1963
RCA Design Research Unit
Academic framework

- USERS
- DESIGNERS
- INDUSTRY PARTNERS
Design for patient safety
A guide to the design of electronic infusion devices

Edition 1
2010

Design: Sally Halls, Helen Hamlyn Centre
Residents should be encouraged to choose the colour scheme, objects and furniture for their bedrooms. This concept shows a good-sized bedroom with en-suite facilities and a snug that provides views of the garden.

1. Carpeted floor for comfort
2. Movable storage affixed to wall once in preferred position
3. Wireless internet connection
4. Bed positioned away from windows, radiators and entrances. Direct view from bed to wc door
5. Mat with pressure sensor switches on low level lighting at night
6. Invisible, contactless light switch with dimmer function
7. Window with integrated blind

8. Media centre and TV screen recessed into wall, connected with concealed flat wire
9. Space saving pocket door to en-suite washroom and WC
10. Window seat with view of garden giving continuous awareness of the weather and time of day and year
11. Built in storage. Drawers opened with cut-out feature negating potential issues with handles and fixings
12. Door sensor

"if you’ve got autism, in my experience, you’re likely to spend a lot of time in your bedroom because that’s where you feel safest, so what’s in your bedroom and what you can see through the window is your world"
Strategic improvements to the Emergency Ambulance 2010–2011
Introduction
Problem
Aims
Roles of disciplines – co research

- designers
- clinicians
- psychologists
- business
Roles of disciplines – co design
Research – mapping and analysis

Handwashing pathway

Before touching a patient
Before clean/aseptic procedure
After body fluid exposure
After touching a patient
After touching patient surroundings

Start
- Remember to decontaminate hands

Decide to decontaminate hands
- Remove watch/jewellery
- Remove jacket
- Tuck tie in or remove

Alcohol Gel
- Find gel dispenser
- Operate gel dispenser
- Catch gel in hand
- Cover all areas of hands
- Allow hands to dry

Soap & Water
- Decide to use alcohol gel or soap and water
- Find soap and water
- Turn on tap
- Rinse
- Operate soap dispenser
- Wash all areas of hand
Research - FMEA
### Severity
Using a 1-4 scale, please rate the maximum severity of harm that could result from the effects of this failure mode.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>-Death&lt;br&gt;-Permanent complete disability</td>
<td>4</td>
</tr>
<tr>
<td>Major</td>
<td>-Permanent incomplete disability&lt;br&gt;-Increased length of stay or increased level of care for ≥3 patients</td>
<td>3</td>
</tr>
<tr>
<td>Moderate</td>
<td>-Increase length of stay or increased level of care for 1 or 2 patients</td>
<td>2</td>
</tr>
<tr>
<td>Minor</td>
<td>-No injury/increased length of stay or level of care</td>
<td>1</td>
</tr>
</tbody>
</table>

### Frequency
Using a 1-4 scale, please rate the likelihood that the effects of this failure mode will result in harm of any severity.

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several times in 1 year</td>
<td>4</td>
</tr>
<tr>
<td>Once every 1-2 years</td>
<td>3</td>
</tr>
<tr>
<td>Once every 2-5 years</td>
<td>2</td>
</tr>
<tr>
<td>Once every 5-30 years</td>
<td>1</td>
</tr>
</tbody>
</table>

*Within the context of a general surgery ward.

### Detectability
Using a 1-4 scale, please rate the likelihood that the effects of this failure mode will be detected before harm occurs.

