Tracking Medical Exposures – on Individual, National and Global levels

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The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

Established in 1955 by the General Assembly of the United Nations "to collect and evaluate information on the levels and effects of ionizing radiation."

www.unscear.org

Recent Assessments of Medical Exposures by UNSCEAR

- **UNSCEAR 1988 Report (Annex C)**
- **UNSCEAR 1993 Report (Annex C)**
- **UNSCEAR 2000 Report (Annex D)**
- **UNSCEAR 2008 Report (Annex A)**
- **UNSCEAR 2021 Report (Annex A)**

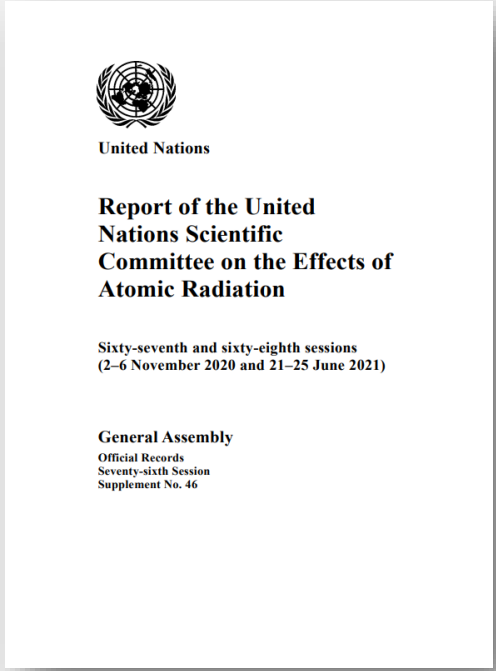
Assessments rely on extensive literature review and collection of “quality-assured data” from Member States.

www.unscear.org/unscear/en/publications.html

2021 Report to the General Assembly

- **Medical exposure remains by far the largest human-made source of radiation exposure of the population.**

- **The use of medical radiation for diagnosis and therapy continues to be strongly weighted towards high- and upper-middle-income countries.**


United Nations

Report of the United Nations Scientific Committee on the Effects of Atomic Radiation

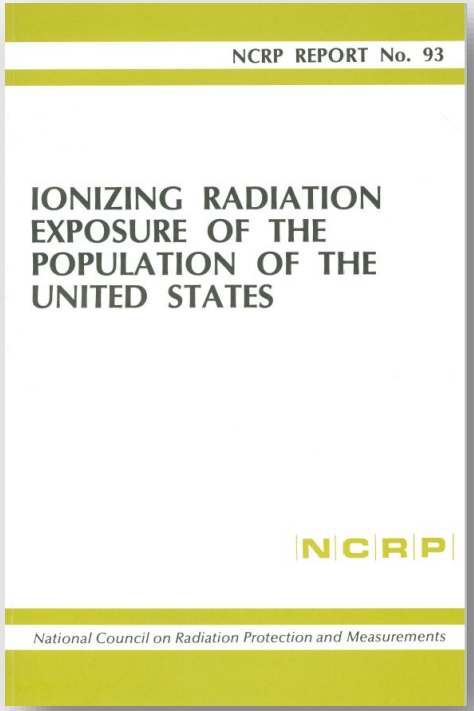
Sixty-seventh and sixty-eighth sessions
(2–6 November 2020 and 21–25 June 2021)

General Assembly
Official Records
Seventy-sixth Session
Supplement No. 46

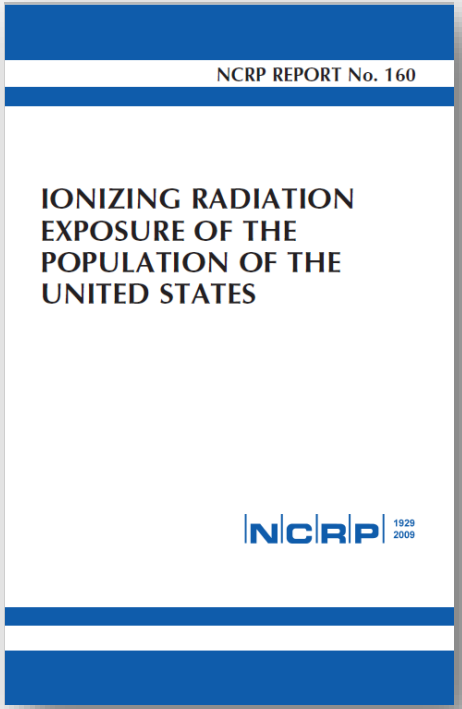
- Radiology procedures: 70% of examinations and 75% of the collective effective dose.
- Nuclear medicine: > 90% of procedures and > 95% of the collective effective dose.
- Access to radiation therapy: 95% of all treatments.

