

IFMP WORKSHOP IN IONIAN UNIVERSITY, CORFU, GREECE

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ETHICS FOR RADIATION PROTECTION IN MEDICINE

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The system of radiation protection (RP) in most countries is based on the recommendations of the ICRP, whose publications are purpose built for radiation protection. They are based on scientific evidence, combined with value judgments that allow the evidence to be applied to practical problems in industry, medicine, education, research, and everyday life. Some of the values on which ICRP relies are articulated, but most are implied and not explicitly present. In medicine, there is a longstanding system of values stretching back to the Hippocratic Oath, which recognises the need for care and ethical sensitivity in the way patients are treated and treatments are delivered. The resultant corpus of knowledge and experience is impressive. Medical ethics has a tried and tested teaching literature for undergraduates and postgraduates, as well as an active research community throughout the world.

For the most part scholarship in medical ethics does not attend to the problems in radiation protection. It appears there is an unwritten assumption that radiation protection issues are dealt with in a separate system and medical/general ethicists have not engaged with it. In consequence radiation protection in medicine has enjoyed exceptional independence, which allowed it unique access to management and resources. The counterpoint is that the ethical issues in radiation protection have low recognition in the medical world, except for a handful of RP specialists who advise in the area. The net impact is that radiation protection has, until recently, been isolated from contemporary ethical and social thinking, especially in medicine.

The systems of medical ethics and the ICRP system for radiation protection overlap significantly. However, there is no simple way of mapping one onto the other. Notwithstanding, it appears that a widely recognised system of medical ethics may provide backing to the system of RP. Further, ICRP and the International Radiation Protection Association (IRPA) are reviewing the ethical approaches that may help inform and guide RP in the future, and a publication in the area has been drafted.



Ethics and Radiation Protection of the Patient

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Evidence: good as we think?

- Dark Sides to Science/Med
- Evidence base weaker ----

Ethics in General

- Ethics, RP and the Patient
- ICRP Ethics & RP Culture



Evidence: Dark Sides of Science, Medicine

- In theory: We **PRESUME** our practice to be evidence based
- Problems: over-utilization/ inappropriateness/ UN-EC: Systemic 20-50% in radiology / overdiagnosis/ misdiagnoses /in hospital accidental deaths
- Reproducibility, Plagiarism, Fraud, eg. MMR Vaccine Case
- Lifestyle medicine/ Mammography controversies/ IHA



4 Retraction

Common Causes

- Fraud, Mistakes, Plagiarism etc

Example:

- Japanese. Jan 2014. ***Nature***: reprogramming of adult cells to stem cells. Mega deal.
- Other scientists raised issues; eg, with images in paper
- **Multiple authors (eg MMR) and Difficulties repeating work**
- Haruko Obokata disciplined for inappropriate behaviour. Others walked (but not all).
- Retraction by journal Jun 14.



5 Reproducibility and Quality

in Medicine/related Sciences

Topic	Finding	Comment	Source
Basic Medical Research	50 – 80% not reproducible	US cost \$28bn	Freedman et al. PLOS, 2015
Diagnostic Errors in Intensive Care (ICU)	28% one or more at autopsy. 5% potentially lethal*	In US about 40k/pa die with an ICU misdiagnosis	Winters et al. BMJ Qual and Safety, 2012
Psychology Investigations	At best a quarter (Social Psych) to a half (Cognitive) investigations reproducible	Replication often discouraged in psychology; criteria for reproducibility	Science, Aug 2015 and general media
All Medical	Most published medical research false	Anticipated hostility, but well regarded.	Ioannidis, PLOS, 2005.

Is Physics better?

*Eg: Vascular, infection, obstruction, PE.

