3. Understanding Systems And The Effect Of Complexity On Patient Care

Objectives:

- Explain The Terms System And Complex System As They Relate To Health Care.
- Explain Why A Systems Approach To Patient Safety Is Superior To The Traditional Approach.
- Apply Reasons “Swiss Cheese” Model & Defense To Identify Possible Causes Of Error In A Clinical Scenario.
- Identify The Principles Of HROs Which Can Be Applied In Health Systems

Important | Doctors’ notes | Extra | ***New terminology***

Editing file | Feedback form | Lecture Handout

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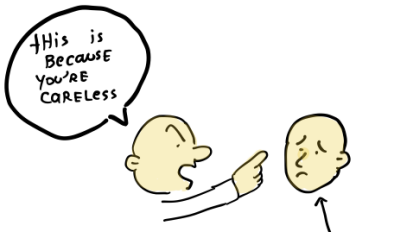
Lecture Overview

System

Complex System
- Something could go wrong

Health care
- Open
- Complex



- Blaming
- Naming
- Shaming
- Retraining

Error maker

Iatrogenic Injury

Traditional or "person" approach

Systems approach
- multiple factors

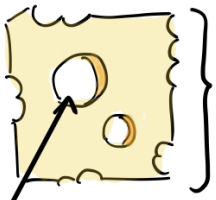
✗ Individual Failing

✓ Investigate

- How? Why?
- ↓ Recurrence
- ✓ Accountability

Strategies
- Education
- new protocol
- new system

Swiss cheese model

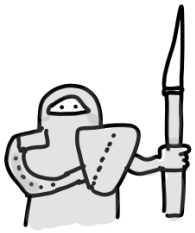


Layer of defense

Hole
- Failure
- Latent condition

if Hazards pass through → **Accident**

Reason's defences



1. policy writing, training
2. standarizing, simplifying
3. automation
4. improve
   - devices
   - Architecture

HRO characteristics

1. Explain The Terms System And Complex System As They Relate To Health Care.

A System

Any collection of two or more interacting parts, or “An interdependent group of items forming a unified Whole” *National Patient Safety Education Framework*. Canberra, Commonwealth of Australia, 2005.(p.202)

Like physiological system & electric system.

We have:

1- Open system. (Elements interact with each other towards one goal while there are chances for interventions from outside variables). Ex: healthcare system.

2- Close system. (NO intervention except when there’s hazard) Ex: Electric system.

A Complex System

أكثر من دائرة داخلية تتفاعل مع بعض لتعطيني الهدف مثل healthcare system which is Open & Complex

- **<u>Many</u> interacting parts.**
- **Difficult if not impossible to predict the behavior of the system based on a knowledge of its component parts.**
- **Health care is a complex system.**
- **Complexity = increased chance of something going wrong!**

هنا فرصة الخطأ بتصير أكثر بسبب كثرة المتغيّرات اللي تدخل علينا

2. Explain Why A Systems Approach To Patient Safety Is Superior To The Traditional Approach.

Two Schools Of Thought Regarding Iatrogenic* Injury

*resulting from the activity of a health care provider or institution *يعني السيستم نفسه يسببه

- You may encounter a bit of both in your "journey" -

1. Traditional or person approach:	*2. Systems approach:*
▪ The "old" culture ▪ Just try harder	▪ The "new look"
▪ See errors as the product of carelessness. ▪ Remedial measures directed primarily at the error-maker. - Naming - Blaming - Shaming - Retraining نشوفه كثير بالمدارس و بعض المؤسسات هنا لازم نقول فلان أخطأ و نحط المشكلة و المشكلة ترجع مرة !هذا خطأ لأن محد بيجي بعدين و يقول سوّيت خطأ .على فرد ثانية حتى لو غيّرنا الشخص. بكذا صار (هذا أول خطأ بالسيستم)مثل لما ٤رزدنت يأخذون إجازة بنفس الوقت ضغط أكبر على الستاف الباقين غير إنه فيه رزدنت و انتيرنز جدد مو عارفين كيف هنا !فلقوا بيشنت على نيزوقاسترك تيوب له أسبوع مش موجود و مش بياكل !الوضع !ما نقدر نلوم أحد معيّن	Multiple factors: ▪ Patient factors ▪ Provider factors ▪ Task factors طبيعة العمل ▪ Technology and tool factors ▪ Team factors ▪ Environmental factors Like some wards put the utility room faraway & we have 50 rooms! Instead of putting it in the middle which's the best way whether you need something you can easily go & Bring it. Here we lost time with exhaustion. So the whole setup is wrong! How they accommodate that? They bring trolley's & put in the center. ▪ Organizational factors لأن الشخص اللي نلومه هو جزء من السيستم فنرجو نسوي تشيك على كل السيستم ونشوف إيش خلّاه يعمل الخطأ ونعدّله& because we always learning about mistakes so we keep improving, we never stop which called "Continuous quality improvement".

