Standardization versus adaptation for patient safety: a lesson learnt from three scabies outbreaks

Sheuwen Chuang, CEO
Health Policy and Care Research Center,
Taipei Medical University, Taiwan
sheuwen@tmu.edu.tw
A story of three scabies outbreaks in Respiratory Care Wards (RCW)

Density of Infection%

25.0

20.0

15.0

10.0

0.0

2007/ Aug

2008/Nov

May/31/2012

1,161 days apart, no suspected cases of scabies occur. Keep monitoring.
The setting

• A respiratory care wards (RCW) with 60 beds in a Taiwan regional hospital.

• At the third outbreak (2008 – 2009), the occupancy rate was 83.4% per month.

• Total workforce in the RCW consisted of 4 doctors, 18 nurses, 21 personal care assistants, 3 respiratory therapists and one full responsible infection controller.

• All patients were on prolonged mechanical ventilation (PMV), over age 60 and disabled
Context

Disease

• Scabies is not a notifiable disease in Taiwan.
• Institutional scabies outbreaks in health care settings are underreported.
• Scabies outbreaks are common in long-term care and nursing homes around the world.
• Scabies is a significant source of morbidity to residents in nursing homes and among debilitated and immune-compromised patients in hospitals because of its highly contagious nature.
Context

Quality of life
. Scabies is additional suffering for patients on PMV whose quality of life is already very low.

Financial burdens
• Scabies is associated with a considerable working and economic burden including prolongation of hospitalization, ward closures, patient’s treatment, laundry, and environmental disinfection procedures, and extra staffing.
• Patients on PMV are increasing in the last ten years in Taiwan.
• Average of health expenditure of patient on PMV has been the highest burden for the National Health Insurance (NHI) system in Taiwan.
• Several revisions of NHI’s payment scheme for the patients on PMV were made in order to control the increasing financial burdens.
Story of the three scabies outbreaks

Prevention, Treatment, Investigation

Disturbance 1: An infected scabies visitor came to see a patient

Disturbance 2: Diagnosis of a crusted scabies patient was missed

Disturbance 3: After two separate reports a patient with skin condition like scabies was isolated for two weeks then moved back to a regular room because scabies was not confirmed.

P1: Pre-established prevention activities (A guideline for controlling scabies infection)

P2: P1 plus an amendment in self-declaration of visitors’ skin condition

P3: amendment and integration of prevention and treatment for controlling scabies infection and outbreak

T1: Pre-established treatment

T2: T1 plus the required isolation period of 14 days for a suspected patient

T3: T1 plus extending isolation time from 14 days to 21 days and then to 2 months

RCA

RCA

RCA

SOEA
Two event investigation methods

• Root Cause Analysis (RCA)

• System Oriented Event Analysis (SOEA)
Root Cause Analysis

Adverse Event

WHAT happened?

WHY did it happen?

Why did that happen?

ACTION?

〈system factors〉

Incidents

prevention

System improvement

ETTO concern
System Oriented Event Analysis model

Establishment of system concept

1. Describe system boundary
2. Classify system components

Hazard Management

3. Identify hazards in and between system components
4. Evaluate hazards
5. Construct system-wide causal maps
   (Steps 2, 3, 4, 5 generate worksheet #1)

Control

6. Organize system hierarchy
7. Decide and align control activities between levels
   (Step 7 generates worksheet #2)

Multiple events analysis

Alignment of control activities across organization levels

Evaluation & communication of risks, alignment of risk controls

patient-centered operational thinking to establish systems concept
Patient-centered operational thinking to establish a system concept
System-wide causal map to link the interrelations between systems

Subsystem 1 → Hazard 1 → O1: Due to behavior of operating component in operational level → C1: No or inadequate policy/rule/working procedure made in different management levels/governance → M1/G: Due to behavior of higher level operating component (management/governance) → Hazard 2

Subsystem 2 → Hazard 1 → O2: Due to behavior of operating component in operational level → C2: No or inadequate policy/rule/working procedure made in different management levels/governance → M2/G: Due to behavior of higher level operating component (management/governance) → Hazard 2

Subsystem 3 → Hazard 2

Subsystem N → Hazard X → Ox: Due to behavior of operating component in operational level → Cx1: No or inadequate policy/rule/working procedure made in different management levels → Mx/G: Due to behavior of higher level operating component (management/governance)
System hierarchy for synthesis and communication

(Hitchins, 1992)
# Event-Map of the third scabies outbreak

<table>
<thead>
<tr>
<th>RC 22 (room 22)</th>
<th>Dirty equipment room</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC20</td>
<td>Ward kitchen</td>
</tr>
<tr>
<td>RC18</td>
<td>Nursing Station</td>
</tr>
<tr>
<td>RC16</td>
<td></td>
</tr>
<tr>
<td>RC12</td>
<td></td>
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<tr>
<td>RC10</td>
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<td>RC08</td>
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<tr>
<td>RC06</td>
<td></td>
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<tr>
<td>RC02</td>
<td></td>
</tr>
<tr>
<td>Bath room</td>
<td></td>
</tr>
<tr>
<td>Seminar room</td>
<td></td>
</tr>
<tr>
<td>Nursing Station</td>
<td></td>
</tr>
<tr>
<td>Change Room</td>
<td></td>
</tr>
<tr>
<td>RC01</td>
<td></td>
</tr>
<tr>
<td>RC03</td>
<td></td>
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<tr>
<td>RC05</td>
<td></td>
</tr>
<tr>
<td>Ward kitchen</td>
<td></td>
</tr>
<tr>
<td>Dirty equipment room</td>
<td></td>
</tr>
<tr>
<td>RC26</td>
<td></td>
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<tr>
<td>RC28</td>
<td></td>
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<tr>
<td>RC30</td>
<td></td>
</tr>
<tr>
<td>Toilet</td>
<td></td>
</tr>
<tr>
<td>Main Gate</td>
<td></td>
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<tr>
<td>Main Gate</td>
<td></td>
</tr>
<tr>
<td>Machine Room</td>
<td></td>
</tr>
<tr>
<td>RC11</td>
<td></td>
</tr>
<tr>
<td>RC09</td>
<td></td>
</tr>
<tr>
<td>RC07</td>
<td></td>
</tr>
</tbody>
</table>

