

Manual on radiation protection in hospitals and general practice

Volume 3
X-Ray Diagnosis

B. E. KEANE & K. B. TIKHONOV



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WORLD HEALTH ORGANIZATION GENEVA

MANUAL ON RADIATION PROTECTION IN HOSPITALS AND GENERAL PRACTICE

Volume 3 X-Ray Diagnosis

B. E. KEANE

*Principal Physicist, Medical Physics Department, Royal Sussex County Hospital,
Brighton, England*

K. B. TIKHONOV

*Professor and Director, Central Research Institute for Röntgenology and Radiology,
Leningrad, USSR*



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REVIEWERS

- Dr G. M. Ardran, Nuffield Institute for Medical Research, Oxford, England
Dr C. B. Braestrup, Consultant Physicist, Lenox Hill Hospital, New York, USA
Dr Tawan S. Bunnag, Director, Chulalongkorn Memorial Hospital Medical School, University of Medical Sciences, Bangkok, Thailand
Professor R. H. Chamberlain, Chairman, Department of Radiology, Hospital of the University of Pennsylvania, Philadelphia, USA
Professor D. Frost, Director, Department of Radiation Physics, Rudolf-Virchow Hospital, Berlin
Dr H. Jammet, Head, Department of Health Protection, Atomic Energy Commission, Centre for Nuclear Studies, Fontenay-aux-Roses, France
Professor F. G. Krotkov, Academic Secretary, Academy of Medical Sciences, Moscow, USSR
Dr Bo Lindell, National Institute for Radiation Protection, Karolinska Hospital, Stockholm, Sweden
Dr O. G. Machado, Director, Radiotherapy Department, National Cancer Institute, Rio de Janeiro, Brazil
Professor P. Pellerin, Director, Central Service for Protection against Ionizing Radiations, Le Vesinet, France
Dr K. J. Vikterlöf, Radiation Physics Department, The Regional Hospital, Örebro, Sweden
Dr L. R. Whittaker, Kenyatta National Hospital, Nairobi, Kenya

JOINT SECRETARIAT

- Dr H. T. Daw, International Atomic Energy Agency, Vienna
Mr E. Hellen, International Labour Office, Geneva
Dr W. Seelentag, World Health Organization, Geneva
Dr B. Waldeskog, World Health Organization, Geneva

Preface

Much technical material has been published at the national and international levels on radiation protection in the nuclear power industry, nuclear research, and conventional industries. On the other hand, the subject of radiation protection in hospitals and general practice, where a large proportion of public and occupational radiation exposure occurs, has not yet received much attention in the international literature.

The International Labour Organisation, the International Atomic Energy Agency, and the World Health Organization all have a long-standing interest in these problems from various points of view. They therefore decided to collaborate in the preparation of a Manual on Radiation Protection in Hospitals and General Practice in several volumes, with each agency taking special responsibility for the volumes that concern it most. However, to simplify distribution and to make it easier for readers to purchase the various volumes, the entire work is being published by WHO.

The manual as a whole deals with the radiation protection of patients, occupationally exposed persons, and the public and is written for the reader having a basic general knowledge of radiation and biology. It is hoped that it will be found helpful not only to those who are directly engaged in radiation protection in hospitals and general practice but also to national authorities, hospital administrators, supervisors, hospital workers, teachers in training centres, and all those who have some responsibility in the subject.

The present volume, the third in the series, deals with radiation protection in X-ray diagnosis. The authors discuss the organization of radiation protection, the choice of X-ray equipment, the siting and construction of radiology departments and the conduct of radiation surveys, and throughout the book they give guidance on good practice, which is perhaps the most significant means of reducing the hazards to which patients and staff may be exposed. The book should be used in conjunction with Volume 1—a general review of the basic requirements of radiation protection.

The preparation of the volume was undertaken by Mr B. E. Keane and Professor K. B. Tikhonov, and the final text was completed in collaboration with Drs B. Waldeskog and W. Seelentag (WHO).

The draft was reviewed by the experts listed on page 7, some of whom are the authors of other volumes in the series. The observations received were taken into account in the preparation of the final text, and the contributions are gratefully acknowledged.

Introduction

When setting up radiation protection for an X-ray facility it is insufficient simply to design protective thicknesses and order standard apparatus. There is a need to take an interest in the organization of the whole radiological department. Radiation protection should not be forgotten once the protective equipment has been installed. Its purpose must be understood and good radiation protection practices must be encouraged until they become habitual.

The functioning of an X-ray diagnostic facility is inevitably influenced by the level of medical care with which it is associated, which may range from the highly specialized teaching hospital to the small clinic served by a single X-ray machine. The reader will find it useful to identify the approximate level of the X-ray facility with which he is concerned (see pp. 13-14) so that he may concentrate on those parts of the text most relevant to him. This will enable him to make a rapid assessment of his immediate situation. Later he may study other levels, if a change is desirable.

Any X-ray diagnostic installation passes through a series of familiar phases in its life-cycle, from conception and construction through routine operation to eventual replacement. It will be helpful for the reader to attempt to identify the point that has been reached in the life-cycle of his own installation so that he may be aware of all the present problems and may anticipate those likely to arise in the immediate future.

Radiation protection in X-ray diagnosis should be viewed in relation to the other branches of radiology. In a well regulated X-ray department of modern design and staffed by trained personnel the radiation exposure to staff can be less than the dose limits for the general public. This may not be true in a nuclear medicine and radiotherapy department, where the staff have to contend with the additional hazards of contamination, high-energy radiation, and patients who emit radiation continuously, but in X-ray diagnosis full containment of undesirable stray radiation is a realistic objective, which should be pursued at every opportunity.

Chapter 1 provides an administrative approach to radiation protection and is intended as a guide to the rest of the volume.

Chapters 2 to 5 present information suitable for planning a new installation but may nevertheless be useful when checking the radiation protection in one that already exists. They are addressed primarily to the head of a department and may be brought to the attention of the manufacturers, architects, and engineers concerned with the installation.

Chapters 6 and 7 on radiation surveys and monitoring of staff may be applied immediately to existing installations and should be referred to by all persons directly responsible for radiation protection.

In all matters of radiation protection the advice of an expert should be available. However, it is appreciated that in some remote circumstances it may be difficult to obtain access to such a person. If the approach is to be by correspondence it is important to ask the right questions, and to know to whom they should be addressed. It is hoped that this volume will help those concerned with radiation protection in X-ray diagnosis not only to take action themselves but also to seek aid when they need it.
