

# Risks of Modern Radiology

Dr Grant Meikle

Consultant Radiologist



# My Background

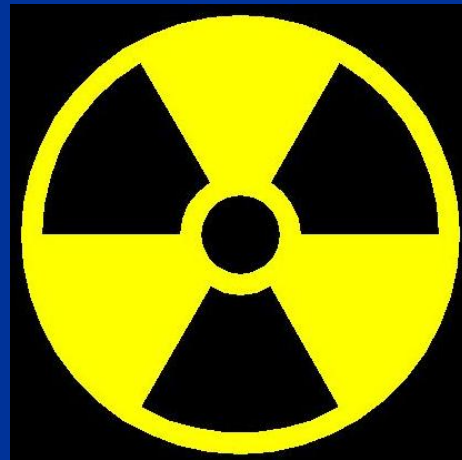
- Consultant Radiologist
  - MBChB 1994
  - FRANZCR 2001
  - Musculoskeletal Imaging Fellowship 2001/2002 Canberra, Australia.
  - Current Appointments
    - SDHB Consultant Radiologist
    - Consultant Radiologist, Shareholder, Chairperson Otago Radiology Ltd (Part of the Pacific Radiology Group)
    - Honorary Senior Clinical Lecturer University of Otago Department of Medicine.
  - Other commitments.
    - Part 2 examiner FRANZCR
    - External Advisor ACC Treatment Injury Claims Unit.



# Talk Structure

- RADIATION
- ERROR
- COST/DEMAND
- PRIVACY

# RADIATION



# How it all started?

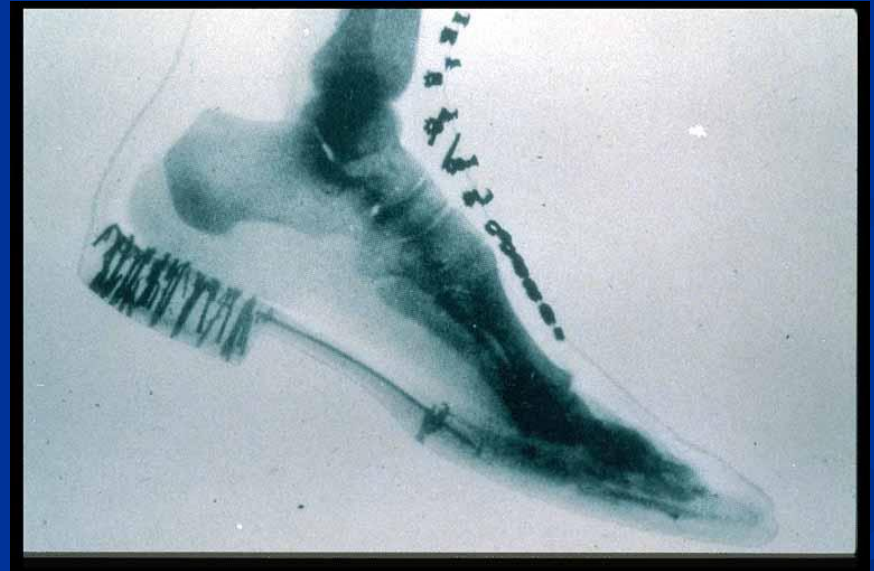


Roentgen 1896



Mrs Roentgen's Hand

# Hindsight is wonderful thing!



# Radiation Effects



# CT Scans Increase Children's Cancer Risk, Study Finds

By DENISE GRADY

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CT scans in children can cause small but significant increases in the risk of leukemia and brain [cancer](#), a new study finds.

Researchers say the results do not mean that CT scans should be avoided entirely — they can be vitally important in certain situations, like diagnosing severe head injuries — but that the test should be



Christopher Furlong/Getty Images

Undergoing CT scans as a child may increase cancer risk, a new study finds.

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### X-Rays Cause Cancer: But Then, They Always Have

© What Doctors Don't Tell You (Issue 275) [+ Share](#)

**X-rays cause 700** cases of cancer every year in the UK, around 5700 in the USA, and a total of 18,500 cases overall in 15 developed countries, a new study has found.

Cancer risks per cumulative x-ray exposure range from just 0.6 per cent in Poland and the UK, and up to 3.2 per cent in Japan, the highest. The USA has a cancer risk of 0.9 per cent.

