The CSI of a Fall
A Systems Approach to Investigating Causes of Falls

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Objectives

At the end of this presentation you will be able to:

1. Differentiate risk factors from causes of falling
2. Distinguish between person and systems approaches to falls prevention
3. Recognize Systemic Falls Investigative Method (SFIM)
4. Be aware of safety culture and components of positive safety culture in health care
5. Understand how SFIM contributes to improvement of safety culture
6. Correctly answer all quiz questions
Persons vs. System Approach

The purpose of an accident investigation is to learn from failure and advance safety.

Investigate how people’s assessments and actions made sense in the given circumstances.

How did people get caught in an Error Trap?

Human error is a symptom of trouble deeper in the system!

Miyagi (2005)

Decker (2002)
SYSTEMIC FALLS INVESTIGATIVE METHOD (SFIM)

1. F-SHELF data collection tool
2. Sequence of Events
3. GEMS – Generic Error Modeling System
4. Swiss Cheese Model of Accident Causation
5. Identify safety deficiencies
6. Develop safety action

Zecevic et al. (2007), Canadian Journal on Aging
1. F-SHEL data collection tool

\[ F = \text{The Faller} \\
S = \text{Software} \\
H = \text{Hardware} \\
E = \text{Environment} \\
L = \text{Liveware} \]
2. Sequence of Events

- Senior admitted to rehab unit. June 4, 2007
- Friend unloads senior’s walker from the car. 18:27
- Friend places walker in front of the passenger door. 18:28
- Friend assists senior to get out of the car. 18:28
- Senior picks up the walker. 18:29
- Friend parks the car in drop-off zone in front of the hospital. 18:25
- Friend unloads senior’s walker from the car. 18:27
- Friend follows the senior over the grass. 18:30
- Senior walks 9.4 m along concrete sidewalk negotiating around vines. 18:31
- At the end of sidewalk senior steps from 6” curb. 18:32
- Friend stands beside senior. 18:29
- Friend walks behind senior towards hospital’s front door. 18:31
- Friend walks behind senior towards hospital’s front door. 18:31
- At the end of sidewalk senior steps from 6” curb. 18:32
- Friend walks behind senior towards hospital’s front door. 18:31
- Senior loses balance 18:32
- Senior falls. 18:32
- Dim light at dusk.
- Age decline in contrast acuity.
- Unexpected height change of support surface.
- Unmarked step.
- Senior on the ground.
3. **GEMS** Generic Error Modeling System

Rasmussen (1987), Reason (1990)
4. “Swiss Cheese” Model of Accident Causation

Holes present active failures or latent conditions.

They dynamically change in response to local conditions.

Accident occurs when holes line up and allow the arrow to pass through all defense layers.

(Reason, 1990, 1997)
5. Identify safety deficiencies
   • Evaluate level of risk
   • Assign priorities

6. Develop safety action
   • Goal: improve safety
   • Propose safety mechanisms

Implementing changes is not in a domain of the investigator!
SFIM Database

http://empowerhealthresearch.ca
User Name: SFIMguest@empowerhealthresearch.ca
password: SFIMwelcome

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Organizational Factors:

- No individualized assessment of the environment from Physiotherapist and Occupational Therapist for the Fallers right side hemiparesis.
- No policy to assess new environments by an occupational therapist or physiotherapist.
- No policy for formal training for staff members working with new participants at the new residence.
- No procedure to ensure that support strategies are up to date and available in the binder.
- No policy regarding the minimum number of staff required for safety at the new residence.
- September 1st, 2009 the binder system was changed to reduce the number of binder copies travelling to the centre and from the residence.
- No policy to ensure that all staff are trained on the changes in the documentation system.
- No policy on anti-slip floors.

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Supervision:

- Balance test is not completed due to the time constraint in the mornings.
- The staff member providing support to the Faller was not trained on his shower.
- Staff member was unable to find the strategies outlining how to support the Faller.
- Other staff members at the residence reported they were not trained to support the Faller during his shower routine.
- The residence was running short staffed by one staff.

