



Designing Out Medical Error

Ed Matthews

World Congress on Design and Health, Boston, 8 July 2011

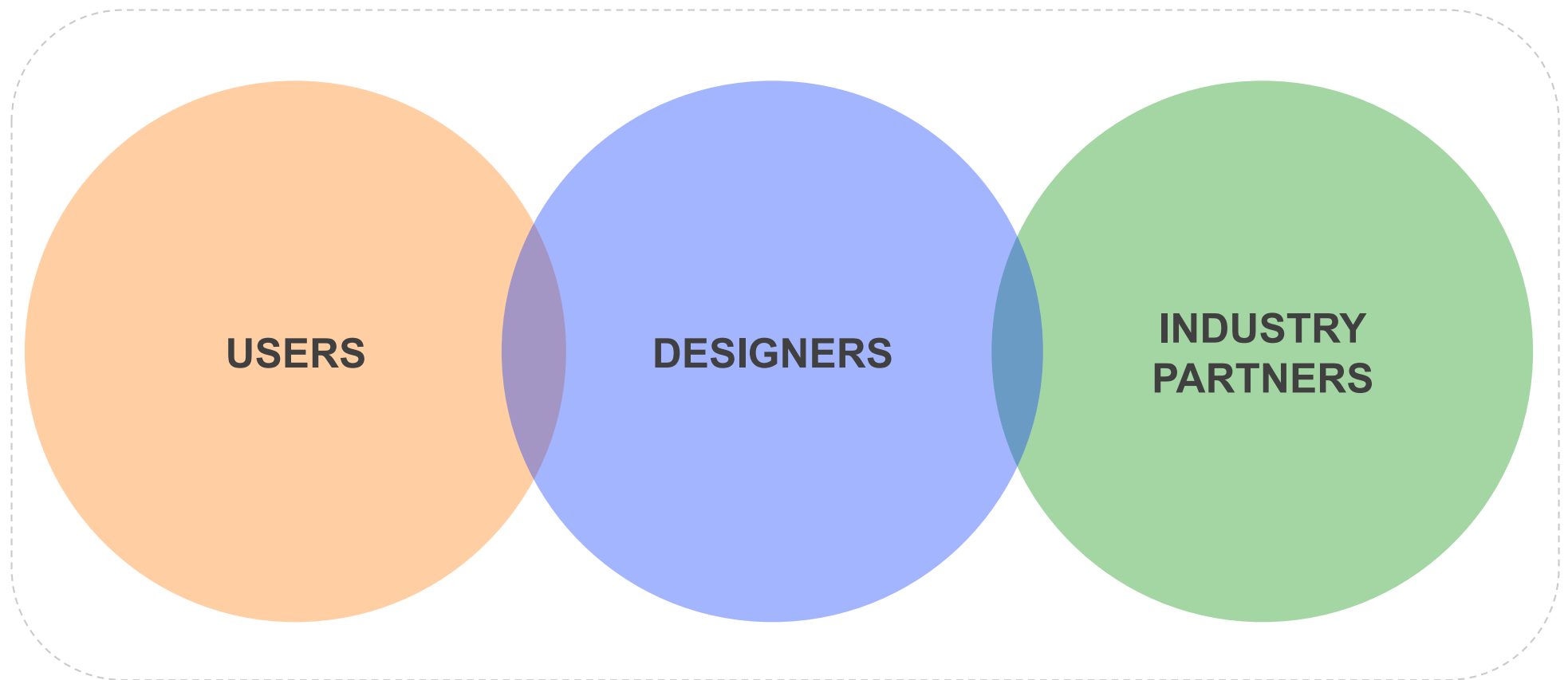
Royal College of Art



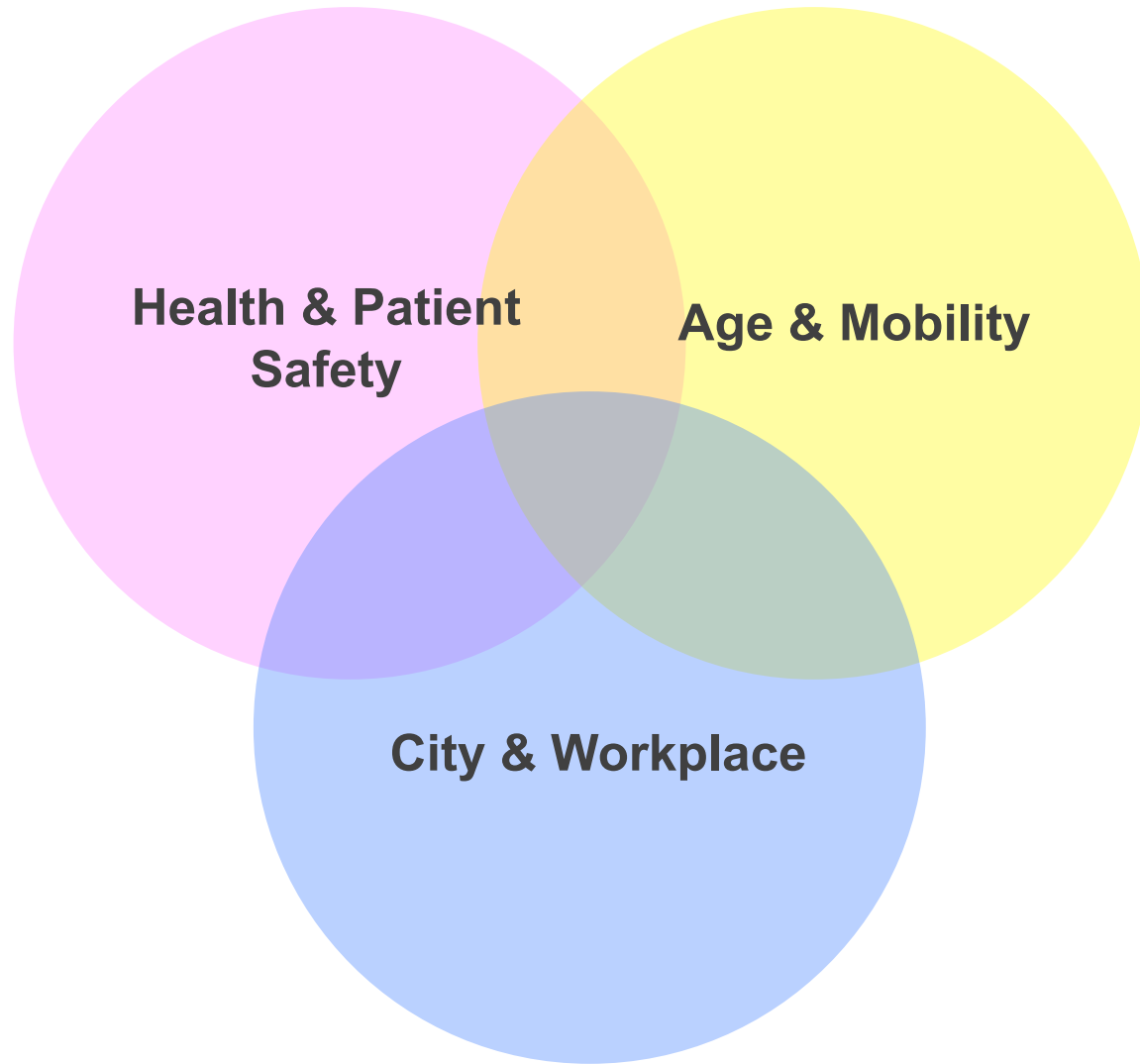
1963

RCA Design Research Unit





Academic framework



**Health & Patient
Safety**

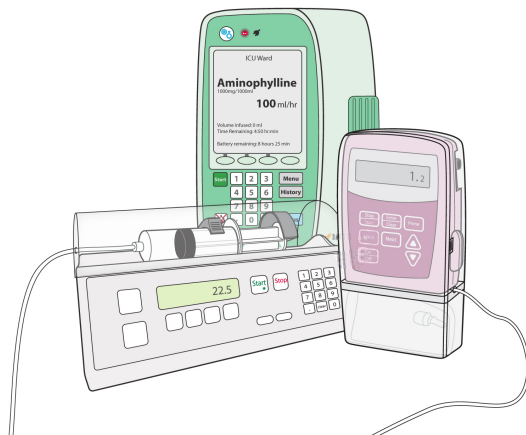
Age & Mobility

City & Workplace

Design for patient safety

A guide to the design of electronic infusion devices

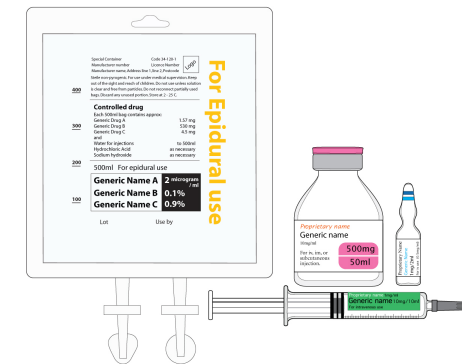
Edition 1
2010



Design for patient safety

A guide to labelling and packaging of injectable medicines

Edition 1
2008

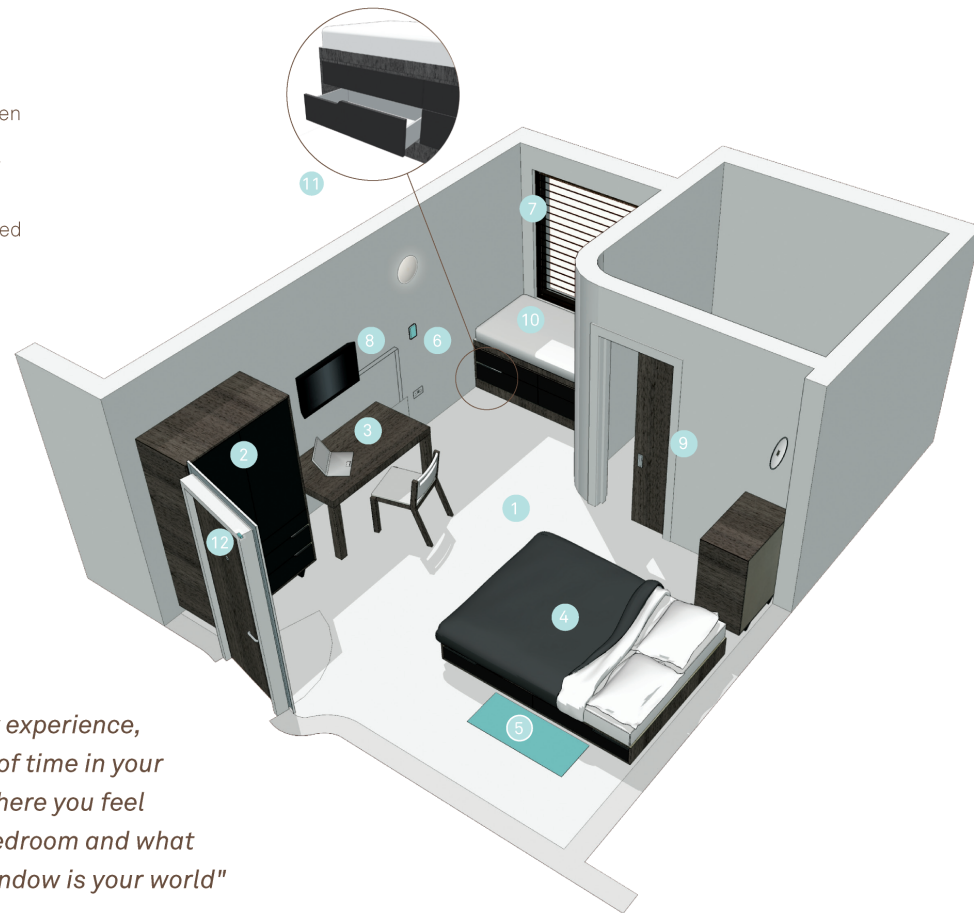




Bedroom Concept

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

Sale of the century
Yes take a seat to art auction, week, page 17

DEPENDENT



Questions over vaccine safety

Potentially dangerous blood-poisoning microbe found in manufacturer's samples

Recall issued for 20,000 doses of meningitis C jab from health centres

The Observer

Eleven more hospitals at centre of safety scandal

- Failures lead to thousands of deaths
- Government orders new investigation

By Anushka Bhatnagar and Owen Campbell

