Ethics in Medical Radiological Protection

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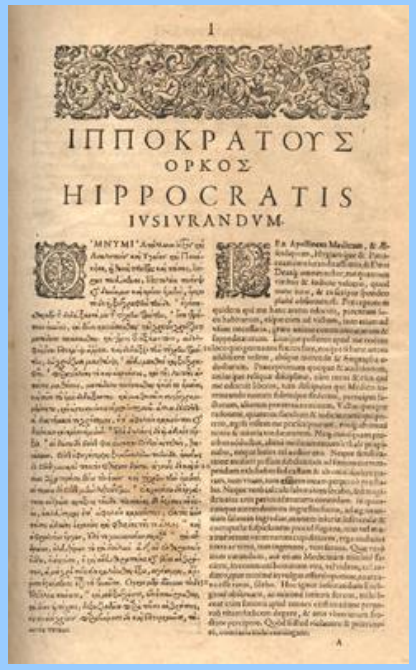


Ethics in Medical Radiological Protection

- What is medical ethics?
- Protecting the patient
- Justification and informed consent
- Optimisation and DRLs
- Medical education

Medical Ethics

Hippocratic oath

‘I will follow that system of regimen which, according to my ability and judgement, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous’

Medical ethics

- **What is medical ethics?**
- **A system of moral principles that apply values and judgements to the practice of medicine**
- **Encompasses practical application in clinical medicine in addition to other disciplines e.g. sociology and philosophy**

Values in medical ethics

- **Autonomy – patient has the right to choose or refuse treatment**
- **Beneficence – a doctor must act in the best interest of the patient**
- **Non-maleficence – ‘first do no harm’**

Values in medical ethics

- **Justice – distribution of heath resources with fairness and equality of treatment**
- **Respect for persons – the patient has the right to be treated with dignity**
- **Truthfulness & honesty – importance of informed consent**

Ethics of radiological protection

Most important values in ethics of medical radiological protection:

- **Beneficence**
- **Non-maleficence**
- **Truthfulness especially informed consent**

Radiological protection of the patient

- **Justification**
- **Optimisation**
- **No dose limitation**

Justifying Medical Exposures

Justification

- **What do we mean?**
- **Review the benefits and risks of a practice that will do more good than harm**
- **Usually relies on professional experience, knowledge, judgement and common sense**

Justification

3 levels of justification

- **Radiation in medicine does more good than harm**
- **Generic justification of defined procedure**
- **Justification of a procedure for an individual e.g. complex diagnostic or interventional procedure**

Justifying medical exposures

- **Is the x-ray/procedure really necessary**
- **Will the result change management?**
- **‘Nice-to-know’ disease**
- **Is there an alternative investigation e.g. US or MRI**
- **Informed consent**

Justifying medical exposures

Is the x-ray really necessary?

