

## Basics of Risk Management

### *Learning Objectives-*

- ✓ Define: error, active error, and latent error.
  - ✓ Discuss the origins of error in human and system perspectives.
  - ✓ Describe and apply the different models of failure.
  - ✓ Describe the tools used by risk management to prevent future errors
  - ✓ Identify and initiate steps to resolve potential “error traps” in the work environment.
- 

### *Background-*

- The publication “To Err Is Human” by Donald A. Norman in 1988 is one of the most influential works inciting the development of risk management in hospitals.
- In his book chapter from “The Design of Everyday Things”, Norman defines types of error and ways to detect and correct them.<sup>1</sup>
- Different industries including the health care field have incorporated these concepts to develop risk management strategies.

### *Overview-*

- Active vs. Latent error
  - Active errors are made by the frontline person e.g. physician, nurse, etc.
  - Latent errors are due to systems problems that affect frontline persons e.g. staffing shortage because of budget cuts
- There are two fundamental categories of active error:

1. Slips: discrepancy between goal and result due to subconscious and automatic behavior that is not executed as intended

- Most everyday errors are slips; these show up in skilled, routine, and lower level behaviors
- Result from lack of attention; we don’t make many slips in things we are still learning
- Six types of slips: capture, description, data-driven, associative activation, loss-of-activation, and mode errors
- Slips are easily detected only if there is feedback on results of the action: Incidence Reports, Peer Review, M&M, etc.
- Error detection/correction usually starts at the low level specifications and works its way higher to the most global description.

<u>Types of Slips</u>	<u>Definition</u>	<u>Example</u>
<b>Capture Error</b>	Frequently done activity (familiar) takes charge instead of the intended activity (unfamiliar): both have common initial stage/sequence	You intend to call your friend but dial your home phone number instead.
<b>Description Error</b>	The intended action has much in common with other possible actions. Occurs when you perform the correct action on the wrong object usually when they are in physical proximity.	A nurse grabs KCl instead of NaCl for flushing the line. Both bottles look the same and are stored next to each other.
<b>Data-driven Error</b>	Automatic actions driven by new incoming data that interrupt ongoing action sequence and cause an unintended behavior.	You are writing a prescription and ask for the patient's weight which you insert as the dosage.
<b>Associative activation Error</b>	Internal thoughts and ideas trigger actions in error if the association is wrong.	Phone rings and you pick up the receiver and say: "come in".
<b>Loss-of-activation Error</b>	Forgetting to do something or parts of an action. The "activation" is lost.	You open the fridge and can't remember what you wanted.
<b>Mode Error</b>	Same action has different meanings in different modes. Especially likely when the modes are not visible.	Dopamine drip rate is set for the Vancomycin line on the same infusion pump.

Table 1: Definition and examples of slips as errors.

**2. Mistakes:** result from conscious deliberations based on partial or faulty evidence which correctly achieve an inappropriate goal and therefore lead to error

- Result from wanderings of human thought and choice of inappropriate goals
- Decisions are based on prior experiences and our memory of the events.
- Memories are biased toward overgeneralization of the commonplace and overemphasis on the discrepant
- Model of human thought - **Schema Theory**:
  - There is logic and structure to the individual structures
  - Memory is **associative**, each schema points/refers to multiple other related schemata to define the component
  - Humans use information from one schema to **deduce** the properties of another
- Explaining away errors and impact of social pressure on mistakes needs to be considered and can make detecting mistakes hard
- Need for built-in functions such as **forcing functions** (actions are constrained so that failure at one stage prevents the next step from happening) to prevent errors: e.g. cannot remove key from ignition before turning off headlights.

*Prerequisites for Effective Risk Management: Understanding Failure*

- **“Vulnerable System Syndrome”** (VSS) is a cluster of organizational “pathologies” that lead to adverse events.<sup>2</sup>
- The three self-perpetuating core elements of the VSS are:
  - **Blaming** the front line individuals: based on perceptions of human free will and hind-sight bias
  - **Denying** the existence of systemic errors: pathological and bureaucratic organizations usually discourage change and tend to feed into this problem. Generative organizations encourage reporting and improvement.

- Pursuing productive and financial incentives/restraints: focused mainly on numbers, thinking in linear rather than network sequences; ripple effects of changes are not taken into account.
- Double loop learning rather than single loop learning is required for breaking the cycle of VSS when an error is detected.
  - Single loop learning looks at immediately preceding actions for explanation and lessons learned: feeds into blaming, shaming, denying.
  - Double loop learning looks beyond the immediate actions to the underlying assumptions and conditions that lead to these actions: this learning recognizes that errors are almost always systemic consequences rather than isolated causes.

