

ISOE Asia

Do We Need Another Category of Consented Exposure ?

2014.9

Jaiki Lee

Hanyang Univ., Seoul, Korea

jakilee@hanyang.ac.kr



Current System for Exposure Control

(ICRP 103)

Exposure Situations	Occupational exp.	Public exp.	Medical exp.
	Workers	Public	Patients
Planned	Dose limits + Constraints	Dose limits + Constraints	RL(Diagnostic)
Emergency	Ref. levels	Ref. levels*	-
Existing	-	Ref. levels	-

* Questionable: to be discussed

Occupational & Medical: consented

Public: Unconsented

Consented Exposure?

□ Informed & Consented exposure

□ How come?

- Radiation exposure accompanies risk
- A person has **right not to be exposed**
- The right is compromised when he/she gets **benefits** in return
- The responsible party for the exposure should inform the exposure level and associated risk: a necessary condition
- Consent of exposed persons is their decision

Rationale Behind

- The level of risk taking: roughly **proportional to the value** of returning benefit
 - Precise proportionality is difficult to achieve
 - The exposed person is in **capacity of decision making**
 - Taking increased exposure to a certain level is justifiable
-

Consented Exposures

□ Occupational exposure

- Normal exposure: job
- Emergency exposure: special return

□ Medical exposure

- Health return to themselves
 - Mass screening: public health return
 - Carers and comforts, subjects of biomedical research: medical exposure?
-

Un-consented Exposure

- Neither informed nor consented
 - Full right of not to be exposed
 - But minimal obligation as a contemporary citizen to accept exposure from common sources
 - Already widespread radioactivity (fallout from nuclear test or nuclear accidents)
 - Effluent release from facilities dealing with radioactive material (nuclear facilities, hospitals, NORM facilities)
 - Consumer products (particularly containing NORM)
-

Unconsented exposure = Public exposure?

Yes, in basic concept

No, because not defined so

Public exposure encompasses all exposures of the public other than occupational exposures and medical exposures (ICRP 103)

Pose problems in understanding public exposures

Which of these people are members of the public ?

1. Air passengers exposed to elevated cosmic radiation
2. Air passengers undergoing security x-ray screening
3. Current residents living in the city of Fukushima
4. Evacuees returning their home when the restriction lifted
5. Residents near an operating nuclear power plant
6. Citizens of Prypiat city at the time of Chernobyl accident
7. Monks insisting remain in the temple against evacuation recommendation
8. Housewives buying foodstuffs with elevated activity for cheaper price
9. Pet owners holding the pet while x-ray imaging at a veterinary
10. Residents in radon-prone home

Questions in Aftermath of the Fukushima Accident

- Is not the 20 mSv reference level too high when compared with the dose limit 1 mSv?
 - How about the children?
 - Is bearing a child not contaminated by annual dose of 1 mSv projected?
 - Problems caused by misconception of public exposure
What happens after exposure exceeding 1 mSv?
 - What are the safe criteria for foodstuff?
-

What is Public Exposure?

公众成员

일반인

公衆の構成員



Members of the Public ?

- ❑ Never defined in ICRP recommendations
- ❑ What should that mean legally?

Members of the public in the context of RP

- ❑ Individuals who have **a right** to refuse significant radiation exposure
 - ❑ Exposed individuals **without informed consent**
-

When does the right not to be exposed weaken ?

- Having benefit in return (job, healthcare, compensation, fame, safety, comfort, convenience, . . .)
- Own faults
- Sacrifice with free-will

Weak right  Certain obligation to take additional risk

Trade-off of radiation risk with benefit or other risk

Sometimes No Right Intrinsicly

- No does the right to be claimed
 - Normal background radiation
 - Existing exposure situations (fateful) : No right de facto
 - Residents in high background areas (including radon): own responsibility
 - Legacy of past activities (weapon fallout)
 - Exposure at early phase of a radiological event (no time to claim the right)
-

Informed Consent

- For informed (prerequisite of consent)
 - Got sufficient information needed to understand the exposure situation and associated health risk: prior education
 - More than simple explanation in one-way
 - For consent
 - Need a **written document** in principle
 - **Implicit consent** may be recognized for minor and general exposure
-

Now what are public exposures ?

1. Air passengers exposed to elevated cosmic radiation
 2. Air passengers undergoing security x-ray screening
 3. Current residents living in Fukushima city
 4. Evacuees returning their home when the restriction lifted
 5. Residents near an operating nuclear power plant
 6. Citizen of Prypiat city at the time of Chernobyl accident
 7. Monks insisting to remain in the temple against evacuation recommendation
 8. Housewives buying foodstuffs with elevated activity for cheaper price
 9. Pet owners holding the pet while x-ray imaging at a veterinary
 10. Residents in radon-prone home
-

What are the affected population from a nuclear accident ?