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Preconditions:

- Ataxia due to ABI.
- Faller is more unsteady and off balanced than usual the next morning.
- Faller is fatigued in the morning.
- Faller is agitated.
- No non-slip mat on the bathroom floor.
- The bathroom floor is slippery.
- He feels unsafe as he walks toward the towel rack.
- There is no non-slip mat in the shower.
Case Study 1

On August 27, an 83 year-old hospital resident with cognitive impairment, had an unwitnessed fall around one o’clock in the morning. He woke up with urgent need to empty his bladder. He got up and used his two-wheeled walker to get to the bathroom independently, despite advise to call for supervision when walking.

He fell while returning from the bathroom. He was carrying a full urinal back to his bedside and slipped on urine that had spilled. He could not remember why he decided to use the urinal rather than the toilet or why he did not empty the urinal into the toilet. He fell onto his left side hitting his head on the bedrail and the floor.

Nursing staff heard noise and found the patient on the ground. He received medical attention for a cut, bruise and sprain, but x-rays and a CAT scan ruled out spinal cord or brain trauma.

WHAT DO YOU THINK CAUSED & CONTRIBUTED TO THIS FALL?
Case Study 1 - Conclusions

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SFIM application

2004-05  SFIM development
2005-06  Used to investigate falls in community dwelling seniors
2007    Tested in 3 hospitals and 1 LTC
2008    Piloted in a residential care of individuals with ABI
2009-10 Developed models for capacity building and knowledge translation to allow uptake of SFIM conclusions (5 sites)
2011-13 Investigate falls of stroke survivors
SFIM Findings (2005-2009)
(2 communities, 1 residential care, 3 hospitals, 1 LTC)

Lack of or inadequate policies and mediocre practices, unregulated designs of built environments and assistive devices, limited resources for supervision, budget restrictions, inadequate management of property, poor inspection policies, workload, scheduling, fatigue management, Ministry of Health policies on staffing levels, assessment requirements...

Poor monitoring of patient’s whereabouts, communication problems (staff-patient, staff-staff, management-staff, between institutions), misinformation, scanty training of new and replacement staff, poor education of residents/patients or family...

Incontinence, dementia, confusion, muscle strength, vision, pain fatigue, dizziness, gait problems, medication side-effects, new or unfamiliar environment or activities, unmarked obstacles, poorly designed equipment, darkness, broken footwear, room space restrictions, noise, temporary fixes, ...

Multitasking, hurry, incorrect self-assessment, impulsive decision making, attempts to do things independently, walking on slippery surfaces, voiding, not following instructions, ...

Fall or near fall

We know SFIM works!

Why is it difficult to implement and sustain it?
Development of **knowledge translation** strategies for removal of causes of falls, identified through Systemic Falls Investigative Method (SFIM), in hospitals, LTC and community

Objectives:

- Review literature on Safety Culture in healthcare
- Understand Safety Culture in 5 health care organizations using mixed methods design (survey, interviews and focus groups)
- Implement SFIM
- Understand barriers and facilitators to SFIM implementation (environment, adopters and innovation)
- Test potential of SFIM to influence Safety Culture
- Collect a dataset of 20+ comprehensive falls investigations
SFIM implementation and mentorship

PRE-intervention
Safety Culture
survey, interviews and FG

POST-intervention
SFIM implementation
interviews and FG

SFIM
Training

SFIM implementation and mentorship

21 comprehensive falls investigations

Tools
Survey: Modified Stanford Patient Safety Culture Survey Instrument\(^1\)
FG and I: Patient Safety Culture Maturity Model\(^2\) and Ottawa Model for Research Utilization framework\(^3\)

\(^1\)Ginsburg, et al. (2009); \(^2\)Fleming & Wentzell (2008); \(^3\)Graham & Logan (2000)
Barriers and Facilitators for Safety Improvement
Rehab Hospital