From The Handout

Traditional approach:

• Health-care professionals are hesitant to report incidents/errors if they will be blamed.

• 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.

System approach:

• 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.

An Individual Failing?

Doesn’t work!

- People don’t intend to commit errors … only a very small minority of cases are deliberate violations.
- Won’t solve the problem - it will make it worse.
- Countermeasures create a false sense of security … “we’ve ‘fixed’ the problem”.
- Health professionals will hide errors.
- May destroy many health professionals inadvertently - the "second victim”.

لما نيرس تخطئ مجرد إحساسها بخطأها و تأنيب الضمير انه كان ممكن يؤذي إنسان يعتبر عقاب فما بالك لما تتعاقب بدون احتواء للموقف و نشوف وين المشكلة! هل تحتاج تدريب؟ هل في خطأ بالسيستم؟ أوكي عملت ريبورت هذا شيء كويّس هذا اللي يحسّن النظام بعكس العقاب وخلاص انتهينا !هنا ممكن يخسر الشخص كفاءاته و ممكن يرجع الخطأ لعدم حل المشكلة الأساسية.

Why Investigate?

عشان ندافع عن نفسنا هذي استراتيجيات مهمة

1. The more we understand how and why these things occur, the more we can put checks in place to reduce recurrence.

2. Strategies might include:

- Education.
- New protocols.
- New systems.

3. Accountability.

اذا اكتشفت الخطأ خلاص نسكت؟ لا لازم نعلّم و نغيّر السيستم و نحط بروتوكول جديد.

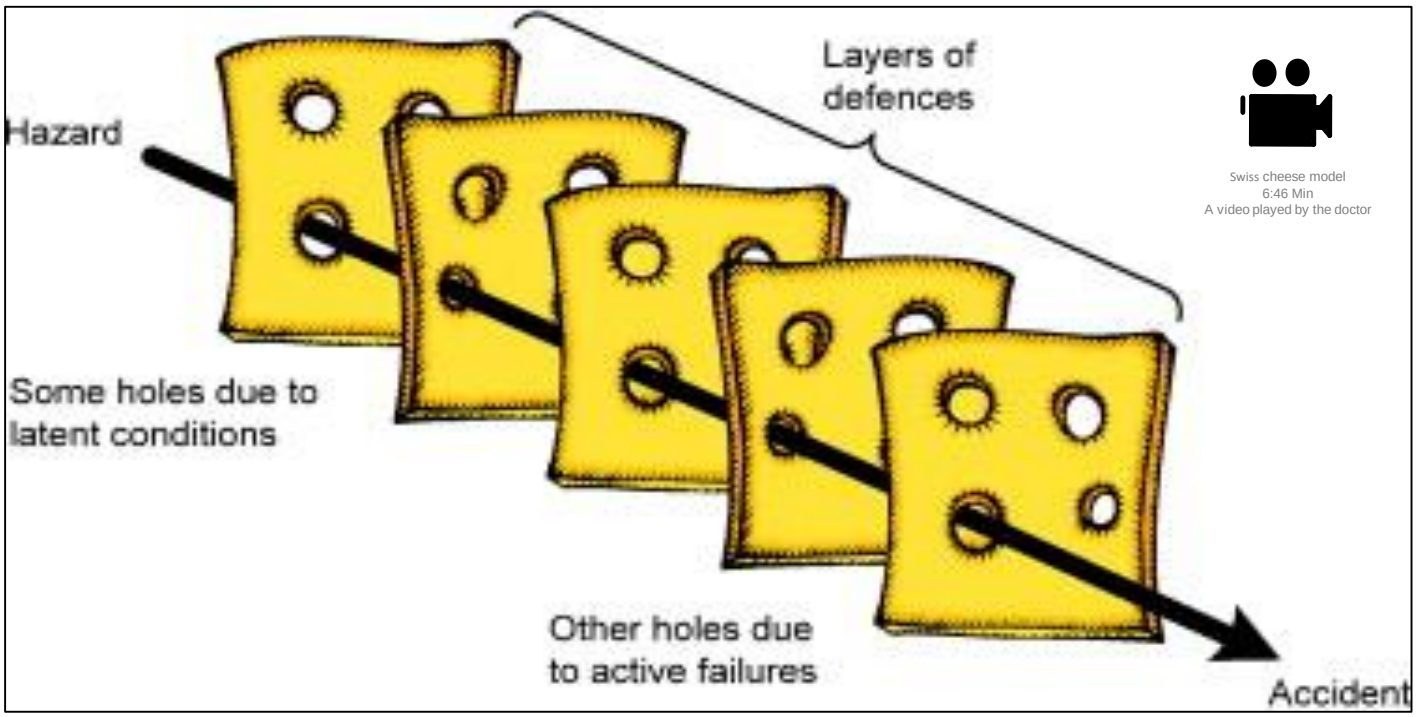
Why A Systems Approach To Patient Safety Is Superior To The Traditional Approach?

