily photographic control testing is not required at this time.

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