

Revision of the Medical & Dental Guidance Notes

A good practice guide on all aspects of ionising
radiation protection in the clinical environment,
IPEM, 2002

John Sanderson

Chair of MDGN Working Party

- Will Mairs, Philip Mayles, Lisa Rowley, Mark Worrell -



Great Staff - Great Care - Great Future

Hull and East Yorkshire Hospitals 
NHS Trust

Wednesday, March 23, 1921.

DEATH FROM NEW RADIUM TUBES.

NOTED RADIOLOGIST FALLS
VICTIM IN PRIME OF LIFE.

DR. IRONSIDE BRUCE.

ANOTHER X-RAY MARTYR IN
CAUSE OF HUMANITY.

To the rôle of heroes who have fought and died in the battle of science in the unromantic environment of the science laboratory has now to be added the name of Dr. Ironside Bruce, radiologist to Charing Cross Hospital.

He is yet another of the many martyrs claimed by investigators of the strange, life-giving, yet death-dealing X-rays.

In Dr. Bruce's case death was caused by destruction of the blood, a plastic pernicious anæmia caused by the gamma rays of the new tubes against which the protective measures devised for the older tubes are inadequate.

Pioneer of New Tube.

Dr. Ironside Bruce, who was only 44, was a pioneer in the use of X-ray tubes of higher penetrating power.

An extremely lovable man, he is spoken of in the highest terms by the hospital staff and his



Dr. IRONSIDE BRUCE

assistant, Mr. Curtis, who has worked in close connection with him for 16 years.

Hundreds of letters of sympathy poured in upon his widow to-day from grateful patients all over the country.

The work Dr. Bruce undertook was carried out both at the hospital and in private practice. He associated himself more closely with what is known as "screening"—work which means considerable exposure to tubes and the taking of many risks.

He had been ailing for a long time, but had said little about it, his nature being to carry on to the very last moment.

Work his Passion.

However, about six weeks ago it was evident that he was dangerously ill; pernicious anæmia developed, and, despite all efforts to save his life, he died.

Right to the last his chief topic of conversation

X-ray and Radium Protection Committee

Preliminary Report , 1921

100

The Journal of the Röntgen Society.

JULY, 1921.

X-RAY AND RADIUM PROTECTION.

THE X-ray and Radium Protection Committee, representing various radiological and other scientific bodies in this country, has issued a preliminary report which sets out present knowledge in regard to equipment, ventilation and working conditions of X-ray and radium departments.

The committee proposes to investigate experimentally a number of points which have arisen. Offers of assistance are invited by the committee, and should be sent to the Hon. Secretaries, from whom copies of the preliminary report may be had on application.

The Committee is constituted as follows :—

Chairman : Sir Humphry Rolleston, K.C.B. *Members* : Sir Archibald Reid, K.B.E., C.M.G., St. Thomas's Hospital ; Dr. Robert Knox, King's College Hospital ; Dr. G. Harrison Orton, St. Mary's Hospital ; Dr. S. Gilbert Scott, London Hospital ; Dr. J. C. Mottram, Pathologist, Radium Institute ; Dr. G. W. C. Kaye, O.B.E., National Physical Laboratory ; Mr. Cuthbert Andrews, *Hon. Secretaries* : Dr. Stanley Melville, St. George's Hospital ; Prof. S. Russ, the Middlesex Hospital. *Address* : Care of Royal Society of Medicine, 1, Wimpole Street, W.1.

X-RAY AND RADIUM PROTECTION COMMITTEE. PRELIMINARY REPORT.

INTRODUCTION.

The danger of over-exposure to X-rays and radium can be avoided by the provision of efficient protection and suitable working conditions.

The known effects on the operator to be guarded against are :—

(1) Visible injuries to the superficial tissues which may result in

GENERAL RECOMMENDATIONS

It is the duty of those in charge of X-ray and Radium departments to ensure efficient protection and suitable working conditions for the personnel. The following precautions are recommended :—

1. Not more than seven working hours a day.
2. Sundays and two half-days off duty each week, to be spent as much as possible out of doors.
3. An annual holiday of one month or two separate fortnights

Sisters and nurses, employed as whole-time workers in X-ray and Radium departments, should not be called upon for any other hospital service.

