The Stress of Safety:
How Workplace Experiences Affect Patient Safety

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Objectives

- Understand the concepts of patient safety and workplace conditions.
- Describe clinical situations which may contribute to patient errors.
- Discuss recognition and corrective action applicable to negative workplace environments.

2002 ÜBERLINGEN MID-AIR COLLISION

Report of Findings

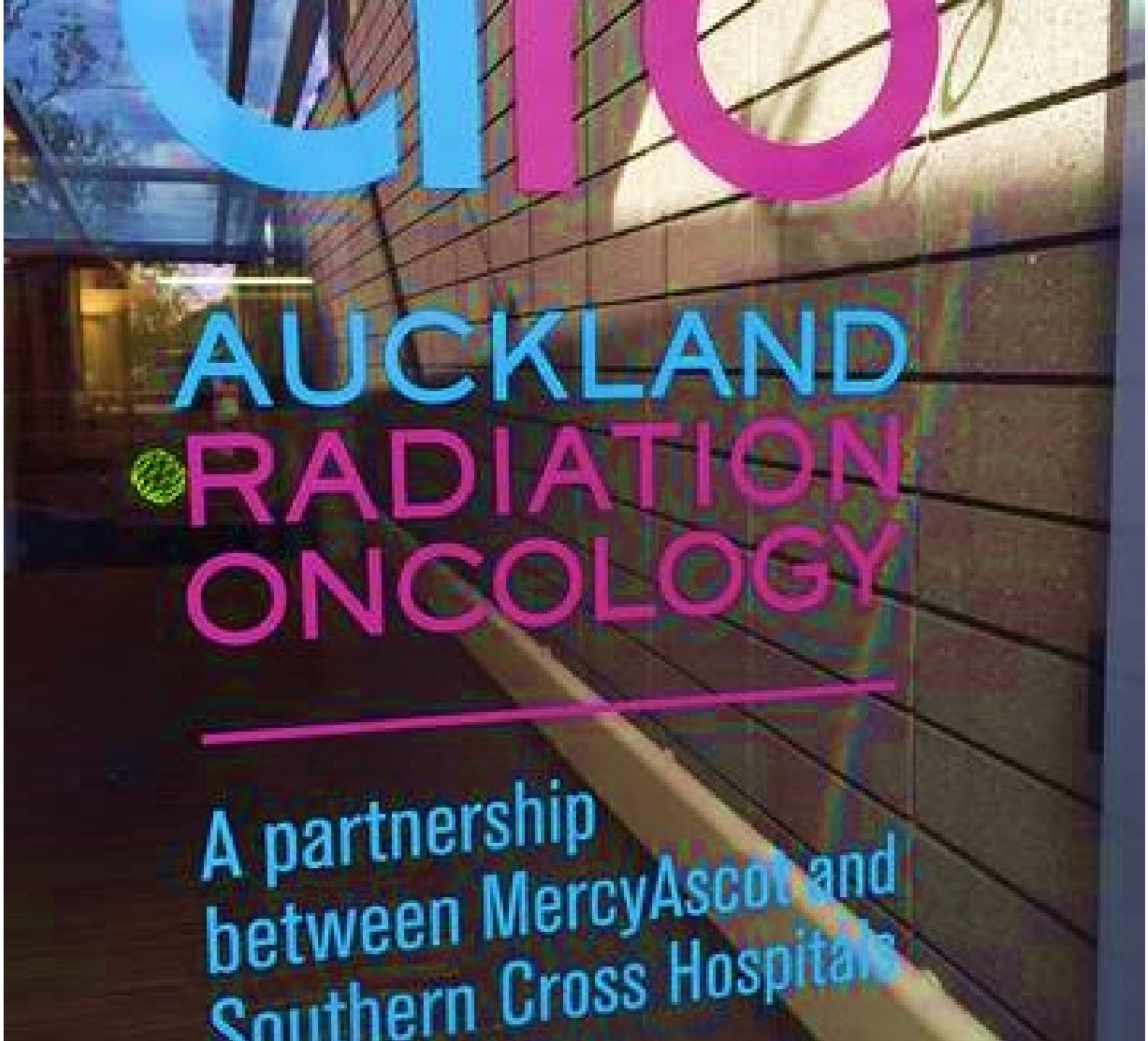
Need for 2 people working at all times

Timely dissemination of updated material / procedures / policies

Limit distractions

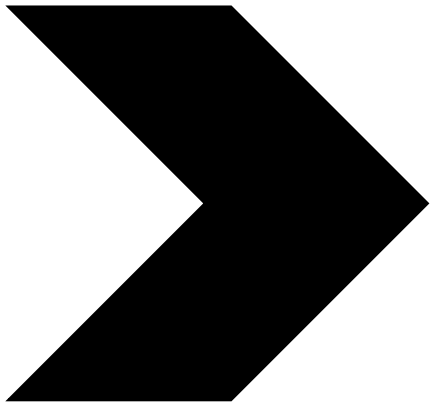
Increase training

2014 New Zealand Radiation Therapy Accident



Report of Findings

- UNDERSTAFFED
- OVERWORKED
- LIMIT DISTRACTIONS
- INCREASE TRAINING



STRESS

St. Vincent's Hospital – Manhattan, NY

Radiation Offers New Cures, and Ways to Do Harm – NYT, 2010

A few months before Mr. Jerome-Parks's treatment, New York State health officials reminded hospitals that I.M.R.T. required a "significant time commitment" on the part of their staffs.

"Staffing levels should be evaluated carefully by each registrant," the state warned, "to ensure that coverage is sufficient to prevent the occurrence of treatment errors and misadministrations."

Soon after the accident, at St. Vincent's Hospital in Manhattan, state health officials cautioned hospitals to be extra careful with linear accelerators, machines that generate beams of high-energy radiation.

St. Vincent's Hospital – Manhattan, NY

Radiation Offers New Cures, and Ways to Do Harm – NYT, 2010

Radiation Offers New Cures, and Ways to Do Harm – NYT, 2010

State University of New York—Downstate Medical Center

One therapist mistakenly programmed the computer for "wedge out" rather than "wedge in," as the plan required. Another therapist failed to catch the error. And the physics staff repeatedly failed to notice it during their weekly checks of treatment records.

Even worse, therapists failed to notice that during treatment, their computer screen clearly showed that the wedge was missing. Only weeks earlier, state health officials had sent a notice, reminding hospitals that therapists "must closely monitor" their computer screens.

621 MISTAKES FROM 2001 TO 2008

- On 133 occasions, devices used to shape or modulate radiation beams were left out, wrongly positioned or otherwise misused.

621 MISTAKES FROM 2001 TO 2008

- On 284 occasions, radiation missed all or part of its intended target or treated the wrong body part entirely.
  - In one case, radioactive seeds intended for a man's cancerous prostate were instead implanted in the base of his penis.
  - Another patient with stomach cancer was treated for prostate cancer.
  - Fifty patients received radiation intended for someone else, including one brain cancer patient who received radiation intended for breast cancer.

Report of Findings

- SOFTWARE FLAWS
- FAULTY PROGRAMMING
- POOR SAFETY PROCEDURES
- INADEQUATE STAFFING & TRAINING
  - ie UNDERSTAFFED & UNDER-TRAINED

https://www.nytimes.com/2010/01/24/health/24radiation.html

Report of Findings

- All the therapists had to do was watch the computer screen — it showed that the collimator was open.

Report of Findings

- But they were not watching the screen, and in fact hospital rules included no specific instructions that they do so.
- Instead, their eyes were fastened on Mr. Jerome-Parks, out of concern that he might vomit into the mask that stabilized his head.

