RISK PERCEPTION OF IONISING RADIATION AMONG HOSPITAL PERSONNEL

Charlotte Stiévenart\textsuperscript{1} and Catrinel Turcanu\textsuperscript{2}

\textsuperscript{1}ISP-WIV (Scientific Institute of Public Health), Bruxelles, Belgium
\textsuperscript{2}SCK•CEN, Belgian Nuclear Research Centre, Mol, Belgium

cha.stievenart@gmail.com; ceturcanu@sckcen.be
Perception of radiation risks

- Psychological characteristics of risk are more important than technical risk estimates
  - Familiarity, voluntary action, disaster potential, controllability, ..., influence risks perception
  - “Unnatural” or immoral aspects of modern technologies increase risk perception
Perception of ionising radiation risks

- Psychological characteristics of risk are more important than technical risk estimates
  - Familiarity, voluntary action, disaster potential, controllability,..., influence risks perception
  - Unnatural or immoral aspects of modern technologies increase risk perception

- The context also plays a role
  - Industrial vs. medical
    - E.g. aversion against radioactive waste depends on the activity generating it
Perception of ionising radiation risks

- Psychological characteristics of risk are more important than technical risk estimates
  - Familiarity, voluntary action, disaster potential, controllability, ..., influence risks perception
  - Unnatural or immoral aspects of modern technologies increase risk perception

- The context also plays a role
  - Industrial vs. medical
    - E.g. aversion against radioactive waste depends on the activity generating it

- Difference between lay public and experts’ perceptions
  - Public considers nuclear power and radioactive waste more risky, and diagnostic X-rays less risky, than the technical experts do
Perception of ionising radiation risks

- Psychological characteristics of risk are more important than technical risk estimates
  - Familiarity, voluntary action, disaster potential, controllability,…, influence risks perception
  - Unnatural or immoral aspects of modern technologies increase risk perception

- The context also plays a role
  - Industrial vs. medical
    - E.g. aversion against radioactive waste depends on the activity generating it

- Difference between lay public and experts’ perceptions
  - Public considers diagnostic X-rays less risky, and nuclear power and radioactive waste more risky than the technical experts do

- Higher trust in the institutions responsible for risk governance lowers risk perception
Perception of ionising radiation (IR) risks among professionally exposed

- Limited number of studies in the literature
Perception of ionising radiation (IR) risks among professionally exposed

- Limited number of studies in the literature

  - Nuclear power plant employees
    - Perceived nuclear risk accounts for one third of the perceived overall job risk
      - nuclear risk by far the most important predictor
    - Job satisfaction more strongly related to perceived conventional job risks than to nuclear risks
    - Lower specific knowledge correlated to higher risk perception
Perception of ionising radiation (IR) risks among professionally exposed

- Limited number of studies in the literature
  - Nuclear power plant employees
  - Hospital personnel
    - Organisational variables (e.g. hierarchy and team membership) influence perception of occupational exposure to low-level IR
      - Small clinics likely to be different than large hospitals
Perception of ionising radiation (IR) risks among professionally exposed

- Limited number of studies in the literature
  - Nuclear power plant employees
  - Hospital personnel
  - Employees of the SCK•CEN professionally exposed to IR
    - Upcoming
Perception of ionising radiation (IR) risks among professionally exposed

- Limited number of studies in the literature
  - Nuclear power plant employees
  - Hospital personnel
  - Employees of the SCK•CEN professionally exposed to IR

- Studies on other types of occupational exposure
  - Lower risk perception correlated to the use of less safe procedures among asbestos workers
  - Risk perception is one of the dimensions of safety climate
Perception of IR among hospital personnel in a number of Belgian hospitals

Methodology

- Dedicated questionnaire
  - Socio-demographic variables, working environment, risk perception, (claimed) safety behaviour
  - Items: stated as questions; answering categories: 5-point Likert scale

- Printed version distributed in five Belgian hospitals among hospital personnel exposed to IR
  - Voluntary and anonymous
  - NL or FR

- Data used for the comparisons with the general population: from SCK•CEN’s 2011 Barometer
The sample

- 81 respondents
  - Radiology (55), radiotherapy (15), nuclear medicine (13), emergencies (1)
  - Profession: nurse (36), technician (21), doctor (22), other (2)
  - 49% questionnaires in French and 51% in Dutch
  - 48% men vs. 52% women
  - 43% of respondents working with IR for less than 10 years
Perception of the working environment

- 85% (70 out of N=81, 85%) consider their professional training on IR as sufficient for their work
  - 46 respondents (57%) would like to follow additional training
- Most respondents (67 out of N=81, 83%) "satisfied with their work and their working environment"
- 37% (30 respondents out of 81) found their "working environment too stressful", while 39% (32 respondents) disagreed
- Age and dissatisfaction with work and working environment correlated with perceived stress
Perception of health risks at work

Perception of work-related risks

- Radiation-related health risks
  - Very low: 9%
  - Low: 36%
  - Average: 37%
  - High: 16%
  - Very high: 4%

- Other (non-nuclear) health risks
  - Very low: 12%
  - Low: 36%
  - Average: 37%
  - High: 10%
  - Very high: 4%