The true extent of 103 hospitals failing to comply with the safety standards that underpin the NHS's blood products has emerged in a report by the Health Protection Agency (HPA) that has been published in the *Lancet* journal.



BNP leader to represent Europe at world climate summit

By Toby Hines, Robin Hickie and Rogers Taylor

Nick Griffin, leader of the British National Party, is to represent the far-right party at the UN climate change conference in Copenhagen, which opens next week.

Griffin will be one of a number of far-right politicians and climate change deniers who will be attending the summit on behalf of the EU.

SENTENCED TO DEATH BY TR

A few years ago, Ann Hume wrote a long letter to a retired doctor she had once loved in the highest regard. There was not much she did not expect a reply – she simply had been told to try.

Diagnosed with an illness she didn't have, Ann Hume was prescribed a controversial treatment by her doctor that left her with a fatal



Legacy of suffering: Ann Hume, diagnosed with an illness she didn't have, was prescribed a controversial treatment by her doctor that left her with a fatal

Mid Staffordshire NHS Foundation Trust

Stafford Hosp

wards of
hame

car
ina

Probe into
deaths
4 patients

'Hospital was
like prison'

Aims



Team & expertise



Roles of disciplines – co research



Roles of disciplines – co design





Research

Research - observations



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

Decide to use alcohol gel or soap and water

Alcohol Gel

Find gel dispenser

Operate gel dispenser

Catch gel in hand

Cover all areas of hands

Allow hands to dry

Soap & Water

Find soap and water

Turn on tap

Rinse

Operate soap dispenser

Wash all areas of hand

Research - FMEA



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.

Grade	Description	Score
Catastrophic	-Death -Permanent complete disability	4
Major	-Permanent incomplete disability -Increased length of stay or increased level of care for ≥ 3 patients	3
Moderate	-Increase length of stay or increased level of care for 1 or 2 patients	2
Minor	-No injury/increased length of stay or level of care	1

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

Description	Score
Several times in 1 year	4
Once every 1-2 years	3
Once every 2-5 years	2
Once every 5-30 years	1