652 EVENTS IN 2009

- In 2009, The Pennsylvania Patient Safety Authority receive reports of 652 events in **RADIOLOGY**:
  - 50% - wrong procedure or test
  - 30% - wrong patient
  - 15% - wrong side
  - 5% - wrong site

Table. Wrong Events by Radiologic Study Reported to the Pennsylvania Patient Safety Authority, 2009

RADIOLOGIC STUDY	WRONG EVENT				NUMBER OF WRONG EVENTS	PERCENTAGE OF WRONG EVENTS
	Wrong Patient	Wrong Procedure	Wrong Side	Wrong Site		
Radiography	93	104	75	24	296	45.4%
Computed tomography	36	69	4	6	115	17.6
Mammography	7	87	4	0	98	15.0
Magnetic resonance imaging	7	27	5	0	39	6.0
Ultrasound	13	13	6	3	35	5.4
Nuclear medicine	4	8	0	1	13	2.0
Interventional	3	3	0	0	6	0.9
Dexa scan	1	1	0	0	2	0.3
Positron emission tomography	1	0	0	0	1	0.2
Not specified	31	14	2	0	47	7.2
Total Number of Events	**196**	**326**	**96**	**34**	**652**	
Total Percentage of Events	**30.1%**	**50.0**	**14.7**	**5.2**		**100**

652 EVENTS IN 2009

Modality	Involvement
Radiography	45%
Computed Tomography	18%
Mammography	15%
MRI	6%
Sonography	5%

Report of Findings

- Resources:
  - “ … includes a shortage of fully prepared people, a shortage of experienced people, a shortage of space in which to create a calm environment in which to work, a shortage of supplies, and a shortage of dollars for upgrades, equipment, and additional staff.”

https://www.appliedradiology.com/

Report of Findings

- Systems:
  - It was determined that an average of **150** distinct steps needed to occur to complete the process of obtaining a chest x-ray.

https://www.appliedradiology.org/courses/2851%2FPDF%2FMedical_Errors_AR060815.pdf

Report of Findings

- Work Environment:
  - The environment is busy, noisy, full of interruptions, and is not designed for the kind of work that is done today.

Another Finding

“The lack of experienced staff means that there are not the role models, preceptors or mentors needed … ”

MRI Safety Incidents – UK 2015-2017

- ~1.3 million patients were scanned with a total number of 4343 MRI-related reports submitted
- This total is made up of 72% (3127) incidents related to static sites and 27% (1173) from mobile units
  - 70 MR systems
  - 50:50 split between static and mobile-based units

https://www.birpublications.org/doi/pdf/10.1259/bjro.20180006

MRI Safety Incidents – UK 2015-2017

Event

- A near-miss occurred when the safety checking processes failed and the patient, who had a cardiac pacemaker in situ, was taken into the scan room
- This was detected at the last minute and the patient was removed before they being placed within the magnet

Root Cause

- Poor In-Team Communications causing confusion around team roles due to too many staff involved in the care of the patient

MRI Safety Incidents – UK 2015-2017

Event

- Heat-related incident associated with a patient feeling warm, wearing a metallic flecked sweater
  - resulted in a small skin burn at the contact site
- Another being a conductive loop where the patient moved their hands together mid scan causing a burn

Root Cause

- Ineffective Technologist and Patient Education regarding safety and positioning
- Inappropriate patient preparation and positioning
  - to ensure the risk of any burn occurring is mitigated

Report of Findings

- Direct harm to staff or patients from MRI is low, and most often when it does occur, it is the result of a series of failings caused by some process failure or human error which are ultimately preventable.

Report of Findings

Incident	Percentage of Occurrence
Contraindicated Referrals	32%
Adverse Contrast Reactions	18.4%
Inability to Confirm Patient Safety	11.4%
Unexpected Implants or Foreign Bodies	10.1%
Projectiles	4.75%
Burns or Heating Related Issues	1.48%

Report of Findings

- Categories of “unable to confirm safety” and “unexpected implant/foreign body” (**21.5% collectively**), suggest issues associated with communication, screening processes, and interaction with patients.
- The shared roles within busy departments can lead to weaknesses in the patient screening process.

Report of Findings

- Misunderstanding of organizational safety policies
- Busy departments or schedules
- Ineffective communication
- Inappropriate safety training

606 Incidents – Scotland, 2005

- 85% of incidents in radiology departments and 37% in **nuclear medicine** were overexposures of patients.
- 80% of these resulted from human error or procedural failure …
- Other incidents in **nuclear medicine** were contamination events (49%) and failure in management of radioactive materials (10%).

New South Wales Australia, 2017

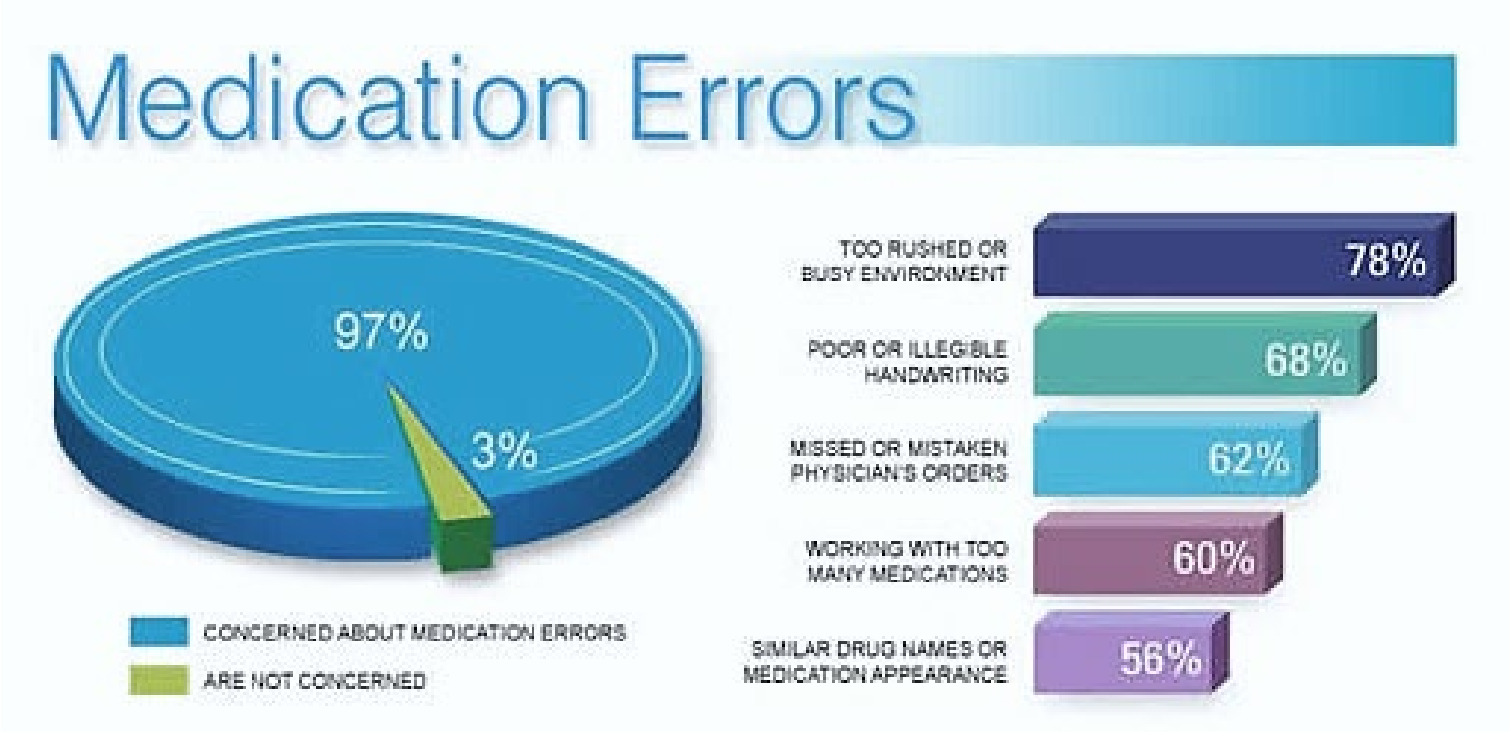
- Errors by nuclear medicine technologists during the preparation of radiopharmaceuticals or at other times can cause patient harm and may reflect the impact of interruptions, busy work environments, and deficient systems or processes.