Sections

- I. X-Rays for diagnostic purposes
- II. X-rays for superficial therapy
- III. X-rays for deep therapy
- IV. X-rays for industrial and research purposes
- V. Electrical precautions in X-ray department
- VI. Ventilation in X-ray departments

VII. Radium therapy

VII. RADIUM THERAPY.

The following protective measures are recommended for the handling of quantities of radium up to one gram (*i.e.* 37 GBq). :—

(1) In order to avoid injury to the fingers the radium, whether in the form of applicators of radium salt or in the form of emanation tubes, should be **always manipulated with forceps** or similar instruments and it should be **carried from place to place in long-handled boxes lined on all sides with 1 cm. of lead.**



i.e. distance

VII. RADIUM THERAPY.

(2) In order to avoid penetrating rays of radium all manipulations should be carried out as rapidly as possible and the **operator should not remain in the vicinity of radium for longer than is necessary.**



i.e. time

The radium when not in use should be stored in an enclosure the **wall thickness** of which should be equivalent to **not less than 8 cms. of lead.**

i.e. shielding



VII. RADIUM THERAPY.

(3) In the handling of emanation all manipulations should, as far as possible, be carried out during its relatively inactive state. In manipulations **where emanation is likely to come into direct contact with the fingers thin rubber gloves should be worn.**

The **escape of emanation should be very carefully guarded against and the room in which it is prepared should be provided with an exhaust electric fan.**

i.e. contamination & inhalation risks



Also in 1921 guidance . . .

- *Co-operation* – “. . . dependent upon the loyal co-operation of the personnel . . .”
- *Periodic testing of measures* – “National Physical Laboratory . . . is prepared to carry out exact measurements upon X-ray protective materials, and to arrange for periodic inspection . . .”
- *Surveillance* - “. . . wherever possible periodic tests, e.g., every three months, be made upon the blood of the personnel, so that any changes which occur may be recognised at an early stage.

DEVELOPMENT OF GUIDANCE

British X-Ray & Radium Protection Committee

- 1921 first recommendations
- revised 1923, 1927, 1934, 1938, 1943 and 1948

*Radioactive Substances Act 1948 section 6 created the “**Radioactive Substances Advisory Committee**”*

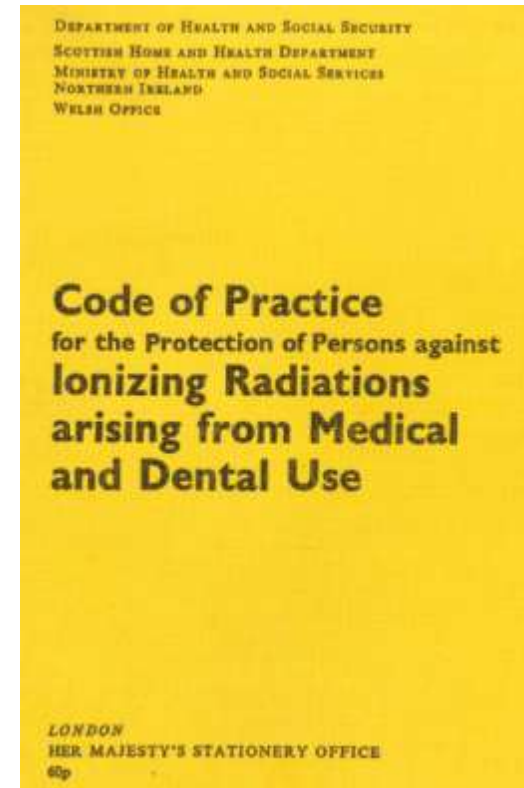


- 1953 *British X-Ray and Radium Protection Committee* wound up

DEVELOPMENT OF GUIDANCE

Radioactive Substances Advisory Committee

- 1957 – 1st edition, ***Medical & Dental Code of Practice***
- 1964 – 2nd edition, Code of Practice
- 1972 DHSS at al -3rd edition, ***Code of Practice for the Protection of Persons against Ionizing Radiations arising from Medical and Dental Use*** – Prof Sir Brian Windeyer et al