The findings, made by Oxford University, should come as no great surprise. Radiation is a known carcinogen, and medical x-rays represent 14 per cent of total radiation



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# Doses of common exams

| Examination    | Dose (mSv) | Comparable Natural Background Radiation | Additional Lifetime risk of Cancer |
|----------------|------------|-----------------------------------------|------------------------------------|
| Extremity Xray | 0.001      | 3 hours                                 | Negligible                         |
| Spine Xray     | 1.5        | 6 months                                | Very Low                           |
| CXR            | 0.1        | 10 days                                 | Minimal                            |
| CT Head        | 2          | 8 months                                | Very Low                           |
| CT Abdomen     | 10         | 3 years                                 | Low                                |

# What do the risks mean?

- Approximate additional risk of fatal cancer for an adult from an examination:
  - Negligible: less than 1 in 1,000,000
  - Minimal: 1 in 1,000,000 to 1 in 100,000
  - Very Low: 1 in 100,000 to 1 in 10,000
  - Low: 1 in 10,000 to 1 in 1000
  - Moderate: 1 in 1000 to 1 in 500
- Note: These risk levels represent very small additions to the 1 in 5 chance we all have of dying from cancer.

# What do we do?

- ALARA principle.
- Increased Awareness.
- Balance between risks and benefits.





# Justification



- The most important consideration is balancing the risk (radiation) against the clinical utility of the examination.

## EXAMPLES

- Stubbed toe 2 hrs ago, weight bearing normally but sore toe.
- Persistent bony knee pain without history of trauma and increasing lethargy and weight loss.

# COST and DEMAND



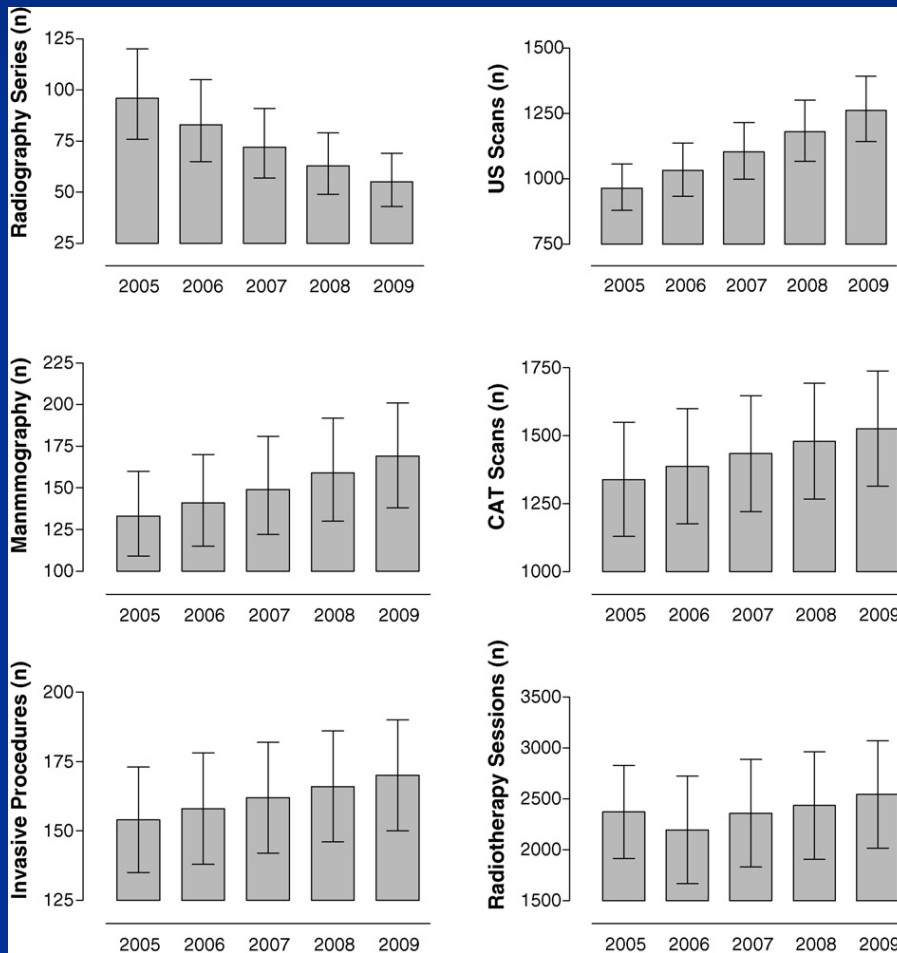


# Cost



- The cost of Imaging varies but is in the range of:
  - Xray \$0 - \$150
  - US \$0 - \$300
  - CT \$0 - \$2000
  - MRI \$0 - \$2000
  
- The cost of an Imaging Examination is dependent on many factors including:-
  - Equipment.
  - Staff (MRTs ,Radiologists, Nurses, Clerical)
  - IT.
  - Public vs Private system.
  - Government Funding/Insurance/ACC/Community Schemes.

