Establishing proof of concept for a tablet-based staff training tool to help in the prevention and control of healthcare associated infections (HAIs)

The Glasgow School of Art
Robert Gordon University, Aberdeen
NHS Grampian
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Arts and Humanities Research Council

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overview of presentation

1. Outline of the issues
2. The initial Visualising the Invisible (VisInVis) project
3. visionOn: a tablet-based visualisation tool for training staff re healthcare associated infections (HAIs)
4. HAIVAIRN: Healthcare associated infection visualisation and ideation research network

context: hospital service ecosystem

people - doctors, nurses, cleaning staff - their everyday roles and tasks – plus patients & visitors

pathogens - norovirus, C diff, MRSA - location, survival, transmission

environment - nora
hospital beds, bedside areas, curtains, taps, toilets, flooring ..; soft - air currents, humidity, temperature ..
The issues

- Pathogens under normal circumstances are invisible. How do people (hcws) conceive of pathogens within the context of clinical practice?
- Use of visuals in IPC often taken for granted. Very little systematic R&D
- Much opportunity for the development of more dynamic visualisations to explain and educate e.g. to convey new microbiological data on risk-in-context such as hand touch sites and pathogen transmission
- Much opportunity for related evaluation of what works and how in particular contexts
- Tablet-based computers are convenient and now commonplace

the visualising the invisible study

Phase 1: (see poster T10)

- If “seeing helps believing”, can dynamic approaches to visualisation help us to prevent and control HAIs?
- Do healthcare workers envisage pathogens in their own mind’s eye when they go about their work?
- What current ways of representing pathogens and their consequences are most meaningful to these workers?
- How might visualisations best convey new data such as who touches what, and what grows there?
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**design**

- Phase 1: Workshop 1 exploring these issues with 12 healthcare staff and 2 patient representatives (also pilot with 6 nurses/midwives)
- Phase 2: development and evaluation of visualisation prototypes (over 200 healthcare staff)

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**moving forward**

**Vis-Invis**: Recommendation: “Further development of the concept prototypes for staff training would be beneficial if the visualisations could be augmented with specific training information and scenarios centred around the prevention of HAIs.”
visionOn: a tablet-based visualisation tool for training staff in healthcare associated infections (HAIs)

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using visualisation

Could a visually-oriented interactive tool raise awareness of location, survival and transmission of pathogens in the ward environment and assist training in IPC across job roles by reinforcing the ‘why’ behind IPC procedures?
3 stage co-development process

- **Stage 1**: Mock-ups
- **Stage 2**: Prototypes
- **Stage 3**: Prototypes

**Key themes**

- Pathogen location
- Pathogen survival
- Pathogen transmission

- MRSA
- Norovirus
- *C. difficile*

**Intervention**

- Without cleaning
- With cleaning
3 stage co-development process

stage 1 mock-ups
(n=30)

stage 2 prototype
(n=18)

stage 3 prototype
(n=102)

(N=150)
1. Different pathogens have different survival times within the ward environment depending on whether adequate cleaning has taken place.
2. Pathogens are invisible to the naked eye so the ward can appear ‘clean’ but may not be.
3. At 24 hours after cleaning a surface, the microbial level can grow and return to the pre-clean levels.

Example - pathogen survival:
- Relevant to each pathogen type and risk to patient.
- More detail only if required.
### 3 stage participative process

<table>
<thead>
<tr>
<th>Stage</th>
<th>Lanarkshire</th>
<th>Grampian</th>
</tr>
</thead>
<tbody>
<tr>
<td>workshop 1</td>
<td>N = 10</td>
<td>N = 3</td>
</tr>
<tr>
<td>workshop 2</td>
<td>N = 9</td>
<td>N = 4</td>
</tr>
<tr>
<td>Evaluation</td>
<td>N = 4</td>
<td>N = 16</td>
</tr>
<tr>
<td>Stage totals</td>
<td>N = 24</td>
<td>N = 30</td>
</tr>
<tr>
<td>Overall total</td>
<td>N = 150</td>
<td></td>
</tr>
</tbody>
</table>

- A. Pathogen Location
- B. Pathogen Survival
- C. Pathogen Transmission
initial findings

- Visualisations were engaging and supportive of different learning styles
- Offered staff a new perspective on pathogens, being able to 'see' them contextualised in the virtual ward, making them seem more real
- Information relevant for different staff cohorts, with a mix of experience levels
- Increased participants' awareness about pathogens by explaining 'why' (through dynamic visuals and information) IPC procedures should be followed
- Reinforced understanding of how HAIs occur

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Likert scale data (total)

<table>
<thead>
<tr>
<th>All Participants (N=102)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information relevant for job role</td>
</tr>
<tr>
<td>Information at an appropriate level</td>
</tr>
<tr>
<td>Information communicated clearly</td>
</tr>
<tr>
<td>Visuals helpful to understanding</td>
</tr>
</tbody>
</table>

- A: Strongly Agree  - B: Agree  - C: Neutral  - D: Disagree  - E: Strongly Disagree
Will the tool help improve adherence to IPC protocols?

- Awareness ✓
- Understanding ✓
- Adherence?
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HAIVAIRN (see Poster M9)

Healthcare associated infection visualisation and ideation research network
2016 – 2018 (AHRC funded)

How can we better address the problem of healthcare associated infections (HAIs) through visualisation-related ideation and applications?

Widening out interdisciplinary involvement and collaboration

See gateway website for more information on all these projects: http://visionon.org

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acknowledgements

This programme of work has been funded through a series of grants from the Arts and Humanities Research Council. We would like to gratefully acknowledge this support as well as the collaboration and support from staff in our partner organisations in these various projects.

- **visinvis** AHRC/SFC Knowledge Exchange Programme: A Healthier Scotland HR 05032
- **visionOn** AHRC Follow-on Fund for Impact and Engagement AH/M00628/1
- **HAIVAIRN** AHRC Network Grant AH-N006429/1