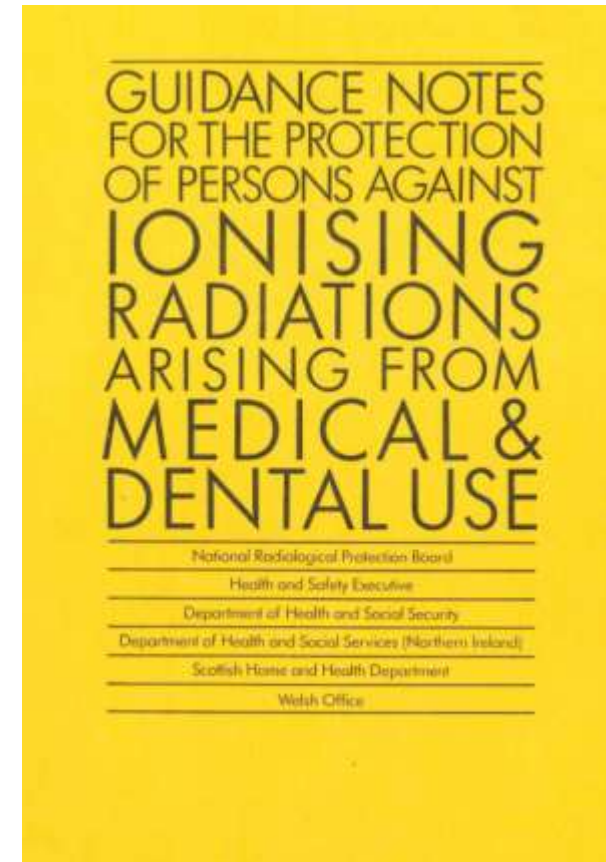


DEVELOPMENT OF GUIDANCE



National Radiological Protection Board

- The Radiological Protection Act 1970 replaced *Radioactive Substances Advisory Committee* with ***N.R.P.B.***
- 1988 – ***Guidance Notes for the protection of persons against ionising radiations arising from medical & dental use***

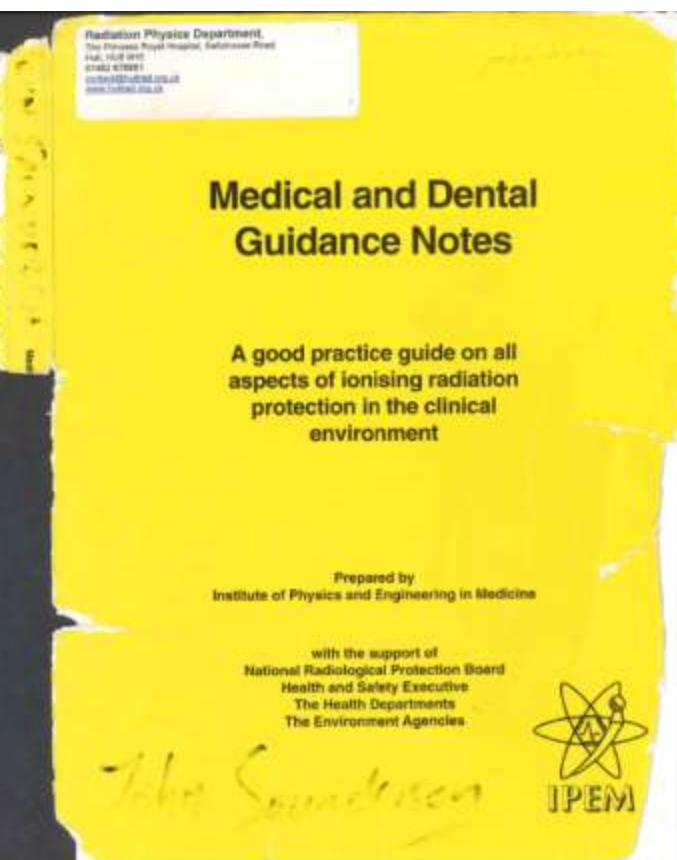


DEVELOPMENT OF GUIDANCE

IPEM



- ***2002 Medical & Dental Guidance Notes: A good practice guide on all aspects of ionising radiation protection in the clinical environment***



Penny Allisy-Roberts (Chairman),
Andy Brennan, Hamish Porter,
Marge Rose, Adam Workman.

Time for new Guidance?

- New techniques
 - Ra-223 therapy, PET/CT, SNLB
 - Linac CBCT, Gammaknife, Cyberknife, tomotherapy, IORT, FFF linacs, proton therapy
 - I-125 breast tumour localisation
 - Dental CBCT, hand held units
- New understanding of risks
 - Cataract threshold changed: 500 mGy acute dose
→ 500 mGy chronic dose [ICRP118]

- Legislative changes so far . . .
 - Environmental Permitting Regs 2010, RSA Exemption Orders 2011
 - IRMER amendments, MARS amendments
 - Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009, ADR updates
 - Drugs Act 2005 Section 5 / Police and Criminal Evidence Act 1984 section 55A - Authorisation by police inspector of x-ray of arrested person who may have swallowed a Class A drug (England & Wales, with section 6 for Northern Ireland)
 - The Justification of Practices Involving Ionising Radiation Regulations 2004
 - **Radioactive Waste Adviser certification**

- Legislative changes to come (?)
 - Euratom BSS implementation – Feb 2018
 - Medical Physics Expert certification
- Changing regulators, etc.
- Much more free PDF guidance on internet, e.g.
 - SCoR/BIR/RCR *“A guide to understanding the implications of the IRMER regs in diagnostic and interventional radiology”* & SCoR/IPEM/RCR *“a guide to understanding the implications of the IRMER regs in radiotherapy”*

