

Safer workplaces using simulation based interventions

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Conflicts of interest

None

Plan

13:30-13:40	Introductions
13:40-14:10	Theory, concepts and application of workplace simulation
14:10-15:00	Group exercise
15:00-15:30	Break
15:30-16:00	Simulation methodology and QI
16:00-16:45	Group exercise
16:45-17:00	Feedback and close

Learning outcomes

- Understand the role and impact of workplace simulation
- Explain the concept and application of latent errors in improving patient safety
- Review and apply the links between simulation methodology and quality improvement

What is workplace simulation?

- Conducted in the normal clinical/working environment
- Uses genuine patient facilities/settings/equipment
- Can use nominated simulation spaces within the clinical environment
- Primary/community/secondary/other settings

Workplace \approx 'in situ' \approx 'point of care'

How would you describe an in situ sim?

Planned

Ad hoc

Routine

Frequent

Whole team

Briefing

Targeted

Time limited

In situ models: examples

ED/trauma theatre

- Whole team
 - ED team
 - Anaesthetists
 - Ortho/Gen surgeons
 - Theatre nurses
 - OPDs
 - PACU nurses
 - Porters
 - X ray
 - ICU team
- 1 hour+ per scenario
- Logistics
- Outside normal service?

PACU staff

- Individual
- Personalised
- Low tech
- During normal service
- Brief
- Frequent
- Repetitive content
- Flexible



Tea trolley sim

ASPiH Standards: Recommendations

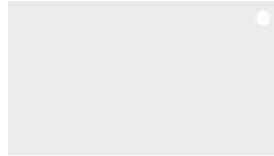
STANDARDS

12. Every ISS exercise has clearly defined learning objectives that achieve individual, team, unit level and/or organisational competencies.
13. Local processes and procedures are carefully reviewed to deliver ISS activity authentically.
14. Faculty delivering the ISS activity are proficient in SBE and have the required expertise on a given topic (Refer to Standards on faculty development above).

Potential gains from in situ?

Potential gains from in situ?

- Team performance
 - Human factors
- Systems
- Protocols
- Latent errors
- Ergonomics (+ adjuncts)
 - Microscopic
 - Macroscopic
- Resilience



Hull and East Yorkshire Hospitals NHS Trust

Labour Ward In Situ Simulation



Hull in situ simulation: Impact

Latent errors	Description	Frequency
People	Misoprostol not given	1
Management/Policy	Tranexamic acid not used	2
	Staff unaware of MOH protocol activation	2
	Staff unaware of location of emergency medicines.	2
	Members unaware of intra lipid	1
Material (equipment)	Peri mortem section pack location	3
	Delay in peri mortem section	3
	Location of O negative blood	2
Method (process)	Delayed fluid resuscitation	3
	Delayed shock recognition	1
	CPR cycle length unclear	1
	Delay in recognition of VF	
	4 Hs/ 4Ts not considered	2
	Delayed defibrillation	1
	Delay in delivery of shock	1
	No clear communication	4
	No clear leader identified	4
	Task fixation	2
Money	All required specialties not present	3

Likelihood Score					
Likelihood	1	2	3	4	5
Risk consequence / Impact	Rare	Unlikely	Possible	Likely	Almost Certain
5 Catastrophic	5 Moderate	10 High	15 Severe	20 Severe	20 Severe
4 Major	4 Moderate	8 High	12 High	18 Severe	20 Severe
3 Moderate	3 Low	6 Moderate	9 High	12 High	15 Severe
2 Minor	2 Low	4 Moderate	6 Moderate	8 High	10 High
1 Negligible	1 Low	2 Low	3 Low	4 Moderate	5 Moderate