New South Wales Australia, 2017

- Nuclear Medicine technologists completed 5227 tasks and experienced 569 interruptions.
  - 4.5 times/hour
- The highest interruption rate occurred when technologists were in transit between rooms.
  - 10.3 times/hour
- Interruptions during radiopharmaceutical preparation occurred a mean of 4.4 times/hour.

Vanderbilt Nurse 2017

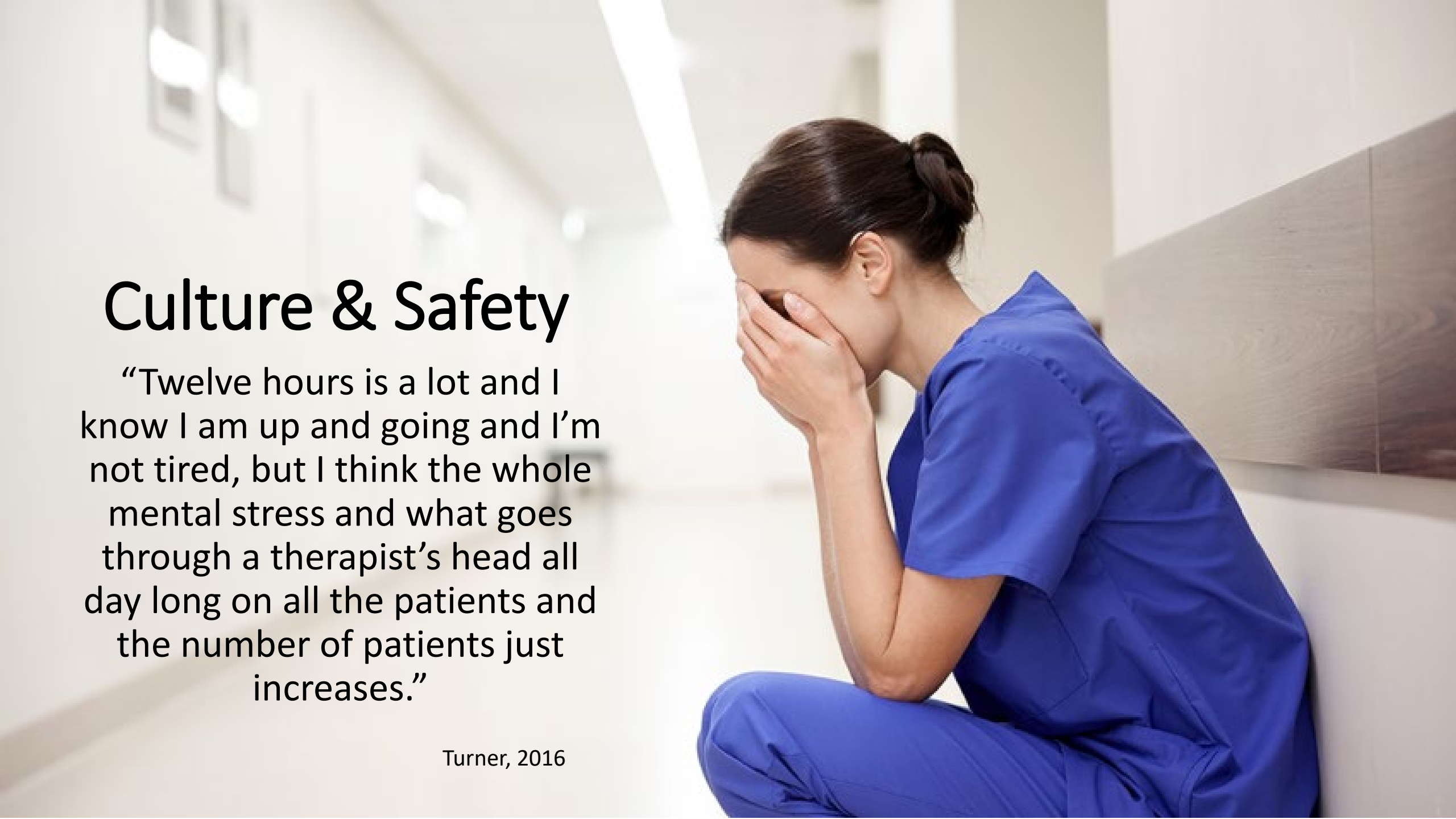
- Prosecutors say at least ***10 mistakes*** led the nurse to accidentally give a patient a fatal dose of the wrong medication.
- She told investigators she was "***distracted***."



Culture & Safety

"Twelve hours is a lot and I know I am up and going and I'm not tired, but I think the whole mental stress and what goes through a therapist's head all day long on all the patients and the number of patients just increases."

Turner, 2016



"I'm thinking a hundred times over because I am the only one standing between me and a mistake."

Culture & Safety

Turner, 2016

ROSSI Survey

"I believe that RTTs are being asked/required to perform procedures under un-safe conditions, be that too many with too little staffing, too complex with too little training, or while too distracted ... all with the potential for treatment error."

ROSSI Survey

“Constant pressure for throughput with complex procedures coupled with frank non-support from management … ”

ROSSI Survey

“It is important that employees are trained and have understanding of what they are doing. I think it's dangerous when therapists are merely performing a repetitive act without understanding what they are doing.”

Practical Radiation Oncology (2011) 1, 16–21

practical radiation oncology
pro
www.practicalradonc.org

Special Article

Improving patient safety in radiation oncology

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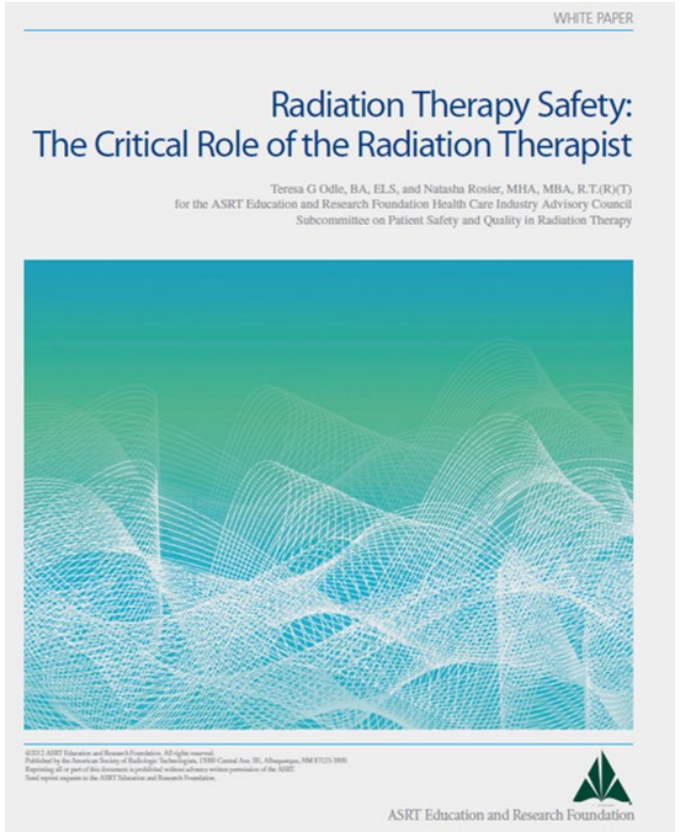
- Staffing levels
- FMEA
- Error reporting
- Accreditation
- Standardization
- Checklists