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Facilitators</th>
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<tr>
<td>Heavy workloads</td>
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<td>Lack of staffing</td>
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<td>Nursing Culture</td>
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<td>Increase of patients not ready for rehabilitation</td>
<td>“Really only people can prevent falls. This is all it is. And it does come down to dollars and cents. They physically can’t put that many people here [rehab hospital] anymore. It’s just the way our healthcare has changed. But if you have the people, people don’t fall and we know that.”</td>
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<tr>
<td>Protective answering</td>
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“It's a guilty thing to say, but some of it is nursing culture. Unfortunately when you present something new to a lot of nurses, a lot of them immediately decide I know already, or I learned this in school already, or I've been doing this for 15 years already.”
### Barriers and Facilitators to SFIM implementation

#### Rehab Hospital

<table>
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<tr>
<td>Time consuming</td>
<td>Interest in SFIM’s systems approach</td>
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<td>Lack of awareness of SFIM</td>
<td>Good characteristics of SFIM investigator</td>
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<td>Lack of communication between frontline staff and management</td>
<td>Unit manager was a good champion</td>
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<td>One SFIM investigator unable to participate due to personal reasons</td>
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**Quotes:**

- “I know the manager really thought it [SFIM] was a good idea.”
- “I think it’s [SFIM] a different way of looking at issue [and] problems and solving them from a comprehensive way.”
Common Findings for all 5 Sites

**Facilitators**
- Safety is a priority
- Teamwork / shared workload
- Good communication
- Open door policy
- Management involvement
- Good incident reporting
- Low staff turnover
- Awareness of fall risks
- No blame culture
- Training opportunities
- Enthusiastic staff

**Barriers**
- Time
- Budget and resources
- Workload
- Communication
- Built environments
- Blame culture
- Lack of training
- Complex clients needs
- Underreporting of incidents
- No follow-up/continuity
- Professional silos
What is safety culture?

“...is the product of individual and group values, attitudes, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization’s health and safety programmes. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measure”

Improving safety culture improves patient/resident safety!

Measuring Safety Culture using Survey

Hospital | Patient Safety Culture in Healthcare Organizations Survey Results

Perceived State of Safety
Learning Responses
Learning Culture
Reporting Culture
Threats to Safety
Fear of Repercussions
Supervisory Leadership Support for Safety
Senior Leadership Support for Safety

Strengths and areas for improvement can be readily identified

Safety Culture - Improvements

Assess Safety Culture
- Identify areas for improvement
- Measure with surveys
- Raise staff awareness
- Evaluate interventions
- Track changes

Improve safety culture

Implement Interventions
- Leadership Walkarounds
- Team Training
- Patient Safety Team
- Patient Safety Education
- Safety Audits
- Reporting + Analysis Systems
  - SFIM

- Leadership commitment to safety improvement is essential
- Culture is a context-specific, local phenomenon, best to focus on a single unit
- Culture change takes time, approx. 3-5 years
Safety Culture Maturity Model

Healthcare Organizations

- pathological
- reactive
- calculative

No systems in place to promote a positive safety culture

High Reliability Organizations (aviation, nuclear power, military)

- proactive
- generative

Systems are piecemeal, developed only in response to occurrences and/or regulatory or accreditation requirements

Safety is how we do business around here

Westrum, 2004
Patient Safety Culture Improvement Tool (PSCIT)

- Safety culture development in 5 stages (from poor to good) on 5 dimensions:
  
  - **Safety Leadership**
    - Leader safety training; Leader performance evaluation
  
  - **Resource Management**
    - Training & Teamwork
  
  - **Workload Management**
    - Workload; Fatigue management
  
  - **Sharing & Learning**
    - Organizational learning; Incident reporting; Disclosure
  
  - **Risk Analysis**
    - Safety analysis systems

- Once level diagnosed, actions required to move to the next level are identifiable