PERI-MORTEM CAESAREAN SECTION PACK

Recommended to be performed within 5 minutes of arrest

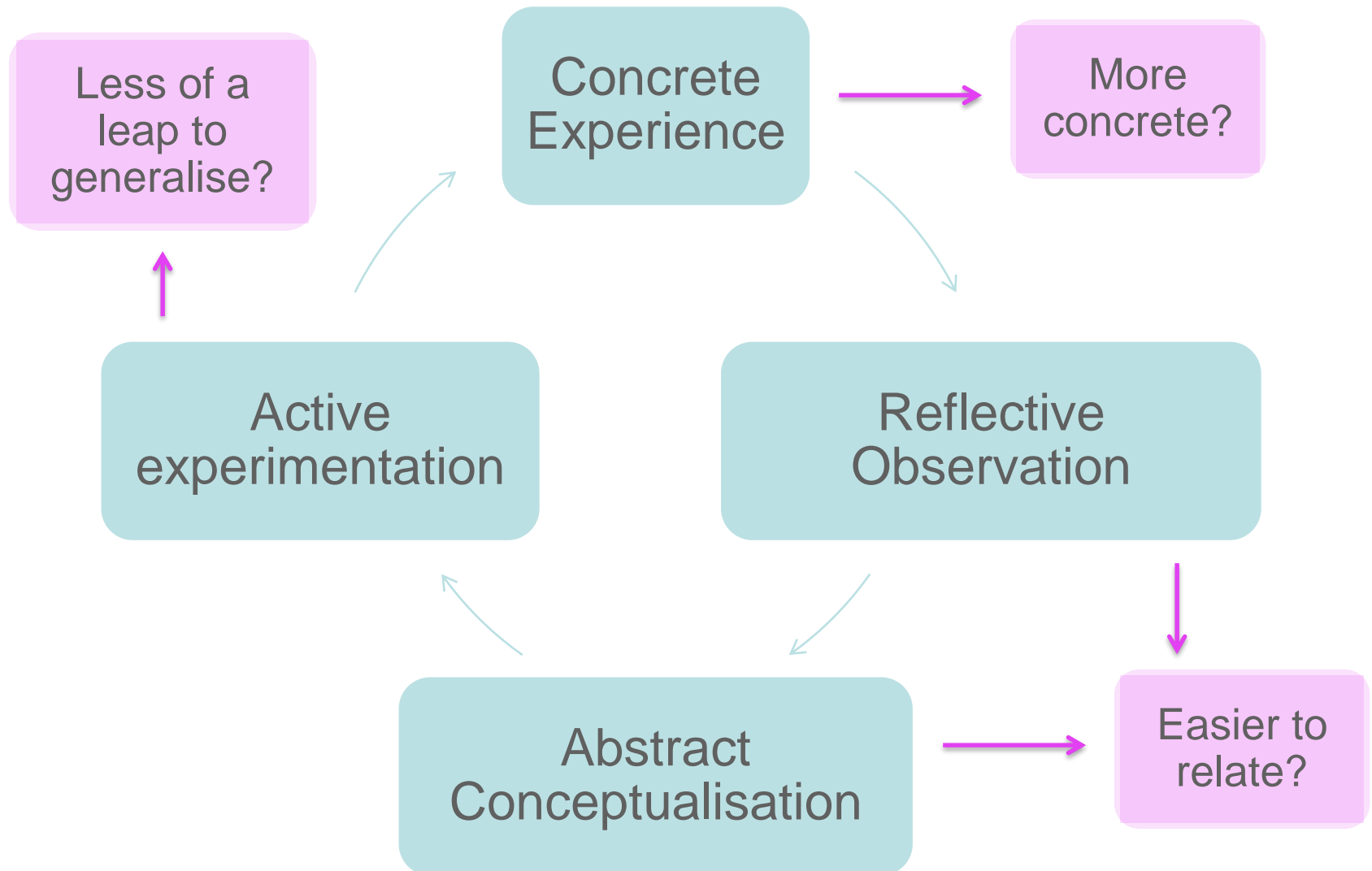
CONTENTS

- Disposable scalpel
- 5 x-ray detectable swabs
- 2 x Cord clamp
- Pair of curved mayo scissors

