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Symposium 4.2

Teaching Radiation Protection in Schools:
A Regional Experience

Lawrence Lau, Melbourne / AU
FACR, FRANZCR, FRCR, FAMS
Chairman, International Radiology Quality Network

Learning Objectives

- ❖ To be informed of the “*X-rays: The Inside Story*” project
- ❖ To consider an opportunity of collaboration in a global project to teach radiation protection to school students
- ❖ To consider the elements affecting its successful implementation

Limited Resources

- ❖ Sun safety & effects of UV rays are taught in schools¹
- ❖ AM built a portable battery-powered X-ray machine²
- ❖ Most students: low awareness of medical radiation issues
- ❖ Med students & practitioners poorly informed about RP^{3,4,5}
- ❖ On-line resources for public & professionals
- ❖ Limited resources for school students



¹WHO (2003) *Sun Protection: A Primary Teaching Resource*. WHO, Geneva

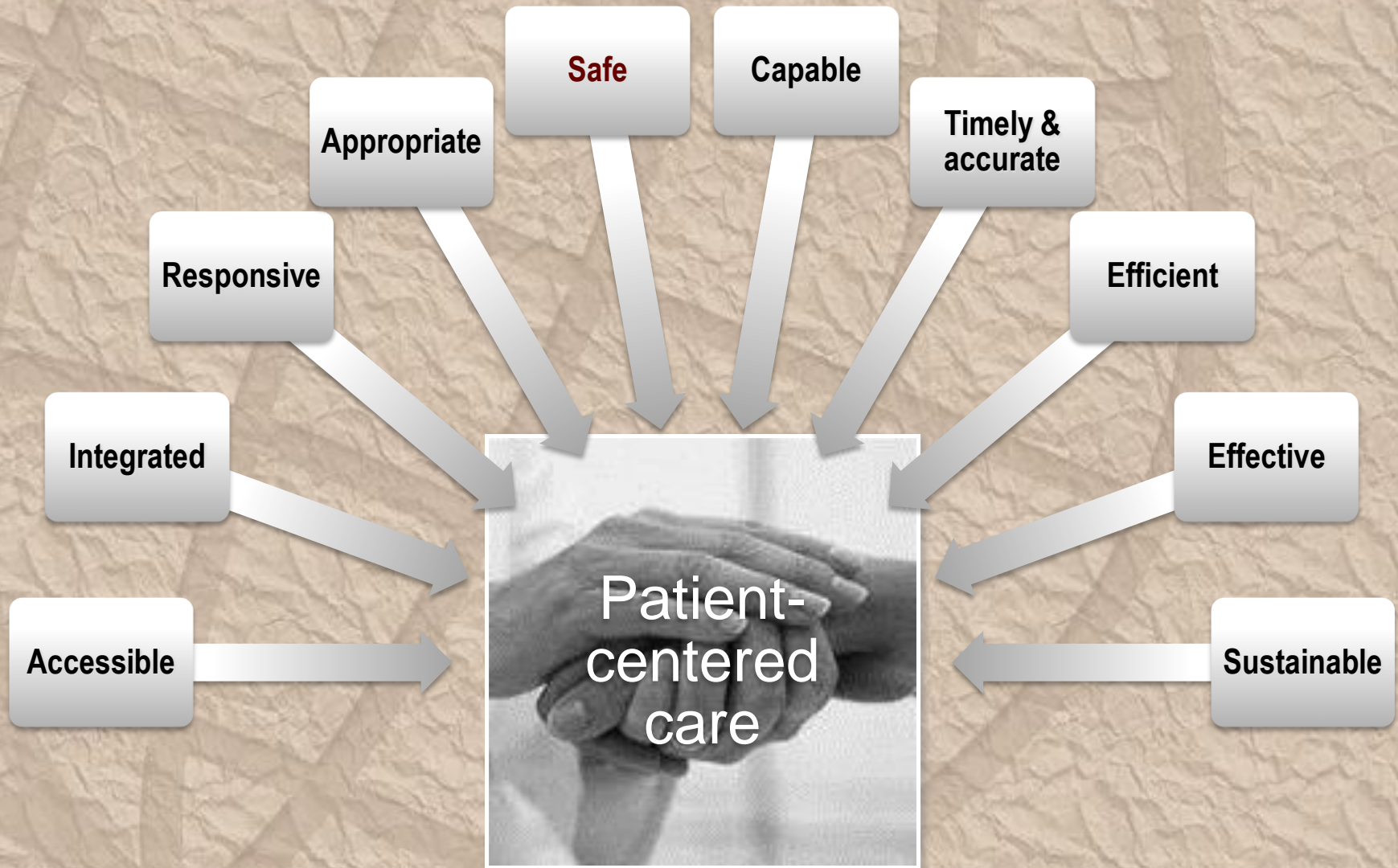
²Popular Science April 2012

³Georgen S (2010) *J Med Imaging Radiat Oncol* 54(1):1-2

⁴Smith-Bindman R (2010) *N Engl J Med* 363(1):1-4

⁵Zhou GZ et al (2010) *J Med Imaging Radiat Oncol* 54(1):17-23

Quality Elements



National Health Performance Framework Report. 2001

Improvement Actions

- ❖ Radiation protection measures
 - ❖ Procedure justification¹
 - ❖ Optimization of image quality, imaging data & RP¹
 - ❖ Error minimization
- ❖ Implementation Strategies²
