Educating the "Start Smart - Then Focus" generation

Peter Davey
BSAC Education & Stewardship Secretary
Medical Research Institute, University of Dundee
Learning Outcomes

• Understand education and training as complex interventions in healthcare
• Be aware of the components of realist evaluation of complex interventions
• Review current delivery of education and training on antimicrobial stewardship from a realist perspective
Why Is Educating Healthcare Professionals Complex?

3 Incident analysis framework*

**Latent factors**
Organisational processes — workload, handwritten prescriptions
Management decisions — staffing levels, culture of lack of support for interns

**Error-producing factors**
Environmental — busy ward, interruptions
Team — lack of supervision
Individual — limited knowledge
Task — repetitious, poor medication chart design
Patient — complex, communication difficulties

**Active failures**
Error — slip, lapse
Violation

**Defences**
Inadequate — AMH confusing
Missing — no pharmacist

AMH = Australian medicines handbook.
* Adapted from Reason’s model of accident causation,5 with permission.
MRC framework for complex interventions

Pre-clinical
- Explore relevant theory to ensure best choice of intervention and hypothesis and to predict major confounders and strategic design issues

Phase I
- Identify the components of the intervention, and the underlying mechanisms by which they will influence outcomes to provide evidence that you can predict how they relate to and interact with each other

Phase II
- Describe the constant and variable components of a replicable intervention AND a feasible protocol for comparing the intervention to an appropriate alternative

Phase III
- Compare a fully-defined intervention to an appropriate alternative using a protocol that is theoretically-defensible, reproducible and adequately controlled, in a study with appropriate statistical power

Phase IV
- Determine whether others can reliably replicate your intervention and results in uncontrolled settings over the long term

Continuum of increasing evidence
Designing and evaluating complex interventions to improve health care

Determining the effectiveness of complex interventions can be difficult and time consuming. **Neil C Campbell and colleagues** explain the importance of groundwork in getting usable results:

- More resource into phases 0 to II
- Iterative approach with focus on context
  - *Campbell et al 2007*
The Importance of Context

• “Yeah, yeah and I think he [the registrar] expected it from the juniors that that was our job really was to manage the more medical side of things and his job was the surgeon. ... Umm, umm and it’s not it’s not like that at all in the medical side of the hospital it’s purely in surgery and like the registrar who was almost a consultant some of them are fantastic but I think probably half of them are, expect their FY staff to deal with things like prescribing antibiotics and that kind of thing so they don't really keep up-to-date with it erm and because they are so much more of a surgeon than trying to treat things with medications they seem to be a bit out of touch.” Female F2, Location 1.

Thanks to Karen Mattick, University of Exeter
The Realist Evaluation Cycle

- **Theorize**: Identify contexts (C), mechanisms (M), and outcomes (O).
- **Hypothesize**: Identify C+M=O configurations.
- **Observe**: Test C+M=O configurations and look for additional CMO patterns in the data.
- **Analyze Findings**: Conclude on what works, for whom, in what circumstances. Then update theory.

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THE FEDERATION OF INFECTION SOCIETIES ANNUAL CONFERENCE 2013
Evidence 1: Workplace Based Assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Studies</th>
<th>Highest Evaluation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Reaction</td>
</tr>
<tr>
<td>MSF</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Mini-CEX</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>DOPS</td>
<td>1</td>
<td></td>
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<tr>
<td>Portfolio</td>
<td>2</td>
<td>2</td>
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</tbody>
</table>

**MSF: Multi Source Feedback**
**Mini-CEX: mini-clinical evaluation exercise**
**DOPS: direct observation of procedural skills.**

Miller & Archer BMJ 2010;341:c5064
Evidence 2: Audit and Feedback


- Median 4.3% increase in compliance (IQR 0.5% to 16%)
- A&F is more effective when combined with
  - Explicit targets and an action plan
- In addition,
  - the target was prescribing
  - the source was a supervisor or colleague
  - it was provided more than once
  - it was delivered in both verbal and written formats