Expiry date

Please see Sue Sallis/Julia Chambers for re-stocking

Experiential learning +



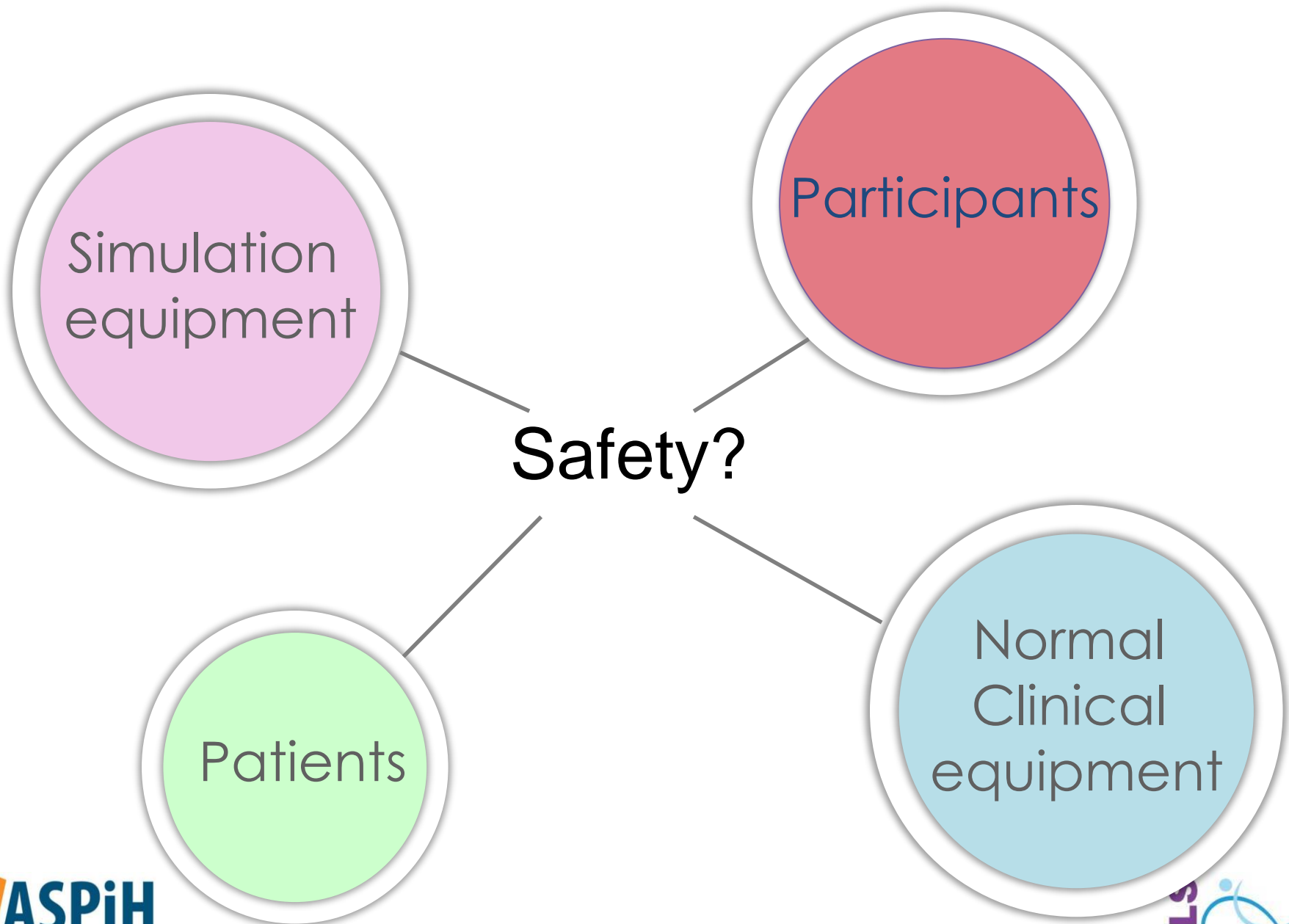
Pros

- Familiar environment
- Accessible
- Lower costs?
- Responsive
- Real team
- Reduced pre-briefing?
- Latent errors
- Integrated
- Public/patient reassurance

Cons

- Maintain service
- Psychological safety
- Faculty/tech support?
- Contamination
 - Clinical
 - Sim centre
- Use of 'real' consumables
- Public/patient concern

Safety considerations and latent errors



Paeds HDU

Patients
Participants
Simulation equipment/props
Normal clinical equipment



Theatres

Patients
Participants
Simulation equipment/props
Normal clinical equipment



In situ simulation checklist

Sim Hardware	Used?	Packed away?	
Manikin			Notes
SimPad			
AV Equipment			
Trolley/cases			
Pre and Post Questionnaires			
Medical Equipment	Used?	Disposal?	
Airway Kit (adjuncts, tubes, laryngoscope blades, anaesthetic circuits)			All medical equipment used should be placed together in a "kit dump" so that the person responsible for re-stocking knows exactly what has been used. The exception to this would be sharps and dummy drugs.
Oxygen Systems (nasal, masks, neb)			
IV fluids and giving sets			
IV dummy drugs			
Blood Sampling (ABG, sample bottles, Culture bottles)			
Suction			
Obs chart / Case notes			The person responsible for re-stocking should be agreed upon in advance of the in situ exercise. Person responsible for re-stocking:
Other			
Environment	Used?	Cleaned?	
ECG machine			Final check of environment should take place at close of exercise
Monitoring (cardiac monitor, DynaMAP)			
Bedspace / trolley			
Anaesthetic machine / Resuscitaire			
Other			

Latent Errors

“Latent errors refer to less apparent failures of organisation or design that contributed to the occurrence of errors or allowed them to cause harm to patients.”

(Threats, problems waiting to happen,
latent conditions)

Latent Errors

- Design in situ simulation to test a new process/ environment

Or...