Fleming & Wentzell, 2008
### Dimensions

<table>
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<tr>
<th>Sub-Dimensions</th>
<th>Pathological</th>
<th>Reactive</th>
<th>Calculative</th>
<th>Proactive</th>
<th>Generative</th>
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</thead>
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<tr>
<td><strong>Safety Leadership</strong></td>
<td>No resident safety education/training is provided to leaders</td>
<td>General information about their safety included in their performance plan</td>
<td>Leaders are taught interpersonal competencies (through skill-based training) to motivate colleagues and subordinates to improve resident safety.</td>
<td>Leaders receive mandatory individualized resident safety leadership development based on upward appraisal and evaluation. There is a formal ongoing evaluation of leaders' behavioral change</td>
<td>Performance is monitored with leading indicators of resident safety. Ongoing and systematic observations of practice are conducted. The results from performance monitoring are used to develop individual learning plans. Peers routinely monitor each other's performance and provide constructive feedback for improvement.</td>
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<td>Leader PS Training</td>
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<td>Leader PS Performance Eval</td>
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<td><strong>Workload Management</strong></td>
<td>No consideration of the impact of workload on resident safety</td>
<td>Guidelines for the ratio of healthcare workers to residents are used to manage workload levels</td>
<td>The analysis is led by resident safety leaders and promoted by the healthcare team. This approach involved providing additional resources for high-intensity situations.</td>
<td>There is a holistic approach to workload management that considers all demands placed on workers, such as the intensity of the work environment (i.e., tasks to be performed, number of client interactions), client acuity and the skill mix of the healthcare team. This approach involved providing additional resources for high-intensity situations.</td>
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<td><strong>Resource Management</strong></td>
<td>No resource management training (interpersonal skills, communication, team working, personal awareness or decision-making) is provided</td>
<td>Information is provided to workers within a team effort</td>
<td>Resource management training includes practice in a simulated environment and is followed by behavioral observation of performance using validated indicators. Feedback is provided to all individuals after training, and a formal evaluation of the training's effectiveness is conducted.</td>
<td>A comprehensive organizational learning system is in place that includes incident reporting, retrospective chart review and audits. The organization learns from both negative and positive experiences that protect residents and reduce reoccurrence.</td>
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<td><strong>Sharing &amp; Learning</strong></td>
<td>There are no systems in place to support organizational learning</td>
<td>Events that result in significant harm (e.g., wrong-site surgery) are investigated, and actions are specified to prevent the reoccurrence of this event</td>
<td>Event reports are investigated and remediation is implemented (e.g., changes in process, policies and procedures). Detailed results of investigations for each event are discussed in monthly meetings.</td>
<td>Safety analysis systems are integrated into the routine activities of healthcare workers; the effectiveness of the system is monitored. E.g., actions identified during a prospective analysis are tracked to ensure they were implemented and worked as intended.</td>
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<td><strong>Risk Analysis</strong></td>
<td>No systematic use of safety analysis systems to promote resident safety</td>
<td>Safety analysis tools are used frequently in using safety analysis tools. Healthcare workers regularly use these tools to learn from incidents and identify ways of improving resident care</td>
<td>A wide range of healthcare workers are competent in using safety analysis tools. Healthcare workers regularly use these tools to learn from incidents and identify ways of improving resident care</td>
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**Guidelines for the ratio of healthcare workers to residents are used to manage workload levels**

There is a holistic approach to workload management that considers all demands placed on workers, such as the intensity of the work environment (i.e., tasks to be performed, number of client interactions), client acuity and the skill mix of the healthcare team. This approach involved providing additional resources for high-intensity situations.

**No systematic use of safety analysis systems to promote resident safety**

Safety analysis systems are integrated into the routine activities of healthcare workers; the effectiveness of the system is monitored. E.g., actions identified during a prospective analysis are tracked to ensure they were implemented and worked as intended.
Elements of Safety Culture & SFIM

1) Patient Safety Leadership
2) Resource Management
3) Workload Management
4) Sharing & Learning
5) Risk Analysis

Reason (1998); Sorra & Nieva (2004); Kirk et al. (2007); Fleming, & Wentzell (2008); Ginsburg et al. (2009)
Conclusions

1. There are **two approaches to falls prevention** - *person* and *systems* approach

2. Risk factors are different from causes of falling. Both need to be addressed

3. Systemic Falls Investigative Method (SFIM) is a comprehensive way to identify unsafe acts and latent unsafe conditions that can guide **targeted** falls prevention

4. Falls occur in a large context of **safety culture** of a health care organization that must be assessed

5. SFIM can contribute to improvement of **safety culture**
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L'Association des infirmières et infirmiers autorisés de l'Ontario

Registered Nurses Association of Ontario
L'Association des infirmières et infirmiers autorisés de l'Ontario
Thank you

Questions?