The SCIENTIFIC PAPER is no longer Holy Writ

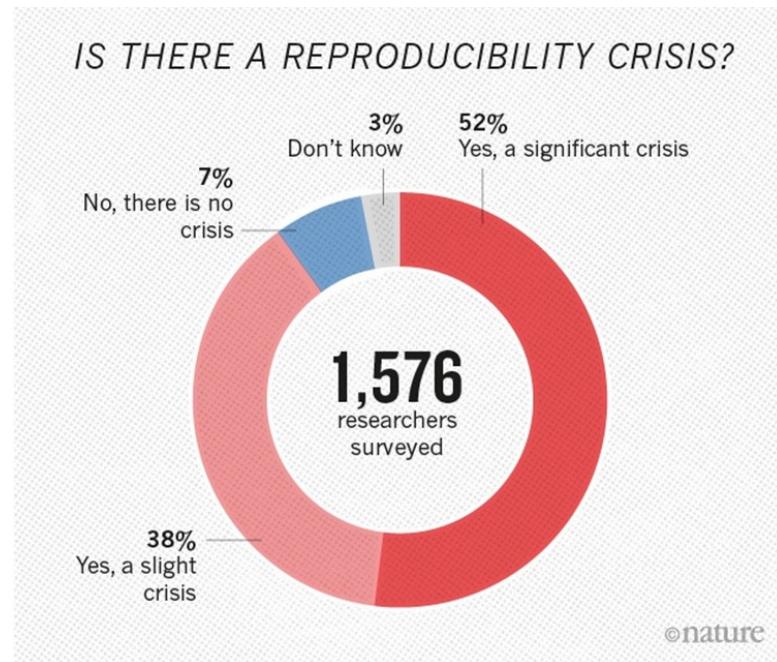
US Death from Medical Mistakes

Year	Deaths /year	Comment	Topic/Source
1999	98,000	Initially disputed Now widely accepted/cited	To Err is Human Inst of Medicine (US Nat Academy of Sci)
2010	180,000	Bad care contributes to these deaths	Office of Inspector General for HHS, US. Lancet Editorial
2013	210,000- 440,000	Preventable harm contributing to death	JT James, NASA https://www.documentcloud.org/documents/781687-john-james-a-new-evidence-based-estimate-of.html#document/p1/a117333
2001	~10% of patients	1/3 serious or death	BMJ, Neale et al., Cambridge, UK

One-Sixth of All Annual Deaths in the United States
Engage patients, seek patient voice, transparency, correct root causes of harm
Problems with reporting systems (factor of 10 apart)

Bad Science and poor Evidence Base

- The rewards System
 - Wishful Thinking
 - Burying Evidence
 - Rewriting History
 - Tidying up data
- Encourage replication studies and good reviews
- Consider the public's view and other “outsider views” in creating research programmes



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“Research misconduct will always occur, but while it is important to have robust systems to deal with allegations of fraud, the true challenge we face is creating a sustainable research environment that fulfils science’s true purpose— inquiry to deliver progress for society and our planet.”

See Editorial page 2223.

Comment	Articles	Articles	Articles	Seminar
Tobacco in China: turning the smoking dragon George Hogg	Assault with a 1-palmitoleoylglycerol ester in heterozygous familial hypercholesterolemia See page 2223	2 year non-invasive and invasive outcomes in infants with very premature birth growth restriction See page 2220	Bone reconstruction to restore hand function after brachial plexus injury See page 1993	Multiple myeloma See page 2207



The Scientific Method is the most valuable way of knowing our species has found.

NOT failure of Scientific Method; IS failure of Ethical Behaviour in science practitioners ---

Solution: a commitment to the values of Science,
respect for truth and improvement of man's lot.

(Boyle "Made conscience of great exactness in experiment")

Ethics: Context and Questions?

- Immense Technical Success over 5 decades
 - Great social change
 - Ethics, Standards and Regulation: fallen behind
 - Iconic role for hospitals, BUT many scandals
 - Contemporary move from paternalism
 - Blood, Organ Donor, Infection, Radiotherapy, Imaging scandals.
- A. What is Ethics?
 - B. Ethics and Public Attitudes
 - C. Ethical Reasoning
 - D. Policy, Values and ICRP
 - E. Pragmatic values for RP of Patient
 - F. Reflections on Culture of RP in medicine

A. What is Ethics?

What ought I/we to do?

- How ought practice of Medical Physics be conducted (by particular individuals dealing with particular ‘problems’)?

Ethics is:

- Essentially practical
- Obligations v ordinary
- And v numerous
- **What I ought to be doing right now ...?**



B. Ethics not only determined by Public Attitudes

1. Repugnant conclusions

- Slavery, capital punishment

2. Difficulty in determining what is 'the public'/'the public's values'. An individual? A survey?

3. View of morality and /or ethics

- Moral Sense vs taste
- Does not give a due place to reason and argument



C. Ethical Reasoning

How does ethical reasoning proceed?

