Understanding Systems and Effect of Complexity of Patient Care

Patient Safety
Lecture no. 3

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Objectives:

- Explain the terms system and complex system as they relate to health care.
- Explain why a system approach to patient safety is superior to the traditional approach.
- Apply reason's "Swiss cheese" model & defenses to identify possible causes of error in a clinical scenario.
- Identify the principles of HROs which can be applied in health systems.

- This lecture was presented by Dr. Jwaher Almulhem
- For the required reading **from Blackboard** click here
- For the Video **from Blackboard** click here

What is a System

System

- Any collection of **two or more interacting parts.**
  "an interdependent group of items forming a unified whole".
  When we think of the word system the first thing that comes to mind is the "Human body"

Complex System

- Involves **many interacting parts** that it is difficult, if not Impossible, to predict the behaviour of the system based on knowledge of its component parts.

- The delivery of health care fits this definition of a complex system.

Health Services

1 **Health services** present as a system—buildings, people, processes, desks, equipment,[1]

2 Unless the people involved understand the common purpose and aim, the system will not operate in a unified fashion.

3 People are the glue that binds and maintains the system.

Problem: emergency department was not able to see patients quickly[2]

Why Healthcare is Complex?

1- Diversity of patients, clinicians and other staff
2- Dependency of Health-care providers on one another
3- Diversity of tasks
4- Huge number of relationships because of the diversity in patients, clinicians and other staff.
5- Vulnerability of patients
6- Variations in the physical layout [3]
7- Variability or lack of regulations [4]
8- Implementation of new technology in healthcare it's considered one of the hardest projects due to sensitivity of information
9- Diversity of care pathways
10- Increased specialization of Health-care professionals Some studies suggest that the physician formulate their diagnosis of the patient based on their speciality while the diagnosis might not be within their speciality. For example: The psychiatrist might diagnose the patient with depression directly without considering an endocrinological diagnosis.

A Systems Approach

A systems approach requires us to look at health care as a whole system, with all its complexity and interdependence, shifting the focus from the individual to the organization.

It forces us to move away from **a blame culture** towards a **systems approach.**

A systems approach examines the organizational factors that lead to dysfunctional health care and accidents/errors **(poor processes, poor designs, poor teamwork, financial constraints and institutional factors);**

Rather than focus on the people who are blamed for an error. This type of approach helps to **move away from blaming**, towards understanding and improving the transparency of the processes of care.

The Traditional Approach
When Things go Wrong

This approach is to **blame** and **shame the health-care professionals** most directly involved in caring for the patient at the time of an adverse event or error.

Why the Traditional Approach is not accepted?

A. Health-care professionals **do not** deliberately (Intentionally) **harm a patient** (**deliberate action is called a violation**).

B. A health-care professional involved in an adverse event /error can accidentally **be destroyed** and become the **"second victim".** The first victimis the patient.

C. Health-care professionals are hesitant to **report incidents/errors** if they will be blamed and become the second victim.

D. Operating in a culture of blame, a health-care organization will have **great difficulty in learning from errors** and thus decreasing the chance of future adverse incidents.

E. A systems approach emphasises the importance of **understanding the underlying factors that caused an adverse event** without diminishing the responsibilities or accountability of health professionals.

Accountability

In all cultures, individual health professionals are required to be accountable for their actions and to **maintain competence** and **practise ethically.**

Accountability is a **professional obligation** and no one believes that health-care providers should not be held accountable.

Yes we don't blame individuals in systems approach but yet individuals need to be accountable

They aim to give **confidence to the community** that the health professionals can be trusted to have the **knowledge**, **skills** and **behaviours** set by the relevant professional body.

There is **system accountability**, which includes mechanisms that are fair, transparent and predictable in a way that health-care providers are aware and know it will be supported to deliver safer health-care services.

Why Accountability is important for Health Professionals

To demonstrate professional behaviour to the public and colleagues	To ensure they are working in their scope to practice	To liable what action they are taken to provide care to the public	To follow the organizational policy

The New Approach "a systems approach" when Things go Wrong

Experts say that although it is hard to change aspects of complex systems, it is even **harder to change the behaviour of human beings**, in terms of errors.

Therefore, the foremost response to health-care errors should be making changes to the system **using a systems approach.**

A systems approach requires an **understanding and action on the multiple factors** involved in each of the areas that make up the health-care system.

The intention of a systems approach is to **improve the design of the system** so that errors are prevented from occurring and/or their consequences minimized.