- Health risks, overall
  - Very low: 9%
  - Low: 40%
  - Average: 36%
  - High: 14%
  - Very high: 4%
  - Don't know/no answer: 4%
Perception of health risks at work (ctd)

- Perceived general risk correlated with both perceived IR and non-IR risks
- General satisfaction with the working environment negatively correlated with perception of overall risk, but not with perceived IR risk
- Similarly, higher perceived stress associated with higher perceived overall risk and non-IR risk, but not with perceived IR risk
Relative perception of health risks at work

Relative risk perception of radiation risks at work

- Radiation risks at work vs. non-nuclear risks at work:
  - Much higher: 4%
  - Higher: 35%
  - Identical: 35%
  - Lower: 21%
  - Much lower: 4%
  - Don't know/ no answer: 2%

- Risks from medical X-rays for Belgian citizen vs. radiation risks at work:
  - Much higher: 4%
  - Higher: 17%
  - Identical: 26%
  - Lower: 32%
  - Much lower: 15%
  - Don't know/ no answer: 6%
Relative perception of health risks at work (ctd)

- Significant explanatory variables for perceived overall health risk: perceived IR risk, perceived non-IR risk and stress at work
  - 53% of the variance explained by the three variables
    - Perceived IR risk alone can explain 32% of the variance
    - Perceived non-IR risk almost as important as perceived IR risk
  - Socio-demographic variables were not significant predictors
Perceived risk of medical X-rays for an ordinary citizen in Belgium

**Perception of risks due to medical X-rays for an ordinary citizen of Belgium**

- **Very low**
  - Hospital staff sample (N=81): "health risks"
  - Belgian sample (N=1020): "risks"

- **Low**
  - Hospital staff sample (N=81): "health risks"
  - Belgian sample (N=1020): "risks"

- **Average**
  - Hospital staff sample (N=81): "health risks"
  - Belgian sample (N=1020): "risks"

- **High**
  - Hospital staff sample (N=81): "health risks"
  - Belgian sample (N=1020): "risks"

- **Very high**
  - Hospital staff sample (N=81): "health risks"
  - Belgian sample (N=1020): "risks"

- **Don't know/no answer**
  - Hospital staff sample (N=81): "health risks"
  - Belgian sample (N=1020): "risks"
General and specific knowledge

• Four items measured general knowledge about IR
  • Higher general knowledge in the sample of health professionals compared to general population
    • E.g. 81% of medical staff knew that “exposure to radiation doesn't necessarily lead to contamination” vs. 31% in the general population
    • 92% among medical staff knew that radioactive waste is not only produced by nuclear power plants vs. 61% in the general population.
  • Higher general knowledge about IR associated with evaluating perceived IR risk at work lower than the non-IR risk

• Four items measured specific knowledge
  • Half of the respondents had three correct answers
  • One in five respondents answered correctly to all questions.
Safety behaviour

- Almost all respondents (91%) agree or strongly agree that protection measures at work are always justified
  - Three out of 81 respondents disagree, and two had a neutral position (neither agreed, nor disagreed).
  - More stress in the working environment associated to weaker agreement with protection measures.

- 66 out of 81 respondents (82%) disagree that "protection measures hamper their work"
  - Seven respondents (9%) neutral, and another seven agree.
  - High perceived overall and non-IR risk associated with stronger agreement.
Safety behaviour (ctd)

● Lower perceived work risks (general, nuclear and non-nuclear) associated with more frequent use of collective or individual protective equipment

● Behavioural motivation hypothesis - that a high perceived risk of harm should encourage people towards a preventive behaviour - can be tested only on longitudinal data

● Possible interpretation of our results:

  safer behaviour with respect to IR work risks

  \[\downarrow\]

  increased feeling of safety and controllability

  \[\downarrow\]

  lower risk perception
Conclusions

- A varied sample of medical staff exposed to IR was analysed
- The respondents
  - consider themselves well-trained,
  - welcome additional training,
  - accept and state that they use protection means,
  - have good knowledge about the subject.
- Stress in the hospital environment is a reality; however seems to have other causes than perceived IR risk
- Perception of IR risk represents a third of the overall perceived job risk; the non-IR risks are equally important
- The study could be reproduced in smaller structures
- Knowledge of respondents' real exposure to IR and real vs. claimed safety behaviour would bring valuable insights
Copyright © 2013 - SCK•CEN

PLEASE NOTE!
This presentation contains data, information and formats for dedicated use ONLY and may not be copied, distributed or cited without the explicit permission of the SCK•CEN. If this has been obtained, please reference it as a “personal communication. By courtesy of SCK•CEN”.

SCK•CEN
Studiecentrum voor Kernenergie
Centre d'Etude de l'Energie Nucléaire
Belgian Nuclear Research Centre

Stichting van Openbaar Nut
Fondation d'Utilité Publique
Foundation of Public Utility

Registered Office: Avenue Herrmann-Debrouxlaan 40 – BE-1160 BRUSSELS
Operational Office: Boeretang 200 – BE-2400 MOL