1. Any facts will matter sometimes
2. Situations are complex
3. Normally what can be done is distinct from what ought to be done
4. Consider situation in sufficient detail
5. Identify possible courses of action
6. Assess various outcomes/courses of action

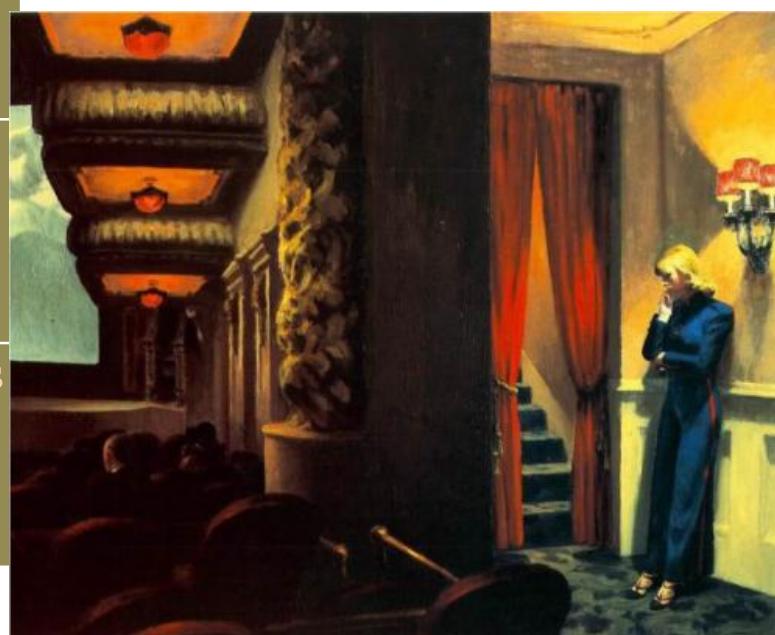


Ethics, Values Medicine and ICRP

- ICRP system consists of:
 - (Incomplete) science
 - Value judgments
 - Experience
- ICRP purpose built; detached from MEDICAL ethical scholarship and practice
- Medical Ethics system; strong scholarship; radiological ignored
- RP, by being separate in medicine, has advantages, but isolated, with low recognition.
- ICRP revisiting ethics: TG-94, IRPA Consultations. Report finalised.



13. Pragmatic Value Set for RP in Medicine

Core Values	+	Values <i>Supplement</i> the 3 ICRP Principles
Dignity/ Autonomy		
Non-Maleficence/ and Beneficence	Additional Values	ACCEPTED ACROSS CULTURES
Justice	Prudence/ Precaution	
Beauchamp's and Childress <small>7th edition since 1979</small> <small>The values are a set.</small>	Honesty/ Transparency Compensate for problems in practice	

14 F. Reflections

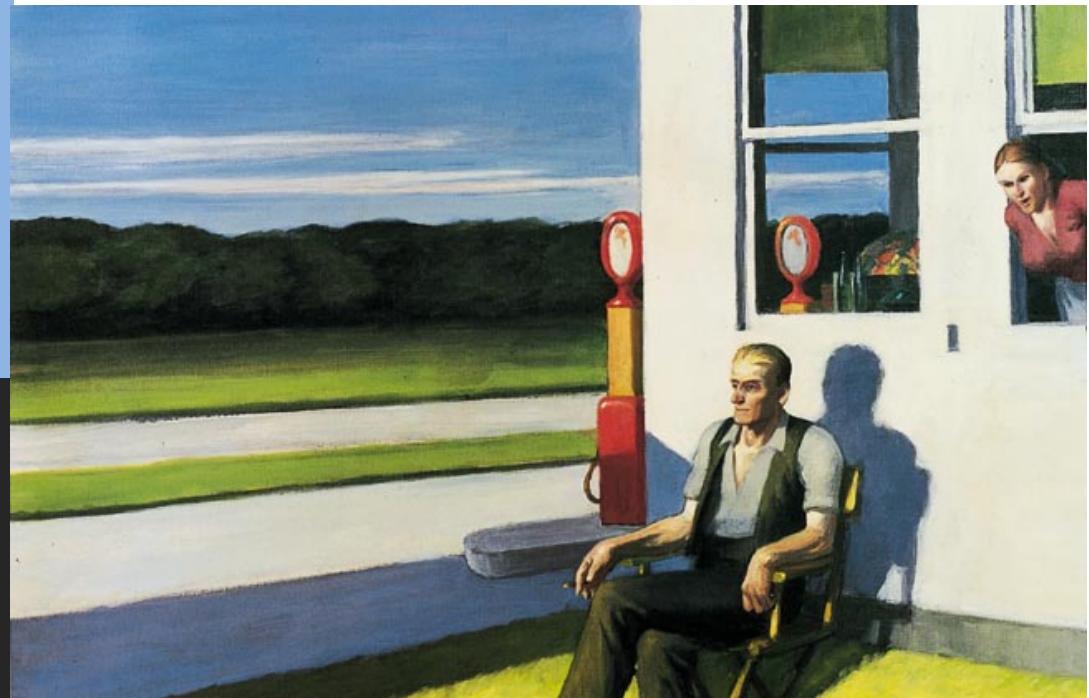
Prudence

ICRP supports LNT model

- Yet “... calculation of the number of cancer deaths based on collective effective doses from trivial individual doses should be avoided.”
This is justified by saying that such calculations would be “biologically and statistically very uncertain” (ICRP)

The ICRP position seems incompatible with the Precautionary Principle, as is AAPM position.

