THE SCOTTISH OFFICE

NHS
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National Health Service in Scotland
Management Executive

St. Andrew's House
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Dear Colleague

PURCHASING RADIOLOGY EQUIPMENT - PATIENT DOSE REDUCTION

11 June 1992

Addressees

For action:

General Managers,
Health Boards,
General Manager,
Common Services
Agency,
Chief Executives, and
Chief Executive
Designate, NHS
Trusts
Primary Care
Administrators
Health Boards

For Information

General Manager,
Common Services Agency
General Manager,
State Hospital
General Manager
Health Education Board
for Scotland

To be copied to Unit
General Managers for
Information

Summary

1. The Royal College of Radiologists (RCR) and the National Radiological Protection Board (NRPB) have produced a report entitled 'Patient Dose Reduction in Diagnostic Radiology'. The report makes a number of recommendations relating directly to radiology equipment. These are summed up in Annex A to this letter, together with the Management Executive's recommendations on the purchase of such equipment. Further technical guidance is at Annex B.

Action

2. General Managers are asked to copy this letter to all those involved in buying radiology equipment and to ensure that they are aware of the recommendations contained in Annex A; to copy this letter also to Radiation Protection Advisers appointed by them under the Ionising Radiations Regulations 1985; to include clear guidelines on buying radiology equipment in their policies on patient dose reduction; and to ensure that the technical aspects of Annex B are considered at the time of purchase. Primary Care Administrators should send copies of this letter to all GP practices and dentists on their lists.

Yours sincerely

G W TUCKER
Directorate of Strategic Management

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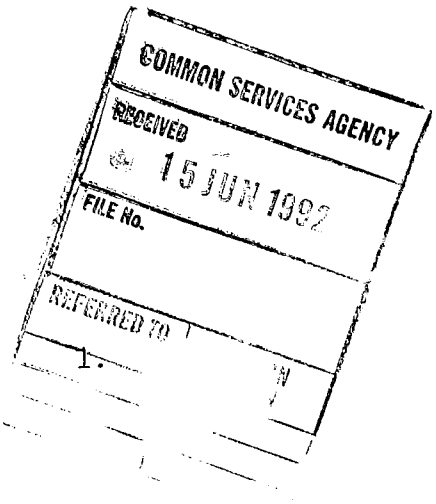

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THE ROYAL COLLEGE OF RADIOLOGISTS/NATIONAL RADIOLOGICAL PROTECTION BOARD REPORT RECOMMENDATIONS

The 7 recommendations designed to minimise patient dose relating directly to radiology equipment are:

Equipment

1. The Department of Health should provide central guidance to Health Authorities on the need for, and means of, achieving patient dose reduction when purchasing diagnostic X-ray equipment. (This guidance will be adopted or adapted by the other Health Departments).

2. Radiology departments should assess their priorities for introducing dose saving equipment on the basis of the cost per man Sievert averted. The need to install dose saving equipment that results in long-term cost savings, without diminishing the diagnostic value of examinations below critical level, is irrefutable.

3. Prime consideration should probably be given to rare-earth screens, to optimal operation of film processors and image intensifiers and to carbon fibre components.

4. All X-ray imaging equipment should be subject to regular performance checks which, if necessary, should lead to appropriate corrective action or replacement. Radiologists should be aware of the dose saving potential of many of the new digital imaging systems.

5. Health authorities should be made aware of the expectations of HSE Inspectors regarding evidence of a planned programme for the replacement of equipment that does not include low attenuation components and for the purchase of rare-earth (or similarly sensitive) intensifying screens wherever clinically possible.

6. Manufacturers should be encouraged to build patient exposure monitoring devices (eg dose-area product meters) into diagnostic X-ray equipment, to provide automatic and instantaneous indication of patient dose for quality control purposes.

7. Increasing the availability of both ultrasound and MRI will reduce reliance upon techniques involving X-rays, particularly for young patients at higher risk.