From The Handout

A systems approach helps us to understand and analyse 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.

3. Apply Reasons “Swiss Cheese” Model & Defense To Identify Possible Causes Of Error In A Clinical Scenario.

Reason’s “Swiss Cheese” Model Of Accident Causation



Successive layers of defences, barriers and safeguards *System defences.*

From The Handout

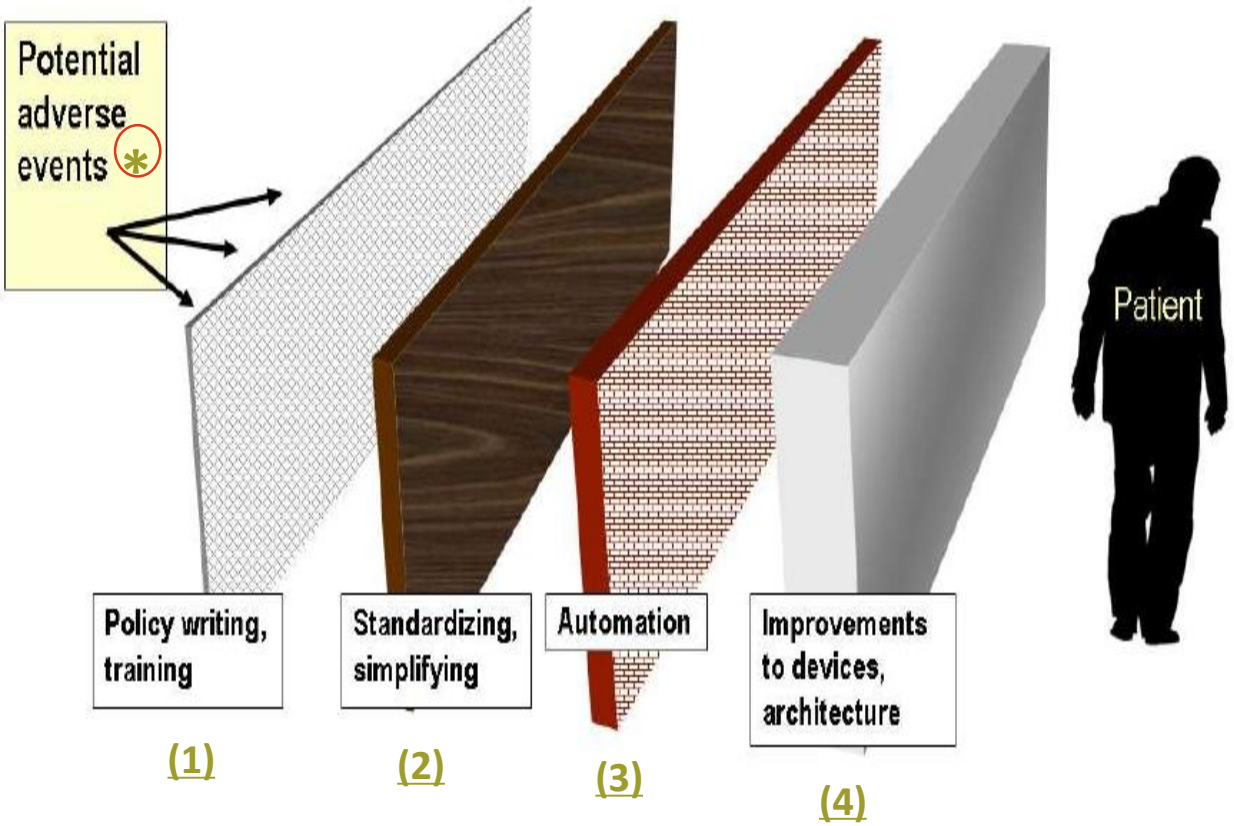
J. Reason created the “Swiss cheese model” to explain how faults in different layers of a system lead to adverse events and medical errors. This model shows how a fault in one layer of a system of care is usually not enough to cause an accident. Adverse events usually occur when a number of faults occur in a number of layers (e.g. fatigued workers + inadequate procedures + faulty equipment) and momentarily line up to permit the “trajectory” of an accident opportunity.

