Is Medical Radiation Safe? Can It Be Safer?

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Top Ten Technology Health Hazards 2001 (ECRI)

- Radiotherapy overdoses
- Alarm failures
- Endoscope contamination
- CT overdoses
- IT complications
- Luer misconnections
- PCA oversedation
- Sharps injuries
- Surgery fires
- Defibrillator failures

2010 NYT Articles on Risks of Radiation Therapy

- Radiation Offers New Cures and Ways to Do Harm – January 2010
- As Technology Surges, Radiation Safeguards Lag – January 2010
- When Medical Radiation Goes Awry - January 2010
- Radiation Errors Reported in Missouri – February 2010
- VA is Fined over Errors in Radiation in Philadelphia – March 2010
- Stereotactic Radiosurgery Overdoses Harm Patients – December 2010
- A Pinpoint Beam Strays Invisibly, Harming Instead of Healing – December 2010

FDA repository (1999–2010) shows ~1200 problems reported due to equipment malfunction or user error

- 75%: linear accelerators
- 19%: treatment planning systems
- 7%: ancillary devices (e.g. simulators)
_____ Health – _____, MO
- 76 patients overdosed during SRS over 5 years
- Caused by use of improper calibration ion chamber
- Similar problem with 145 patients in Toulouse, FR

_____ Cancer Center – _____, FL
- Radiological Physics Center inspection 2005
- Miscalibrated linear accelerator
- 77 brain tumor patients overdose by 50% 2004-05

New York Times
January 23, 2010

Marci Faber is nearly comatose after a treatment mistake.

**New York Times**  
December 28, 2010

- Mother of 3
- SRS for trigeminal neuralgia
- Radiation field too large
- Nearly comatose, in nursing home
- Unable to eat, speak, walk

**Radiation Therapy is a Complex Process**

- Disease Treated
- Technology Employed
- Information Flow
- Human Interactions
- Treatment Evaluation

**Errors will occur because:**

- Process is Complex
- Technology can Malfunction
- Handoff Misunderstandings Occur
- Humans Are Involved

**Process Must Be Fault-Tolerant**

- Responsibilities must be Understood
- Responsibilities must be Manageable
- Early Warnings must be Available
- Must Learn from others Mistakes
- Corrective Actions must Occur
- Audits must be Conducted
- Peer Review must Happen
- Process should be Accredited
Safety in Radiation Therapy: Recommendations

- Return control at point of care
- As complexity increases, control should be simplified
- Provide improved early warnings
- Vendors should address concerns intelligibly

Safety in Radiation Therapy: Recommendations (cont’d)

- More FMEA and RCA
- International reporting system (SAFRON)
- As Safe as Reasonably Achievable (ASARA)
- Return control at point of care

Safety Culture

- Adhering to a culture of safety is a competency
- Top down enforcement of safety first
- Zero tolerance for short cuts
- All staff empowered to stop a procedure
- Second checks and timeouts
- Make sure staff do not operate outside their scope of practice
- Well documented change of P&P process
- Expectations for staff
The Bottom Line Is:

SAFETY IS EVERYONE’S RESPONSIBILITY

ESPECIALLY THE MEDICAL PHYSICIST