Safety Summit 2010

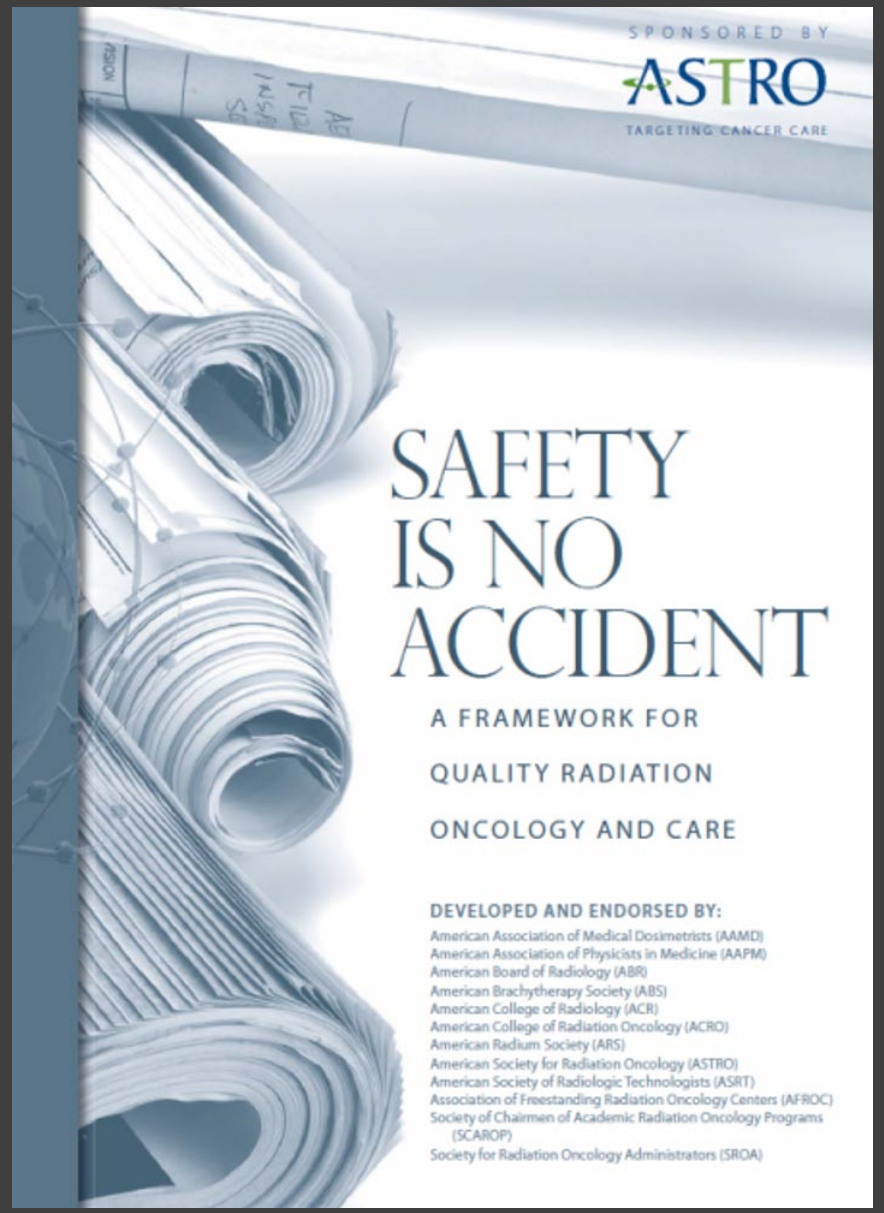


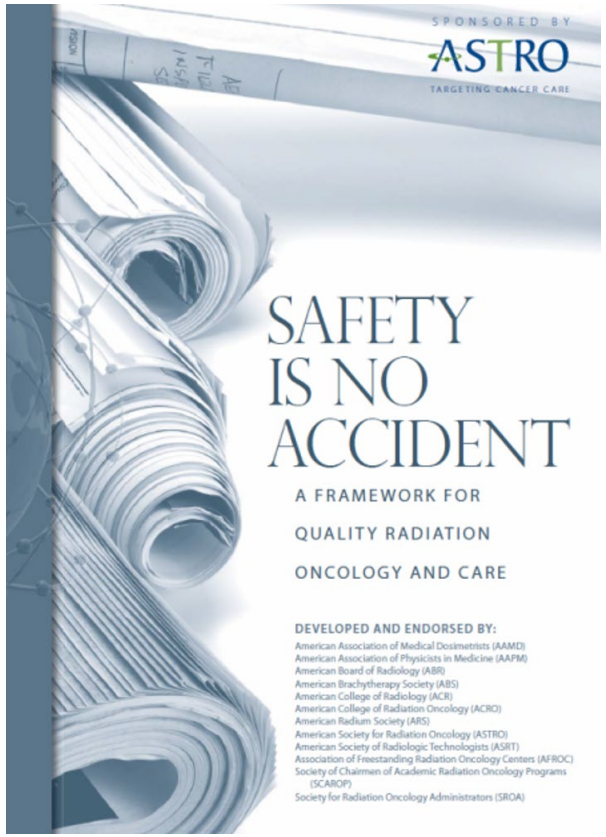
Odle & Rosier, 2012

- Staffing levels
- Training/Credentialing
- Error Reporting
- Accreditation
- Checklists/Time-outs

ASTRO
2012; 2019

- Checklists/Time-outs
- Adequate Time
- Training/Credentialing
- Error Reporting
- Accreditation