الأخطاء تحصل بس أسوأ شيء يكون لما كلها تصير في نفس الموقف مثلا :المريض انصرف له الدواء الغلط لو الممرضه تأكدت من البيانات قبل ما تعطي المريض هنا نكون وقفنا الخطأ لكن لو الممرضة مشغولة والطبيب مو موجود وراح لمريض ثاني ومحد انتبه هنا يصير الخطأ

We have to be aware that these cheese are present. So if we have protocols present the cheese will not have many holes. But there are situations inconsistent with the protocol. Example if in the protocol I must use a specific equipment but its not working, so I have to use a different one. Here the problem is that the maintenance didn’t do their work and I am forced to go outside protocol which opens up potential for error. Another example is new doctors and trainees; they should also have guidelines so they can manage in the new environment and not make errors.

3. Apply Reasons “Swiss Cheese” Model & Defense To Identify Possible Causes Of Error In A Clinical Scenario.

Reason’s - Defences



* In any place there is a potential (احتمال) for hazard events to happen but how can we manage it?

(1) Everything needs to have a clear policy and **everyone** should know it.

Example:

الباص الترددي للطالبات والموظفات بين المستشفى والمدينة الجامعية .في policy محدد وواضح مثلا متى يحرك ووين يروح ومتى يرجع. ولازم الكل يكون عارف حتى سائق الباص لازم يعرف إيش مطلوب منه وإيش اللأشياء اللي يتجنبها.

(2) Standardization = طريقة معينة لعمل شيء ويثبت للجميع we all do it the same way.

Simplification = كل ما كانت الخطوات واضحه كل ما قلت احتمالية الخطأ

(3) Automation

Example: electronic files, they simplify things because everything is in one place and easily accessible. But it also has limitations like privacy problems and power outages.

Even though it is good we have to be aware of its problems when working on it.

(4) *Example:* putting the utility room in a very far location which made it hard and tiring for nurses to continuously go back and forth.

4. Identify The Principles Of HROs Which Can Be Applied In Health Systems

From The Handout

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. Some examples of HROs include air traffic control systems, nuclear power plants and naval aircraft carriers.
The message for health care is that it is possible to achieve consistently safe and effective performance despite high levels of complexity and unpredictability in the work environment.

HROs are not perfect, they adopted strategies to minimize the errors and to keep learning from them, and they have certain features:

From The Handout

Characteristics Of High Reliability Organizations[1] (HROs)

1. Preoccupation with failure

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

2. Commitment to resilience

   proactively seek out unexpected threats and contain them before they cause harm;

HRO
4:02 Min
A video played by the doctor

3. Sensitivity to operations

   pay close attention to the issues facing workers at the frontline;

4. A culture of safety

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

[1]: منظمات عالية الموثوقية

Key Principles From HRO Theory

1. Maintain a powerful and uniform culture of safety.
2. Use optimal structures and procedures. (وتكون واضحه للكل)
3. Provide intensive and continuing training of individuals and teams.
4. Conduct thorough organizational learning and safety management.

The Aircraft Carrier: The Prototypical HRO

Carriers achieve nearly failure-free record despite multiple hazards.

The aircraft industry were the first HROs.

Health Care Can Learn From HROs

Although health care is different from other industries (e.g. people are not airplanes) we can learn:

1. From their successes:
    - What factors make them work so well?
2. From their failures:
    - How do disasters occur even in typically high reliability settings?