THE MANAGEMENT EXECUTIVE'S RECOMMENDATIONS ON THE PURCHASE OF RADIOLOGY EQUIPMENT

1. Recent technological developments in radiology equipment allow lower doses to patients without loss of image quality. As a result, buyers and users of radiology equipment should include among the criteria used in the option appraisal made before purchase a requirement for the dose to the patient to be as low as is reasonably achievable for a given image quality.

2. All individuals involved in the purchase of radiology equipment should be asked to keep in mind their obligations under the Ionising

Radiations Regulations 1985 and observe good practice as described in the Health and Safety Commission Approved Code of Practice "The Protection of Persons Against Ionising Radiation Arising From Any Work Activity" and in the NRPB/Health and Safety Executive/Health Departments "Guidance Notes for the Protection of Persons Against Ionising Radiations Arising From Medical and Dental Use".

3. In particular, General Managers should ensure that procedures for the purchase of radiology equipment include seeking the advice of the Radiation Protection Advisers appointed by them under the Ionising Radiations Regulations 1985.

RADIOLOGY EQUIPMENT: RECENT TECHNOLOGICAL DEVELOPMENTS

1. Some technological developments in radiology equipment allow lower doses to patients without loss or image quality. These include:

1.1 increased sensitivity of film emulsions, and improved performance of intensifying screens, such as rare-earth screens;

1.2 reduced attenuation between patient and image receptor by using materials such as carbon fibre composites for table tops, cassette fronts and anti-scatter grids;

1.3 development of digital radiology systems, using either filmless or re-usable image receptor technology, that may be more sensitive than conventional film technologies;

1.4 use of 100mm cameras with small format fluorography in place of conventional radiography;

1.5 enhanced fluoroscopy with single-frame capture and storage as an alternative to "real-time" fluoroscopy.

ISSUES FOR BUYERS AND USERS

2. Buyers and users of radiology equipment should ensure that:

2.1 they use the most sensitive method of image acquisition consistent with the required image quality;

2.2 where practicable, items between patient and image receptor are made of low absorption materials. These include table tops, bucky fronts, anti-scatter grids, image intensifiers shields and cassette fronts;

2.3 the equipment includes, or has the option to include, dose-area product meters, and displays all the required parameters to enable patient dose to be estimated. Mammography equipment should include a measurement of the compressed breast thickness;

2.4 they consider using digital radiology equipment, where it offers significant dose reduction;

2.5 they make adequate arrangements for:

maintaining the equipment once it is put into clinical service,

including it in the quality assurance programme; and

training the users

(see also HEI 98, "Management of Medical Equipment and Devices", Jan 1991, published by the Department of Health).

ADDITIONAL RECOMMENDATIONS OF ROYAL COLLEGE OF RADIOLOGISTS/NATIONAL RADIOLOGICAL PROTECTION BOARD REPORT (MAIN RECOMMENDATIONS AT ANNEX A)

3. The RCR/NRPB report makes recommendations about:

3.1 quality control of imaging system performance; and

3.2 record keeping and monitoring of patient dose.

4. These have implications for the specification of radiological equipment, such as:

4.1 use of dose-area product meters to monitor performance and consistency of patient dose;

4.2 post-exposure display of the actual exposure factors used during an examination, to enable dose estimation;

4.3 measurement of compressed breast thickness during mammography examinations to estimate dose.

FURTHER INFORMATION

5. A separate report was also published in 1990 by the NRPB entitled "Study of causes of variation in doses to patients from X-ray examinations". As a result of studying patients undergoing similar examinations in different X-ray departments, one of its conclusions was that the speed of the film-screen combination was the largest contributor to the variation in doses.

6. There is also considerable evidence of the effectiveness of correct equipment maintenance on the reduction of patient dose (eg correct operation of film processors may eliminate repeat exposures due to poor image quality).

7. The Health Departments are encouraging manufacturers to make available the facilities that reduce patient dose. In addition, efforts will be made to include information in the blue cover evaluation reports on equipment in respect of dose levels required to make a diagnosis.