# Demand



Health Policy 80 (2007) 194–201

www.elsevier.com

## Trends and future needs in clinical radiology: Insights from an academic medical center

Athina Chrysanthopoulou<sup>a,\*</sup>, Andreas Kalogeropoulos<sup>b</sup>,  
George Terzis<sup>a</sup>, Vassiliki Georgiopoulou<sup>b</sup>, John Kyriopoulos<sup>c</sup>,  
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# Waiting Times

Today's Weather **Dunedin** ▼



**12 3**  
HIGH LOW  
Forecast

## Otago Daily Times

Online Edition | Friday, 17 August 2012 | 00:24:52

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### Radiology wait times extending

Home » News » Dunedin

By [Elspeth McLean](#) on Thu, 3 Feb 2011

News: [Dunedin](#) | [Health](#)

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Concern that patients could wait 20 months for some non-urgent scans at Dunedin Hospital was expressed at the Southern District Health Board hospitals' advisory committee.

### POLL

Is the DCC right to slash funding for public art?

☐ Yes ☐ No

**What do you think?** Tell us why you voted the way you did. Login or register to post a comment.

[Read the story](#)



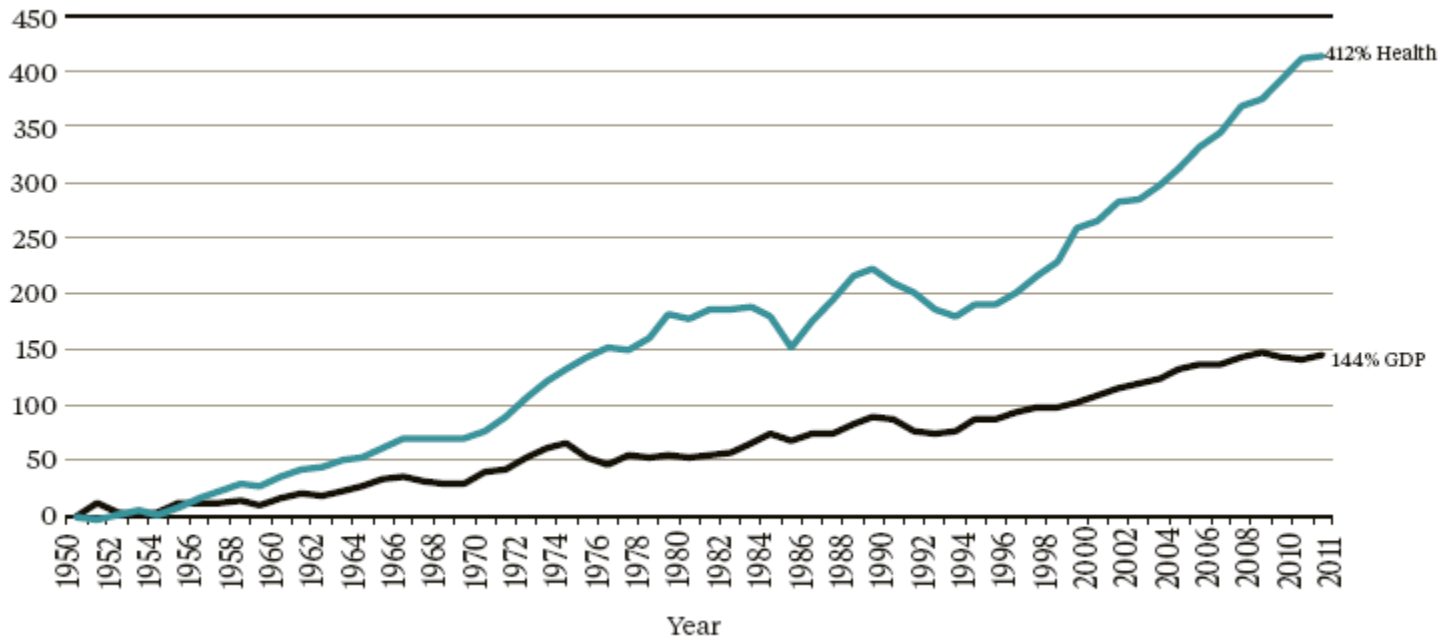
HYUNDAI | NEW THINKING. NEW POSSIBILITIES. *i30*

