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# Visualisation-centred interventions in the healthcare-associated infections field: an integrative review



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**Kostas Tsattalios**, Dr Colin Macduff, Dr Audrey Stephen and Dr Sarah Henderson

School of Nursing and Midwifery  
Robert Gordon University, Aberdeen, UK

Australasian College for Infection Prevention and Control  
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# Agenda

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- **Background**
  - Healthcare-associated infections: *what is known?*
  - Current interventions: *what is done thus far?*
  - Importance of visualisations and their application: *why does it matter?*
- **Methods**
  - Integrative literature review
- **Results**
  - Visual mapping and some examples
- **Conclusions**
  - Implications and next steps



# Healthcare-associated infections (HAIs) at a glance

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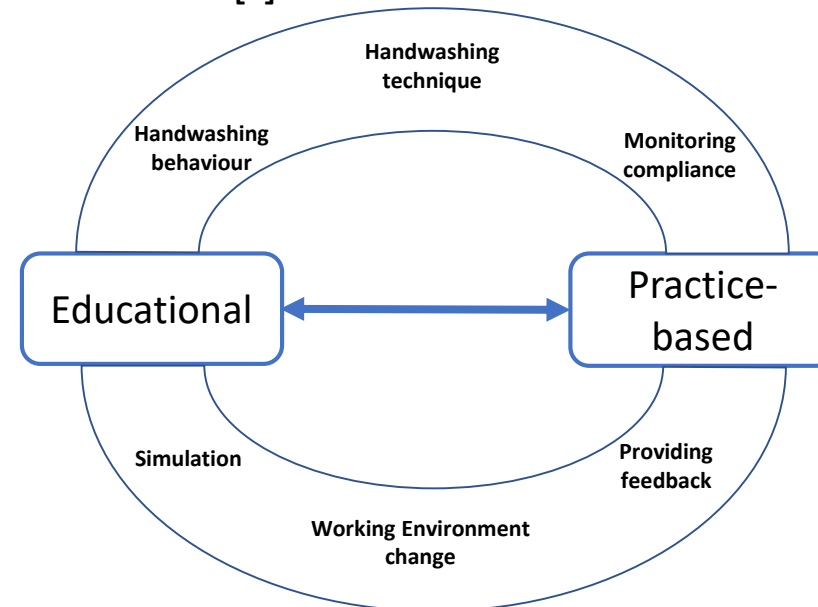
- HAIs remain a significant and challenging public health problem worldwide affecting patients, healthcare staff and the healthcare system [1]
- In 2011, there were an estimated 722,000 HAIs in U.S. acute care hospitals leading to about 75,000 patients with HAIs dying during their hospitalizations [2]
- In Australia, as per 2017, there are more than 80,000 HAIs per year – a number that might be “optimistic” and not truly representative [3]. The total economic burden is close to \$1 billion per annum [4]
- *Centers for Disease Control and Infection*: when staff are aware of infection problems and take specific steps to prevent them, HAIs rates can decrease by more than 70 % [2]



# Current interventions



- Most targeted at healthcare staff – improving hand hygiene is considered to be the single most effective intervention to reduce HAIs [5]