The elements of the system that should be considered as part of a "systems-thinking" approach

Remember the problem in ER in slide (1)? This is how problems in healthcare should be approached

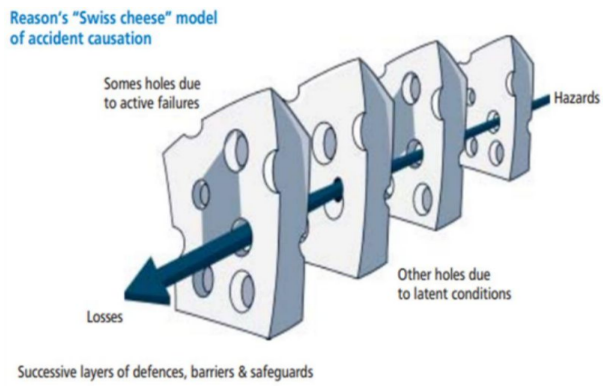
- Patient factors
- Provider factors
- Task factors
- Environmental factors
- **"System Thinking"**
- Technology and Tool factors
- Organizational factors
- Team factors

Swiss Cheese Model

J. Reason created this model to explain how faults in different layers of a system lead to adverse events and medical errors.

This model shows how a fault in **one layer of a system of care is usually not enough** to cause an accident.

Adverse events usually occur when a number of faults occur in a number of layers (e.g. **fatigued workers + inadequate procedures + faulty equipment**).

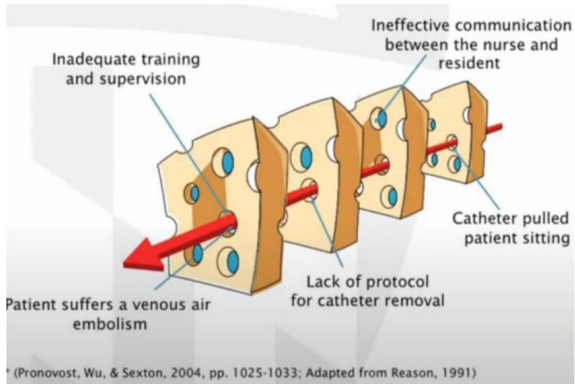


Explanation Video from Doctor's slides

Swiss Cheese Model Example

Example: a patient who requires discontinuation of central line .

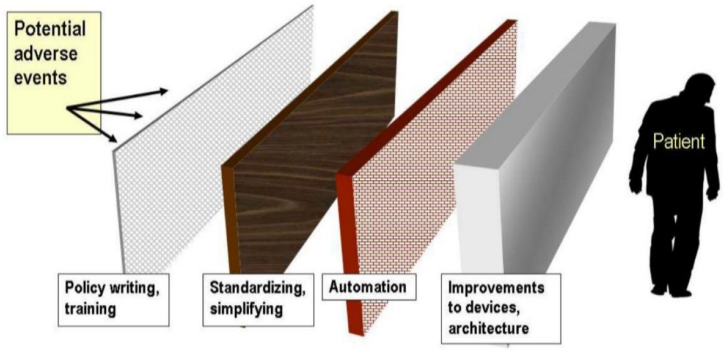
The resident proceeds to pull the central line while the patient is sitting up in the chair, as he has seen it done before. The nurse in the room observes but does not speak up. The patient suffers a venous air embolism.



Reason's Defenses

Reason's Defenses

Successive layers of protection that are designed to guard against the failure.



Understanding the term High Reliability Organization (HRO)

HRO

Refers to organizations that operate under hazardous conditions, but manage to function in a way that is almost completely "**failure-free**".

- They have **very few adverse events**.
- It is possible to achieve consistently safe and effective performance despite high levels of complexity and unpredictability in the work environment.

Some examples of HROs include:

- **Air traffic control systems.**
- **Nuclear power plants.**
- **Naval aircraft carriers.**

Characteristics of HROs

Preoccupation with failure

- Acknowledge and plan for the possibility of failure due to the high-risk, error- prone nature of their activities.

Commitment to resilience

- Proactively seek out unexpected threats and contain them before they cause harm.

Sensitivity to operations

- Pay close attention to the issues facing workers at the frontline.

Establishing and maintaining a culture of safety

- Individuals feel comfortable drawing attention to potential hazards or actual failures without fear of criticism.

Key Principles from HRO theory

- Maintain a powerful and uniform culture of safety
- Use optimal structures and procedures
- Provide intensive and continuing training of individuals and teams
- Conduct thorough organizational learning and safety management.

Conclusion

- A systems approach helps us to understand and analyze the multiple factors underpinning adverse events.
- Therefore, using a systems approach to evaluate the situation—as distinct from a person approach—will have a greater chance of resulting in the establishment of strategies to decrease the likelihood of recurrence of an error and the promotion of a culture of safety in health care.