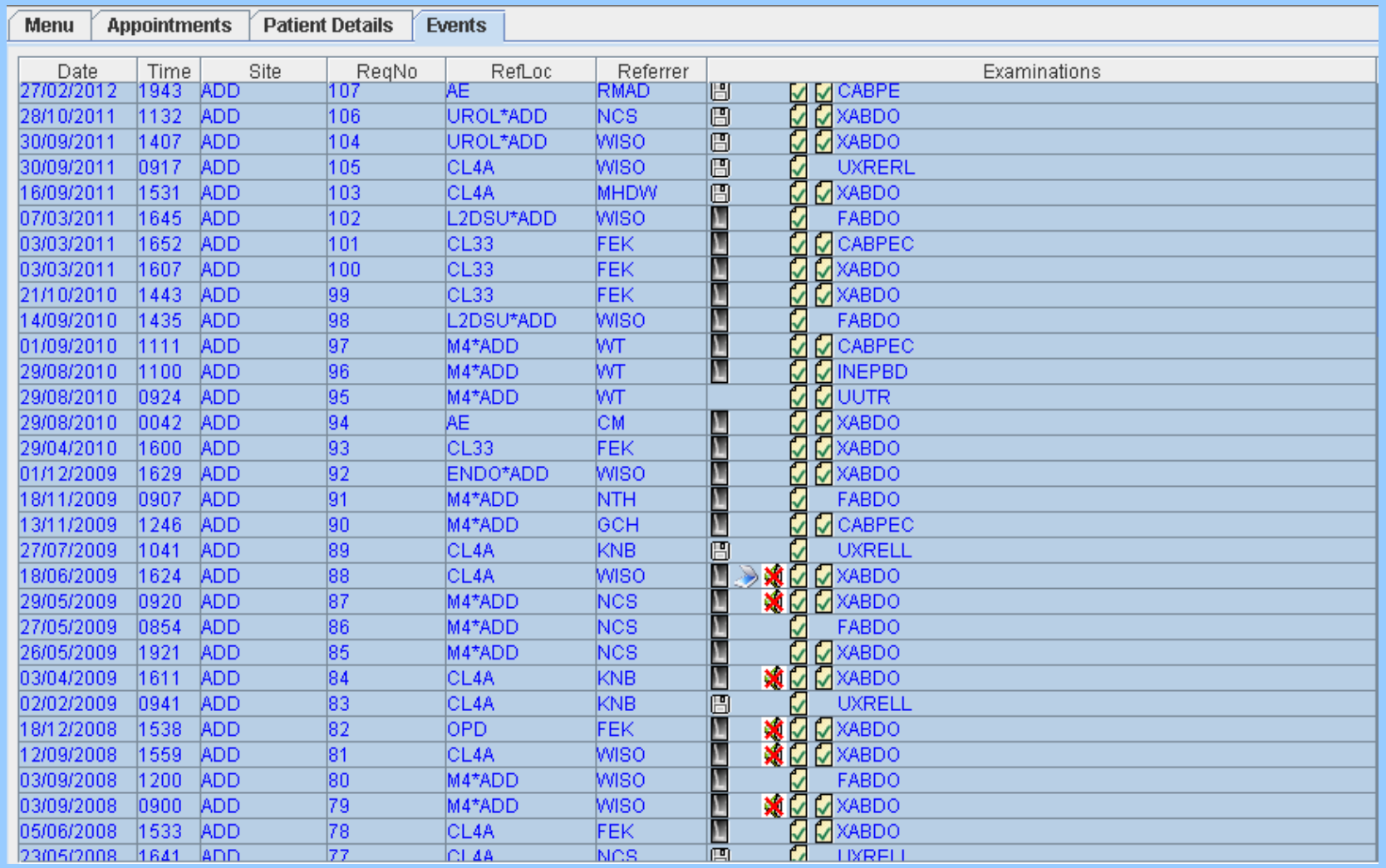
"This is one of Geoff and the kids taken last summer."

Justifying medical exposures

Is the x-ray/procedure really necessary?

- **Defensive medicine often includes unnecessary investigations**
- **Repeated admissions = repeating same tests e.g. chest/abdomen x-rays, CT scans**
- **Different clinical teams and junior doctors**
- **Often insufficient discussion between referrer and practitioner i.e. radiologist**

Justification – multiple exams



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30/09/2011	1407	ADD	104	UROL*ADD	WISO	XABDO
30/09/2011	0917	ADD	105	CL4A	WISO	UXRERL
16/09/2011	1531	ADD	103	CL4A	MHDW	XABDO
07/03/2011	1645	ADD	102	L2DSU*ADD	WISO	FABDO
03/03/2011	1652	ADD	101	CL33	FEK	CABPEC
03/03/2011	1607	ADD	100	CL33	FEK	XABDO
21/10/2010	1443	ADD	99	CL33	FEK	XABDO
14/09/2010	1435	ADD	98	L2DSU*ADD	WISO	FABDO
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29/08/2010	1100	ADD	96	M4*ADD	WT	INEPBD
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13/11/2009	1246	ADD	90	M4*ADD	GCH	CABPEC
27/07/2009	1041	ADD	89	CL4A	KNB	UXRELL
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02/02/2009	0941	ADD	83	CL4A	KNB	UXRELL
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05/06/2008	1533	ADD	78	CL4A	FEK	XABDO
23/05/2008	1641	ADD	77	CL4A	NCS	UXRELL

Justifying medical exposures

Is the x-ray/procedure really necessary?

- **Risk of radiation effects in elderly patients usually outweighed by diagnostic/therapeutic benefit**
- **Increasing use of minimally invasive techniques using fluoroscopy**
- **May still be at risk of skin injury from high dose interventional procedures**

Justifying medical exposures

Will the result change management?