FIND OUT HOW YOU CAN PRESS TO WIN

ENGINE START

# Cost Pressure

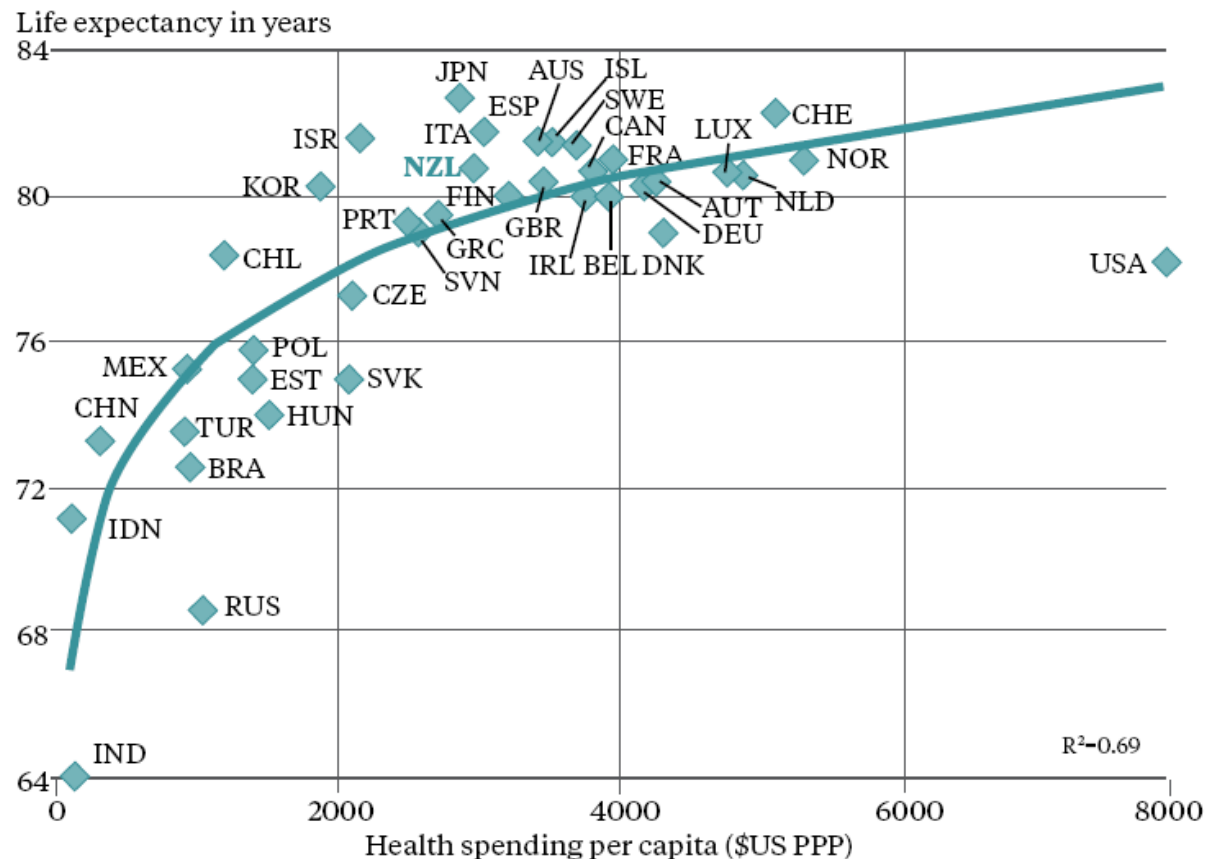
**Figure 2: Health spending and GDP per person, inflation-adjusted**



Source: The Treasury

# Where we stand.

Figure 5: Life expectancy by health spending per capita among OECD countries



# Expectations from the MOH

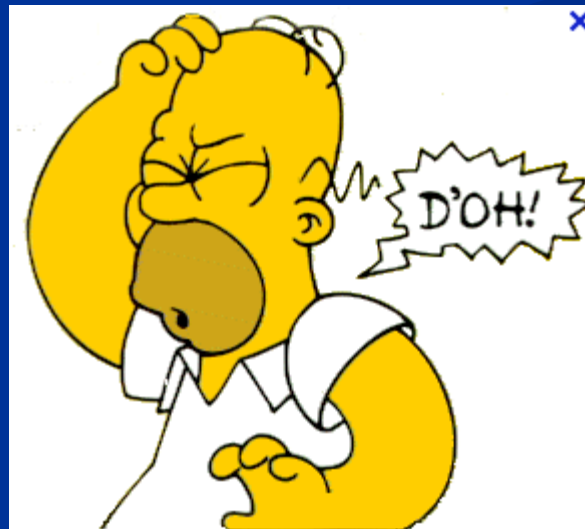
- More for less in a more timely manner.
- Target Waiting Times
  - CT/MRI
    - 6 – 8 weeks
- Is this possible?
  - How?
    - Efficiency?
    - Investment?



# Where's it going to go?



# ERROR



“To err is human, to forgive divine.”

Alexander Pope, *An Essay on Criticism*

English poet & satirist (1688 - 1744)



# Error Rate

- Error rates in Radiological Interpretation are believed to be around the 3.5% to 4% level.
- Historically when an adverse event occurs or a bad outcome occurs there is search for someone or something to blame.
- The “problem” areas in radiology in terms of error are:-
  - Mammography and detection of breast cancer
  - CXR in detection of lung cancer
  - Missed Fractures
  - Obstetric Ultrasound

# Radiology is Unique

- Our “dirty washing” is stored digitally forever for scrutiny with a retrospectoscope.
- Not so with many other areas in medicine.
- Good and Bad.