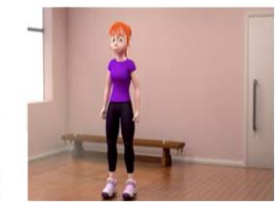
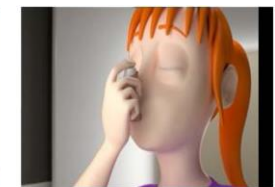
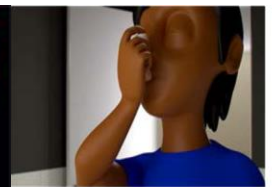
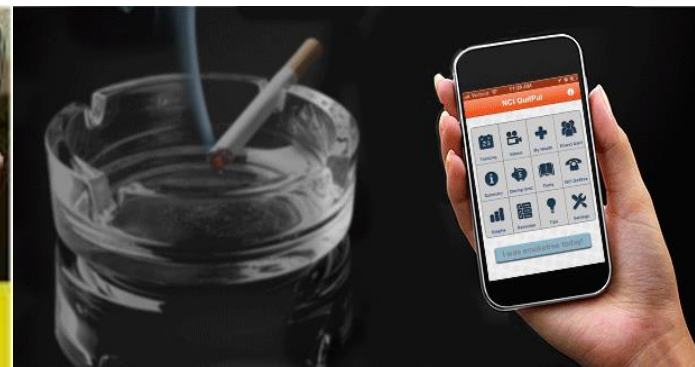
- Many of these interventions do implement visualisations but their selection is not always clearly contextualised and justified.
- Only limited number of, and wide in scope in depth reviews exist (e.g. hand hygiene [6]) without any explicit focus on the use of visualisations.

# Visualisations: *why does it matter?*



- Have been substantially and centrally used in many healthcare-related interventions: obesity [7], physical activity and eating behaviours [8], increasing positive emotion [9], breast cancer [10], asthma and physical activity [11].
- More emotionally evocative and memorable than verbal messages: might be crucial in guiding health information responses.
- Part of video-assisted interventions, mobile apps, poster-based campaigns, visual reminders and cues, mental imagery related interventions...
- Targeted at promoting behaviour change!

Stroke - Act F.A.S.T



# Visualisation approaches to HAIs: towards behaviour change of healthcare professionals' practice



- **PhD work:** “Developing recommendations for behaviour change interventions in the 'healthcare-associated infections' field: the role of theory and visualisations”
- **4 phases:**
  - Integrative review 1: theory
  - Integrative review 2: visualisations
  - Delphi study
  - Focus groups with nurses and nursing students

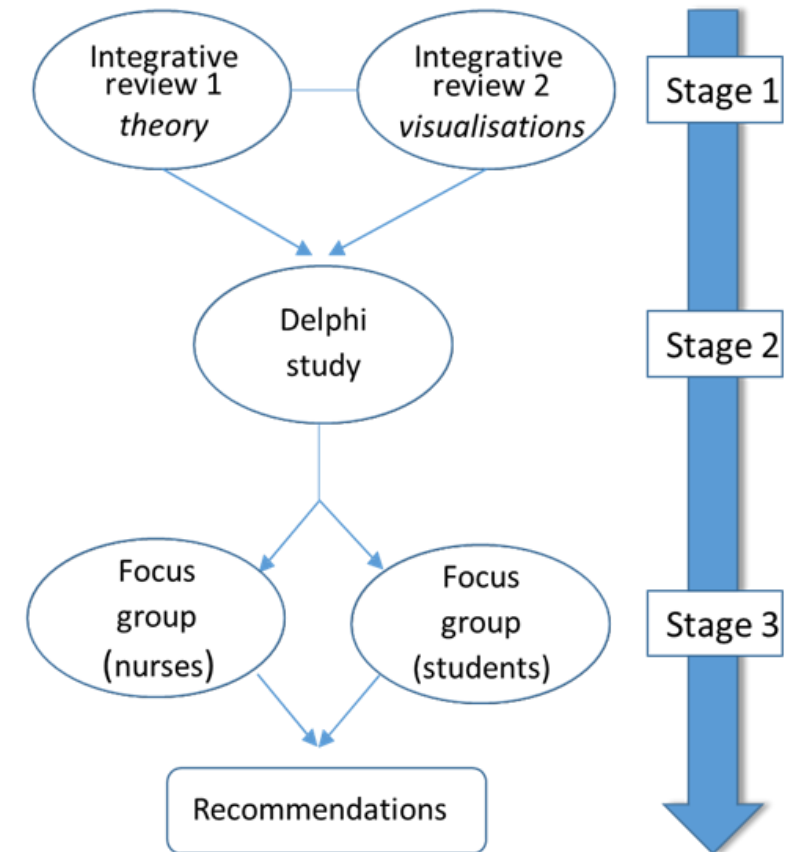
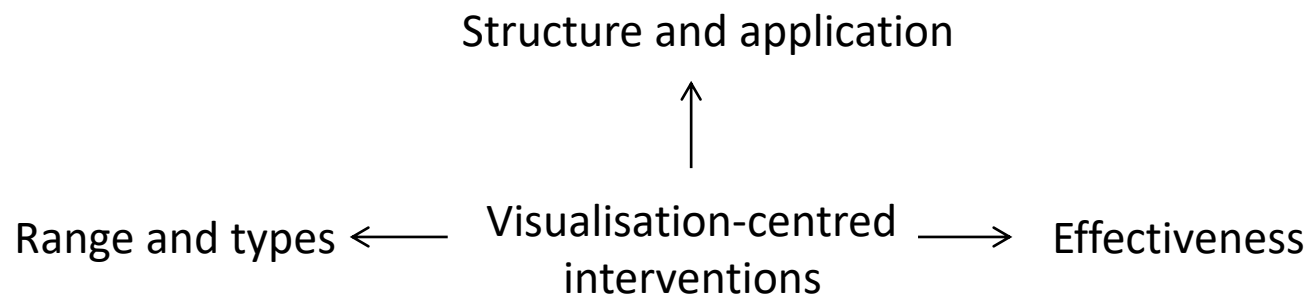