Dr's notes

(1) When mentioning people The first component is the " Patient", family or care provider to patient are counted in the component, the staff at the registration desk, the nurse assessing the patient, the physician, any other health staff or physicians the doctor might refer the patient to. The processing are, The registration, the assessment by the nurse, the assessment by the doctor.

(2) In every problem we should view it systematically
from different aspects in health services "Buildings, people, processes, etc..". For example in this problem: Maybe the issue is in processes (No urgent reaction to patients) or The wards in the hospital cannot accept patients coming from ER due to high number of patients occupying the beds.

(3) The physical layout from one hospital to another is not the same, for example the location of ER in each hospital is different.

(4) As in example, During the Covid-19 pandemic we didn't have any regulations at first "lack of regulations" but we developed them over time, and we've also changed them and improved them over time as well "Variability in regulations".

Case studies

Case 1

An underweight, young, non-English-speaking refugee who also had a low haemoglobin count was booked for midwifery-led care. Her husband, who had very poor English himself, acted as interpreter. She was admitted to the hospital late in pregnancy with bleeding and abdominal pain. Constipation was diagnosed, despite abnormal liver function tests, and she was sent home under midwifery-led care. She was readmitted some weeks later, late in pregnancy with abdominal pain and, despite a further abnormal blood assay, no senior medical opinion was sought and she was again discharged. Some days later, she was admitted in extremis, with liver and multi-organ failure, her unborn baby having died in the meantime. Despite the severity of her condition, her care was still uncoordinated and, although she was visited by a critical care senior house officer, she remained in the delivery suite. The woman died two days later of disseminated intravascular coagulation related to fatty liver of pregnancy.

- Identify the incident/adverse event?
- Using Swiss cheese model, describe the factors that may be associated with this outcome?

Case 2

The anaesthetist and the surgeon discussed the preoperative antibiotics required for the patient who was about to have a laparoscopic cholecystectomy. The anaesthetist informed the surgeon of the patient's allergy to penicillin and the surgeon suggested clindamycin as an alternative preoperative antibiotic. The anaesthetist went into the sterile corridor to retrieve the antibiotic, but returned and explained to the circulating nurse that he could not find any suitable antibiotic in the sterile corridor. The circulating nurse got on the phone to request the preoperative antibiotics. The anaesthetist explained that he could not order them because there were no order forms (he looked through a folder of forms). The circulating nurse confirmed that the requested antibiotics "are coming". The surgical incision was performed. Six minutes later, the antibiotics were delivered to the OR and immediately injected into the patient. This injection happened after the time of incision, which was counter to the protocol requiring that antibiotics be administered prior to the surgical incision, in order to avoid surgical site infections.

- Identify the incident/adverse event?
- Using Swiss cheese model, describe the factors that may be associated with this outcome?

Case studies

Case 3

Mrs Brown was a 50-year-old administrative assistant working in the supply department of a hospital. She was overweight. She slipped in her garden while getting the newspaper and struck her leg on a garden tap. She suffered a fracture of her fibula and was admitted to hospital because it was swollen and painful and required reduction. The procedure was delayed because the operating theatre was busy and her injury was a relatively minor one. The orthopaedic ward was full and so she was placed in a medical ward. Two days later, the fracture was reduced and her leg was put in plaster. When she got up to go home she collapsed and died. At autopsy it was found that she had suffered a massive pulmonary embolus. At no stage was heparin prescribed for the prevention of deep vein thrombosis or any other preventive measures. Her husband was told that she had died from a clot on the lung which had formed in her leg as a result of swelling and trauma. The lack of preventive measures was not mentioned.

- Identify the incident/adverse event?
- Using Swiss cheese model, describe the factors that may be associated with this outcome?

Case 4

An oral surgeon was performing a surgical removal of lower third molar, which was completely impacted. None of the third molars (on either side) were visible. According to the clinical record, the right third molar was to be extracted. However, the X-ray on the view box appeared to show that it was the right third lower molar that was impacted and that the left third lower molar was absent. The oral surgeon made the incision, raised the flap and started the osteotomy. The impacted molar did not appear, so the surgeon enlarged the osteotomy. The surgeon finally realized that the right third molar was not there and that he had made a mistake when he had reviewed the clinical notes earlier and planned the operation. Furthermore, the dental assistant had displayed the X-ray in the wrong position, reversing the left and right sides of the mouth.

- Identify the incident/adverse event?
- Using Swiss cheese model, describe the factors that may be associated with this outcome?

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