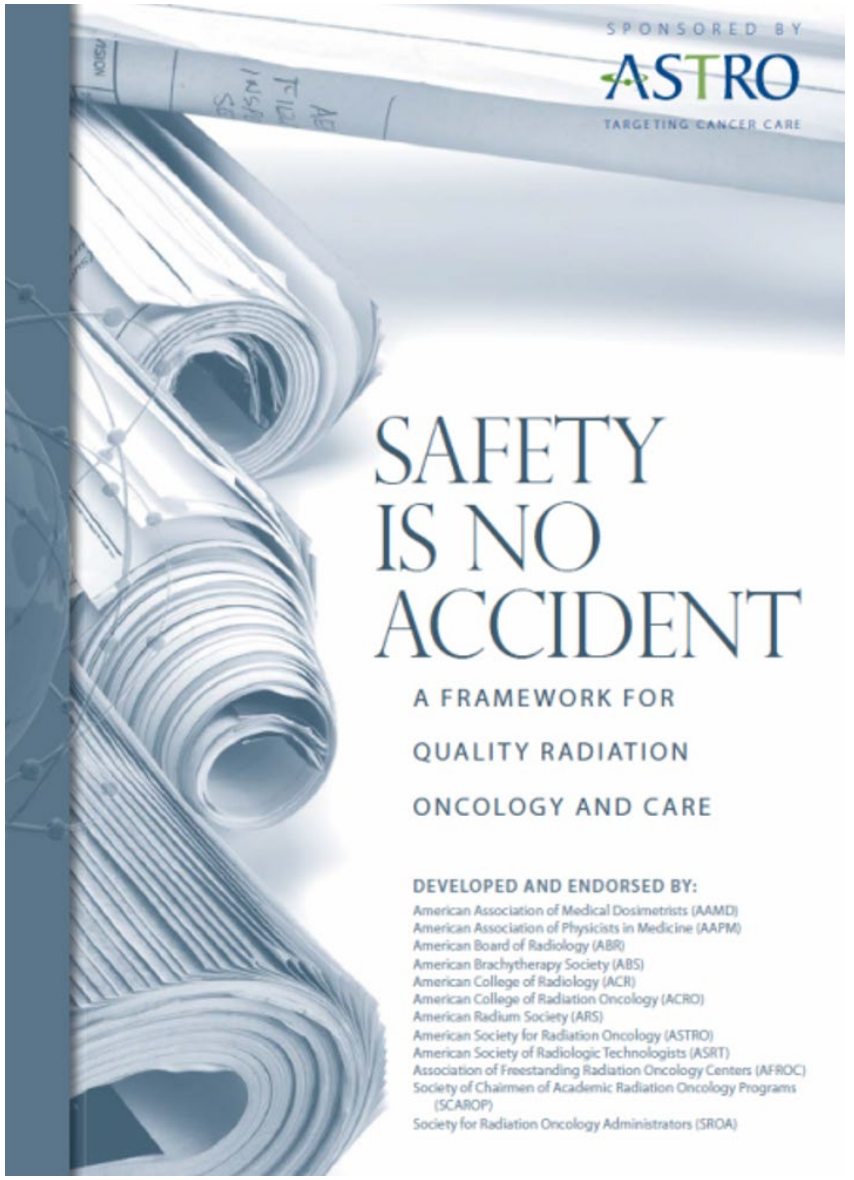


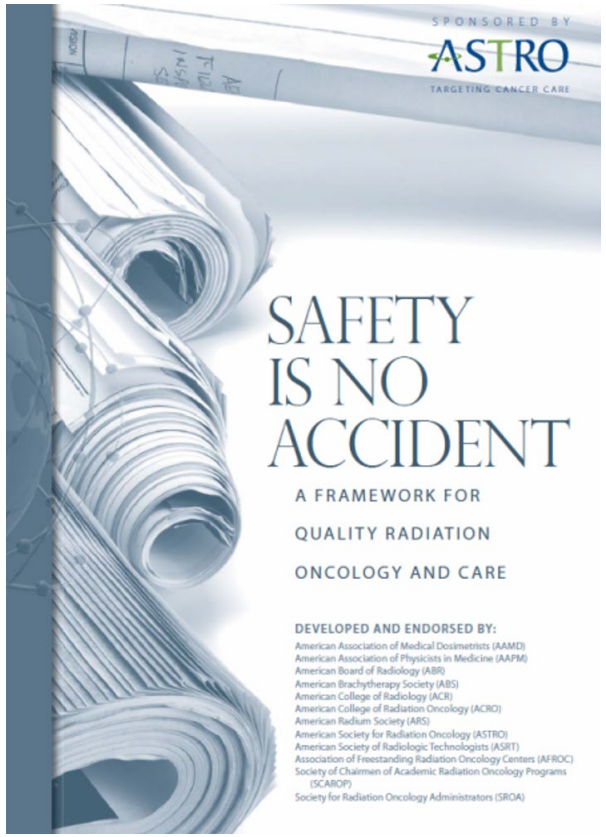
ASTRO – 2019

Given the complex and rapidly evolving nature of RT, its safe delivery requires a concerted and coordinated effort by many individuals with varied responsibilities. Furthermore, efficiency also impacts safety. Inefficient systems lead to staff frustration, rushing and sometimes cutting corners; thus, all staff should work together to create a safe and efficient clinical environment and workflow. (2019)

ASTRO – 2019

All clinical staff must be open to having any member of the team (whether in leadership positions or not) raise concerns about safety and suggest changes. Indeed, it is often the frontline staff that are more likely to understand the limitations of current procedures and propose improvements. (2019)

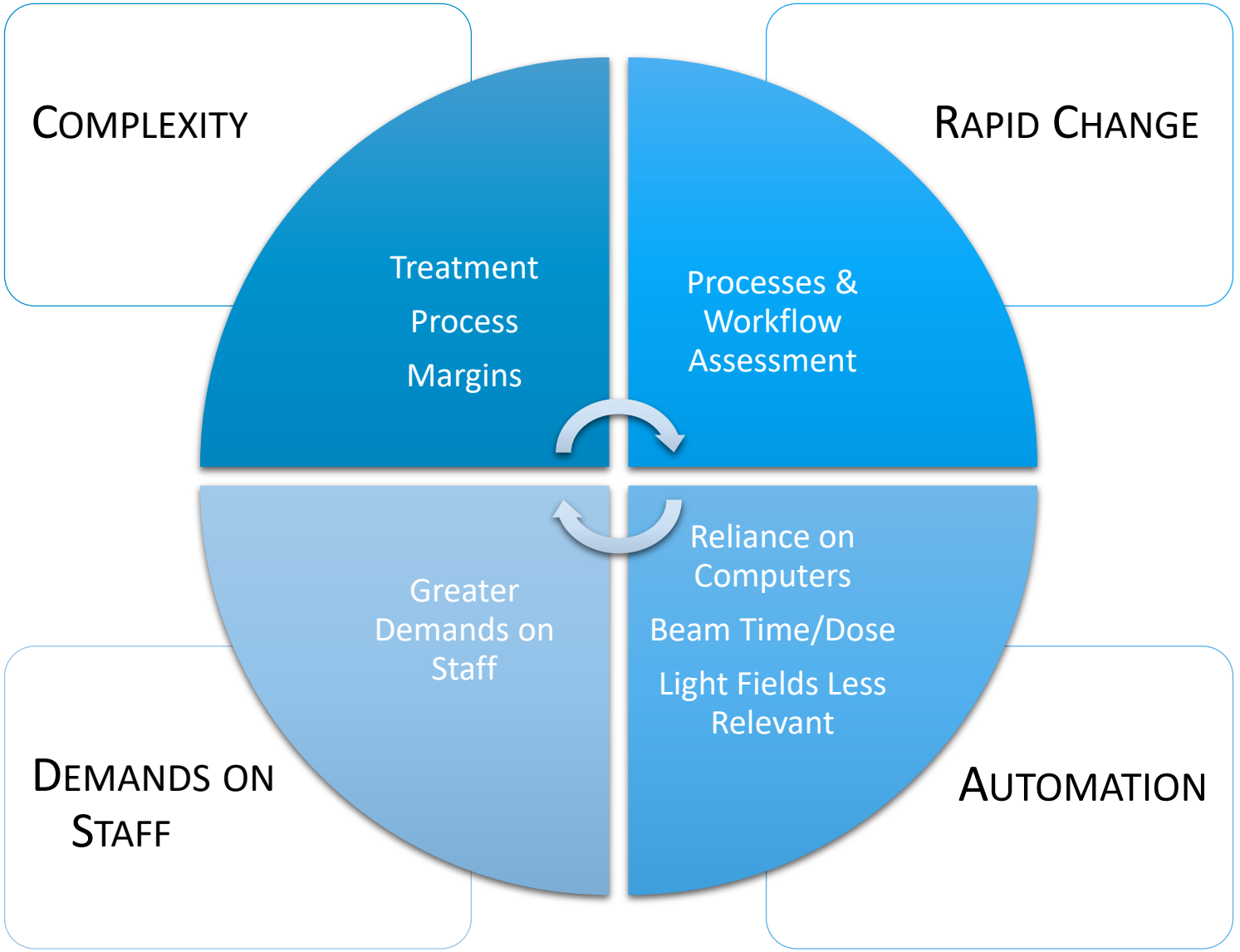




ASTRO – 2019

In a safety-minded culture, all staff are encouraged to suggest, and effect change to improve safety, quality and efficiency. (2019)

