EMR-related Errors as Found in RO-ILS

SHERI WEINTRAUB MS DABR
SOUTHCOAST HEALTH CANCER CENTERS
FAIRHAVEN, MA

Incident Learning and the EMR

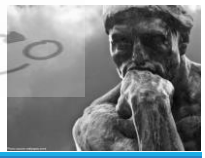
- Error patterns related to today's electronic medical record
- Potential improvements for use of the EMR
- Safety practices to drive error reduction

Assessment of incidents in Radiation Oncology

Historic
- Linear thinking
- Cause and effect

Assessment of incidents in Radiation Oncology

- Need for improved **logic**
- Recognition of **complexity**
- Initial conditions greatly impact a web of potential outcomes
  - No "chain of events"
  - No "cause and effect"
- Consideration of human factors engineering



Human Factors Engineering

Consideration of human behavior, abilities, and limitations in systems and workflows

- Physical (visibility, department layout, lifting beyond capacity)
- Cognitive (distractions, lack of supporting information)
- Organizational (staffing, unclear standards)

Chan, Alvita J. "The use of human factors methods to identify and mitigate safety issues in radiation therapy". *Radiotherapy and Oncology*. 97 (2010): 596-600.

Patterns in the RO-ILS Database

Over 1000 EMR-related errors reviewed between 2014 and 2017

Approximately 3X as many EMR-related events as TPS-related events

Noteworthy findings within the human factors space
- Cognitive
- Organizational

RO•ILS RADIATION ONCOLOGY INCIDENT LEARNING SYSTEM
Sponsored by ASTRO and AAPM

Information lacking due to lack of prominence in the EMR

As a lung SBRT patient is driving in for his treatment…

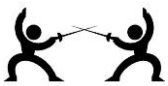
A sidebar conversation between a dosimetrist and physician reveals a **prior history of SBRT** that was not accounted for in the patient's treatment planning.

How did this happen?

Error pathway

- Prior treatment records were obtained and uploaded
- The records were on the bottom of a long list of documents
- The physician forgot to check off the "prior RT" box on his planning note
- The dosimetrist and physicist do not routinely read MD consult notes

The case of dueling EMRs



Consider this private conversation…

A patient with a vaginal cylinder is struggling with severe discomfort during a brachytherapy simulation. She calls the therapist over.

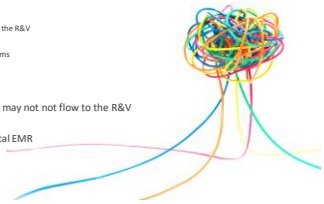
The patient discretely asks the therapist if by chance a latex condom was used with the cylinder and the therapist responds affirmatively.

The patient lets the therapist know that she is the 5th person she has informed about her SEVERE LATEX ALLERGY

How did this happen?

Error pathway

- This patient's department utilizes 2 EMRs
  - Some information may flow from the hospital system to the R&V
  - Some information may not
  - Some staff members may be routine users of both systems
  - Some staff members may not be
- Allergy information is in the hospital EMR but may not not flow to the R&V
- Therapists may not typically look in the hospital EMR



Key Takeaway regarding lack of prominence in the EMR

Important information must become **apparent** during typical workflows

The above must consider utilization of multiple EMRs

Radiation Therapists work in TEAMS for a reason… but roles can be fluid and confusing

It's the first day of this breast patient's new electron field

Therapist 1 reviews the patient's treatment calendar and sees that treatment that day should utilize a new electron block

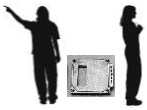
Therapist 2 looked on the day's schedule and saw no indication of the change

Therapist 2 set up the room, the patient, and positioned the wrong block

Therapist 1 sat at the console assuming block 2 was in place.

She treated the patient with the wrong block

How did this happen?



Error pathway

Therapists 1 and 2 have very different workflows that do not intersect prior to treatment

There were multiple credible places to look up what was intended for the day and they did not agree

Key takeaway regarding therapy team communication

If the same information can be found in multiple places, a cross reference within the database should exist

Communication between therapy team members is essential

Workflows with separate functions should intersect prior to treatment

When planning information is communicated outside the EMR: Playing the game of telephone

Sticky note, stickier situation…

A doctor told Physicist 1 what he wanted for his patient's treatment and Physicist 1 wrote it down on his yellow sticky pad

Physicist 1 got diverted to a down machine and handed the sticky note off to Physicist 2

Physicist 2 planned the treatment

When Physicist 2 went to transfer the plan to his EMR he noticed that Doctor was not the attending of record.

After digging, he learned that the name on the sticky note had been written down incorrectly

The patient who needed the plan wound up with a delayed start date

Key Takeaway regarding communications outside of the EMR

1) The game of telephone is serious when played with Rx's

2) Texting can make #1 even worse

3) Passing sticky notes doesn't help

4) Rx changes make things more fragile than usual

Potential Improvements for EMR Use

Improving prominence of key information

The graphical user interface on an EMR can be optimized (or potentially improved) to make the most important information more noticeable

- Prior radiation therapy records
- Pacemaker/ICD information
- Allergy information
- Contact information sensitivities
- Other

Reducing Dual-EMR confusion

Standard hospital or organization-wide EMRs are becoming more prominent

Keep an eye out for optimized/standard communication workflows

Providers are somewhat distanced from the R&V and physics/therapy are somewhat distanced from the hospital EMR

Working in isolation from the system EMR can be dangerous and habit forming. Embrace a culture of change

Keeping everyone on the "same page"

Workflow standards and crosschecks should be systematically implemented

- Alerts, second eye, and/or repeat imaging on shifts over a certain amount
- Therapists OUTSIDE the room and INSIDE the room can use the EMR to make sure that they're on the same page

Beware of information existing in multiple places. Example: treatment calendar and patient schedule

Making Standardized Communication Easier

Why do we still communicate through sticky notes, texts, and verbally?