 - ❖ Promote awareness
 - ❖ Conduct research
 - ❖ Provide education & training
 - ❖ Strengthen infrastructure
 - ❖ Apply policy
 - ❖ Evaluate impact
 - ❖ On-going improvement

¹ *Radiological Protection in Medicine (2007). Ann ICRP 37 (6). Elsevier, Oxford*

² *Lau LSW et al (2011) J Am Coll Radiol 8(5):330-334*

Education & Training

- ❖ Medical students, referrers & providers
 - ❖ Improve knowledge & competency
 - ❖ Strengthen curricula & programs
 - ❖ Revise & improve content, format & delivery appropriate for end-users .
- ❖ School students
 - ❖ More vulnerable to the effects of radiation
 - ❖ Improve awareness, potential extended coverage
 - ❖ Empower consumers to improve use & enhance radiation safety
 - ❖ Promote interest in physical sciences & career choice

A Regional Experience

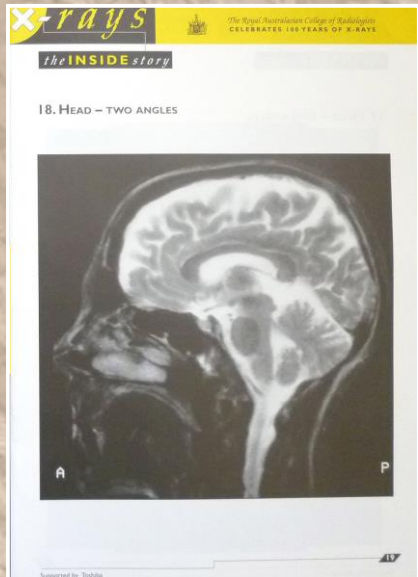
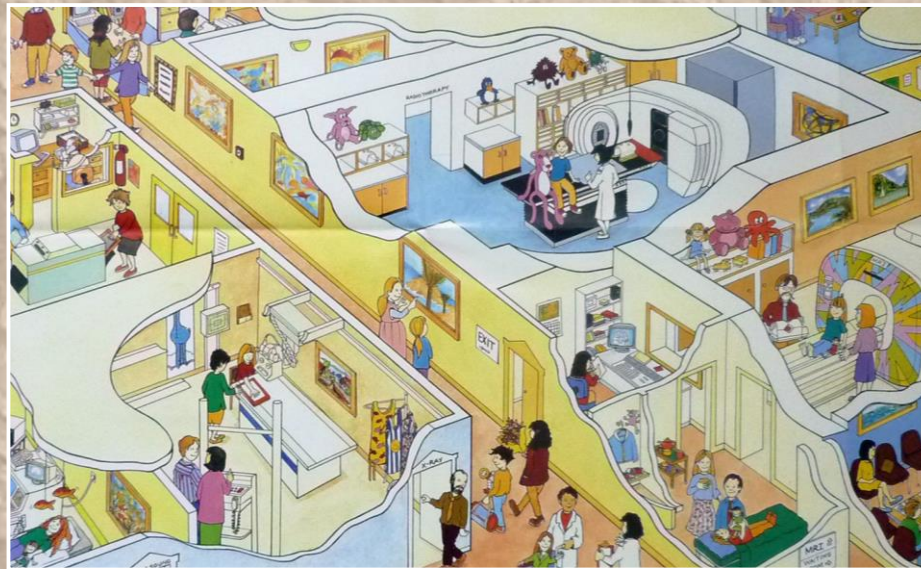
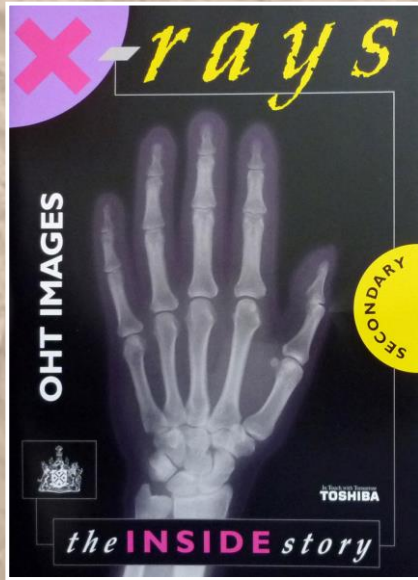
- ❖ Roentgen Anniversary Celebration Efforts (RACE) Program in 1995
 - ❖ Royal Australian and New Zealand College of Radiologists (RANZCR) to celebrate the 100 years discovery of X-ray
 - ❖ **“X-rays: the Inside Story”**
 - ❖ Objective: to promote awareness on the medical use of radiation, RS & RP by the development & distribution
 - ❖ Educational resources tailored for primary & secondary schools
- ❖ Program Partners
 - ❖ Development & implementation: Australian Science Teachers Association
 - ❖ Sponsor: Toshiba Australia