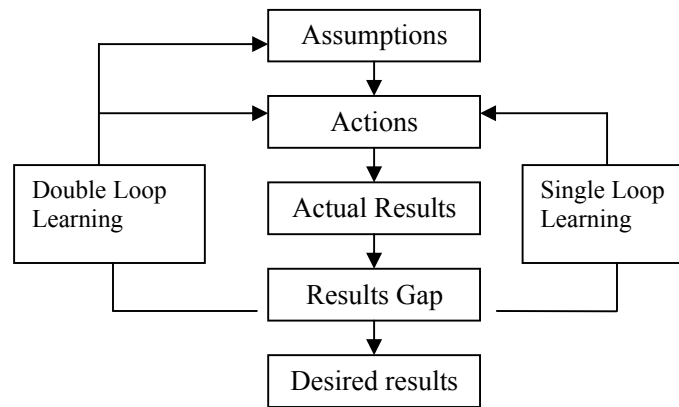
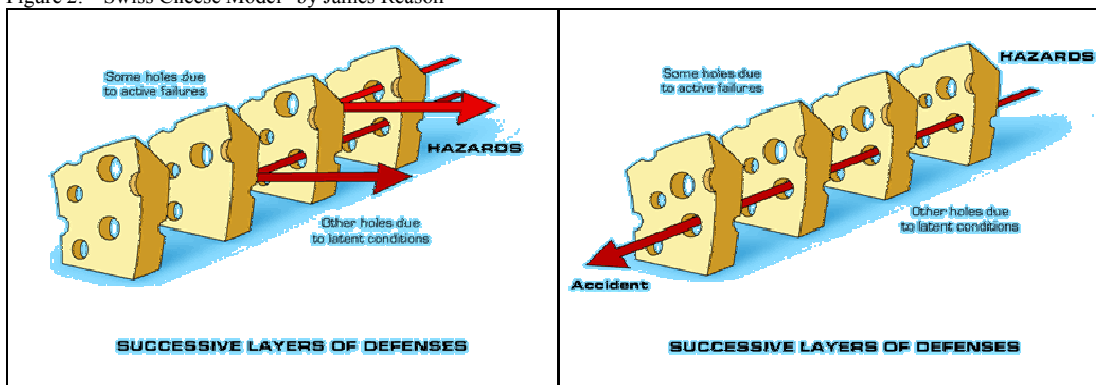


Figure 1: Single loop versus double loop learning diagram

- **“Swiss Cheese Model”** of system failure: assumes that a combination of root causes as well as chance work together to lead to an adverse event
  - The ideal system has layers of defense against failure (layers of cheese)
  - There is opportunity for failure in every step of a process (holes in Swiss cheese)
  - The holes can line up either by chance or by a flaw in the system to allow error to proceed through the layers to lead to an undesired outcome.

Figure 2: “Swiss Cheese Model” by James Reason



### Tools of Risk Management-

- Root Cause Analysis (RCA) which is a **reactive process** to determine causality after an adverse event has taken place.<sup>3,4</sup>
  - Fishbone technique, Onion model, “5 why” model are all RCA methods: may simplify the problem by trying to identify only one root cause
  - Purpose of RCA is to eliminate the risk of recurrence of an adverse event by finding the “root cause(s)” and making systemic changes to correct these