"Retrospectoscope" is a common colloquial term in medicine. Basically, when a doctor criticizes someone for using a retrospectoscope, he's criticizing that person for being a Monday-morning quarterback who uses after-the-fact retrospection to invariably be correct. As they say, hindsight is 20/20, but being correct with the benefit of hindsight requires no brainpower. What riles doctors (or anyone else, for that matter, who is subjected to second-guessing) is that even an idiot can be right 100% of the time when looking at the past.

# What types of errors do Radiologists make?

- In the USA there are 3 main reasons why radiologists are sued.
  1. Observer Errors.
  2. Failure to suggest next appropriate step.
  3. Failure to communicate in a timely and clinically appropriate manner.

# Observer Errors

- An abnormality is simply not observed. Several overlapping subclasses
  - Scanning error
    - Don't look
  - Recognition error
    - Look but don't see
  - Decision making error
    - See but discount
  - Satisfaction of Search
    - Distracted by another finding



# Background factors that contribute to error in Radiology

- Background of “psychophysiological factors”
  - Alertness / Fatigue.
  - Distracting factors.
    - Phones / Noise / Pagers / Consults etc etc
  - Previous Study Bias.
- Other Factors
  - Volume of Information.
  - Pressure for fast turnaround.

# The NZ System

Our legal system does not usually involve law suits like the USA but there are a number of avenues that can be pursued.

HDC

ACC

MCNZ

Civil Action



In general the NZ system facilitates a more open approach to error and its prevention.

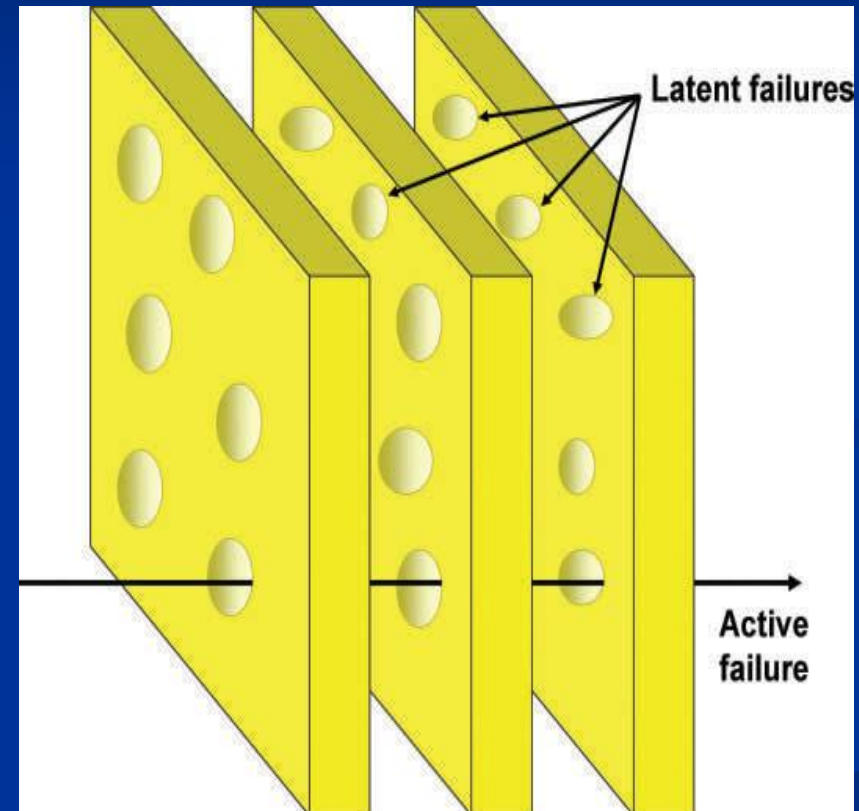
# The NZ System

- On review of ACC TI and HDC cases involving Radiology Services a few threads stick out.
  - Adequate Supervision.
  - Communication.
  - Waiting Times.
  - Failure to act on a result.



# Reason's Swiss Cheese Model of Medical Error

- James Reason, British Psychologist who in 1990 introduced risk analysis and management systems to human error.
- Two approaches:-
  - PERSON APPROACH
    - Assigns blame for an error to an individual
  - SYSTEMS APPROACH
    - Acknowledges that humans make mistakes and errors are to be expected.
    - Views error as a consequence and focuses on system failure and safeguards that could prevent a recurrence.