Culture Shift



The report of Task Group 100 of the AAPM:

Application of risk analysis methods to radiation therapy quality management

- Improve patient safety and enhance quality
- Provide framework for departments
- Apply formal risk analysis
  - Hardware
  - Software
  - Processes

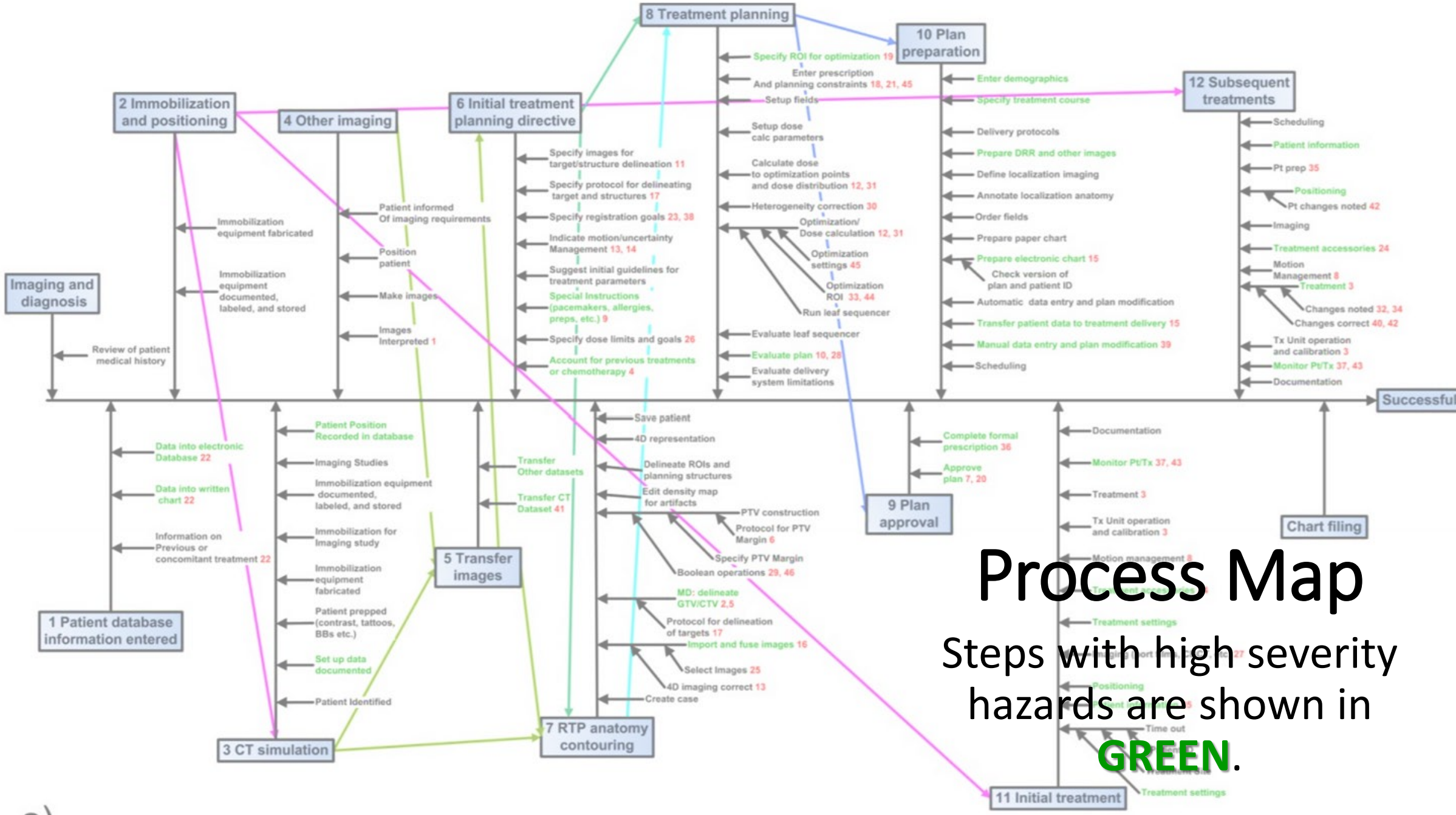
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4985013/

Report of Findings

“Errors that occur not due to failures in devices and software rather failures in workflow and process … ”

Report of Findings

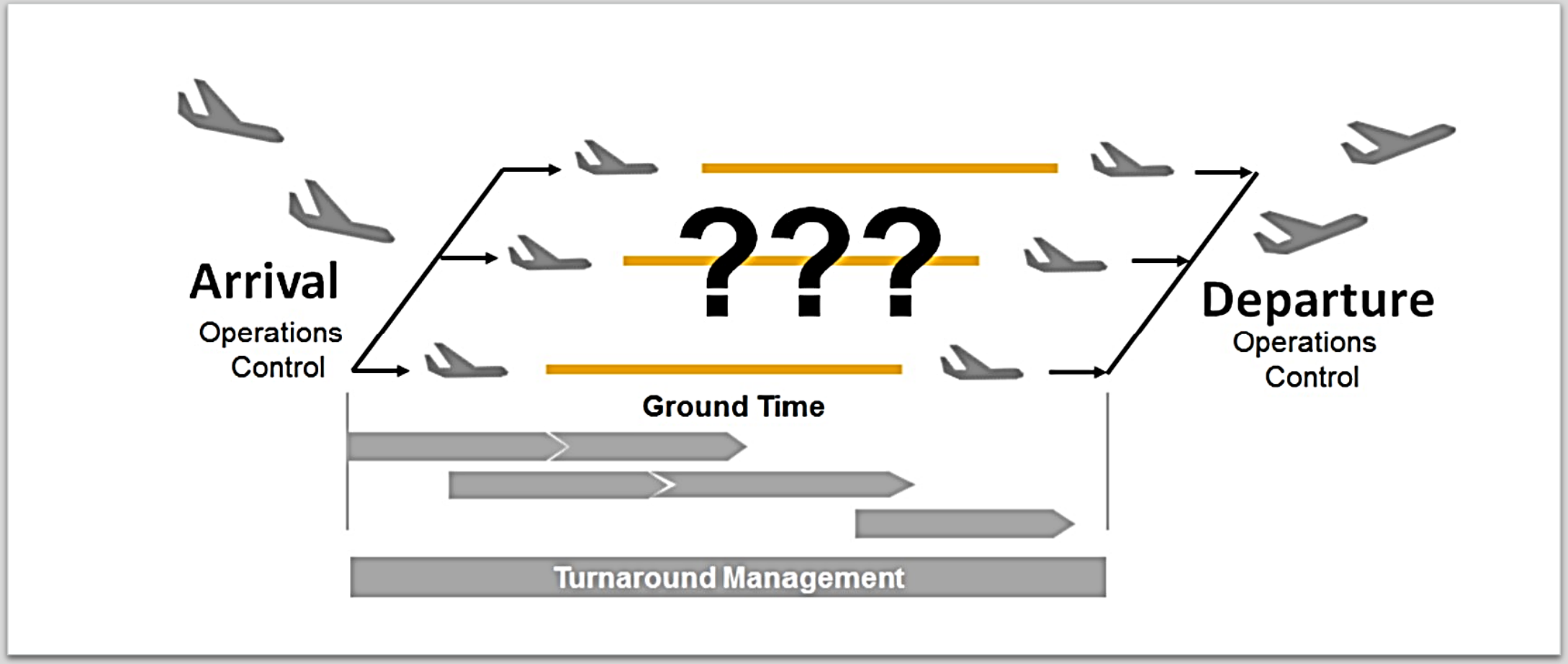
"Lack of standardized procedures, lack of communication, inadequate training, human failure (inattention), human failure (failure to review work), lack of staff (rushed process, lack of time, fatigue)."



a)

Process Map

Steps with high severity hazards are shown in **GREEN**.