- Run in situ simulation for another purpose, but be mindful of latent errors

Latent Errors

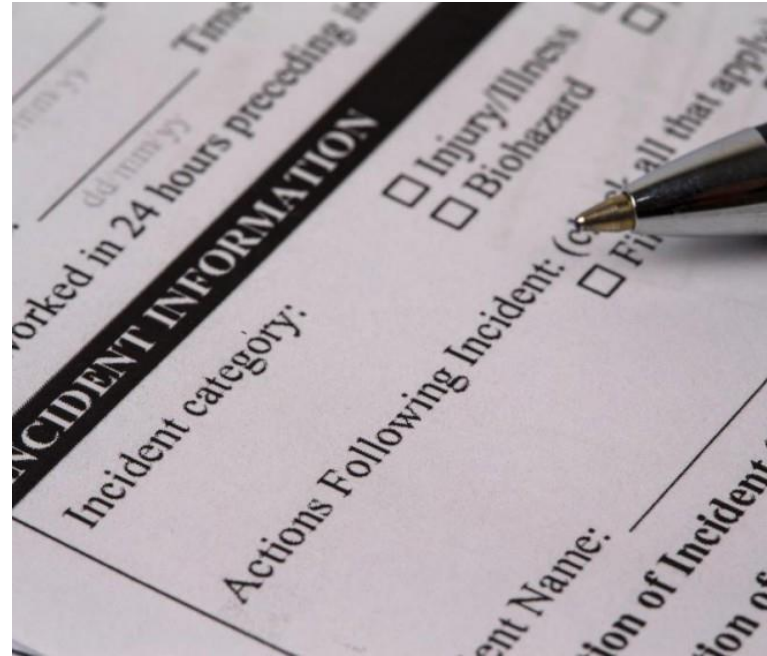
What do you do with a Latent Error when you've found it?



→ Infrastructure?

Latent Errors

- Document it
- Characterise it
- Write a report and circulate it to relevant people



Datix[®]Sim



NPSA risk matrix

	Likelihood				
Consequence	1	2	3	4	5
	Rare	Unlikely	Possible	Likely	Almost certain
5 Catastrophic	5	10	15	20	25
4 Major	4	8	12	16	20
3 Moderate	3	6	9	12	15
2 Minor	2	4	6	8	10
1 Negligible	1	2	3	4	5

Categorising Latent Errors

	Risk Identified	Risk Score (NPSA matrix)	Action taken (include responsible person)
Medication			
Equipment			
Environment			
Training			

Latent errors detection: examples

- Medication
 - Terlipressin
 - Alprostadil
 - Sodium Bicarbonate
- Environment
 - Paeds resus layout
 - Trauma call not going out to all bleeps
- Equipment
 - ETT suction catheters
 - Airway rescue in interventional radiology
- Training
 - Traumatic arrest
 - Bronchodilators in bronchiolitis
 - Paeds airway skills

Systems

Ergonomics



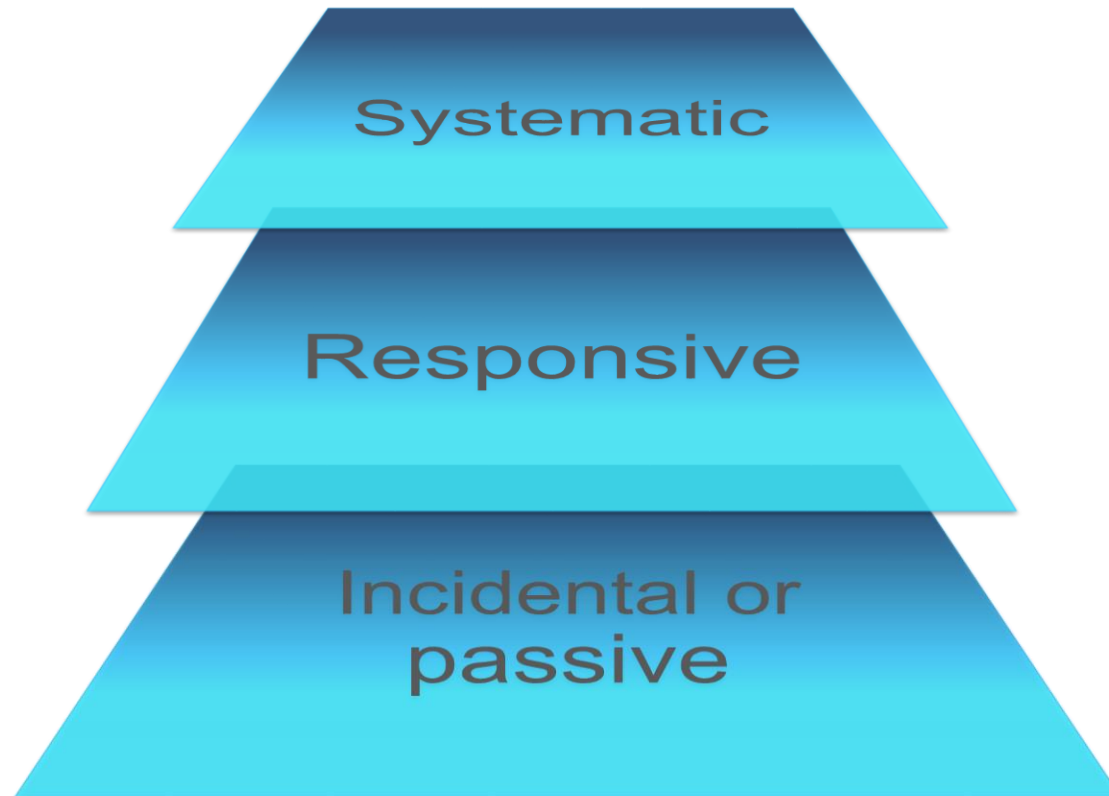
Systems

Process



Resilience





Evidence

Simulation-based mock codes significantly correlate with improved pediatric patient cardiopulmonary arrest survival rates. [Pediatr Crit Care Med](#). 2011 Jan;12(1):33-8