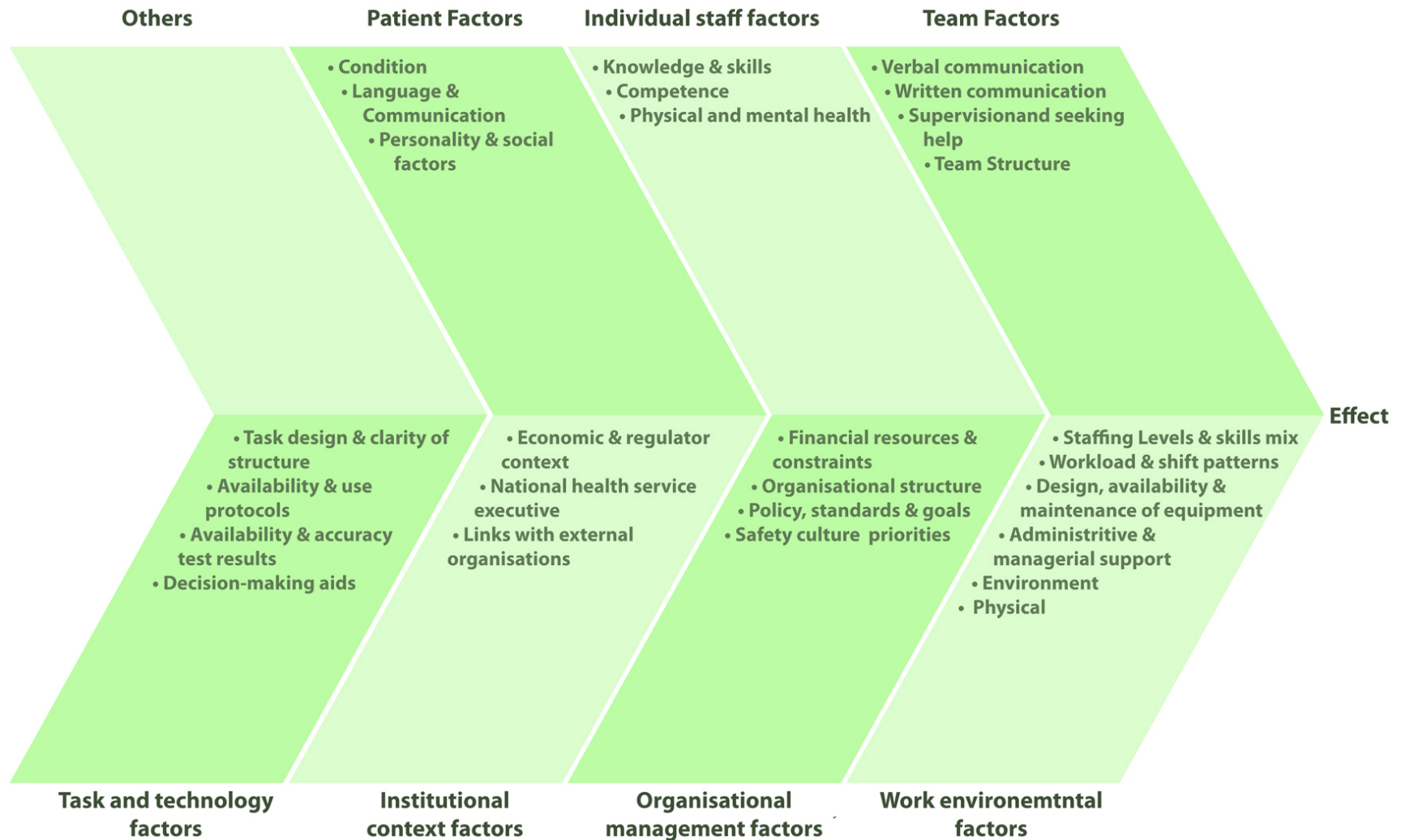
*Within the context of a general surgery ward.