Aircraft Turnaround Process

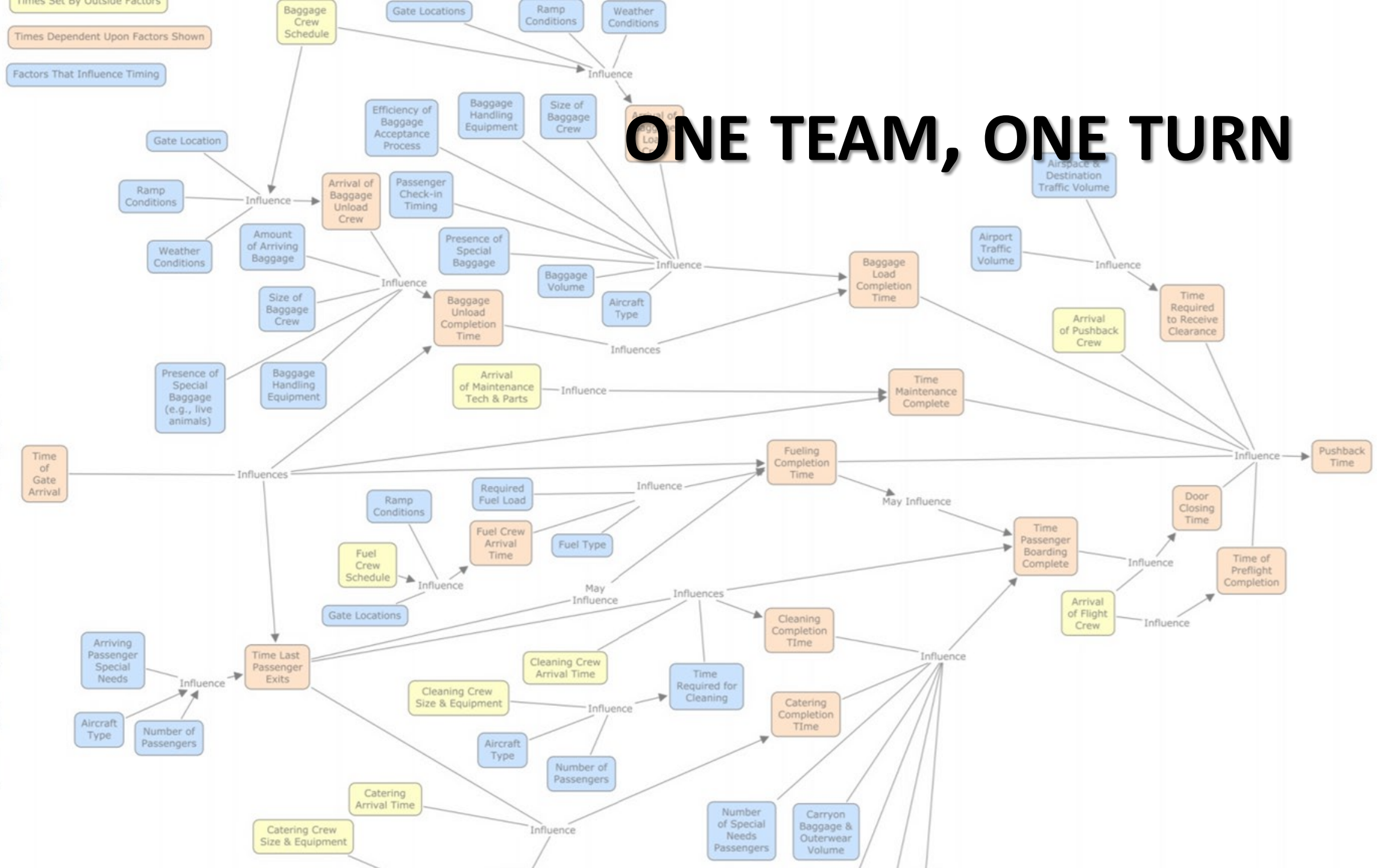


Figure 5. Flow of events for turnaround flights at the gate

ONE TEAM, ONE TURN

Failure Analysis

TABLE XI. Most common classifications for the possible causes for the failur shown in the IMRT fault tree analysis in Appendix E (Ref. 141).

Category	Occasion
Human failures	230
Lack of standardized procedures	99
Inadequate training	97
Inadequate communication	67
Hardware/software failure	58
Hardware	9
Software	44
Hardware or software	5
Lack of staff	37
Inadequate design specifications	32
Inadequate commissioning	18
Use of defective materials/tool/equipment	12

Failure Analysis

- Human failures have many causes:
  loss of attention, biased expectations, distractions due to multiple demands, bad judgment in the face of a deviation from the normal process, and fatigue or overwork

Rank (process tree step#)	Subprocess #_description	Step description	Potential failure modes	Potential causes of failure	Potential effects of failure	Avg. *O*	Avg. *S*	Avg. *D*	Avg. RPN
1 (#31)	4—Other pretreatment imaging for CTV localization	6—Images correctly interpreted (e.g., windowing for FDG PET)	Incorrect interpretation of tumor or normal tissue	Inadequate training (user not familiar with modality), lack of communication (inter-disciplinary)	Wrong volume	6.5	7.4	8.0	388
2 (#58)	7—RTP anatomy	Delineate GTV/CTV (MD) and other structures for planning and optimization	1—>3*sigma error contouring errors: Wrong organ, wrong site, wrong expansions	Lack of standardized procedures, hardware failure (defective materials/tools/equipment), inadequate design specification, inadequate programming, human failure (inadequate assessment of operational capabilities), human failure (inattention), human failure (failure to review work), lack of staff (rushed process, lack of time, fatigue)	Very wrong dose distributions, very wrong volumes	5.3	8.4	7.9	366
3 (#204)	12—Day *N* treatment	Treatment delivered	LINAC hardware failures/wrong dose per MU; MLC leaf motions inaccurate, flatness/symmetry, energy—all the things that standard physical QA is meant to prevent	Poor design (hardware), inadequate maintenance, software failure, lack of standardized procedures (weak physics QA process), human failure (incorrectly used procedure/practice), standard Linac performance QM failure (not further considered here), inadequate training	Wrong dose, wrong dose distribution, wrong location, wrong volume	5.4	8.2	7.2	354
4 (#48)	6—Initial treatment planning directive (from MD)	Retreatment, previous treatment, brachy etc.	Wrong summary of other treatments. Other treatments not documented	Lack of staff (rushed process, lack of time, fatigue), human failure (inattention), lack of communication, human failure (reconstructing previous treatment), human failure (wrong info obtained), information not available	Wrong dose	5.3	8.6	7.3	333
5 (#59)	7—RTP anatomy	Delineate GTV/CTV (MD) and other structures for planning and optimization	2—Excessive delineation errors resulting in <3*sigma segmentation errors	Lack of standardized procedures, availability of defective materials/tools/equipment, human failure (materials/tools/equipment used incorrectly), human failure (inadequate assessment of materials/tools/equipment for task), inadequate design specification, inadequate programming, inadequate training, human failure (inadequate assessment of operational	Wrong dose distribution, wrong volumes	5.9	6.6	8.0	326

6/10

- Staff should also be appropriately trained to use each specific device.
- In some cases (for example, radiation therapists moving between different kinds of treatment machines), additional training or review sessions on the use of specific devices may be necessary more often than annually.