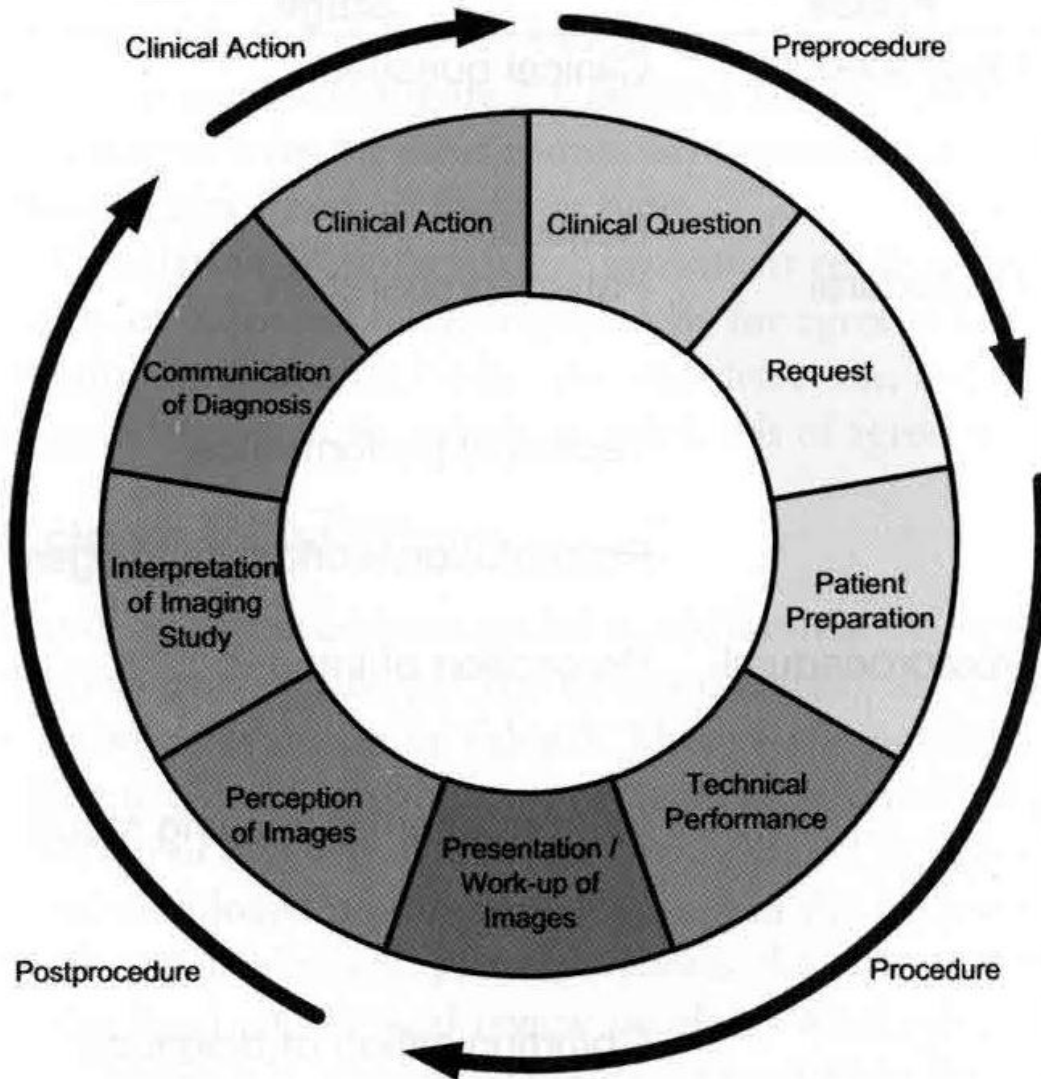


# Reason's Swiss Cheese Model of Medical Error

- For an error to occur at a clinical level there is usually a convergence of two factors.
  - ACTIVE FACTORS
    - Human Factors
  - LATENT FACTORS
    - System Factors
- An active factor such as a human error will not usually cause an adverse event if safeguards are in place to prevent a system error