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

Description	Score
Remote	4
Low	3
Moderate	2
High	1

Room 3
HANDOVER

Research - causes

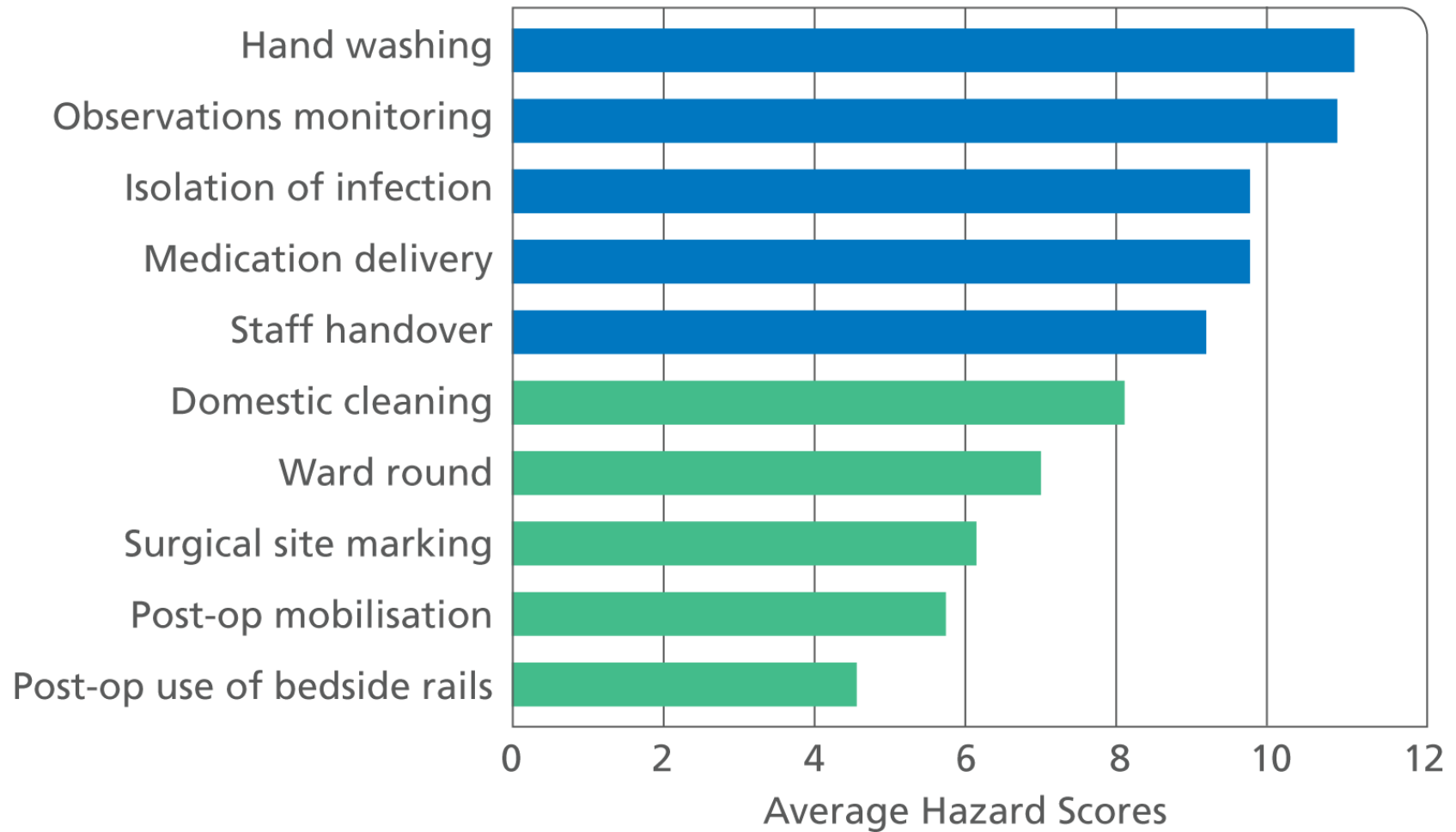


Research – triangulation






Summary hazard scores



Analogous industries

Roles of disciplines – co research





Lisheen Mine



**ANGLO
AMERICAN**

Operation Survival Safety Team



INCIDENT INFORMATION



Two white informational sheets are pinned to the glass. The left sheet features a logo at the top and several sections of text. The right sheet also has a logo and text, appearing to be a checklist or a set of instructions.

PRODUCTION PERFORMANCE

UNIT	START	STOP	STATUS
1	08:00	16:00	Running
2	08:00	16:00	Running
3	08:00	16:00	Running
4	08:00	16:00	Running
5	08:00	16:00	Running
6	08:00	16:00	Running
7	08:00	16:00	Running
8	08:00	16:00	Running
9	08:00	16:00	Running

PRODUCTION PERFORMANCE

UNIT	START	STOP	STATUS
10	08:00	16:00	Running
11	08:00	16:00	Running
12	08:00	16:00	Running
13	08:00	16:00	Running
14	08:00	16:00	Running
15	08:00	16:00	Running
16	08:00	16:00	Running
17	08:00	16:00	Running
18	08:00	16:00	Running



Site entrance



The image shows a safety performance board for Lisheen Mine. The board is white with black and green text and features two digital displays. In the background, there is an industrial facility with a large cylindrical tank, a metal structure with stairs, and a wind turbine under a cloudy sky.