Thanks to Susan Michie, UCL
Self-regulation (control) Theory: Carver & Scheier, 82

GOAL

Compare behaviour with standard

Discrepancy noted

No discrepancy – goal reached

Disengage from goal

Act to reduce discrepancy

GOAL/STANDARD-SETTING

ACTION-PLANNING

FEEDBACK

Thanks to Susan Michie, UCL
The COM-B system: Behaviour occurs as an interaction between three necessary conditions

- **Capability**: Psychological or physical ability to enact the behaviour
- **Motivation**: Reflective and automatic mechanisms that activate or inhibit behaviour
- **Opportunity**: Physical and social environment that enables the behaviour

Michie et al (2011) *Implementation Science*
• **Opportunity**
  – Alcohol hand rub beside every bed

• **Motivation**
  – Persuasive posters
  – Encouraging patients to ask

• **Capability**
  – No intervention
Capability

• Nurses have the capability to clean their hands
  – But not to
    • pay attention to this behaviour over other competing behaviours
    • develop routines for noticing when the behaviour does not occur, and plans for acting in future
  • Train staff to set goals, observe their behaviour, develop action plans on the basis of feedback
    • Developed at UCL, based on behavioural theory
MONTHLY FEEDBACK INTERVENTION
Co-ordinated by infection control team

- Individual level component
- Group level component

Observe two staff member’s behaviour for 20 minutes
Give immediate verbal feedback
*Full compliance* = certificate for use at staff appraisal

OR

< full compliance = immediate goal-setting and action planning regarding observed non-compliance & repeat observation next month

Observe one group of staff members for 20 minutes
Feedback displayed, and given at ward meeting
Praise for compliance

OR

< full compliance = ward level goal-setting and action planning regarding observed non-compliance/s
BSAC Spring Meeting 2014
Antimicrobial stewardship in human & animal health
Thursday 20 March, RCP, London

• No action about us without us –importance of driving professional behaviour change in successfully implementing new technologies and stewardship strategies

• Professor Susan Michie, Health Psychologist, University College London, London
Evidence 3: New Approaches

- Spaced education
- In-situ simulation
Spaced Education:

- Grounded in the spacing and testing effect
- Short, case-based questions are emailed to participants in a repeating pattern over the period of the program
- Participants are required to retire questions by answering them correctly twice
- Participants are provided with succinct feedback and links

Thanks to Tim Shaw, UoS
VA Spaced Ed PSA trial
Primary Care Physicians

Percentage of Inappropriate PSA Screening

Controls

Interactive Spaced Education

p = 0.041 overall
p = 0.018 for trend

Thanks to Tim Shaw, UoS
Weeks
3 6 9 12 15 18
Percentage of Inappropriate PSA Screening
0
6
8
10
12
14
16
Control Cohort
Time vs Cohort 1 - Interv
Interactive Spaced Education
Controls
0 18 36 54 72 90
p=0.018 for trend
p=0.041 overall
108
USPSTF Statement

谢谢Tim Shaw，UoS
You have been paged to OR 4 to assist a colleague as she has to urgently leave to attend another case as she is the senior surgical resident in attendance. She asks that you start the arterial line on her next patient. As your friend begins to leave she tells you that the site is prepped and draped with all the necessary supplies open and waiting for you.

What should you do next (more than one answer may be correct)?

Choose all that apply

- [ ] Decline to place the arterial line
- [ ] Go ahead and start the line
- [ ] Ask your friend for a formal hand-off on the patient
- [ ] Verify the patient needs an arterial line
- [ ] Verify the patient ID
- [ ] Verify the correct procedure site

Thanks to Tim Shaw, UoS
### Choices

<table>
<thead>
<tr>
<th>Your Choice</th>
<th>Answer Key</th>
<th>Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Decline to place the arterial line</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Go ahead and start the line</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ask your friend for a formal hand-off on the patient</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify the patient needs an arterial line</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify the patient ID</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify the correct procedure site</td>
<td>25%</td>
</tr>
</tbody>
</table>

**Total**

100% (N = 595)

This question will be resent on 06/14/10

### Explanation

**Take home message**

Regardless of the situation, it is always vital to do a proper hand-off and personally ensure you are performing the correct procedure on the right patient in the right site.