Use of in situ simulation and human factors engineering to assess and improve emergency department clinical systems for timely telemetry-based detection of life-threatening arrhythmias. [BMJ Qual Saf](#). 2013 Jan;22(1):72-83

In situ simulation: detection of safety threats and teamwork training in a high risk emergency department. [BMJ Qual Saf](#). 2013 Jun;22(6):468-77

Using In Situ Simulation to Evaluate Operational Readiness of a Children's Hospital-based Obstetrics Unit. [Simulation in Healthcare](#). 2014; 9 (2): 102-111

A randomized, controlled trial of in situ pediatric advanced life support recertification ("pediatric advanced life support reconstructed") compared with standard pediatric advanced life support recertification for ICU frontline providers. [Critical Care Medicine](#). 2014; 42 (3): 610-618

No benefit:

In Situ Operating Room-Based Simulation: A Review. Owei, L., Neynan C., Rao, R et al. [Journal of Surgical Education](#) 2017; 74(4): 579-588

In situ simulation in continuing education for the health care professions: a systematic review. Rosen, MA., Hunt, E.A., Pronovost, P.J., Federowicz, M.A., Weaver, S.J. [J Contin Educ Health Prof](#). 2012 Fall; 32(4):243-54

Sustainability: simple tips

- Demonstrating benefit
 - Individual/team/organisation
- Advocates in key positions
- Established as integral (work unit/quality and safety team)
- Keeping it fresh/up to date
- Varied styles
- Faculty (!)
- Patient and public engagement
- Put a price/saving on it

Major trauma centre

Your major trauma centre is consistently missing its “time to CT scan” target as set out by the Trauma Audit Research Network: *MTC 11 - Proportion of directly admitted patients receiving CT scan within 30 mins of arrival.*

1. How would approach the planning of a simulation to address the concern?
1. Please design a simple outline scenario
1. What challenges would you face in designing and delivering the scenario and how would you overcome it?

CT

Resus

Majors



Midwifery-Led Birth Unit

A new midwifery-led birth unit has recently opened for low risk deliveries. It is positioned next to the existing labour ward. After the first few months, there have been reports of difficulty escalating women with unanticipated complications and treating them rapidly, including moving to a high risk room.

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GP surgery

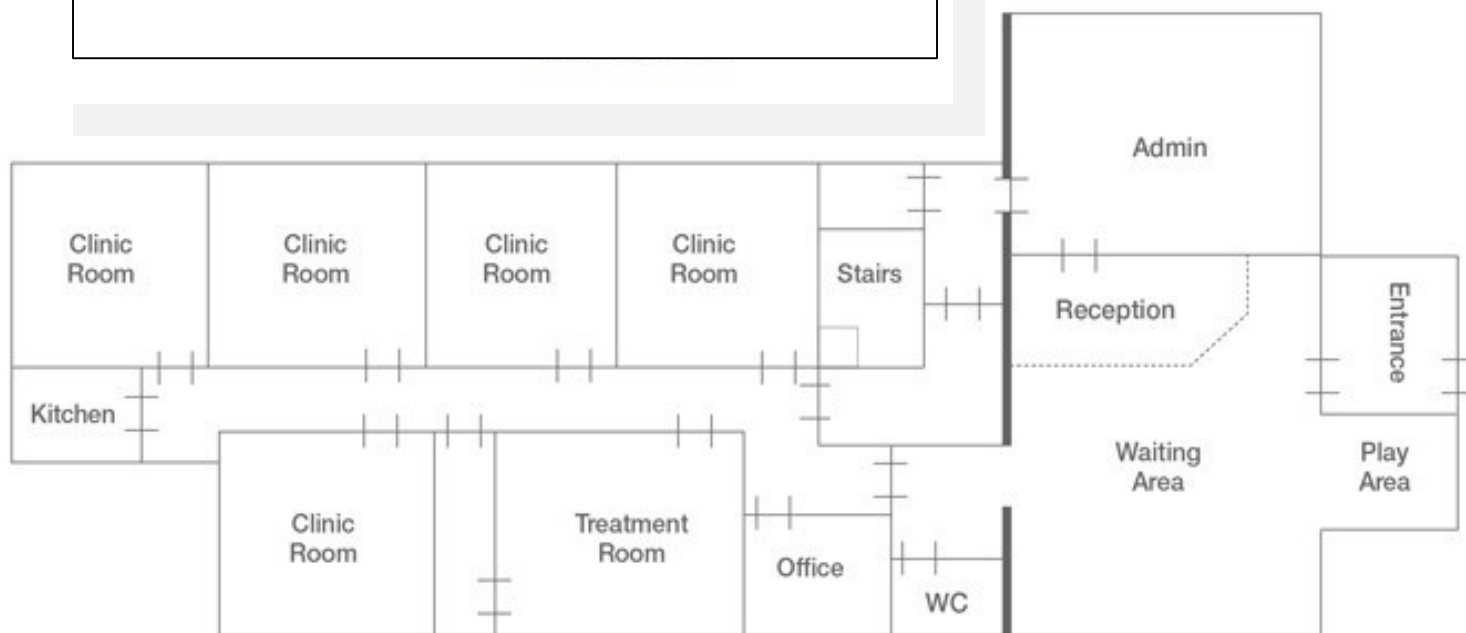
A patient recently collapsed in the surgery car park. The practice team didn't feel they managed the situation effectively and would like to improve their response