IPEM Project 552

IPEM Working Party on the Revision of the Medical & Dental Guidance Notes

- Formed by RPSIG with support of DRSIG, NMSIG, & RTSIG
- 1st meeting December 2012
- Euratom Basic Safety Standard
 - 2012; planned to be accepted June 2013, possibly with 2 (*or 3 or 4*) year implementation date (*new IRR June 2015?*)
 - Actually published February 2014, with 4 year implementation date (*new IRR 2018*)

Working Party Members

- Chair
 - John Sanderson, Hull, john.saunderson@hey.nhs.uk
- Nuclear Medicine chapter editor
 - Lisa Rowley, Oxford, lisa.rowley@ouh.nhs.uk
- Diagnostic Radiology chapter editor –
 - Mark Worrell, Dundee, markworrall@nhs.net
- Radiotherapy chapter editor
 - Philip Mayles, Clatterbridge, philip.mayles@nhs.net
- Radiation Protection chapter editor
 - Will Mairs, Manchester, william.mairs@christie.nhs.uk

Regulator Observers

- Attended some meetings
 - EA - Kate Griffiths
 - DH – Ian Chell
 - PHE – Steve Ebdon-Jackson, Andrew Gulson, Ruth Lofts
 - HSE – Karen Fuller, Mike Nettleton, David Orr
- Invited / correspondence
 - SEPA – Adam Stackhouse, Isabelle Watson
 - PHE – Joanne Stewart
 - CQC – Cliff Double

Some general decisions so far

(note, not fixed if a good reason to change)

- Most of the current advice is still good practice.
- Keep same basic structure as 1988 & 2002
 - Chpt 1 – general staff safety
 - Chpt 2 – general patient safety
 - Chpt 3-6 – radiology
 - Chpt 7-9 – Radiotherapy
 - Chpt 10-17 Nuclear Medicine
 - Appendices.

Some decisions so far *(note, not fixed if a good reason to change)*

- Where there is a cross over (e.g. PET/CT)
 - sometimes repeat to make easier as a quick reference
 - sometimes refer between chapters
 - advice must be consistent.
- Where another free PDF now exists, brief paragraph and reference
- Remove odd references to non-ionising (i.e. appendix 2 radiation safety policy)
- Add a final short appendix “Other things hospital RPA or RWA may be asked about”, e.g. schools, vets, etc. with very brief directions to other resources.

Timetable

- Wide consultation May/June 2016 (meetings, email lists, professional bodies and regulators)
 - Say what we plan to change
 - Ask for feedback
- 1st draft complete April 2017
- Tweak for changes to regulations as soon as they are fixed
- Draft out for final consultation (time?)
- Publish as early 2018 as possible

Consultation – general professionals?

- medical-physics-engineering@jiscmail.ac.uk
- ipem-rp@jiscmail.ac.uk
- IPEM web site, newsletter, email list, RP forum
- HSE Radiation Community (<http://webcommunities.hse.gov.uk/connect.ti/radiationcom>)
- *Other bodies consulted will be free to pass on to their members*

Interested non-IPeM bodies?

- Environment Agencies
- Health & Safety Executive
- Department of Health
- Public Health England
- Care Quality Commission (*IRMER*)

- British Institute of Radiology
- College/Society of Radiographers
- Royal College of Radiologists

Interested non-IPEM bodies?

- Society for Radiological Protection
- Medicines & Healthcare products Regulatory Agency,
- Institute of Physics (*Medical Physics Group*),
- British Dental Association,
- UK Radiopharmacy Group,
- UK PET Physics Group,
- Association of Healthcare Technology Providers for Imaging, Radiotherapy & Care (AXREM),
- British Nuclear Medicine Society,
- British Society Of Dental And Maxillofacial Radiology,
- British Dental Trade Association,

Interested non-IPEM bodies?

- Faculty Of General Dental Practitioners (UK) Of The Royal College Of Surgeons Of England
- Royal College of Physicians
- British Chiropractic Association
- British Society of Interventional Radiography
- Scottish Health & Social Care Directorate
- Northern Ireland Department of Health
- Social Services & Public Safety
- Welsh Government Health and Social Services
- HSE Northern Ireland
- Ministry of Defence
- **Who've me missed?**
 - English and Scottish members of Working Party – anyone from Northern Ireland and anyone from Wales with whom we could check things out?

Other current work in progress?