Lisheen Mine
Safety Performance Board

THE LISHEEN MINE
2009 YTD

AT LISHEEN,
WE INJURE
SOMEONE EVERY **12** DAYS

WE HAVE
WORKED **7** DAYS WITHOUT
AN INJURY

safety starts with S but begins with U

Safety Performance Board

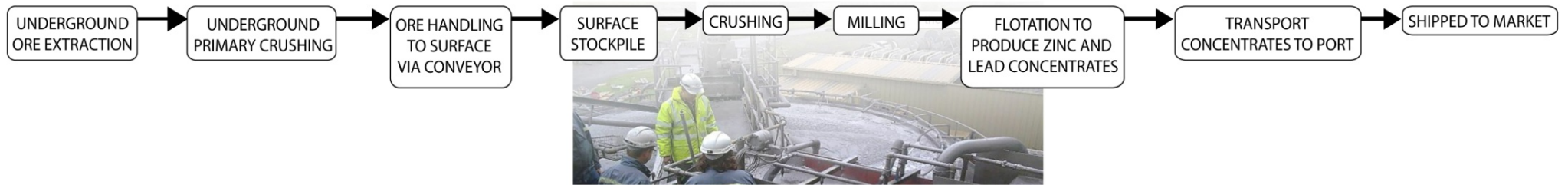
Analogous industries



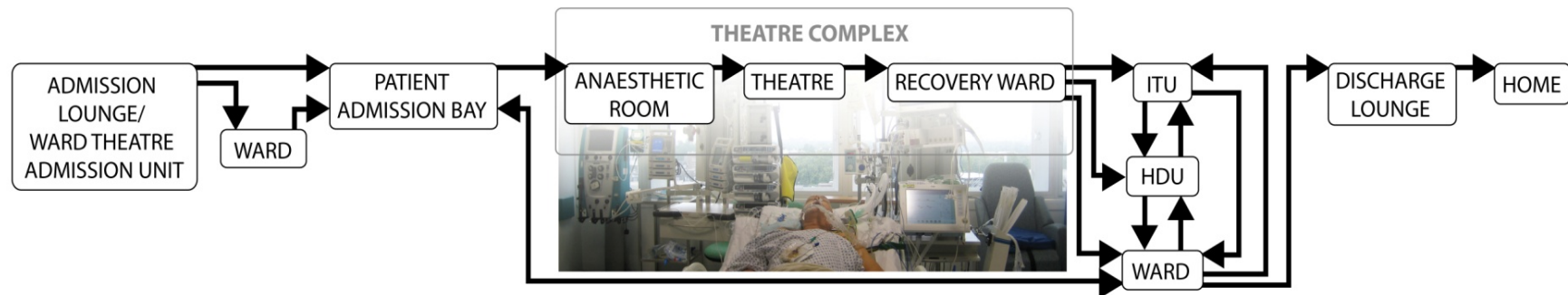


Analogous industries