We should always learn from our mistakes (what went wrong) and from our success (what went right) through continuous briefing and debriefing.
We should also make sure there are checklists and we follow them.
Don't underestimate other peoples opinion so always stop and listen and keep an open mind.

Summary

- Health care is complex and open.
- When things go wrong, adopting a systems approach is far more productive for patient safety than a person approach. (the people that make errors are secondary victims so we should look at the system before we look at the person)

Summary

- **System**: Any collection of two or more interacting parts, or "An interdependent group of items forming a unified Whole"
- **Approaches to Iatrogenic Injury:**
  Systems (multi-factorial) **vs Traditional** (blaming)
- **Individual Failing**: People don't intend to commit errors, blaming makes things worse
- **Why investigate?** → to understand how and why things occur, reduce recurrence, and establish accountability.
- **"Swiss Cheese" Model Of Accident Causation**

- **Characteristics Of High Reliability Organizations**

- **Key principles from HRO theory**

- **Health Care Can Learn From HROs**
- **A systems approach is far more productive for patient safety than a person approach.**

Questions

Case 1:

A 20 year old and 60 year old patients, both named Mohammed Alotaibi were admitted to the same ward. The doctor prescribed penicillin to the 20 year old to treat his URTI. During the shift change, the nurse gave a quick verbal report to the nurse covering the shift but did not inform her that there were 2 patients with the same name. When the new nurse went to administer the medication she only verified the first name, and therefore she accidently gave the dose to the wrong Mohammed (60 year old) who had suffered an anaphylactic shock. Thankfully the team was able to rescue him and he recovered, but the nurse was fired and inquiry was made to revoke her nursing license.

Q1: Identify 2 defenses from the swiss cheese model that were lacking in this situation?

- Procedures: before giving the medication we must check the patients name and I.D number.
- Policies: when changing shifts the nurses should document all the important details and notes, and pass them on the colleagues, this ensures that no important information is forgotten or overlooked.

Q2: Which approach did the management take when handling the error?

The traditional or person approach

Q3: How could this case have been handled better?

The management should not have fired the nurse directly, she is a secondary victim as she had no intention of hurting the patient. First they must investigate further and review their system and try to understand why this error occurred and how to prevent it in the future.

Case 2:

A 18 year old patient presented to the emergency room complaining of lethargy and high glucose levels. The intern checked the blood glucose level with a glucometer and the reading was 600mg/dL. He rechecked the sample and got the same reading. He then proceeded to give the patient insulin to reduce the blood glucose level. After a while the patient became unresponsive and was rushed to the ICU. Further investigations revealed the patient was suffering from hypoglycemia. Before punishing the intern the hospital decided to run a full investigation, which lead them to conclude that the error was not from the intern but from the faulty glucometer. The following few days the management made sure to recheck all the glucometers and developed a new policy to prevent this error from happening again.

Q1: Identify 2 HRO characteristics from the scenario.

- A culture of safety: the hospital applied the system approach and looked at all the factors before deciding whether or not to punish the intern
- Preoccupation with failure: after identifying the error, the hospital worked actively to prevent it from happening again.

Q2: Which factor was at fault in this case?

- Technology and tool factors

Q3: List any 3 other factors of the system approach.

- Patient factors
- Provider factors
- Task factors

Questions

Q1: List the elements of the system thinking approach.

- Patient factors
- Provider factors
- Task factors
- Technology and tool factors
- Team factors
- Environmental factors

Q2: List the defenses present in the Swiss cheese model.

- Policy writing
- Training
- Standardizing
- Simplifying
- Automation
- Improvement of devices and architecture.

Q3: What are the characteristics of HROs?

- Preoccupation with failure
- Commitment to resilience
- Sensitivity to operations
- Establishing and maintaining a culture of safety

Q4: Choose the correct answer

i. Which of the following describes the traditional approach when something goes wrong?

A. Reward and applaud
B. Blame and shame
C. Excuse and help
D. Looking at overall picture

ii. Which of the following is NOT a key principle from the HRO theory?

A. Maintain a powerful and uniform culture of safety.
B. Provide intensive and continuing training of individuals and teams.
C. Conduct thorough organizational learning and safety management.
D. Use strict punishment to staff when errors occur.

i: B – ii:D

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References: Doctors' slides (WHO, Patient Safety Curriculum Guide) & notes.