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1. Please design a simple outline scenario
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Car park

Pharmacy

Road



Major trauma centre

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GP surgery

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Simulation methodology and quality improvement

What is high quality care?

USA

- Safe
- Effective
- Patient centered
- Timely
- Efficient
- Equitable

UK

- Safe
- Effective
- Positive patient experience

Committee on the Quality of Health Care in America. Crossing the quality chasm: A new health system for the 21st century. 2001.

Department of Health. High quality care for all: NHS Next Stage Review final report. Department of Health. 2008.

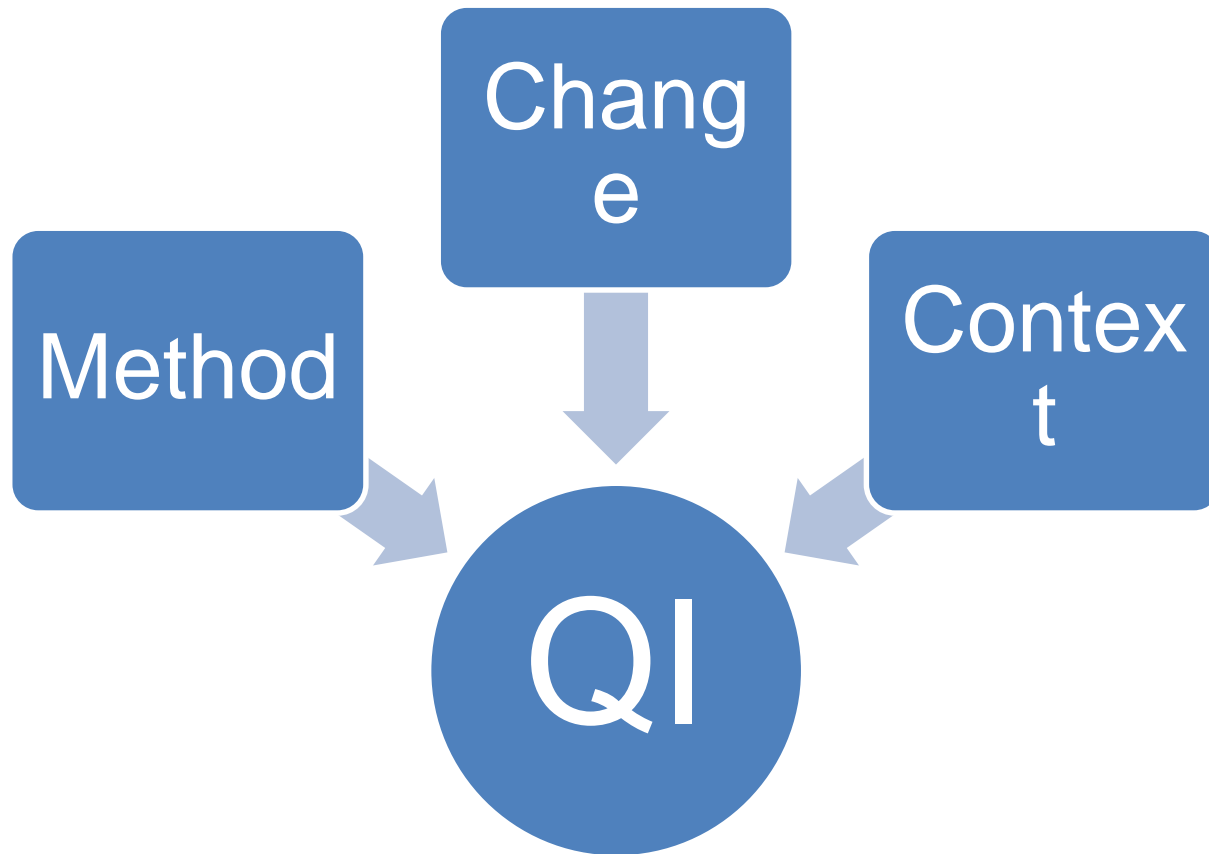
Quality Improvement

Definition

Better patient experience and outcomes achieved
through
changing provider behaviour and organisation
using
a systematic change method and strategies