Figure 1. Stages of current PhD project

# Operational definition

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## Visualisation:

*“the creation and/or deployment of **visual artefacts** (such as static or dynamic imagery), and/or the stimulation of guided mental imagery, used as the **central, substantive focus** of an **evaluated intervention** within education, practice development/quality improvement or research in order to prospectively and **positively influence healthcare staff** to prevent and control healthcare associated infections (excluding visual artefacts used primarily for purposes of microbiological detection or surveillance, and written text based artefacts without a central focus on substantive integral visual imagery).”*

- Captures the nature of included visualisation-based interventions
- Developed by the team and adjusted to the aims of the review
- Very broad existing definitions outwith the HAIs context



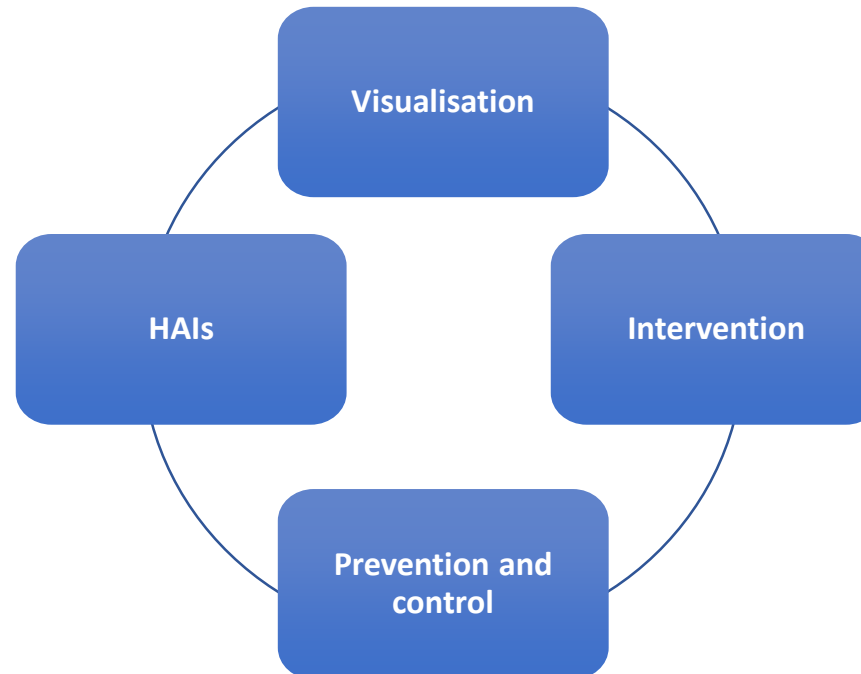
# Visualisation-centred interventions - *methods*