Development



- ❖ Written by teachers, tailored for students & suitable for schools
- ❖ Radiology team provided support & advice

Teaching Tools



X-rays the INSIDE story

6 RADIATION

When you use the word radiation, a lot of people respond with fear. Let's take a closer look.

Radiation includes X-rays, gamma rays and particle radiation. All of these are used in medicine and they all occur naturally. Use the table to work out how many sieverts of radiation you have had in the last year.

The first graph on the resource sheet is an estimate of the main sources of radiation experienced by Australians. Explain what the graph shows.

Cancer caused by radiation is the same as other cancers, so it can be difficult to identify the cause. It does not show up until years or decades after exposure to radiation. The data we have comes mostly from survivors of atomic bombs, radiation works, and those treated with radiation.

The second graph shows the lifetime risk of cancer out of 10,000 people all receiving 1 sievert of radiation. The shaded bars give maximum estimates for fatal cancers, the dotted bars show total number of cancer cases. Analyse the graph carefully. Write a paragraph explaining what it shows.

Source of radiation	Amount in sieverts
Cosmic Rays	0.0015 to 0.0025 per year
	Depends on altitude
Soil	0.00015 to 0.0007 per year
	Depends on locality
Air	0.0001 to 0.001 per year
	Depends on ventilation and building materials
Food and Water	0.0001 to 0.00015 per year
	Depends on diet
Air Travel	0.00005 to 0.000015 for a round trip Auckland-Christchurch-Auckland.
	Depends on altitude and flying time
Diagnostic X-rays	0.0002 to 0.02 per X-ray
	Depends on type of X-ray

Supported by Toshiba

X-rays the INSIDE story

Teacher's Guide

By Karen Paton, St Mary's College
Vicki Spillius, An Halden Girls' Grammar School
Alan Marshall, Oxley University

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Advisory Committee: The Royal Australian College of Radiologists - Peter Carr, Christine Clew, Peter Duffy, Barbara Hutchinson, Lawrence Lau, (President), David Miller, Australian Science Teachers Association, Robin Green, Education Ministers Service, Tasha Cohen, The Royal Society of New Zealand, Peter Spigel, Auckland College of Education, Louise Murray

X-rays - the INSIDE story is an initiative by The Royal Australian College of Radiologists, Level 9, 51 D'Almeida St, Sydney 2000