- Need to know of any other working parties who may publish guidance before 2018 so it can be referenced, e.g.
 - IPEM Personal Dosimetry WP
 - BIR/RCR/SCoR/IPEM/SRP guidance on dosimetry across multiple employers
 - et cetera

Being considered - Publication

(not yet agreed with IPEM)

- Print, PDF (*searchable and cut'n'paste-able*) and online versions
- Online version ?
 - Could have an annex to each chapter, which can be added to by Special Interest Groups?
 - Annexes might include odd advice currently published in SIG newsletters, changes to URLs, etc. IPEM members could lobby SIGs for guidance when needed?
 - quick 5 yearly revisions by short-lived Working Parties, using info in annex ???
- Not a wiki – needs to be refereed to have authority.

Please send all suggestions for
improvements to

john.saunderson@hey.nhs.uk

If possible also include any suggestions you may
have for then also

- references to paper, reports, etc.
- knowledgeable person (yourself or another)
on that aspect

Current Working Party proposals re. radioactive substances



MDGN revision: Nuclear Medicine Chapters

Lisa Rowley (lisa.rowley@ouh.nhs.uk)

Oxford University Hospitals 
NHS Foundation Trust

- General updates – latest legislation, guidance and practice
- Refer to guidance etc. as appropriate, rather than replicate
- Contributions for specific areas of expertise – have some, more welcome (contributions acknowledged)
- Edit, add and update rather than re-write

Biggest changes



- EPR 2010
 - Will still refer to RSA as well (Scotland and NI)
- Transport
 - section on transporting radioactive material by road (Type A, Excepted)
 - ADR keeps changing
- Alphas
 - Brief section for alphanadin therapies
- PET chapter



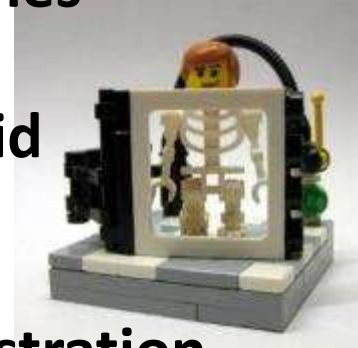
Brief overview

- **Chpt. 10 Diagnostic uses of open radioactive substances**
 - More radionuclides
 - Eye dose (also PET, therapy and radiopharmacy)
- **Chpt. 11 Preparation of radiopharmaceuticals**
 - Multiplication factors – rings (IPEM working party)
 - Safer sharps – classification / contingencies
- **Chpt. 12 Therapeutic uses of unsealed radioactive substances**
 - Alphas
 - Ward staff advice
 - Laundry (lots of mailbase discussion!)
 - dosimetry



Brief overview

- **Chpt. 13 Ionising radiation in general laboratories**
 - General update
- **Chpt. 14 Diagnostic uses of sealed or other solid radioactive sources**
 - General update
- **Chpt. 15 Patients leaving hospital after administration of radioactive substances**
 - Update diagnostic advice based on most recent ARSAC DRLs (e.g. upped for SPECT), repeat exposures etc
 - Breastfeeding – contact time not included in ARSAC guidance notes (refers to MDGN...)
 - I-131 restrictions – Bill Thompson updating previous work
 - IPEM working party for therapy restrictions to be set up



Brief overview

- **Chpt. 16** **Precautions after the death of a patient to whom radioactive substances have been administered**
 - Reference to IPEM report 106 for I-125 seeds
 - Alpharadium
 - More detailed advice
- **Chpt. 17** **Keeping, accounting for and moving radioactive substances (including transport)**
 - RWA
 - New section on transport (problem updated every 2 years, will just refer to the latest ADR and hope things don't change too much)
 - Financial provision
 - Delivery and security



Brief overview

- **Chpt. 18 Accumulation and Disposal of radioactive waste**
 - New excretion factors (published on IPEM website, review by NM SIG)
 - Prostate waste following I-125 seed therapy – IPEM report
 - Contaminants (e.g. I-125 in I-123, Lu-177m in Lu-177, Eu-152, Eu-154, Eu-156 in Sm-153)
 - Accumulation for contingencies
 - Appendix 17 Environment Agency internal handbook – included in this chapter (asked to retain by Kate Griffiths, EA)
- **Chpt. 19 Contingency planning and emergency procedures**
 - Medical emergencies – patient priority
 - Fire – grab packs
 - Flood
 - RAMGENES and NAIR
 - Roles of physicists in response
- **PET chapter**
 - New chapter
 - Cyclotrons
 - Mobile PET



Also in “non-nuclear medicine” chapter

- Ditch reference to low dose rate brachytherapy in patients? (para 9.48)
- Add short radon section to chapter 1

Please send all suggestions for
improvements to

john.saunderson@hey.nhs.uk

or see me over lunch