## The Stages of the Imaging Cycle



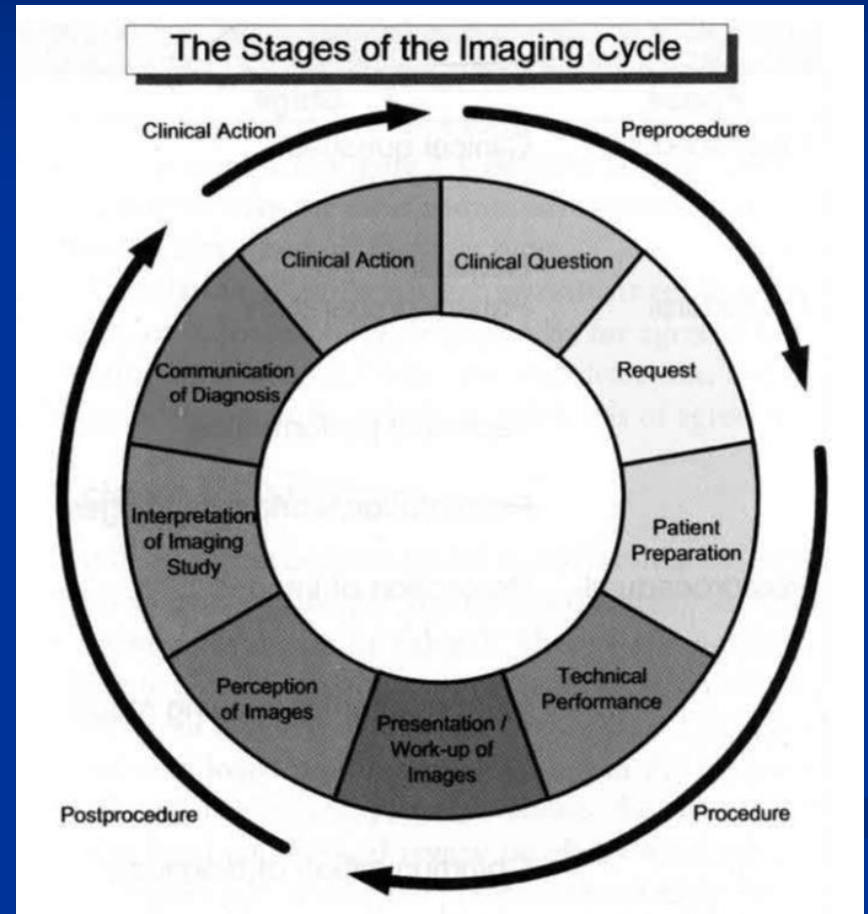
# What are Radiologists doing?

- Audit
  - “Mistakes” meetings
  - MCNZ requirement
- Peer Review
  - Consensus review
  - Blind peer review
- RaER
  - Radiology Events Register
- Hospital and Practice quality systems.
- Accreditation
- CME/CPD (RANZCR and MCNZ)



# What can you do?

- Good Clinical details
- Be aware of patient preparation and issues associated with it.
- Have a practice policy/system regarding action on report findings.
- Integrate IT systems
- If it doesn't seem correct then ask.



# PRIVACY

# PRIVACY

- The right of privacy is well laid out in the Privacy Act.
- There is also a drive to integrate patient information.
  - PACS Info.
  - Public / Private.
  - Who can look.
- Collision Course
- Policy and Procedures required and a balance needs to be struck.

# The Privacy Act

## Take the time to know your privacy principles

The Privacy Act has 12 privacy principles for handling personal information.



- The law is the law.
- Who can look?
- Privacy often important in an Imaging Setting
  - Pregnancy
  - Cancer
  - Celebrities/Staff/VIPS