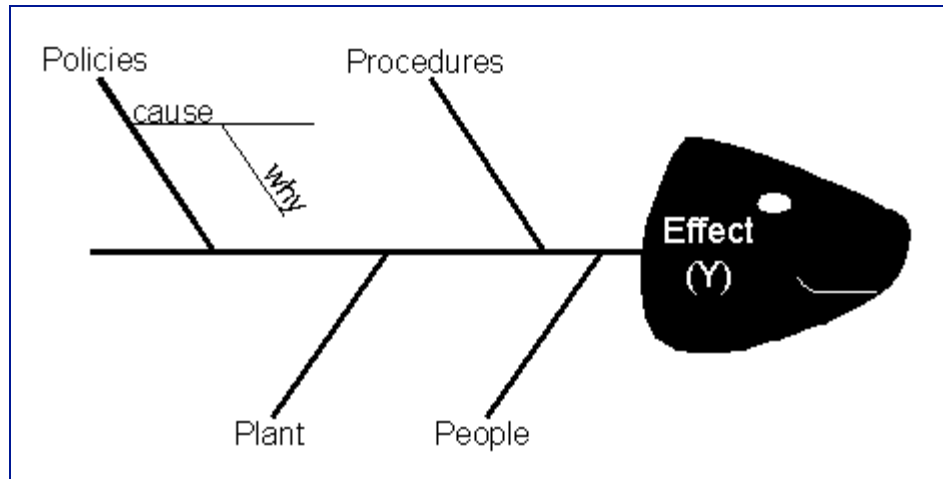


Figure 3: Ishikawa (Fishbone) diagram used for cause-effect analysis<sup>5</sup>

- Failure Mode and Effects Analysis (FMEA): **proactive process** aimed at predicting the adverse outcomes of various errors (temporal mirror of RCA – takes place in the present).<sup>3,4</sup>
  - Well known concept in the industry but introduced to health care only in 2002 by JCAHO in its “Leadership Standards and elements of Performance Guidelines”
    - Requirement for the use of FMEA to reduce risk, improve patient safety, and enhance patient satisfaction in high-risk processes
    - JCAHO requires facilities to select at least one high risk process for proactive risk assessment each year
  - FMEA project methodology<sup>6</sup>
    - Step 1: Define the FMEA topic
    - Step 2: Assemble the team
    - Step 3: Review the process/ create a process flowchart
    - Step 4: Brainstorm possible failure modes, causes, and effects
    - Step 5: Evaluate risk of failure or hazard score
    - Step 6: Calculate total risk priority number score (RPN score)
      - Composed of severity, probability of occurrence, and detection capability (score based on 1-10 scale)
      - RPN score = severity x occurrence x detectability
      - RPN score > 100 is significant and warrants intervention
      - Total RPN score is addition of the component RPN scores
    - Step 7: Create an action plan
    - Step 8: Determine FMEA project success (recalculate total RPN score)

*Designing an Effective Risk Management Program-*

- Designing for Error: Need to change thinking about errors. Errors are not something done by unskilled or unmotivated people, everyone makes errors. The challenge is to prevent errors from happening and when they do happen, be able to detect them more readily and correct them.<sup>7</sup>
  - Need to:
    - Understand the causes of error and design to minimize them
    - Make it possible to reverse actions or make it hard to do actions that are not reversible
    - Make it easier to discover errors and make them easier to correct
    - Change thinking about errors: actions are approximations of what is desired
  
- Learning from other “high risk” industries: by respecting human limits and designing jobs for safety you can anticipate the unplanned, plan for failure, and design for recovery. **High-reliability organizations** incorporate the following into their design:
  - **Automate** when appropriate – include use of forcing functions
  - **Standardize** – reduce reliance on memory
  - Use **checklists**
  - Reduce the number of steps and handoffs
  - Add **redundancy** (double checks) for high risk processes
  - Encourage **reporting** of errors and near-misses, and use them as opportunities to prevent future errors

## References:

1. Norman D. To Err Is Human. In: *The Design of Everyday Things*. New York: Currency-Doubleday; 1988: 105-140.
2. Reason J, deLeval M. Diagnosing “vulnerable system syndrome”: an essential prerequisite to effective risk management. *Qual Health Care* 2001; 10: ii21-25.
3. Senders J. FMEA and RCA: the mantras of modern risk management. *Qual Health Care* 2004; 13: 249-250.
4. Latino R. Optimizing FMEA and RCA efforts in health care. *ASHRM Journal* 2004; 24(3): 21-28.
5. Simon K. The cause and Effect Diagram (a.k.a. Fishbone). Viewed 10 August 2007. <<http://www.isixsigma.com/library/content/t000827.asp>>
6. Reichert T. Applying Failure Modes and Effects Analysis (FMEA) in Healthcare: Preventing Infant Abduction, a case study. 2004 Society for Health Systems Presentation, February 20-21, 2004. Viewed 10 August 2007. <[www.iienet2.org/uploadedFiles/SHS/Resource\\_Library/details/10\\_reichert.pdf](http://www.iienet2.org/uploadedFiles/SHS/Resource_Library/details/10_reichert.pdf)>
7. Gregory B, Kaprielian V. Anatomy of an Error. Department of Community and Family Medicine, Duke University Medical Center 2005. Viewed 3 August 2007. <[http://patientsafetyed.duhs.duke.edu/module\\_e/module\\_overview.html](http://patientsafetyed.duhs.duke.edu/module_e/module_overview.html)>

## Risk Management Problem Set:

*Problem #1:* Categorize the following errors into active vs. latent errors.

Active                      Latent

- |                       |                       |   |
|-----------------------|-----------------------|---|
| <input type="radio"/> | <input type="radio"/> | Taking the turn to go to work on your day off   |
| <input type="radio"/> | <input type="radio"/> | Unclear handwriting on a new patient prescription   |
| <input type="radio"/> | <input type="radio"/> | A hospital keeping sound-alike medications on formulary despite mix-ups   |
| <input type="radio"/> | <input type="radio"/> | A corporation delegating to a temporary agency the responsibility for doing criminal checks on new hires, without verifying that these are being done |
| <input type="radio"/> | <input type="radio"/> | Saying one word when you intended to say another  |
| <input type="radio"/> | <input type="radio"/> | A software bug that turns off your computer in mid-task   |

(1-Active, 2-Active, 3-Latent, 4-Latent, 5-Active, 6-Latent)

*Problem #2:* 60 year-old man s/p L MCA ischemic stroke with profound R hemiparesis, dysarthria and dysphagia had G-tube placement IR for permanent feeding. Two days post procedure, he was found pulseless. Code blue was called but his providers were unable to resuscitate him. Autopsy showed chemical peritonitis with intraperitoneal placement of the G-tube.

Design both a single-loop and a double-loop diagram to analyze this case and suggest ways to avoid recurrence of the same problem.

*Problem #3:* Design an FMEA model to reduce falls in the hospital by 50%.

(<http://www.ihl.org/ihl/workspace/tools/fmea/ViewTool.aspx?ToolId=1248>)