6/10

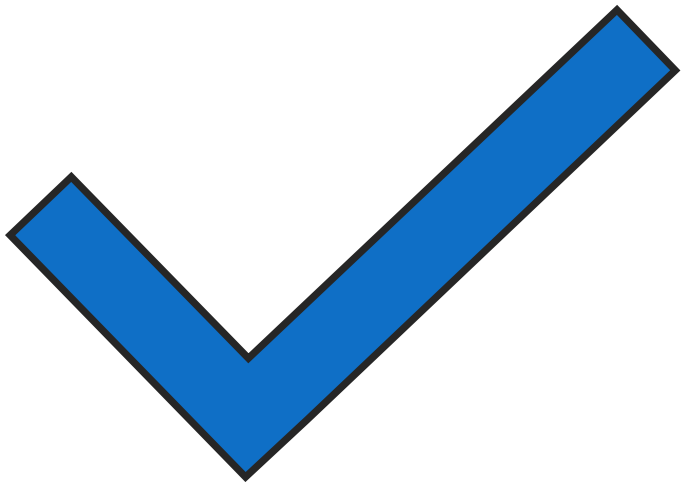
- This may be challenging with new technologies where there are few training programs, or the technology is rarely available.
- Nevertheless, practices must ensure that providers are qualified to deliver the appropriate care.


SHORT STAFFING IS KIND OF LIKE DRUNK DRIVING
YEAH, SOME OF THE TIME EVERYONE GETS AWAY FINE.
BUT ALL OF THE TIME PEOPLE'S LIVES ARE AT RISK.
@ImpactDispa

TG 100 Conclusions

- Standardize Procedures
- Provide Comprehensive Training of Staff
- Ensure Clear Lines of Communication Among Staff
- Maintain Hardware & Software Resources
- Commit to Adequate Staff, Physical, and Computer Resources

A Culture of Safety



- Acknowledgment of the high-risk nature of an organization's activities and the determination to achieve consistently safe operations
- A blame-free environment where individuals are able to report errors or near misses without fear of reprimand or punishment
- Encouragement of collaboration across ranks and disciplines to seek solutions to patient safety problems
- Organizational commitment of resources to address safety concerns

A Culture of Safety

- Safety and quality initiatives are often viewed as separate from routine practice.
- A preferred approach is to ingrain safety considerations into the fabric of clinical operations, such that it is a natural component of evolving clinical practice.

A Culture of Safety

- This requires a persistent acknowledgement of safety concerns by the leadership to enable an increased mindfulness among the staff.

RO-ILS®

RADIATION ONCOLOGY
INCIDENT LEARNING SYSTEM

Sponsored by ASTRO and AAPM

Safety Culture

- A culture of safety, where it is acceptable and encouraged to talk about mistakes and errors
- A culture of learning, where those mistakes and errors are distilled into learnings to prevent future incidents and the question ‘who did it’ is replaced by ‘what happened’ and ‘how do we prevent it’
- And a culture of justice, where everyone within the organization holds each other to maintaining and fostering this culture as well as being accountable for building fail-safe processes to protect patients

(Dekker 2012, 2014)

https://www.astro.org/ASTRO/media/ASTRO/Patient%20Care%20and%20Research/PDFs/ROILS-Q1_2017_Report.pdf

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Safety Culture

- Within this definition of culture, how would leadership characterize the culture of your organization and your department?
- How would frontline staff characterize the culture?
- How well does your organization understand and practice these key safety culture features at all levels within the organization?

Just Culture

"A fair and **just culture** improves patient safety by empowering employees to proactively monitor the workplace and participate in safety efforts in the work environment … "

https://www.rsna.org/news/2019/February/Just-Culture-Background

Key Components of Just Culture

- Adopting one model of shared accountability
- Learning from mistakes vs. blaming individuals
- Managing behavioral choices (human error, at-risk behavior, reckless behavior)
- Designing safety into all clinical systems and processes
- Commitment of organization/leadership to shared goals

Wellness in Action

"We have a formal learning process that identifies safety and quality gaps, but we are also trying to strengthen culture by bringing people together and encouraging staff and physicians to tell the stories of human excellence that are occurring each day … "

Wellness in Action

"Our team realized that it wanted to go beyond problem-solving and foster conversations that could serve as a catalyst to ensure that our individual members were working in a ***healthy environment*** with a ***healthy mindset***."

Department of Radiology and Imaging Sciences at Indiana University School of Medicine, Indianapolis

Fixing It?

- on-site massage service
- discounted gym memberships
- a wellness program offering
- photography
- yoga
- classes designed to reduce stress and encourage work/life balance

What is it Really Going to Take?

"… there was a notable lack of workplace stress management strategies, which the participants usually perceive as a lack of interest on behalf of the management regarding their emotional state."

Koinis A, Giannou V, Drantaki V, Angelaina S, Stratou E, Saridi M. The Impact of Healthcare Workers Job Environment on Their Mental-emotional Health. Coping Strategies: The Case of a Local General Hospital. *Health Psychol Res*. 2015;3(1):1984. Published 2015 Apr 13. doi:10.4081/hpr.2015.1984

What is it Really Going to Take?

"Some significant factors for lowering workplace stress were found to be the need to encourage and morally reward the staff and also to provide them with opportunities for further or continuous education."

Koinis A, Giannou V, Drantaki V, Angelaina S, Stratou E, Saridi M. The Impact of Healthcare Workers Job Environment on Their Mental-emotional Health. Coping Strategies: The Case of a Local General Hospital. *Health Psychol Res*. 2015;3(1):1984. Published 2015 Apr 13. doi:10.4081/hpr.2015.1984

Thank You!

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References

https://www.appliedradiology.org/courses/2851%2FPDF%2FMedical_Errors_AR060815.pdf

http://www.avalonmedicaleducators.com/mederrors.html

https://www.astro.org/Patient-Care-and-Research/Patient-Safety/Safety-is-no-Accident

https://psnet.ahrq.gov/primers/primer/5/Culture-of-Safety

https://www.getskore.com/aircraft-turnaround-process/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4768542/

https://qualitysafety.bmj.com/content/26/6/466

https://www.ncbi.nlm.nih.gov/pubmed/16177014

https://www.rsna.org/news/2019/June/Expanding-Peer-Learning

https://www.rsna.org/news/2019/February/Just-Culture-Background

https://www.aviationsystemsdivision.arc.nasa.gov/publications/2016/AIAA-2016-3909.pdf

https://www.tennessean.com/story/news/health/2019/02/04/vanderbilt-nurse-reckless-homicide-charge-vecuronium-versed-drug-error/2772648002/

https://www.astro.org/ASTRO/media/ASTRO/Patient%20Care%20and%20Research/PDFs/ROILS-Q1_2017_Report.pdf