www.unscear.org/unscear/en/general_assembly_all.html

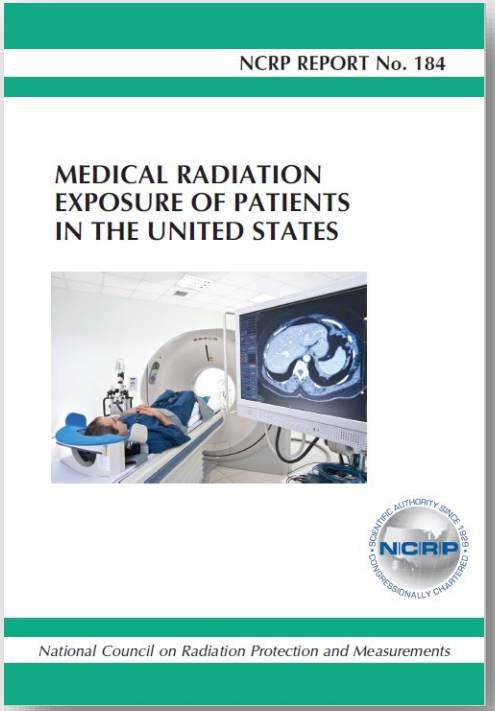
Medical Exposures of the US Population



1987



2009



https://ncrponline.org/publications/

2019

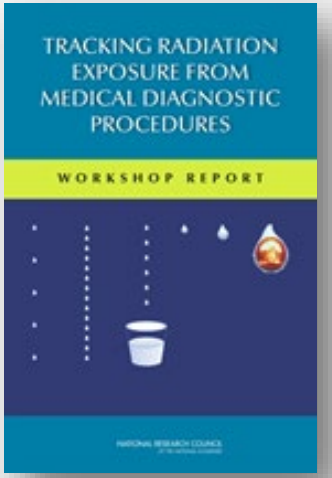
A Timeline (2008-2012)

- Image Gently® campaign (2008)
- NCRP Report 160 (2009)
- Step Lightly (2009)
- IAEA Smart CardCard/SmartRadTrack (2009)
- Image Wisely® campaign (2010)
- ACR Dose Index Registry (2011)
- Joint Position Statement by ESR, FDA, IAEA, IOMP, ISRRT, WHO and CRCPD* (2012)
- NASEM Workshop Report – sponsored by CDC and FDA (2012)

* European Society of Radiology (ESR), U.S. Food and Drug Administration (FDA), International Atomic Energy Agency (IAEA), International Organization for Medical Physics (IOMP), International Society of Radiographers & Radiological Technologists (ISRRT), World Health Organization (WHO), Conference of Radiation Control Program Directors, USA (CRCPD)

Public Health Benefits of Tracking and Recording Diagnostic Radiation Doses

A primary motivator: “implement and maintain dose reduction strategies through optimization and justification with the ultimate goal of improving care.”



www.nap.edu/read/13416/chapter/2

Demonstrated in case studies:

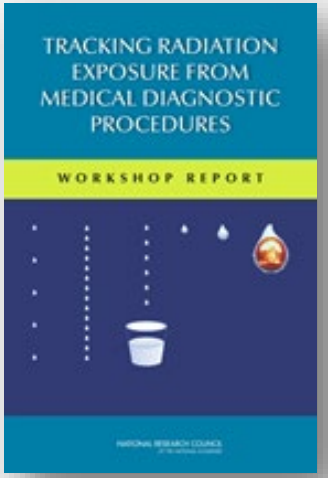
- R. Seuri et al., How tracking radiologic procedures and dose helps: experience from Finland, *Am J Roentgenol*. 2013 Apr;200(4):771-5.
- Collective dose for a patient was not used in any situation in decision making.


AJR

How Tracking Radiologic Procedures and Dose Helps: Experience From Finland

www.ajronline.org/doi/10.2214/AJR.12.10112

Public Health Benefits of Tracking and Recording Diagnostic Radiation Doses



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- Justification
- Optimization
- Individual risk assessment?
- Research purposes
  - Enormous public health benefit gained regarding potential health risks from low dose, low dose-rate exposures.