- Neither workers, volunteers nor patients with informed consent
- Not members of the public having a right not to be exposed

My answer:

It depends on the *informed consent*

If informed consent **not** expected

- At Higher dose levels, short term, above reference levels
 - They are just **natural persons** getting an **existing exposure**
 - Like residents in a high background area or a radon prone home
 - No relation to the right not to be exposed
 - Subject to **intervention** to reduce dose
 - Do all reasonable actions to lower the dose below reference levels
-

If informed consent is assumed

- At lower dose below **reference level**, prolonged term
 - If continue living in the area, they are **informed individuals** (**voluntary exposure**)
 - Like radon exposure of typical levels
 - E.g. citizens of Iitate city in Fukushima
 - If leave the area with their own account, they are **nobody** (out of radiation protection)
 - Compensation/reparation is not a matter of RP
-

Gap

‘Public’ put under
unconsented exposure
(Radiation protection)



‘Public’ in common
Understanding
(Everyday life)

- People exposed to domestic radon are not members of the public?
 - Expected difficulty in communication
 - Use another term instead of *public* ?
-

Control of Consented Exposure

可以接受

acceptable

응인 가능

容認可能

risk



Gaps

- There are people exposed neither occupationally nor as a member of the public
 - Trainees (?)
 - Pet owners helping imaging at a veterinary (?)
 - Carers/comforts (medical)
 - Volunteer subjects of biomedical research (medical)
 - Air passengers (public)
 - Visitors to a radiation facility (?)
 - Residents rehabilitated (public)
 - Informed consumer (public)
 - Radon spa users (public)
 - Cave tourists (public)

*current classification in
ICRP 103

Let's call them
volunteers

Dose Restriction for Volunteers?

- Informed & consented (explicitly or implicitly)
 - Apply the same dose limits as workers?
 - Probably No
 - Occupational limits are derived by comparing with acceptable risk at work (for job)
 - Benefit return for volunteers: less
 - Should apply reduced limits
-

Dose Limits for Volunteers

- At what level?
 - Traditional practice of 3/10 approach
 - Concept of occasional worker (Korean & Japanese regulations)
 - Working condition B in previous ICRP recommendations
 - Code of practice for protection of minors
 - 6 mSv/y of effective dose
-

Problems in Categorizing Exposure Situations

计划照射

计划被ばく

계획피폭

既存照射

Existing

비상피폭 Planned

Emergency

緊急時被ばく

既存照射

現存被ばく

기존피폭

Current Categories

- **Planned** situations
 - Related to deliberately introduced sources
 - **Emergency** situations
 - Require urgent actions
 - **Existing** situations
 - Already exist at the time of decision
-

Confusions

Planned

- Include **potential exposure**?

Emergency

- Exposure of emergency workers is *planned*
- Exposure of residents under nuclear accidents?
- Include all the occupational exposures in Fukushima in March 2011?

Existing

- Radon exposure at work?
 - Cosmic radiation exposure of air crew?
-

Planned Exposure or Planned Source?

- Categorizing Exposure situations, not the source
 - A planned source can cause all 3 exposure situations
 - Sources exist but exposure is planned
 - Rn exposure at work
 - Cosmic radiation exposure of air crew
 - Recovery workers at Fukushima
-

Problem with term *Emergency*

- Wide spectrum of emergency
 - Form a spill at a laboratory to severe accident at an NPP
 - Wrong lead to encompassment of all exposures under an accident
 - My understanding
 - Key concept of emergency exposure: **intentional** exposure of **higher doses** to save great value (sacrifice of the Braves)
-

A Better System

Exposure situations	Planned				Unplanned	
	Consented				Unconsented	
Category	Missional	Occupation.	Voluntary	Medical	Existing	Public
Exposed individuals	Braves	Workers	Volunteers	Patients	Natural person	Members of the public
Dose restriction	Ref. levels	Limits + constraint	Reduced limits + constraint	Ref. levels (diag.), prof. judgment	Ref. levels	Limits + constraint
Examples	Fighters(rescuer), space crew	Ordinary workers, air crew	Residents rehabilitated, carers, air passengers, biomedical subjects, visitors, informed consumers	Patients under diag., nuclear medicine, therapy procedure	Residents in radon prone home, affected people at early phase	Residents near nuclear facility

Conclusion

- Current categorization of exposed persons and exposure situations in ICRP 103 suffers significant conceptual gaps
 - Mis- interpreted or misleading in part
 - Need a reform of the system of Radiological Protection
 - Re- wording
 - Potential addition of exposure categories
-



**DeconWork in
Iitate
Thanks**