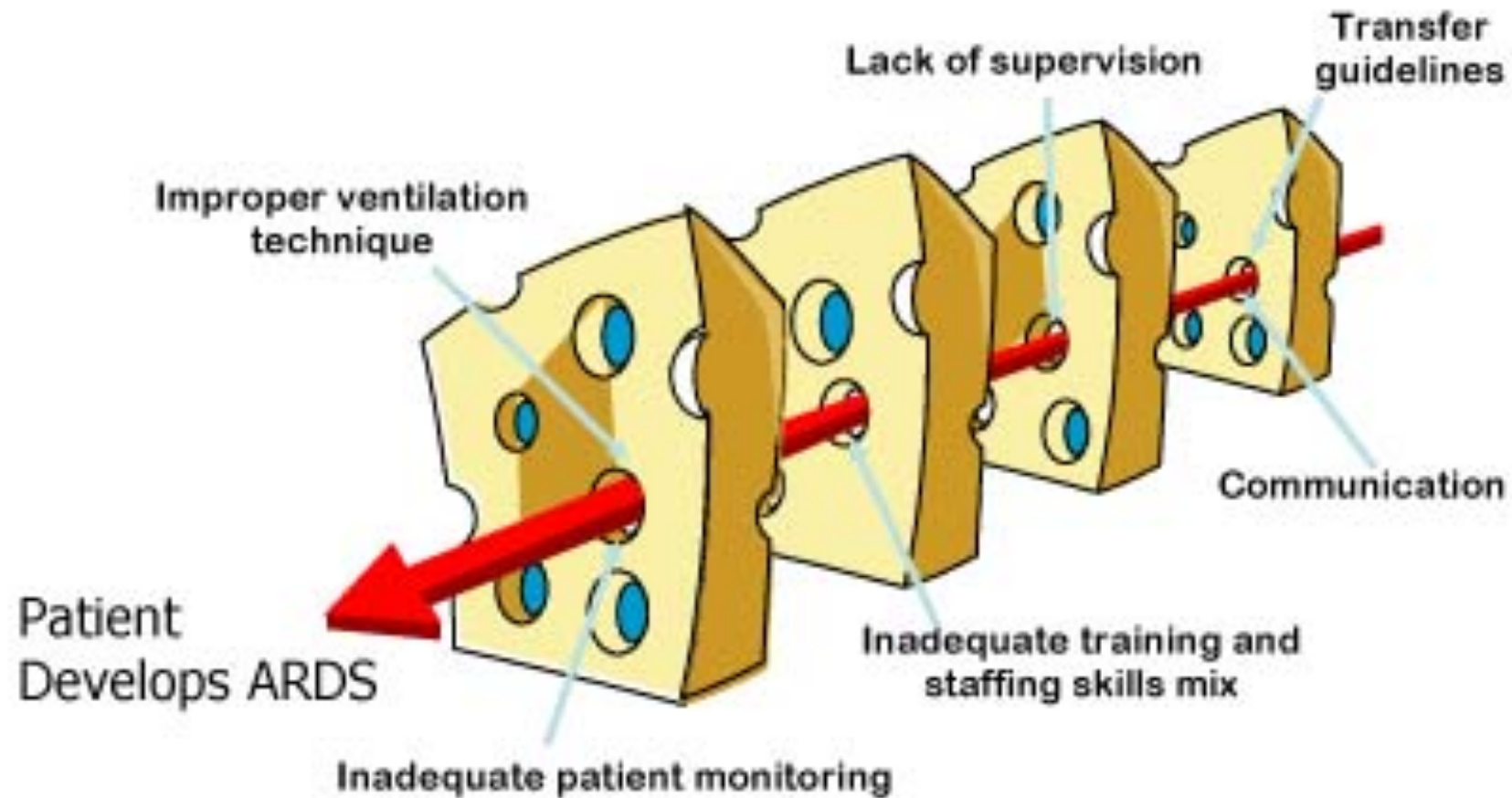
Mining process map



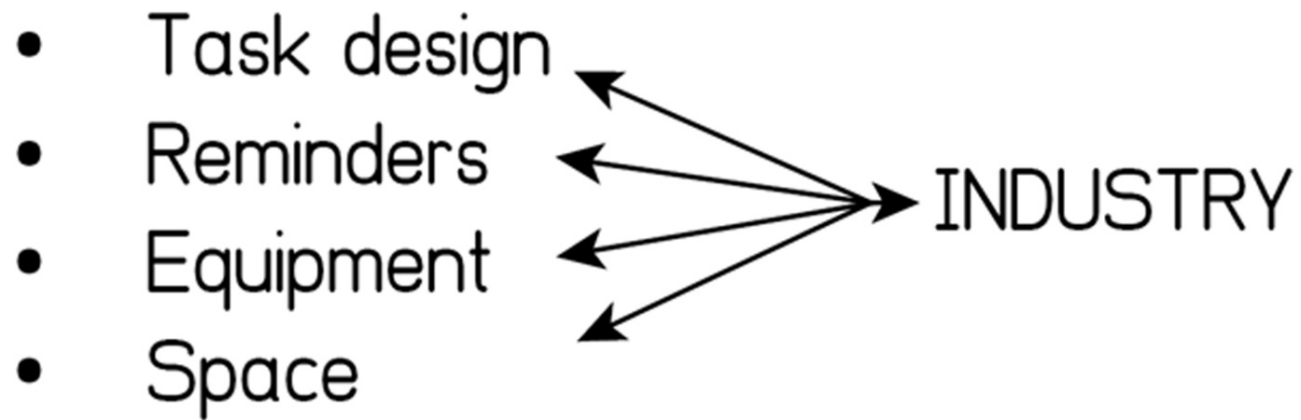
Elective surgical pathway process map



Analogous industries



Analogous industries

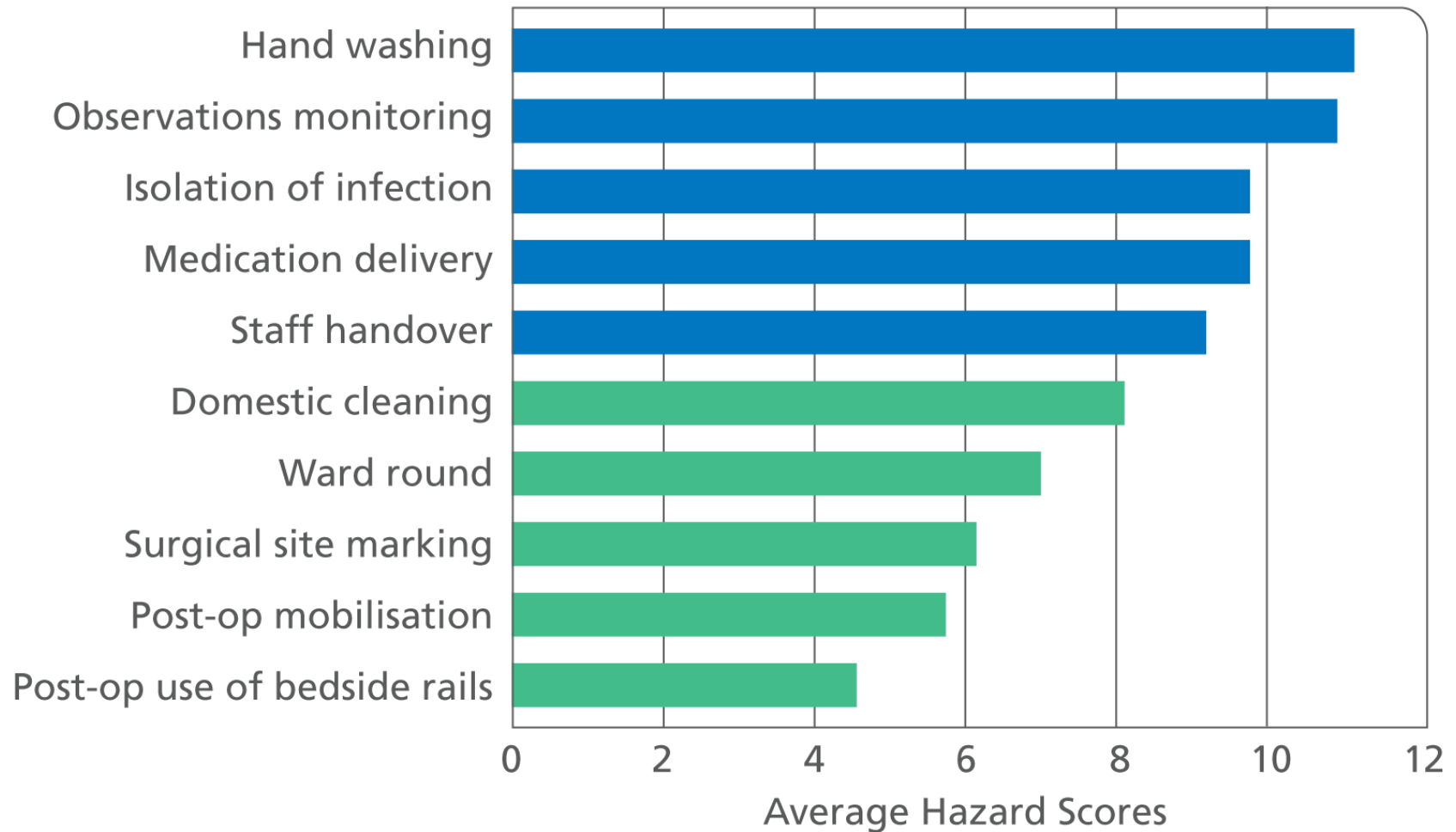




Design



Design | research forming design briefs



Design | briefs



Handwashing



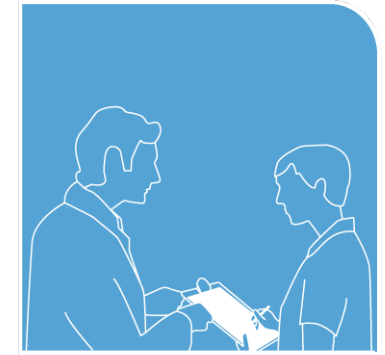