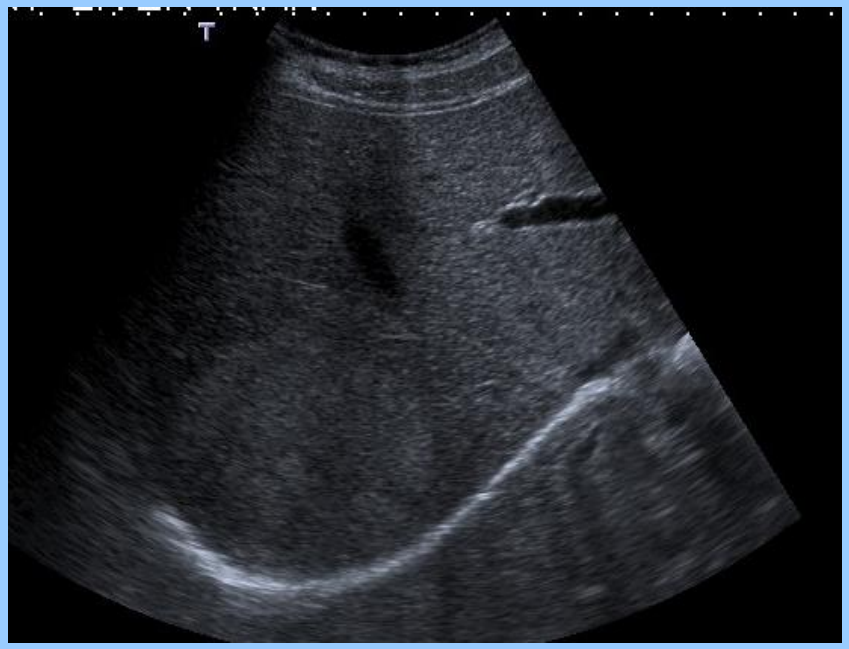
- **‘Nice-to-know’ disease**
- **Very elderly**
- **Terminally ill**
- **Incidental findings (VOMIT)**
  - **Victims Of Modern Imaging Technology**

Hayward, BMJ 2003

Justification

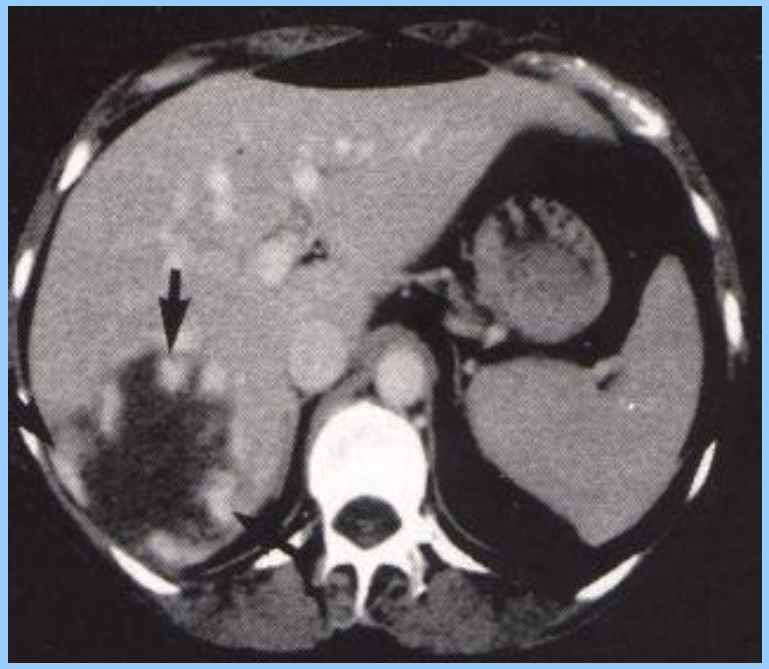
Will the result change management?

VOMIT



Ultrasound

Enhanced CT scan



Justifying medical exposures

Is there an alternative investigation?