- Use of 5-stage integrative review method (Whittemore & Knafl, 2005):

1. Problem identification
2. Literature search
3. Data evaluation
4. Data analysis
5. Presentation

- Key search terms combination:



- Databases search (from 2007 onwards):

Web of Science

EBSCO (AMED, Art & Architecture Source, CINAHL, MEDLINE,

PsycARTICLES, ERIC, American Doctoral Dissertations, SocINDEX SPORTDiscus)

# Visualisation-centred interventions - *methods*

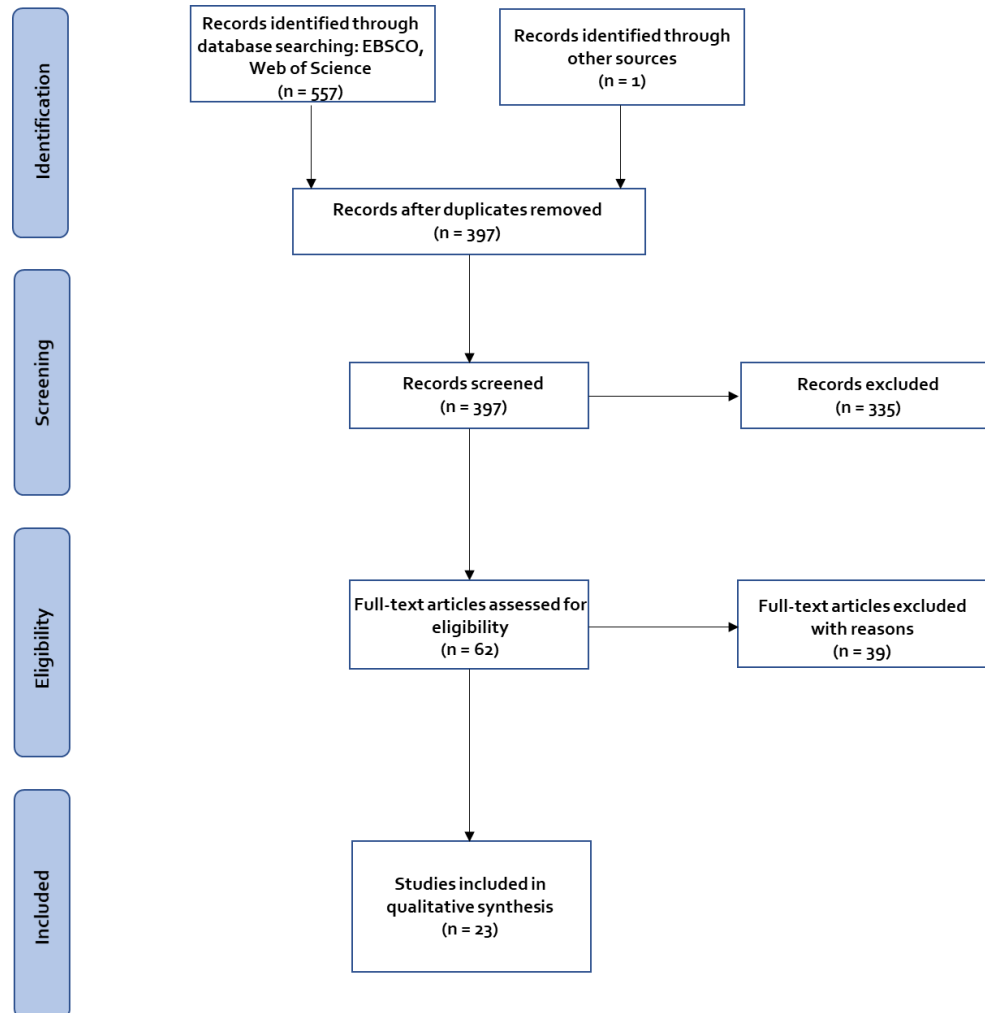


**Table 1. SPIO\* inclusion and exclusion criteria**

	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Study design</b>	Any study with qualitative, quantitative and/or mixed-methods designs	Conference proceedings, discussion paper, unpublished work and non-English language literature