Because it's easier!

Take advantage of convenience-based tools to better align the communication need to ease of use

- Remember that a big component of "easy" is "familiar" so don't avoid change

Implementing Effective Mitigation Strategies in the Clinic

Improving your system with Human Factors Enginering (HFE)

Goal – to achieve better outcomes for patients, employees, and organizations by improving systems and processes

- Analyze where you are
- Design a better system
- Implement the improved system
- Evaluate the new reality and tweak as needed

Xie, Anping and Carayon, Pascale. "A systematic review of human factors and ergonomics (HFE)-based healthcare system redesign for quality of care and patient safety". Ergonomics. 58 suppl 1 (2015): 33–45.

Analyze where you are

Take time to understand how poor outcomes translate to process deficiencies

- Take a broad look at the process
- Identify weak links
- Be realistic about confines of the system but be open to change
- Learn! From colleagues, publications, and even other industries
- Become sensitized to complexity and different opinions – even bad news

Design and implement a better system

Separate the "academic" from the practical by keeping human factors in mind

- Involve others – encourage broad participation and communication
- Make sure learning and feedback are multi-directional
- Consider barriers, test, and don't be afraid to change direction
- Culture is very important – consider engagement and commitment to continuous improvement

Evaluate how things are going

Safety, quality, and outcomes
- Compliance with best practice standards
- Workflow efficiency
- Safety awareness
- Clinical outcomes

Staff well-being, job satisfaction, and motivation
- Culture
- Mental workloads
- Physical and temporal job requirements
- Support and recognition

What do HFE-based mitigation strategies do?

Reduce harm 

Save money 

Allow for easy implementation 

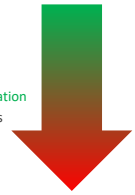
Characteristics of HFE-based mitigation strategies look like?

1. Simplify processes (fewer clicks)
2. Use forcing functions (ex: checklists)
3. Improve clarity in displays of important information
4. Reduce distractions
5. Reinforce required checks

Effectiveness of Error Prevention Strategies

Most to least effective:

Forcing functions (barriers)
Automation
Simplification and standardization
Reminders and double checks
Rules and policies
Education and training



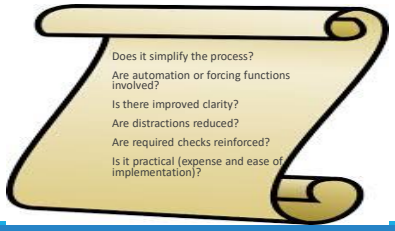
Greenall, Julie and Senders, John W. "Medication safety alerts". *CJHP*. 59 suppl 1 (2006): 34-36

Assessment of Proposed Mitigation Strategies with HFE consideration

1. Consider making a design change you can take a picture of
2. Strategies that start with "make sure that" are weak
3. Strategies designed to be "mistake proof" should include:
   - Mistake prevention
   - Mistake detection
   - Allowances to fail safely
   - Work environments that prevent errors

Grout, John R. "Mistake proofing: changing designs to reduce error." *BMJ Quality & Safety* 15.suppl 1 (2006): i44-i49.

Scrutinize proposed mitigation strategies



Mistake Prevention and Detection

Recall our breast patient with a new electron field

- Two therapists had looked at different places in the EMR to determine what was to be treated
- Communication was poor and the patient was treated with the wrong electron block

Test this mitigation strategy:

A barcoding procedure is implemented whereby:

1) A barcode sticker is applied to all electron blocks
2) The EMR is configured to require scanning and confirming the correct field-specific barcode prior to treatment

- Does it simplify the process? yes
- Are automation or forcing functions involved? yes
- Is there improved clarity? yes
- Are distractions reduced? no
- Are required checks reinforced? yes
- Is it practical (expense and ease of implementation)? yes (in most R&V systems)

Recall our sticky note, stickier situation…

- Communication about a patient was plan was done verbally and then via sticky note
- The plan was ultimately designed for the wrong patient which resulted in a start delay

Test this mitigation strategy

1. The planning workflow is restructured so that prescriptions must exist in the R&V system before treatment plans can be initiated. Physicists and dosimetrists are instructed not to run treatment plans without this documentation in place.
2. A report is run and communicated monthly showing compliance with the timeliness of Rx approvals

- Does it simplify the process? yes
- Are automation or forcing functions involved? no
- Is there improved clarity? yes
- Are distractions reduced? yes
- Are required checks reinforced? yes
- Is it practical (expense and ease of implementation)? yes

Remember that good mitigation strategies allow for "safe failure"

Catching a treatment planning event before it reaches the patient is a "safe failure"

- We do want to improve safety to prevent errors
  but
- Reported errors that do not reach the patient are indicative of healthy mitigation systems

Remember to consider the work environment

The work environment plays a big role in safety

- Culture
- Efficiency
- Distractions
- Tool and task alignment
  - Physical human resources
  - Software
  - Hardware/equipment
- Leadership
- Clarity

Thank you