- **Very many patients require further detailed imaging**
- **MRI may not be readily available out-of-hours**
- **CT often requested instead of US in belief that more diagnostic information**

Justifying medical exposures

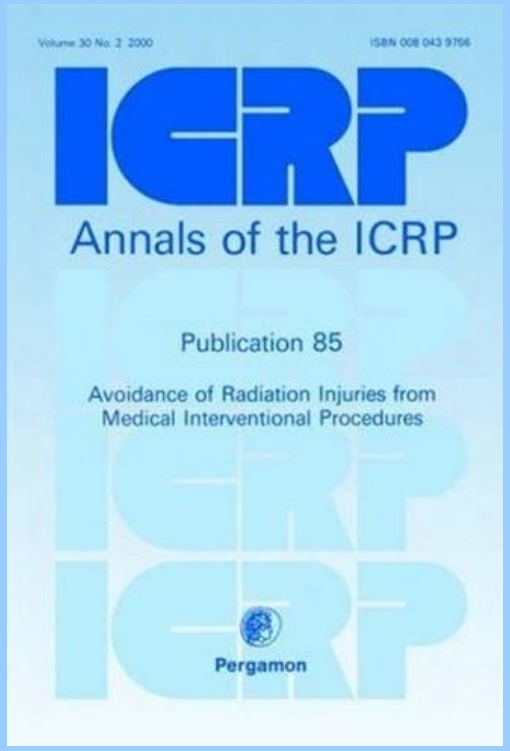
Informed consent

- Radiation risks increasingly important for complex fluoroscopically guided procedures
- Risks of radiation exposure seldom discussed
- Practitioners often not aware of the risks so unable to appropriately consent the patient
- Important not to unduly worry patient so that consent may be denied

Justifying medical exposures

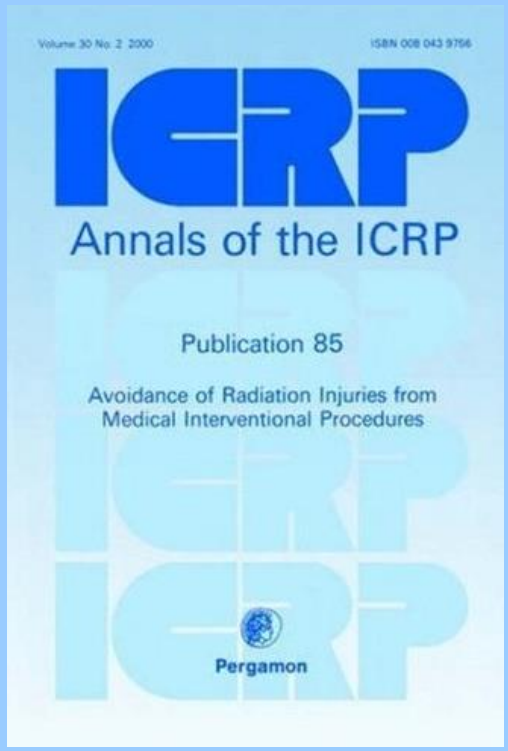
Informed consent

- Patients should be informed of possible skin effects if a high radiation dose is expected
- Skin effects can be delayed
- Radiation effects of multiple procedures are additive



Justifying medical exposures

- **Patients should be advised of symptoms and signs of radiation effects and how to seek advice**
- **For children and young adults, the risks of malignancy may need to be discussed depending on the procedure and organs likely to be exposed**



Optimisation and DRLs

Optimisation of protection for patients

- Usually applied at two levels:
  - appropriate equipment design and installation
  - working practices and procedures
- Means keeping the radiation doses ‘as low as reasonably achievable’ so the dose is commensurate with medical purpose

Optimisation of protection for patients

- **Ensure appropriate protocols and settings on new equipment with adjustment if necessary**
- **Regular quality assurance**
- **Do not use adult imaging protocols for children, particularly in CT**

Optimisation

Optimisation – Diagnostic Reference Levels (DRLs)

- **Help avoid radiation dose non-contributory to clinical purpose**
- **Derived from relevant local, regional or national data**
- **Aim to promote optimum range of values for specific imaging tasks**

Diagnostic Reference Levels

- Allow identification of doses both above and below the specified range
- Designed to compare examinations and not individual patient doses
- In UK, national surveys of patient doses collected by NRPB since early 1990's
- Database reviewed & updated every 5 years

DRLs Paediatric

- **Optimising equipment performance and operator technique can significantly lower dose**
- **Easier in centres with super specialised units**
- **Fluoroscopy paediatric doses 5-25x lower than DRLs at Great Ormond Street Hospital**

Hiorns et al, BJR 2006

Hospital radiation league tables?