<b>Population</b>	Healthcare staff; ancillary staff; academic staff/ student population from health-related disciplines	The studied population comprises patients, visitors and/or policy makers only; the setting is not related to the hospital/healthcare and/or university/educational environment
<b>Intervention</b>	The reported visualisation/s are the central and substantive focus of the evaluated intervention within a hospital clinic/unit/department or an educational setting	Less than 50% use of visualisations; the visualisations are used primarily for purposes of microbiological detection or surveillance
<b>Outcomes</b>	Staff awareness and knowledge, intention to change behaviour, reported/observed behaviour change, HAIs rates, measures and proxy measures of infection.	

\*Note: SPIO framework is adopted from Richardson *et al.* (1995) and is similar to PICO framework

# Visualisation-centred interventions - *methods*



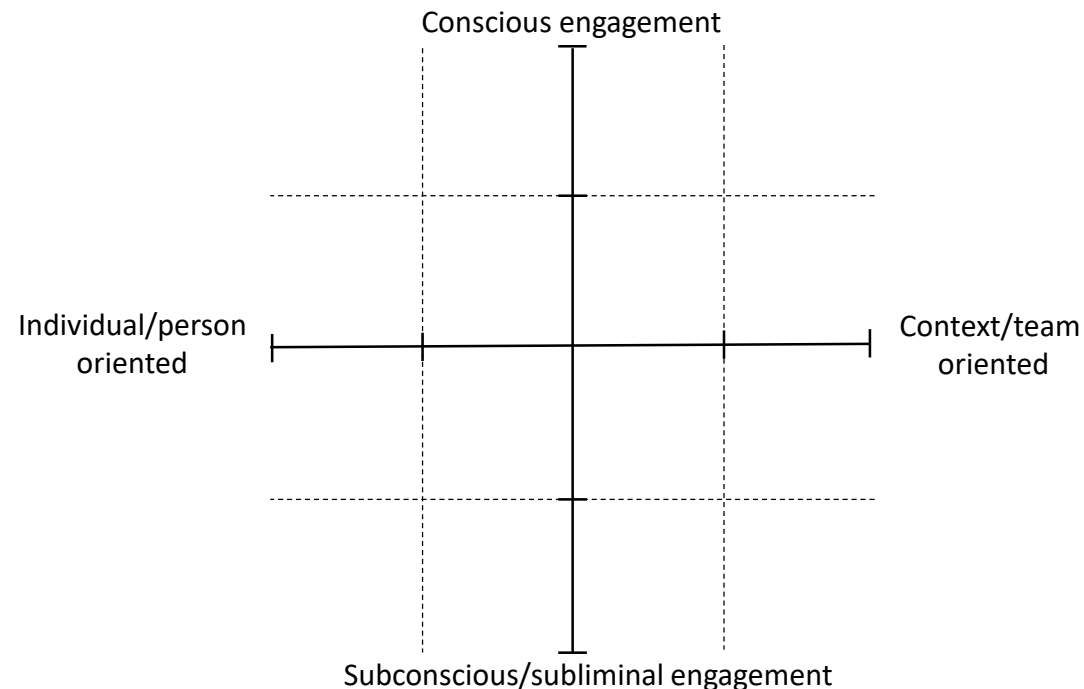
**Figure 1.** Prisma flow diagram-search phase results.