Any patient hand off should be interactive and you should try and minimize interruptions. While this may seem like an implausible concept on a busy hospital floor, there are ways you can minimize interruptions and systems can be put in place to facilitate this.

Before any procedure you need to go through the correct time out or verification process to ensure you have the right patient and right site as well as all the correct documentation and equipment.

**What actually happened?**

In this real life scenario, the resident did just insert the arterial line, when he removed the sterile drapes he saw that the surgeon had marked that arm for surgery. Since the surgeon was going to be using a tourniquet during the procedure, a new arterial line had to be put in on the other side. This was a wrong site procedure that should have been prevented, and a Serious Reportable Event (SRE) that must be reported to the Massachusetts Department of Public Health.

As a doctor you are constantly being put in pressure situations where the easiest thing to do is not always the safest thing to do.

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Thanks to Tim Shaw, UoS
• Testing with medical students in Dundee via University accounts
• Whitelisting Qstream emails for receipt by NHS Mail accounts
In-situ Simulation

Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 3: Performance and Tools)
Edited by Kerm Henniksen, PhD, James B. Battles, PhD, Margaret A. Keyes, MA, and Mary L. Grady, PhD.
Rockville (MD): Agency for Healthcare Research and Quality (US); August 2008.
Publication No. 08-0043-3
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Excerpt
The articles in this volume provide a number of perspectives on performance and tools used to improve the safe delivery of health care. They include a wide variety of approaches that underscore the importance of teamwork and communication, the incorporation of human factors and ergonomic principles, and the use of various tools and best practices that steer us in the direction of more accurate, increasingly reliable, and safer health care delivery.

Contents

Reviews
In Situ Simulation in Continuing Education for the Health Care Professions: A Systematic Review

Michael A. Rosen, PhD; Elizabeth A. Hunt, MD, MPH, PhD; Peter J. Pronovost, MD, PhD; Molly A. Federowicz, MA; Sallie J. Weaver, PhD

In-situ Simulation, Paediatrics, Dundee

Time to First Antibiotic Dose in severe sepsis

% drug prescriptions with at least one error

Serious Harm Index
CMO Configurations for In-situ Simulation

<table>
<thead>
<tr>
<th>Context</th>
<th>Mechanisms</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| • Institutional funding for in situ evaluation  
• Policy supporting in situ evaluation  
• Physical environment  
• Setting for team involvement | • Which teams are involved  
• Level of involvement  
• What procedures are in place to increase the likelihood of success  
• Engagement throughout the research study  
• Long-term involvement  
• Training and support for team members and for facilitators  
• Linking involvement to improved teamwork and communication | • Reduction in harm due to undetected or untreated deterioration  
• Reduction in harm due to failures associated with medicines  
• Reduction in harm associated with failures in multidisciplinary team communication |

Thanks to Suzanne Grant & Evie Fioratou, Dundee
Conclusions

• Competence ≠ Capability
  – Weak evidence that current workplace based assessments change behaviour
  – Strong evidence that feedback, goal setting and action planning increase capability and change behaviour

• Spaced Education and In-situ Simulation are promising new interventions

• Realist evaluation will enable understanding of links between context, mechanisms & outcomes
Related Presentations at FIS

Wednesday 13 November
09.15-10.15 Hall 1
Cultural determinants of infection control behaviour: understanding drivers and implementing effective change  Michael Borg

1100 - 1230 , Hall 1
Concurrent session 1: Antimicrobial stewardship - could do better!
Better social science - Esmita Charani
Better engagement with clinical teams - Emma Donaldson & Imran Qureshi

1500 - 1600 , Hall 3, Free Paper Session
The antimicrobial prescribing experiences of foundation doctors: a qualitative study across two hospital settings.  Karen Mattick
Urinary Catheters How to Reduce Catheter Related Infections through education and data collection Daniel Rowbotham
Thanks for listening

• Questions?