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote</td>
<td>4</td>
</tr>
<tr>
<td>Low</td>
<td>3</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
</tr>
</tbody>
</table>
Research - causes

<table>
<thead>
<tr>
<th>Others</th>
<th>Patient Factors</th>
<th>Individual staff factors</th>
<th>Team Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Condition</td>
<td>Knowledge &amp; skills</td>
<td>Verbal communication</td>
</tr>
<tr>
<td></td>
<td>Language &amp; Communication</td>
<td>Competence</td>
<td>Written communication</td>
</tr>
<tr>
<td></td>
<td>Personality &amp; social factors</td>
<td>Physical and mental health</td>
<td>Supervision and seeking help</td>
</tr>
<tr>
<td></td>
<td>Task design &amp; clarity of structure</td>
<td>Economic &amp; regulator</td>
<td>Staffing levels &amp; skills mix</td>
</tr>
<tr>
<td></td>
<td>Availability &amp; use protocols</td>
<td>context</td>
<td>Workload &amp; shift patterns</td>
</tr>
<tr>
<td></td>
<td>Availability &amp; accuracy test results</td>
<td>Links with external</td>
<td>Design, availability &amp;</td>
</tr>
<tr>
<td></td>
<td>Decision-making aids</td>
<td>organisations</td>
<td>maintenance of equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Administrative &amp;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>managerial support</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Physical</td>
</tr>
</tbody>
</table>

Task and technology factors
Institutional context factors
Organisational management factors
Work environmental factors

Effect
Research – triangulation

incident data

observations

questionnaires
Summary hazard scores

- Hand washing
- Observations monitoring
- Isolation of infection
- Medication delivery
- Staff handover
- Domestic cleaning
- Ward round
- Surgical site marking
- Post-op mobilisation
- Post-op use of bedside rails
Analogous industries
Roles of disciplines – co research

designers

clinicians

psychologists

business
Safety Performance Board

Lisheen Mine
Safety Performance Board

AT LISHEEN, WE INJURE SOMEONE EVERY 12 DAYS

WE HAVE WORKED 997 DAYS WITHOUT AN INJURY

safety starts with S but begins with U
Analogous industries
Analogous industries

Mining process map

Elective surgical pathway process map
Analogous industries

Analogous industries

- Task design
- Reminders
- Equipment
- Space

INDUSTRY
Design
Design | briefs

- Handwashing
- Isolation of Infection
- Vital Signs
- Medication
- Handover
Feedback
Feedback from the frontline
Correct interpretation of Mews Score Calculator
Design Interventions
Summary of Design Interventions
Carestion | the problem

“That’s all you see isn’t it? People running from one side of the bed to another saying get me this, get me that”

Len, Patient on Charles Pannett, St Marys Hospital
1. Patient medication locker
2. Nowhere to put sharps bin
3. Gloves and apron out of bedspace
4. No flat surface for writing
Carestation
Vital signs | the problem

- Transcription errors
- Difficult to clean
- Inefficient cable management
Vital signs trolley
Hand hygiene | the problem

The point of care:
Clean your hands immediately before and after you touch your patient.
Here Now.

DON'T WALK PAST

CLEAN HANDS
ONLY TAKE A MINUTE

- Clean your hands before and after all patient contact
- Use gloves for specific tasks, then remove immediately and clean your hands
- Patient with diarrhea or vomiting? Clean your hands with soap and water
- Hands look clean? Use alcohol handrub
- Hands look dirty? Use soap and water

National Patient Safety Agency
Clean your hands
Summary of Design Interventions

1. Hand Hygiene
   - CARE STATION
   - HAND HYGIENE REMINDERS

2. Infection Control
   - CARE STATION
   - HAND HYGIENE REMINDERS

3. Vital Signs
   - CARE STATION
   - NEW VITAL SIGNS TROLLEY
   - RESPIRATORY RATE METER

4. Handover
   - CARE STATION
   - HANOVER RECOMMENDATIONS

5. Medication
   - CARE STATION
   - MEDICATION DISPENSER
Prototyping and Simulation
Engagement with manufacturers

Humanscale

Bristol Maid
Hospital Metalcraft Limited
Simulation
Trials
Next steps

- Further engagement with manufacturers
- Extended trials
- Cost benefit analysis and comparisons
- Further dissemination
Upcoming Dates

Royal College of Surgeons
Hunterian Museum
31st January – 4th February 2012
Private view 31st January

Royal College of Art
Upper Gulbenkian Gallery
‘The Problem Comes First’
22nd September – 5th October
Private view 22nd September