NCRP Overview
Program Area Committee 4
Radiation Protection in Medicine

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World Health Organization Meeting
Radiation Risk Communication in Pediatric Imaging
WHO, Geneva, Switzerland
September 20-22, 2010
NCRP History

1929: U.S. Advisory Committee on X-ray and Radium Protection.

1946: U.S. National Committee on Radiation Protection.


Dr. Lauriston Taylor
June 1, 1902 – Nov. 26, 2004
Key Elements of NCRP’s Charter Under 1964 U.S. Public Law 88-376

Cornerstones of radiation protection:

1) Collect, analyze, develop and disseminate in the public interest information and recommendations about:
   a) protection against radiation; and
   b) radiation measurements, quantities and units.
2) Develop basic concepts of radiation protection and their applications;
3) Facilitate effective use of combined resources of organizations concerned with radiation protection; and
4) Cooperate with National and International Organizations on Radiation Protection Issues.
NCRP Organization

- Located in WDC Area (Bethesda)
- Full Time Staff: President (Dr. Tenforde); Exec. Director Dr. Schauer, 10 other staff members
- 100 Scientific council members & 48 Distinguished Emeritus members (~ 20 scientific disciplines)
- Members elected by the council based upon
  - widely recognized expertise in their scientific field
  - need to fill Council vacancies & expertise required for current and planned report subject matter
NCRP Medical Reports and Conferences

- Over 160 NCRP documents that directly address medical radiation safety and health protection
  - 30 reports
  - 3 commentaries
  - 4 annual meeting proceedings
  - 1 special symposium (CT)
  - 4 Taylor lectures

- Many other reports related to medical radiation exposures, operational safety, radiation quality, dosimetry, and exposure limitations are of relevance to the safety of medical facilities and procedures

- Reports must have 98% council member approval before they can be published (i.e., no more than 2 unresolved negative votes)
Radiation Protection in Medicine,
Jerrold T. Bushberg, Vice President

- E. Stephen Amis
- James A. Brink
- John F. Cardella
- Cindy C. Cardwell
- Marc Edwards
- Donald P. Frush
- Ronald E. Goans
- Linda A. Kroger
- Edwin M. Leidholdt
- Fred A. Mettler, Jr.
- Theodore L. Phillips
- J. Anthony Seibert
- Stuart C. White
- Shiao Y. Woo
Broad Base of Experience & Expertise

- Presidents ACR, ARR, CRCPD, ASTRO, AAPM, RRS
- 5 Chairs of Radiology / Radiation Oncology
- Experts in CV & IR Radiology, Pediatric Radiology, Radiation Oncology, Nuc Med, Dentistry & Occup med
- Experts in Dx, Nuc Med & Therapy Physics
- Members of Image Gently & Image Wisely
- Experts in Hospital Radiation Safety State & Fed Regulatory
- Experts on acute & chronic effects of medical radiation.
- Members & Advisors to ICRP, IAEA, FDA, WHO, UNSCEAR, IOM…

*Over 300 person-yrs of experience in Radiation Protection in Medicine*
Radiation Protection in Medicine

- NCRP – Scientific Committee (SC) Reports in preparation:
  - SC 2-3: “Radiation Dose Management for Fluoroscopically-Guided Interventional Medical Procedures” (in final preparation for publication as NCRP Report No. 168)
  - SC 1-17: “Second Cancers and Cardiovascular Effects After Radiotherapy” (entering Council review stage and to be published in 2010)
  - SC 4-3: “Diagnostic Reference Levels in Medical Imaging: Recommendations for Application in the United States” (drafting stage)
Radiation Protection in Medicine

Reports in preparation (cont.):

• **Scientific Committee 4-4: Adverse Effects of Radiation on the Gonads, Embryo, and Fetus** (publication expected in 2011)
• **Summary of Workshop on Computed Tomography in Emergency Medicine: Ensuring Appropriate Use** (September 23-24, 2009); basis for 2010 consensus paper on “Guidelines for Application of Computed Tomography in Emergency Medicine”
Conference on Control of CT Doses in Conventional Imaging and Applications in Emergency Medicine September 2009. Consensus guidance publication (to be issued in 2010)
ICRP introduced the concept of DRLs in Report No. 60 (1990), and subsequently recommended their use in ICRP Report No.73 (1996).

DRLs serve as a means to investigate and identify practices where the level of patient dose or administered activity is unusually high, relative to benchmark data.

The goal is to optimize the dose and image quality.

DRLs are not intended for regulatory or commercial purposes or to establish a legal standard of care.
SC 4-3: Diagnostic Reference Levels (DRLs) in Medical Imaging Recommendation for Application in the U.S.