Activity Card Contents

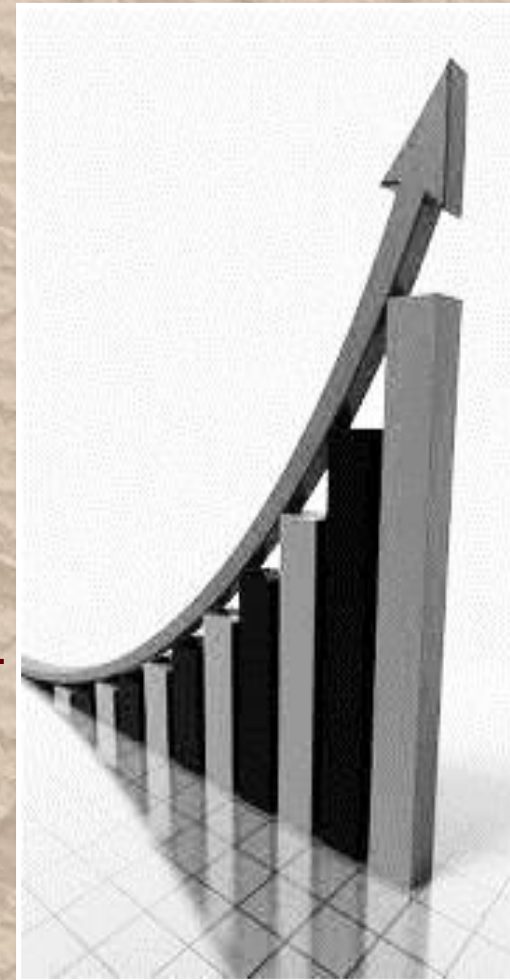
Exploring our perception	Making waves	What's new?	Moral dilemma I
The X-ray is discovered	Shadow pictures	Developing a social conscience	More dilemma II
Roentgen – a scientist	Intensity	Mammography	Defining normal
Why the term X-ray?	X-ray intensity	Therapeutic radiation	Blood flow
Radiation's early effects	Producing X-rays	Patient procedures	Technology challenge
Radiation	Absorption and scatter	What do X-rays do to cells?	Magnetic Resonance Imaging
Rapid change	X-rays and animals	Is cancer more common now?	Drivers of invention
Risks and benefits	The airline industry	Ultrasound	Current health issues
Law and practice	Structure engineering industry	More waves	Current issues: debate
Discoveries – research	Radiologists and MITs	Measuring blood flow	Evaluation

Implementation

- ❖ Innovative approach
 - ❖ Donated by a RANZCR member to a school of his / her choice in **Australia & New Zealand**
 - ❖ ASTA informed members of project & the use of teaching tools
- ❖ Evaluation
 - ❖ Unofficial feedback: good acceptance & use .
 - ❖ No formal evaluation, i.e. degree of uptake, possible gaps & improvement opportunities unknown
- ❖ Experience useful to future projects

Timing & Opportunity

- ❖ Increase utilization: 3.6 billion XR procedures p.a.¹
- ❖ Public interest & concern about inappropriate use & unnecessary exposure
- ❖ Education & training improve awareness & promote appropriate use
- ❖ Teaching in schools is innovative & supports this strategy .
- ❖ Leverage on past experience & develop a global project towards wider dissemination



¹UN Records of the General Assembly 2008

Possible Steps

- ❖ Formation of a core group to lead, initiate & advocate vision to collaborators
- ❖ Adoption of an inclusive & multi-sectorial approach to engage stakeholders
 - ❖ Organizations, agencies & authorities in education, science, medicine & RP
 - ❖ Different experience & unique roles
- ❖ Collaboration provides strength & synergy, maximizes resources, minimizes duplication & spearheads this project
- ❖ Project scope: development, implementation, evaluation & update
 - ❖ Long-term & sustainable .
 - ❖ Bridge the gap between evidence & knowledge

Project Plan

- ❖ Development: jointly by teachers & practitioners
 - ❖ Contents, format & delivery to suit users & local setting, e.g.
 - ❖ Classroom, Internet, multimedia, social media
- ❖ Trial and implementation requires support & collaboration from education authorities, school management, teachers & students .
 - ❖ Advocacy by organizations & agencies
- ❖ End-users evaluation & on-going content improvement
- ❖ Challenges: human, financial, resources & support
- ❖ Solutions: collaborate, share knowledge & resources; patience & perseverance

Conclusion

Living with radiation – Engaging with society

Teaching of RP in schools improves awareness, enhances radiation safety,
& promotes interest in physical sciences & career choice

“X-rays: The Inside Story” a RANZCR + ASTA + Toshiba, Australia project
development & dissemination of a set of teaching tools for schools

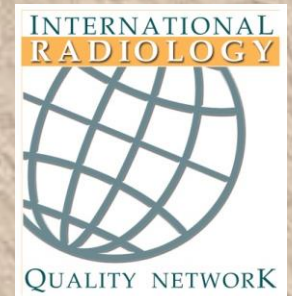
Opportunity for a global project to strengthen awareness
Leadership + collaboration + participation = successful outcome



Teaching of Radiation Protection in Schools

A Regional Experience

Thank you very much for your attention



Collaboration is
Strength