THE INDEPENDENT

High radiation puts child X-ray patients at risk

Requiring hospitals to publish exposure levels could eradicate huge variations in doses

Nina Lakhani

Tuesday, 3 January 2012

Patients are being exposed to unnecessarily high doses of radiation during common X-rays and scans because some hospitals have out-of-date equipment and inadequately trained staff.

Variations between hospitals are so great that adult patients are exposed up to five times as much radiation for identical procedures. Children face the biggest risk, experiencing much larger variations as outside specialist units there are few clinicians with paediatric expertise or equipment.

The British Institute of Radiology will tackle the issue head-on later this month by considering ways to drive up local standards and reduce variations across the country.

Forcing hospitals to collate and publish radiation exposure results, which would allow the public and health professionals to compare departments, could help drive up standards, according to some clinicians and patients.

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DRLs - interventional procedures

- **Being developed for some radiological and cardiological interventional procedures**
- **Particularly in USA and Europe**
- **Consideration of patient size important but correction complicates analysis**

Hart et al, BJR 2009

Miller et al, Radiol 2009

Medical Education

Medical Education

- **Often limited radiological protection education outside radiology training**
- **Increasing use of ionising radiation outside radiology departments with little training**
- **Teaching expensive and resource limited**

Doctors knowledge of radiation doses

- 130 hospital doctors 2 UK district hospitals
- 0% knew dose from CXR or radiation units
- 4% scored 0 correct answers
- 97% marked underestimation of doses
- 5% thought US uses ionising radiation
- 8% thought MRI used ionising radiation

Shiralkar et al, BMJ 2003

Doctors knowledge of radiation doses

- **Doctors 3 university hospitals Turkey**
- **93% marked underestimation of doses**
- **4% thought US uses ionising radiation**
- **27% thought MRI used ionising radiation**

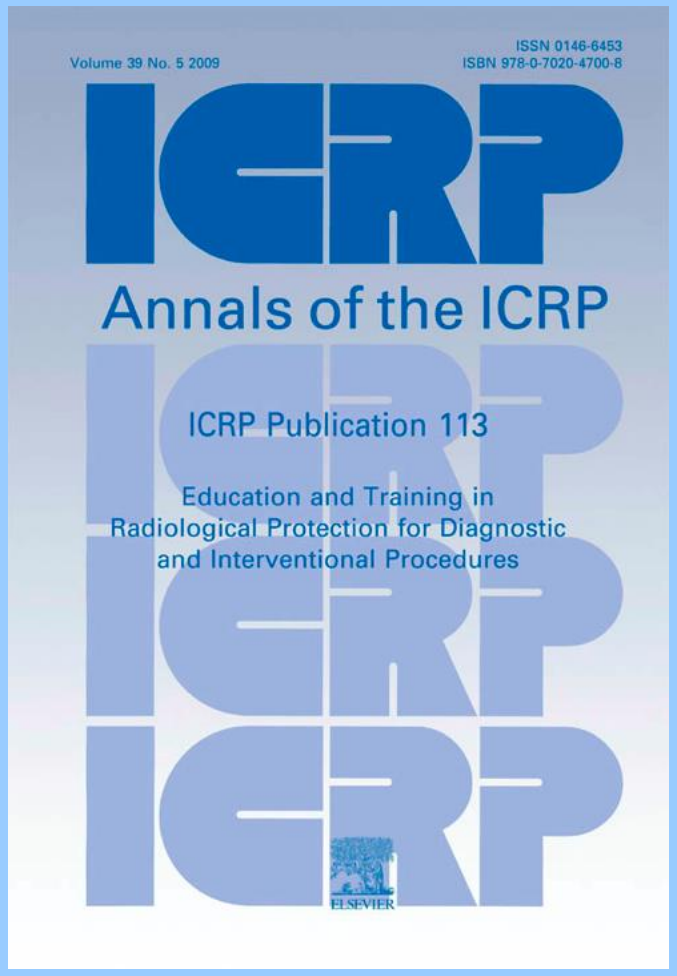
Arslanoglu et al, Diagn Interv Radiol 2007