- DRLs are defined, developed and utilized in different way around the world.
- The NCRP report will contain a comprehensive discussion of the history and applications of DRLs in the U.S., Europe, and elsewhere.
- The report will consolidate and recommend DRLs in adults & children for a number of examinations: Radiography, Fluoroscopy, CT, Interventional Procedures, Dental and Nuclear Medicine.
SC 4-4: Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant

➢ Supersedes:

--1977 NCRP Report 54
Medical Radiation Exposure of Pregnant and Potentially Pregnant Women

--1994 Commentary No. 9
Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus or Nursing Child
SC 4-4: Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant

The report will provide a comprehensive update and discussion of:

- Birth defects and developmental abnormalities that can result from ionizing and non-ionizing (US and RF & Magnetic Fields-MRI) exposures of an embryo, fetus, or nursing infant
- Dose to embryo, fetus, from a variety of medial imaging procedures including the dose to nursing infants from radiopharmaceuticals administered to the mother
SC 4-4: *Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant*

- Effective methods of communicating the risks & responding to FAQs from patients
- Conveying the scientific basis that effect the decisions on whether and when diagnostic or therapeutic radiological procedures can be performed with minimal risk to the developing embryo or fetus.
Future NCRP Activities
Radiation Protection in Medicine


43rd Annual NCRP Meeting (2007): Advances in Radiation Protection in Medicine

44th Annual NCRP Meeting (2008)
Analysis of Biological and Human Health Impacts of Low-Dose Radiation Exposures

To support radiation protection by providing independent scientific analysis, information, and recommendations that represent the consensus of leading scientists.
46th Annual NCRP Meeting (2010)
Communication of Radiation Benefits and Risks in Decision Making

Proceedings of 2010 Annual Meeting to be published in Health Physics, 2011
NCRP Report 160: U.S. Average Annual Ionizing Radiation Exposure

Annual Average Effective Dose (mSv)

3.6

Early 1980s

- Background (83 %)
- Medical (15 %)
- Consumer (2 %)
- Occupational / industrial (0.3 %)

6.2

2006

- Background (50 %)
- Occupational / industrial (0.1 %)
- Consumer (2 %)
- Medical (48 %)
Example of incomplete (Radiation-focused) message:

NCRP 2007: uses of medical radiation have increased six-fold since 1980 – primarily due to increases in CT and Nuclear Cardiology

Is the message received as

A

or

Danger!
Example of incomplete (Radiation-focused) message:

NCRP 2007: uses of medical radiation have increased six-fold since 1980 – primarily due to increases in CT and Nuclear Cardiology

Is the message received as:

A

B

or

Choose one:
Yippee! I survived my stroke!
Yippee! I survived my heart attack!
Yippee! I survived my injury!
Yippee! They found my cancer early!
Communication Problems: Clinician-Patient

- Asking patients to repeat back what the physician told them, half get it wrong. (Schillinger et al. Arch Intern Med 2003;163:83)

- Asking patients: “Describe how you take this medication” -- 50% don’t understand and take it differently than prescribed (Schillinger et al. Medication miscommunication, in Advances in Patient Safety, AHRQ, 2005)

- 50% of patients leave the physician office visit without understanding what the physician said (Roter and Hall. Ann Rev Public Health 1989;10:163)
Social Networks & Partnerships

- CDC
- Myspace.com
- DailyStrength
- Facebook
- EPOCRATES Essentials

Select your platform:
- iPhone
- BlackBerry
- Palm
- Win Mobile
In today’s world, the average informed person reads or listens to seven sources of information daily (Pew, 2008).

CDC Goal: Provide information to our target audiences (public, professionals, policymakers) when, where, and how they want and need it to inform healthy and safe decisions.

Author: Dr. Jay M. Bernhardt US CDC
CDC Goal: Provide information to our target audiences when, where, and how they want and need it to inform healthy and safe decisions.

Provide information where people are.

Provide information that is highly relevant.

Encourage people to interact with the information.

Encourage people to share the information.

Author: Dr. Jay M. Bernhardt US CDC
The Power of Social Media

Traditional Media
- high reach & cost
- low engagement

Aim for the “Sweet Spot”

Social Media
- low cost
- targeted reach
- deep engagement
Streaming Video, Audio, Images

Author: Dr. Jay M. Bernhardt US CDC
What do you mean you don’t know what CTDI is associated with this exam??
The message is not necessarily in the words

After a pelvic CT scan of a pregnant woman, which statement delivers the most appropriate message about risk?

A. the study that you had two weeks ago has perhaps doubled the risk that your child will develop cancer before age 19. [0.6% vs 0.3%]

B. the risk of adverse outcome is very small and the likelihood of normal development is nearly the same as it is for any child. [96.7% vs 96.4%]

Values taken from: ICRP Publication #84
Conclusions

– More Education and Awareness are Needed
  • Referring Clinicians
  • Imaging Specialist
  • Patients

– Further Efforts are Necessary
  • Refine and Communicate Appropriateness Criteria for Dx imaging procedures
  • Expand & Utilize DRLs as part of the QA process
  • Right size the dose for the patient and the Dx objective
Conclusion

If:

- We ensure that imaging study performed represents least invasive modality with the highest probability of answering the Dx question.
- We utilize imaging protocols that optimize image quality & dose relative to the intended diagnostic objective.
- We understand and communicate radiation doses & attendant risks, effectively.

We will be able to tell patients with confidence.
“Benefits will not just be balanced against the risks”

“Benefits will greatly exceed the risks”