Potential Benefits from Patient Radiation Exposure Tracking

Joint Position Statement by ESR, FDA, IAEA, IOMP, ISRRT, WHO and CRCPD*

- Benefits to patients
- Benefits to healthcare providers referring patients for imaging/intervention
- Benefits to healthcare providers involved in performance of imaging/intervention
- Benefits to policymakers
- Benefits to regulators
- Benefits to researchers
- Benefits to industry

a) Receive only the necessary radiation exposure for optimal care
b) Knowledge that there is accountability/responsibility in the delivery of medical radiation
c) Facilitate dialog with healthcare providers regarding radiation exposure
d) Improve patient confidence in healthcare providers'care

www.iaea.org/sites/default/files/documents/rpop/iaea-smart-card-position-statement.pdf

* European Society of Radiology (ESR), U.S. Food and Drug Administration (FDA), International Atomic Energy Agency (IAEA), International Organization for Medical Physics (IOMP), International Society of Radiographers & Radiological Technologists (ISRRT), World Health Organization (WHO), Conference of Radiation Control Program Directors, USA (CRCPD)

Relevant Development – Electronic Health Records

- **President George W Bush State of the Union Address (January 2004)**
  - The Health Information Technology Plan will address longstanding problems of preventable errors, uneven quality, and rising costs. (https://georgewbush-whitehouse.archives.gov)
- **Presidential Executive Order 13335 (April 2004)**
  - Called for the establishment of the Office of the National Coordinator for Health Information Technology (ONC) within the US Department of Health and Human Services.
- **The Health Information Technology for Economic and Clinical Health Act, HITECH Act (2009)**
  - Legislatively mandated the position of the National Coordinator for Health Information Technology

www.healthit.gov

- promote nationwide, standards-based health information exchange
- Advance Person-Centered and Self-Managed Health

HealthIT.gov

The Patient Has a Right To Know!

- **Patient Right to Know Act of 1996 [H.R. 2976]**
  - "Patients cannot make appropriate health care decisions without access to all relevant information relating to those decisions."
    www.congress.gov/104/crpt/hrpt865/CRPT-104hrpt865.pdf
- **Part of the Electronic Health Record**

How does the DLP or $CTDI_{vol}$ for this diagnostic test performed by this provider, and my SSDE compare with the national range per ACR DIR?

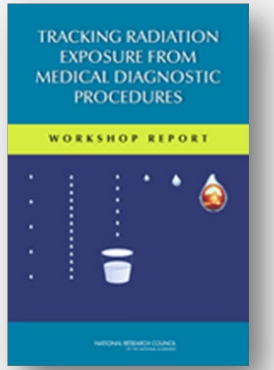
Education	Result	Date	Value	Range
	CL* (see details)	01/27/2021	107 mEQ/L	LOW NORMAL HIGH
	CO2* (see details)	01/27/2021	27 mEQ/L	LOW NORMAL HIGH
	Glu* (see details)	01/27/2021	110 mg/dL	LOW NORMAL HIGH
	BUN* (see details)	01/27/2021	12 mg/dL	LOW NORMAL HIGH

Another Benefit: Better Understanding of Health Disparity in Provision of Healthcare

- There is documented evidence of disparities in the access to and provision of diagnostic and therapeutic radiation medical services.
  - Examples: Ahmed et al., *J Am Coll Radiol*. 2017 Feb;14(2):157-165; Chapman et al., *Adv Radiat Oncol*. 2020 Sep-Oct;5(5):783-790; El Khoury et al., *Acad Radiol*. 2021 Jul;28(7):953-962.
- American College of Radiology Health Equity Coalition (www.acr.org/Practice-Management-Quality-Informatics/Health-Equity)
- Ability to track individual records can help better understand and ultimately address these disparities.

Barriers to Development and Implementation

- Need for translating various dose indices into a single quantity
- Need to decide between organ or effective dose
- Need to automate data collection processes
- Need to account for individual variations in patient size/shape/age
- lack of sharing medical info across health care facilities
- Need to manage patient privacy and security issues
- lack of unique patient identifier and integrated medical records



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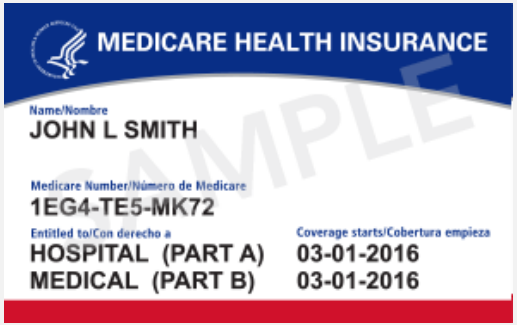
Medicare Beneficiary Identifiers (MBIs)



www.cms.gov/medicare/new-medicare-card/nmc-home

Closing Thoughts

- Tracking radiation doses for individuals offers advantages to the individual, the service provider, the industry, and to the public health as a whole.
- An effective system will include dose metric/procedure information as part of each individual's electronic health record.
- The barriers are not insurmountable. IT solutions exist or can be developed.
- Key partners can be engaged to initiate a pilot project.
- It will be a multiyear effort. However, building from one phase to the next will ensure success.

Thank You!

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