**Report date:**

1. A: Sep/04/2008
2. A: Sep/26/2008
4. A: Nov/04/2008
5. B: Nov/15/2008
6. C: Dec/03/2008
7. D: Dec/21/2008
8. E: Dec/22/2008
15. L: Feb/20/2009

**Note:** өA is the index case
Clinical consultation system

**H0-3**: Diagnosis of an index case was missed in time

**H10**: Patient with red papules was not isolated

**H9**: Patient with red papules removed from isolation into a regular room

**F1**: Patient was disable to react properly to scabies infection

**O3**: Doctor in charge diagnosed the patient with red papules as an eczema patient

**O3**: Doctor in charge gave order to release the patient form isolation

**C9**: For patients on PMV, nursing care and personal care should secure patient's conditions

**C5**: For this kind of patient, existing guideline did not request for contact isolation

**C6**: For a Norwegian scabies patient, the existing guideline asked for 14 days quarantine.

**M1**: Head nurse audits PCA’s daily work and reports patient’s status

**G1**: Infection Control Committee redesigns the existing guideline for an adequate description of contact isolation and release from isolation
System hierarchy: System-in-focus

RCW scabies control system

Clinical consultation system (H9, H10)

Ward nursing care system

Ward cleaning and sterilizing system

Personal care system H5, H6, H2
## Major recommended risk controls

<table>
<thead>
<tr>
<th>Method</th>
<th>Hazards discovered</th>
<th>Major recommended risk controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st outbreak</strong> RCA</td>
<td>H0-1, H0-2 (disturbance 1)</td>
<td>➢ Nursing department requested visitors to report their skin condition in a self-declaration form.</td>
</tr>
<tr>
<td><strong>2nd outbreak</strong> RCA</td>
<td>H0-3, H9, H10, H11 (disturbance 2)</td>
<td>➢ Patients who is suspected to be scabies infected can be isolated for one week and treated with anti-scabies medicine.</td>
</tr>
</tbody>
</table>
| **3rd outbreak** RCA | H0-3, H9, H10, H11 (disturbance 3) | ➢ Suspected patients to be isolated for two weeks and to take preventive medicine.  
➢ Patients with Norwegian scabies to be isolated for two months.                                                                                               |
| **3rd outbreak: SOEA** | H1 ~ H8, H9, H10, H11, H12 (disturbance 2 & 3) | ➢ Four subsystems: physician consultation system, ward nursing care system, personal care system, and ward cleaning and sterilizing system were identified for improvement in an integrated structure across both horizontal and vertical levels  
➢ Isolation period to be adjusted by the doctor-in-charge according to patient’s condition                                                                          |

SOEA: System Oriented Event Analysis
Results

Density of Infection %

25.0
20.0
15.0
10.0
5.0
0.0

180 days apart

270 days apart

15.9

20.7

1,161 days apart, no suspected cases of scabies occur. Keep monitoring.

May/31/2012
Past, current and future

**RCA**
- Policy changes
- New procedures
- “Fixes” for RCA “Causes”

**SOEA**
- Integrated prevention activities with adaptive treatments for controlling scabies infection and outbreak
- Workers understand the hazards and developed a new approach to dealing with the hazards

Doctor blame nurse
Nurse blame doctor
Nurse vs doctor

270 days
180 days
1,161 days
Time
Lesson learnt – 1/3

1. People expect P&P (policies & procedures) to make patient safe. They are wrong.

2. The hospital had safety system based on RCA that did not improve safety. RCA did not point out organizational factors. Including the organizational factors shows how the system weakness allowed outbreak to occur.
Lesson learnt – 2/3

3. SOEA can help create a common ground for collaboration between clinicians.

4. The use of SOEA led to system adaption. Adaptation needs collaboration between clinicians in the system. Doctor, nurse, and personal care assistance share responsibilities for detecting and acting on the threat of scabies.

5. The SOEA is valuable for system thinking and increase of adaptive capacity for a health care system.
Question 1. Do you want to call the new system resilient?
Patient safety: incidents reporting

Reporting rate: number of reports occurring between April 2008 to September 2008, per 100 admissions, in Acute teaching trusts

The graph above shows the rates of reported patient safety incidents per 100 admissions for each organisation during the period 1 April 2008 to 30 September 2008. The black bar represents the data from this organisation. There are 27 organisations in this group (see www.npsa.nhs.uk/organisation-categories for a list of organisations).

66%: no harm, 27%: low harm, 6%: moderate harm, 1%: severe harm
Patient safety - Types of incidents

- Serious injury: 1
  - Event investigation
  - System resilience
  - Resilience Engineering
- Minor injuries: 10
- Property Damage / loss: 30
- Incidents with no visible injury or damage: 600

Bird’s Theory
Question 2: if there are more opportunities to learn from “incidents”, how do we learn and improve system resilience from them?