- Rooted in a “common morality” -- “not relative to cultures or individuals,-- transcends both”
- Common to all wisdom literatures
- Behavior without full knowledge. “Potential for irreversible harm – lack of full scientific knowledge shall not ---”
- Environmental precedents ---



Dealing With Uncertainty

Uncertainty, Epistemology, Medicine, Fraud, and Policy

- Uncertainty: Epistemology to Carelessness, Fraud and Poor Communication (*Accept with humility and serenity*)
- Everyday uncertainty
 - 6 months, 20% chance of cure
 - **Brain Aneurysm** Operation generally successful but 5% procedure mortality?
 - **Personal Experience**
 - Scams and Open Access
- LNT fetish Uncertainty. Professional angst and disagreement confuses
- Clear simple communication that includes the uncertainty

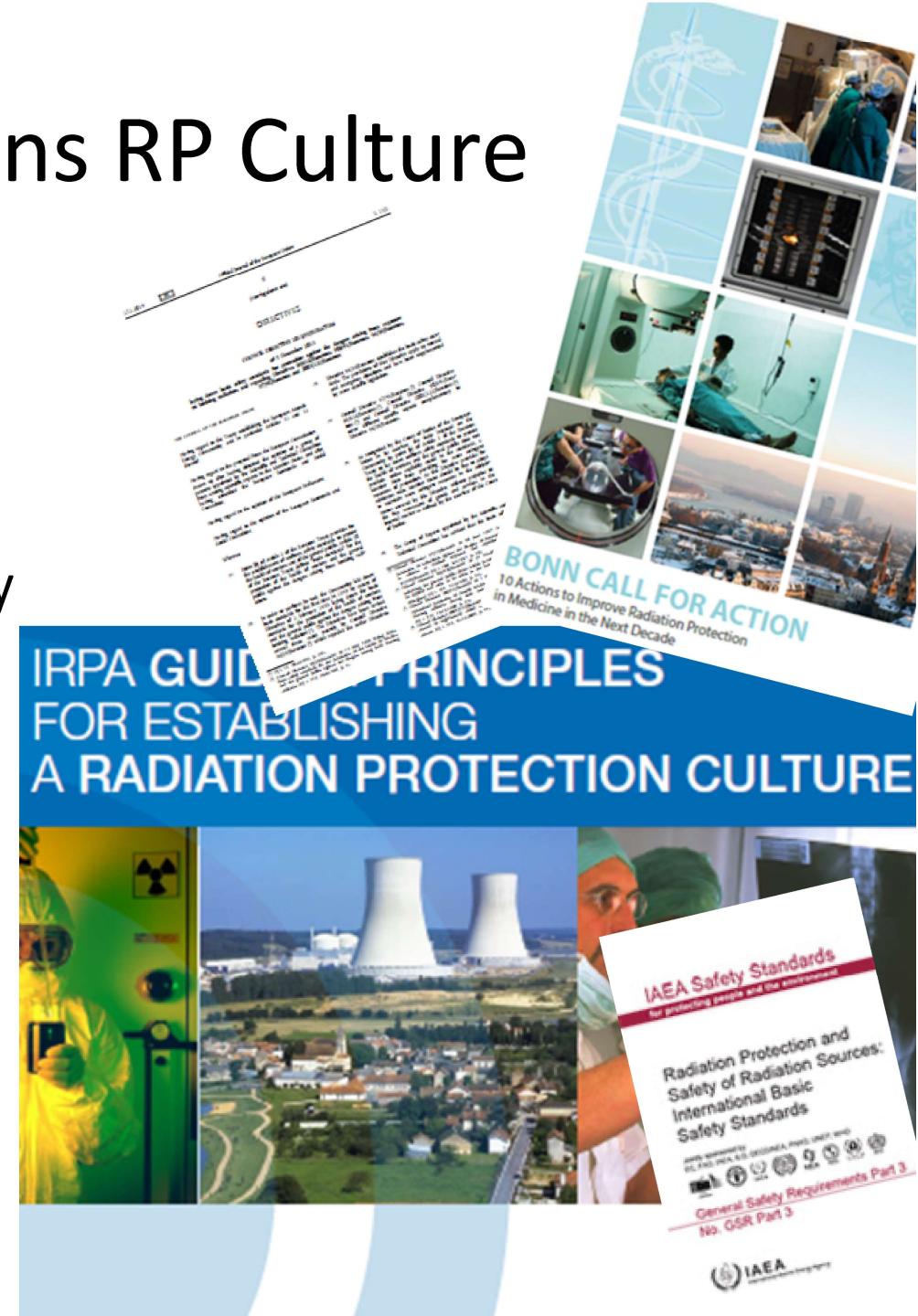




15 Ethics and Radiation Safety Culture in Medicine

16/17.1 F. Reflections RP Culture

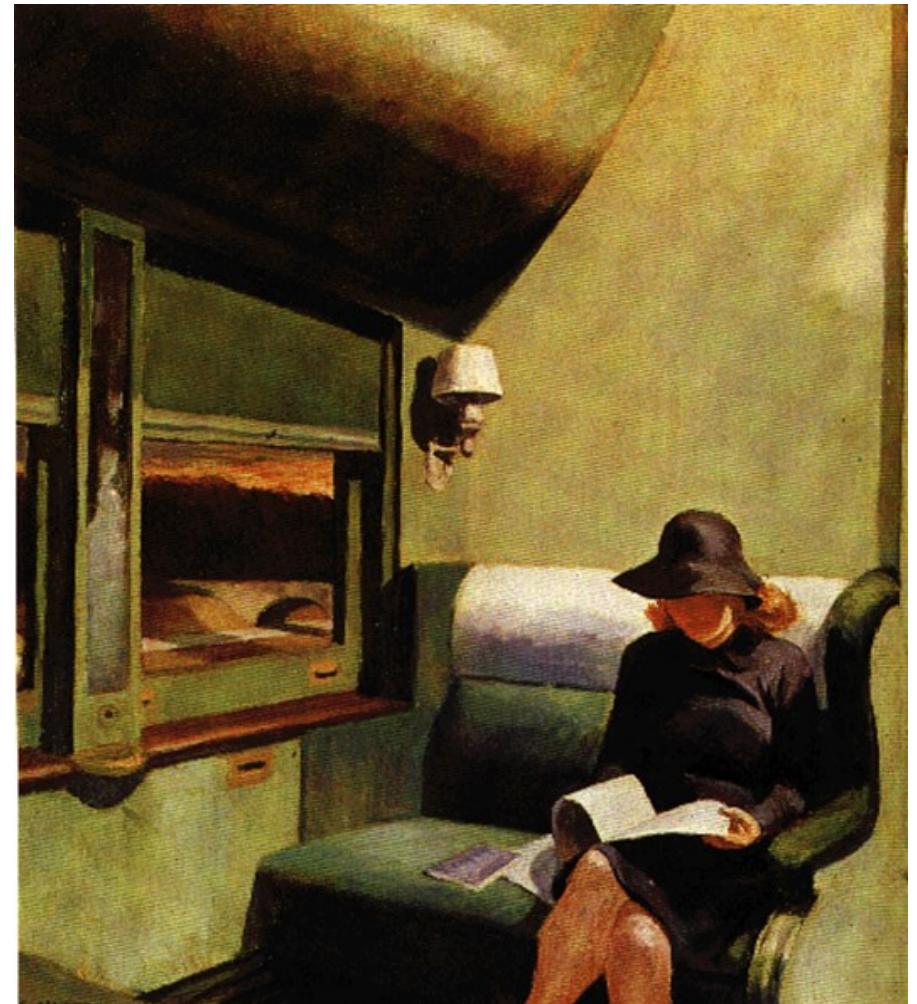
- Work out of a CULTURE: Habits and routines of a profession.
- Often unconscious. Must bring to awareness. Wish for certainty
- Overreliance on Law.
- Law is good; Good Culture is better.
- Concentration on technical; it offers certainty
- MP not pervasive in hospitals
- Reflect on dominance of the technical and on our culture



16/17.2. Reflections, RP Culture and Ethics

- Excavate the Culture
- Reinvent relationships to:
 - ICRP Principles
 - Ethical Values
 - All stakeholders (identify?)
 - Improve communication
 - Dysfunctional relationships patients/press/ public.

“Expected ----- behaviours of a particular culture can be so powerful that it becomes all but impossible for its members to even conceive of other ways of being” Analogous to TRIBES



Salvador Dali, Last Painting
The Swallow's Tail
Based on Catastrophe
Theory, -- point of inflection
Major change, his death

*Scientific Method is Best
System we have*

*Is our work at risk
because of technical
and ethical failures?
We must protect it.*

*More awareness of
ethics and values is part
of the solution. Leave
answers to you*