Quality Improvement

Key elements



QI Methodologies

Principles

- Understanding the problem
- Understanding the processes and systems within the organisation
- Analysing the demand, capacity and flow of the service
- Choosing the tools to bring about change
- Evaluating and measuring the impact of a change

Simulation

QI method/approach/tool

- Understanding the problem ✓
- Understanding the processes and systems ✓
- Analyse the demand, capacity and flow ✓
- Choose the tools to bring about change ✓
- Evaluate and measure impact of change ✓

Descriptive Simulation

- Problem understanding
- Process understanding
- Analysing demand/capacity/flow
- Choosing change tools
- Evaluating impact of change



ORIGINAL RESEARCH: EMPIRICAL RESEARCH – QUALITATIVE

An analysis of nursing students' decision-making in teams during simulations of acute patient deterioration

Tracey K. Bucknall, Helen Forbes, Nicole M. Phillips, Nicky A. Hewitt, Simon Cooper & Fiona Bogossian FIRST2ACT Investigators

ORIGINAL RESEARCH

Information transfer in multidisciplinary operating room teams: a simulation-based observational study

David Cumin,¹ Carmen Skilton,² Jennifer Weller^{2,3}

BMJ Qual Saf: first published as 10.1136



Simulation

Theory testing/generation tool

- Problem understanding
- Process understanding
- Analysing demand/capacity/flow
- Choosing change tools
- Evaluating impact of change

JOURNAL OF INTERPROFESSIONAL CARE
2016, VOL. 30, NO. 1, 116–122
<http://dx.doi.org/10.3109/13561820.2015.1075967>



ORIGINAL ARTICLE

Impact of peer pressure on accuracy of reporting vital signs: An interprofessional comparison between nursing and medical students

Alyshah Kaba and Tanya N. Beran

Medical Education and Research, Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

BJA

British Journal of Anaesthesia, 119 (1): 125–31 (2017)

doi: 10.1093/bja/aez155
Quality and Patient Safety

Impact of sleep deprivation on anaesthesia residents' non-technical skills: a pilot simulation-based prospective randomized trial

A. Neuschwander^{1,2,*}, A. Job³, A. Younes⁴, A. Mignon^{2,4}, C. Delgoutet³, P. Cabon³, J. Mantz^{1,5,†} and A. Tesniere^{2,4}

Intraoperative Noise Increases Perceived Task Load and Fatigue in Anesthesiology Residents: A Simulation-Based Study

Richard R. McNeer, MD, PhD,* Christopher L. Bennett, PhD,† and Roman Dudaryk, MD*

Simulation

Evaluator of interventions

- Problem understanding
- Process understanding
- Analysing demand/capacity/flow
- Choosing change tools
- Evaluating impact of change

In Situ Simulation Comparing In-Hospital First Responder Sudden Cardiac Arrest Resuscitation Using Semiautomated Defibrillators and Automated External Defibrillators

Package Design Affects Accuracy Recognition for Medications

Tor Endestad, Laura A. Wortinger, University of Oslo, Norway, Steinar Madsen, and Sigurd Hortemo, Norwegian Medicines Agency, Oslo, Norway

Clay-Williams et al. *BMC Health Services Research* (2017) 17:558
DOI 10.1186/s12913-017-2514-7

BMC Health Services Research

RESEARCH ARTICLE

Open Access

Service provider perceptions of transitioning from audio to video capability in a telehealth system: a qualitative evaluation

Robyn Clay-Williams^{1*}, Melissa Baysari¹, Natalie Taylor¹, Dianne Zalitis², Andrew Georgiou¹, Maureen Robinson², Jeffrey Braithwaite¹ and Johanna Westbrook¹