Medical Education

- **Studies indicate appalling knowledge of radiation doses amongst hospital medical staff**
- **Emphasises need for adequate and appropriate education during medical training**
- **Continuing medical education also important**

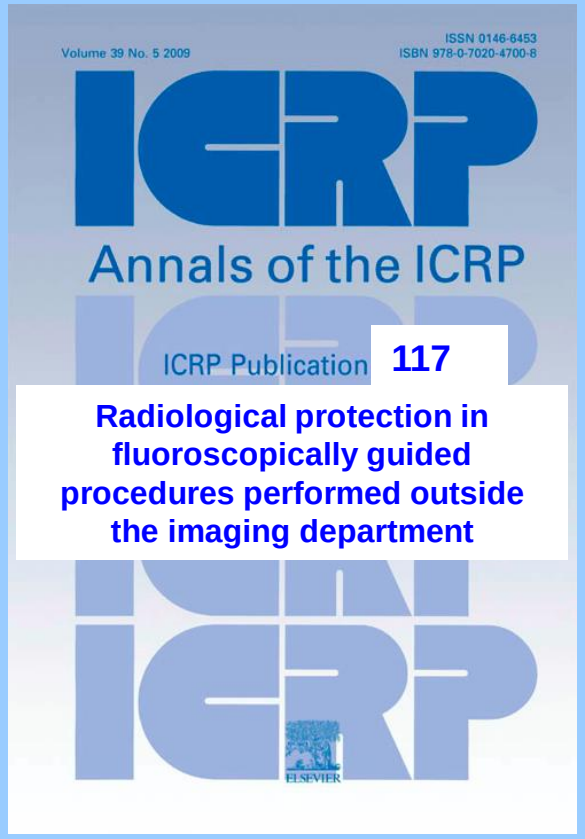
Medical Education

- ICRP 113 2009
- Advice for specific groups of healthcare professionals
- Advice provided on accreditation and certification



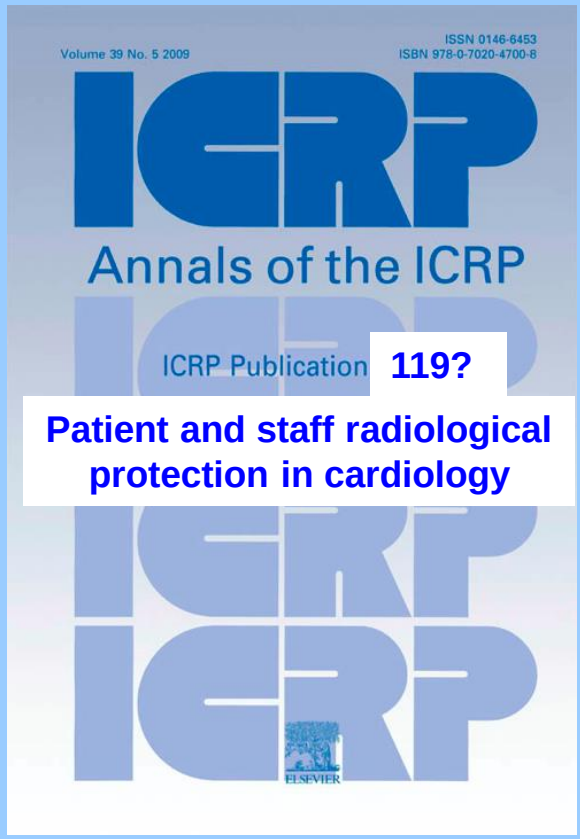
Medical Education

- **ICRP TG 78**
- **Radiological protection in fluoroscopically guided procedures performed outside the imaging department**
- **In press**



Medical Education

- **ICRP TG 62**
- **Patient and staff radiological protection in cardiology**
- **Final stages of preparation for publication**



Conclusions

- **Ethics in medicine, including in radiological protection, is a complex issue**
- **X-rays and radiological procedures offer huge benefits of care from modern technologies and less invasive treatments**
- **RP community has a duty to improve & continue the education of health professionals**
- **Do not forget the fundamental principle of ‘first do no harm’**