SFIM Database – Public Access: [http://empowerhealthresearch.ca](http://empowerhealthresearch.ca)
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Case Study 2

A faller was 77 year-old male, admitted to the LTC home. The fall occurred on September 22, 2007 at about 6:30 pm, as the senior was returning to the home from an outing with a friend. He fell outside the hospital front door.

A friend (also an elderly men), parked his vehicle in a designated drop off zone. The friend unloaded the senior’s walker and stood by to offer assistance. The senior walked around the front of the car across a small grassy slope and onto a sidewalk that runs along the front of the parking area toward the front doors.

The sidewalk was bordered by a large planter box. Vines growing from the box covered part of the narrow sidewalk. The senior was careful not to step on the plants and did not notice that the sidewalk ended in a 20cm curb. He stepped off the edge and fell over his walker to the ground.

His friend, who was following closely behind, tripped over and landed on top of the senior. The friend was uninjured and quickly stood up. The senior was also uninjured, but required the assistance of two bystanders to regain standing. The senior’s hearing aid fell from his ear and was recovered the next day.

WHAT DO YOU THINK CAUSED AND WHAT CONTRIBUTED TO THIS FALL?
Case Study 2 - Conclusions

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Falls can Help Improve Healthcare Safety: Potential of Systemic Falls Investigative Method (SFIM)

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Top ten reasons why you should implement Systemic Falls Investigative Method (SFIM) in your healthcare organization

1. Systemic Falls Investigative Method (SFIM) identifies why actions of people make sense to them at the time of the incident, and how their actions evolved in presence of latent safety deficiencies present in the system. This systems approach is comprehensive and superior to persons approach where blame and shame are inherently present.

2. Falls are frequent and account for 40% of in-hospital accidents. Hospital fall rates vary from 2.9 to 13 falls per 1000 patients >60 years of age.

3. Falls are expensive and congest hospital beds. Patients who were seriously injured after a fall during an in-hospital stay cost on average $30,000 more, and stay in hospital on average 34 days longer, than patients that did not fall while in hospital.

4. There are too many risk factors for falling to address them all. Learning from adverse events and past accidents worked well in the aviation industry. An adapted version of the technique used to discover causes of airplane crashes is now available for healthcare. It is called Systemic Falls Investigative Method (SFIM).

5. SFIM moves the investigative process beyond immediate causes of an incident and reveals how unsafe acts and decisions made by people are combined with deeply embedded latent unsafe conditions. If not removed, these latent unsafe conditions, or “error traps” will cause other people to commit the same errors in different circumstances.

6. SFIM allows the organization to learn from near-misses and create evidence based targeted interventions.

7. Training staff and middle management in how to use SFIM builds capacity for improvement of safety culture across your organization. The safest organizations are those where safety is everybody’s business.

8. To create a standardized adverse event reporting system, the SFIM utilizes a web-based SFIM Database which healthcare organization can continuously use for analysis of patterns and trends.

9. Although currently used to investigate falls, SFIM is an in-depth, comprehensive investigative method that can be used for identification of system-wide adverse events such as medication errors, surgical errors or staff injuries.

10. SFIM was already implemented in four hospitals, one long-term care home, a residential setting for individuals with acquired brain injury and in two communities. It consistently demonstrated the ability to identify safety deficiencies that lead to adverse events.

Our aim is to improve healthcare safety one fall at a time.

For more information please contact:
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To access the SFIM Database:
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