# An Integrated Model and Common Patient Record

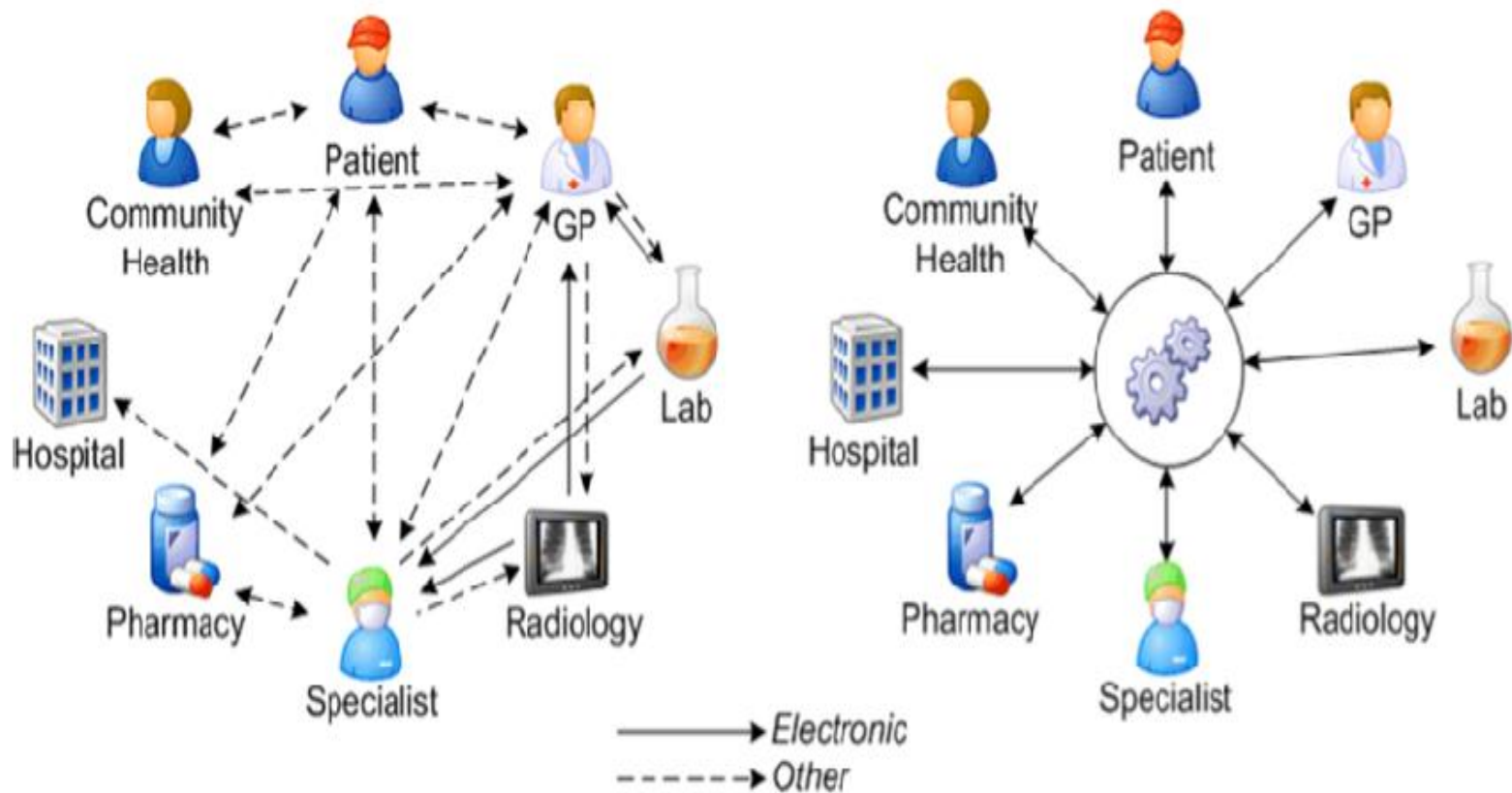


Figure 1. Clinical paradigm 20th vs. 21st century

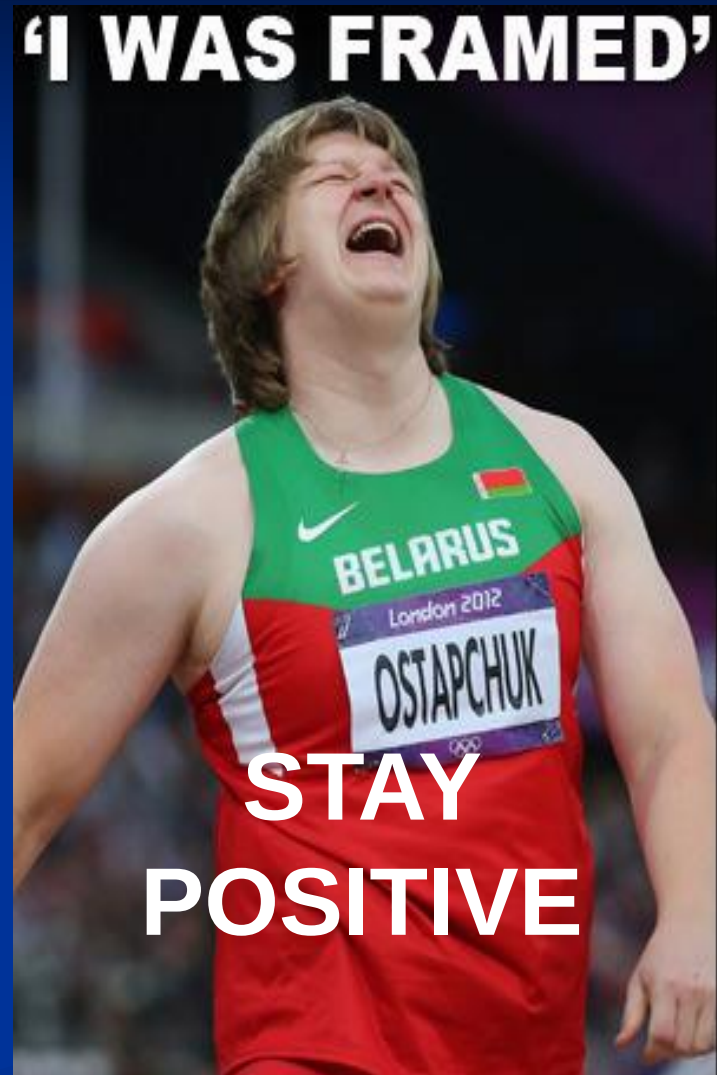
# Collision Course ?

- Need for sound policy and guidelines.
- Audit Trail required.
- Active engagement.
- What's the balance?



# Conclusions

- Balance up the risks and benefits of a radiological examination.
- If not sure ask.
- Everyone should learn from mistakes.
- Be careful around privacy vs access.
- But most importantly.



# Thanks for you're attention.