- Use of 3 quality appraisal tools (CASP, QATSDD and QI-MQCS ) to capture the diversity of included studies.
- Two independent reviewers for screening of studies for final selection and four independent reviewers for quality appraisal.
- Data extraction form

# Visualisation-centred interventions - *findings*

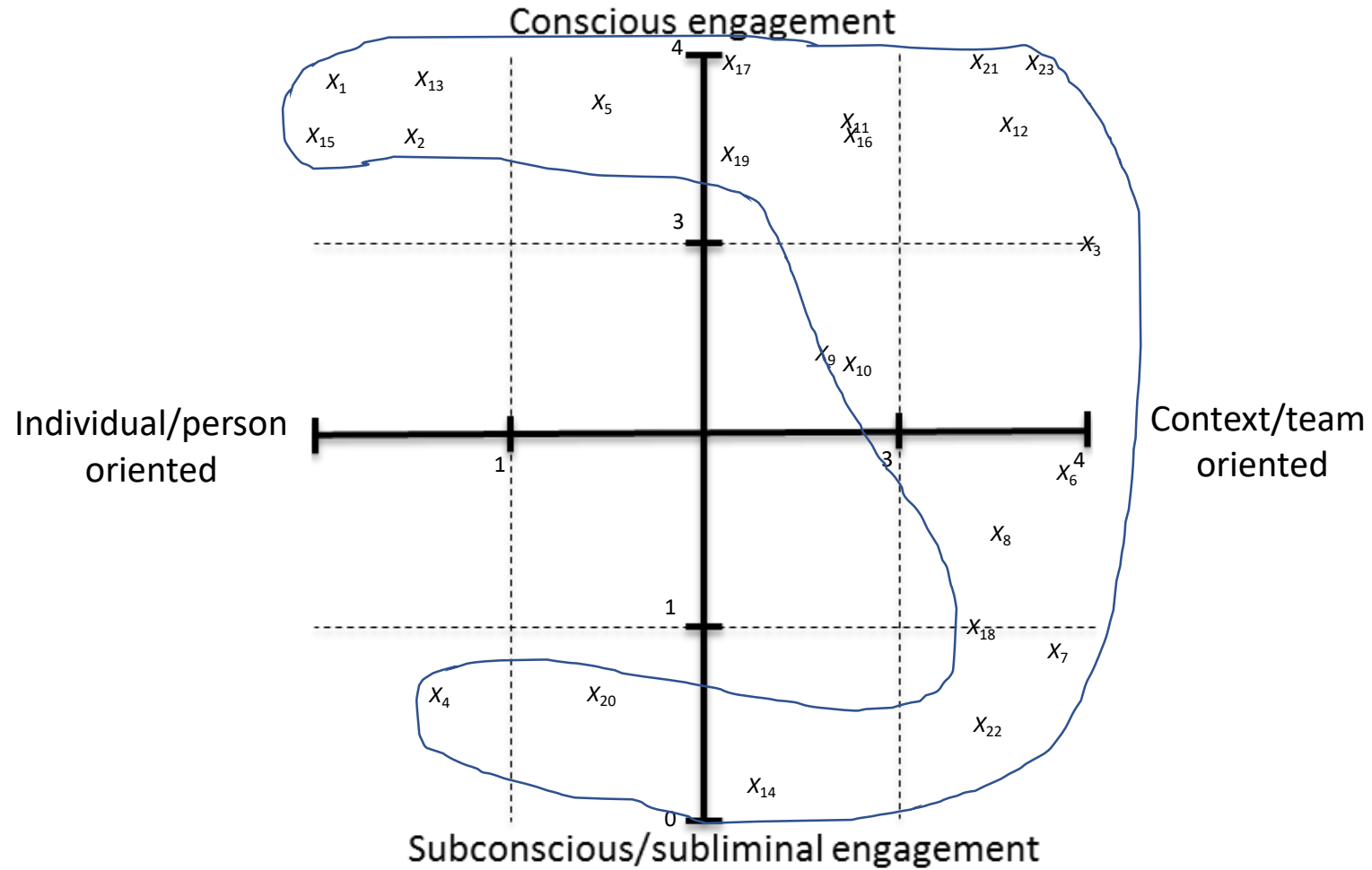


- 397 initially identified studies – 23 finally included
- Use of a 'pre-qualification' system emerged from piloting initial results:
  - Model case 1= subconscious intervention/engagement – not overt
  - Model case 2= conscious engagement with intervention, but none or unclear if additional feedback given to participants
  - Model case 3= as above but with feedback given to participants
- The above system then formed the basis to graphically depict the findings:



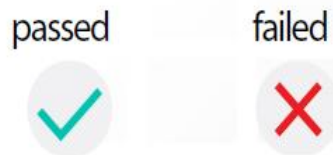
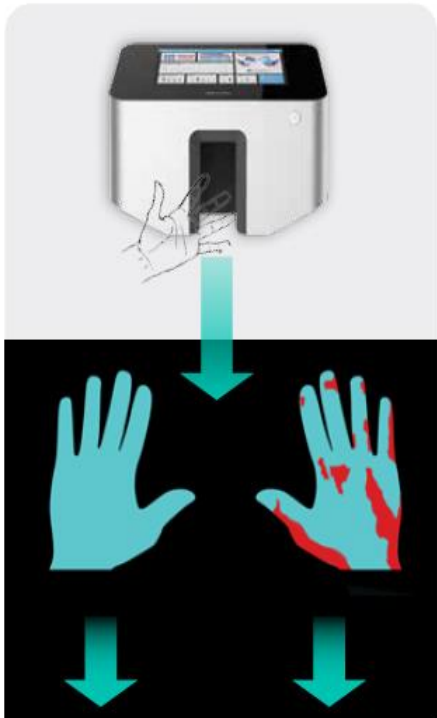
Horizontal axis: orientation of intervention  
Vertical axis: level of engagement