J Med Syst (2016) 40: 141
DOI 10.1007/s10916-016-0502-9

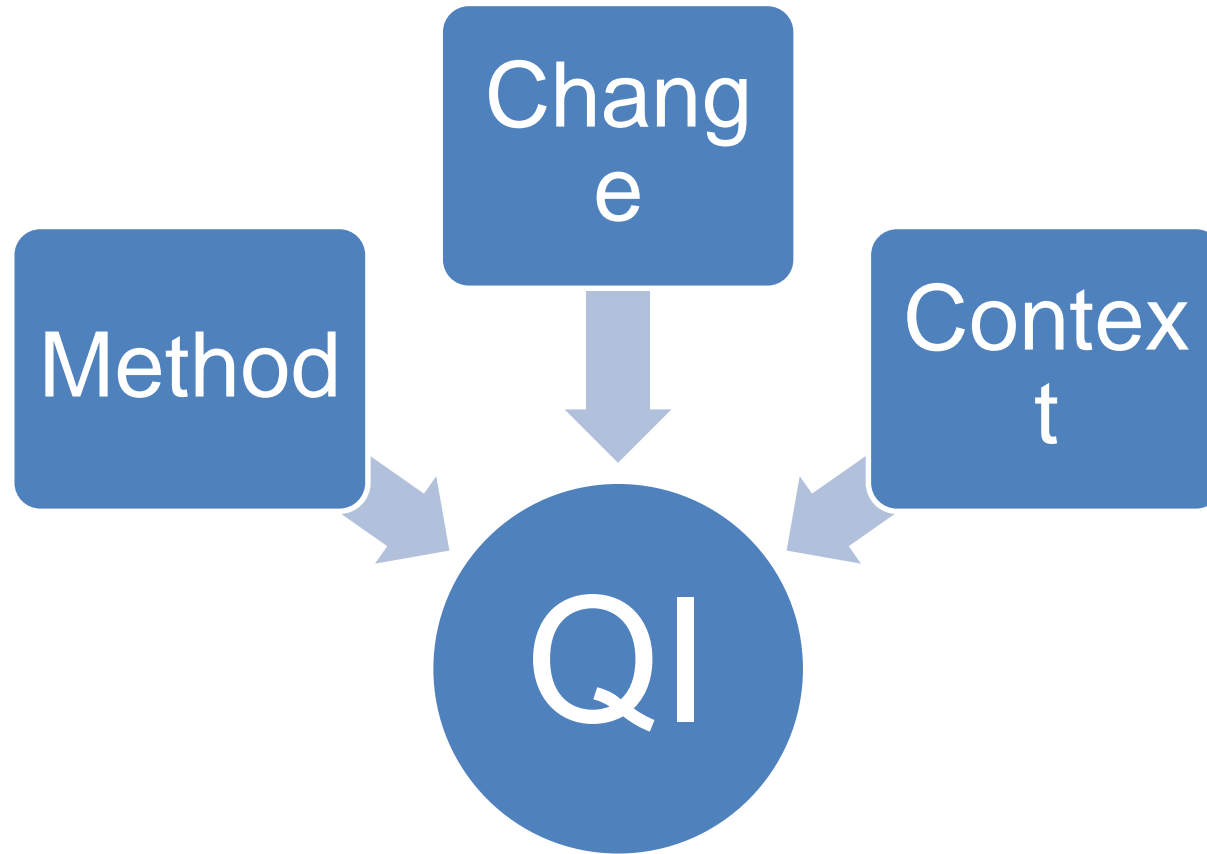
SYSTEMS-LEVEL QUALITY IMPROVEMENT

Cost-Effectiveness Evaluation of EHR: Simulation of an Abdominal Aortic Aneurysm in the Emergency Department

Ofir Ben-Assuli¹ · Amitai Ziv^{2,3} · Doron Sagi² · Avinoah Ironi² · Moshe Leshno³

Simulation

Quality Improvement Tool



Case studies

Care home

You are the nurse manager of a care home which is the step down facility for receiving patients from the local secondary care hospital. There has been a recent patient harm due to failure to manage a deteriorating patient.

Recognising sick patients

Your hospital has had issues with failure to recognise the unwell patient which has led to serious incidents. You are a senior manager in the hospital who has been tasked with the problem of improving patient care.

Central venous catheter infections

You are the lead of an intensive care unit. There have been several incidents of infection arising from the invasive lines (central venous catheters) in your unit . How will you tackle this problem?

How will you use simulation to:

1. Understand the problem and the processes and systems within the organisation
2. Analyse the demand, capacity and flow of the service
3. Choose the tools to bring about change and evaluate and measure the impact of a change



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4th - 6th November 2019

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7. Lamé G, Dixon- Woods M. *BMJ Stel Epub ahead of print: [pleaseinclude Day Month Year].doi:10.1136/ bmjstel-2018-000370*
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11. Simulation-based mock codes significantly correlate with improved pediatric patient cardiopulmonary arrest survival rates. *Pediatric Critical Care Medicine*. 2011 Jan;12(1):33-8
12. Use of in situ simulation and human factors engineering to assess and improve emergency department clinical systems for timely telemetry-based detection of life-threatening arrhythmias. *BMJ Quality and Safety* 2013 Jan;22(1):72-83
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