# Mapping modes of orientation and engagement for 23 visual interventions

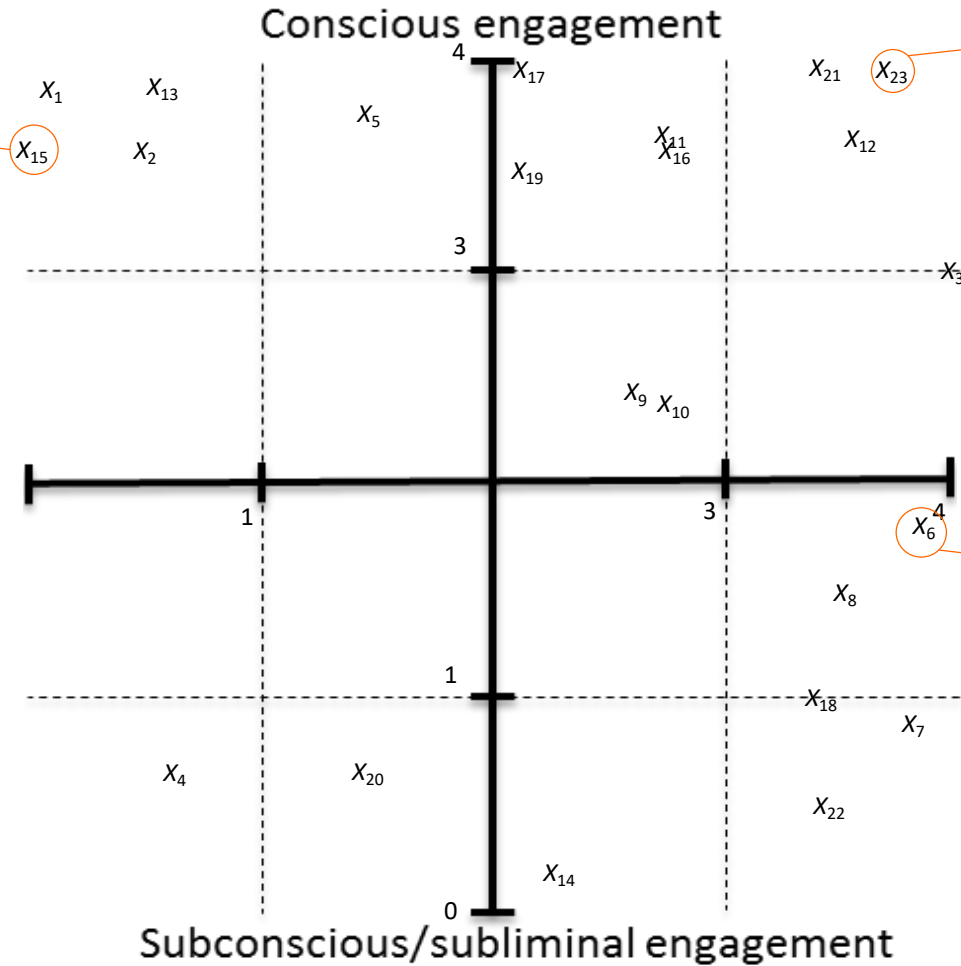


# Some examples

**Lehotsky et al. (2015):** focus on providing personal feedback on hand hygiene technique adopting primarily a rational-empirical change approach



Individual/person oriented



**Wyer et al. (2017):** Video reflexive ethnography where conscious normative-re-educative change approach is followed



Context/team oriented

**Nevo et al. (2010):** manipulation of environmental cues at liminal/subconscious level to improve hand hygiene compliance: power-coercive change approach

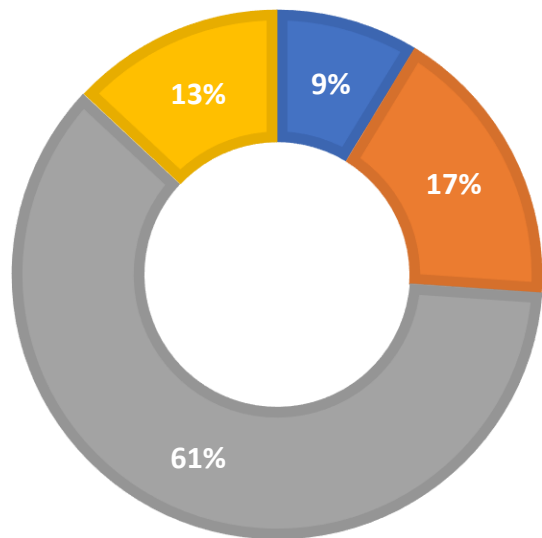


# Visualisation-centred interventions - *findings*



## QUALITY

■ High ■ Good ■ Moderate ■ Poor



- Quality of study designs: majority of **moderate quality**.
- **Improving handwashing compliance** was the most common outcome of the included interventions. Interventions targeted also at improving handwashing technique, promoting the use of hand gel, increasing IPC-related understanding and awareness and hand hygiene knowledge.
- **Visualisations**: colour graphs+feedback, poster campaigns, educational flipchart use of remote video monitoring+feedback, visual reminders/stickers, flashing lights, use of new technologies as educational/training tools (e.g. tablet based apps), use of UV light+feedback.
- Visualisation-centred interventions had predominantly **positive impacts**. Visualisations regarded as **helpful** by healthcare staff when asked.
- Two poster-based interventions were regarded as **ineffective**.

# Conclusions

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- The findings suggest that the use of visualisations in HAIs behaviour change interventions has the potential to alert and positively influence healthcare staff to prevent and control infections especially when considering that the primary cause of HAIs (i.e. pathogens) is invisible to the naked eye.
- Careful and justified selection of visuals is required taking also into account the aim(s) of the intervention e.g. *raising awareness, educating/training, increasing intention to change, changing behaviour, reducing HAIs rates etc.*
- It is suggested that, along with the use of an explicit theory (*integrative review 1*), visualisation-centred interventions are tailored to the staff's needs considering the factors that may facilitate or hinder their daily IPC-related practice

## Next steps:

- Findings from the two integrative reviews will inform a Delphi study and two focus groups
- Goal: to develop recommendations for behaviour change interventions in the field of HAIs by best combining theory and visualisations





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## Any questions?



[k.tsattalios@rgu.ac.uk](mailto:k.tsattalios@rgu.ac.uk) |



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