Isolation of Infection



Vital Signs



Medication



Handover



Feedback

Feedback from the frontline



Feedback

Correct interpretation of results

MEWS SCORE CALCULATOR



VT TROLLEY POINT, GAST
gives piece in up of
risk, 100%
need to understand
or giving around with

RESPIRATORY RATE WATCH

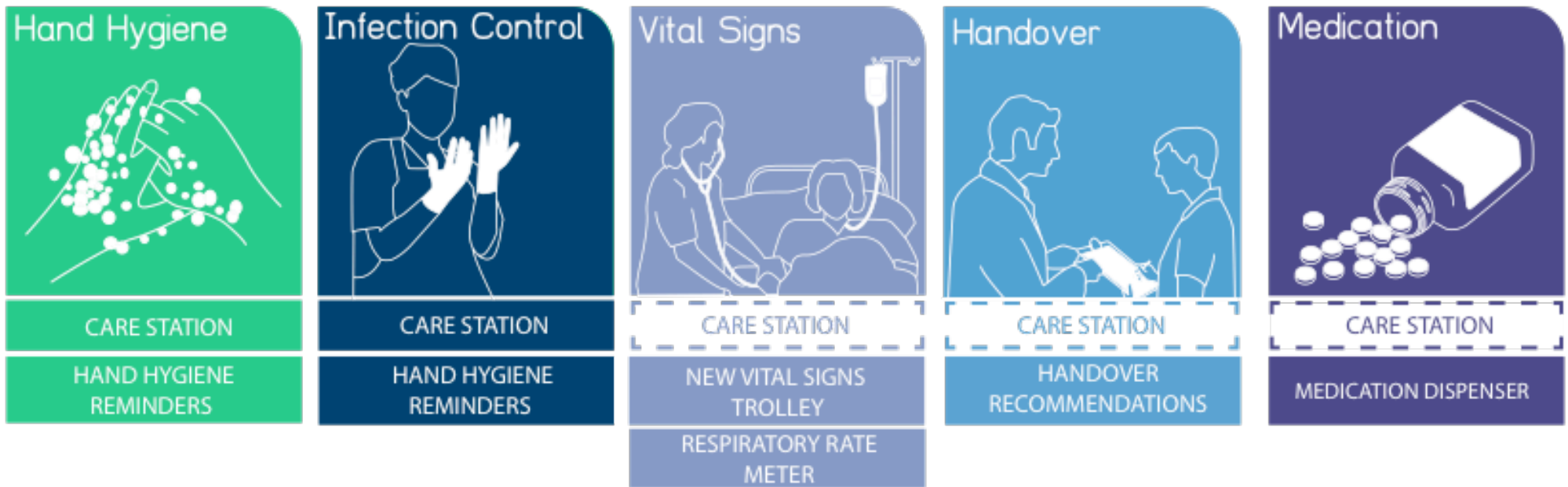






Design Interventions

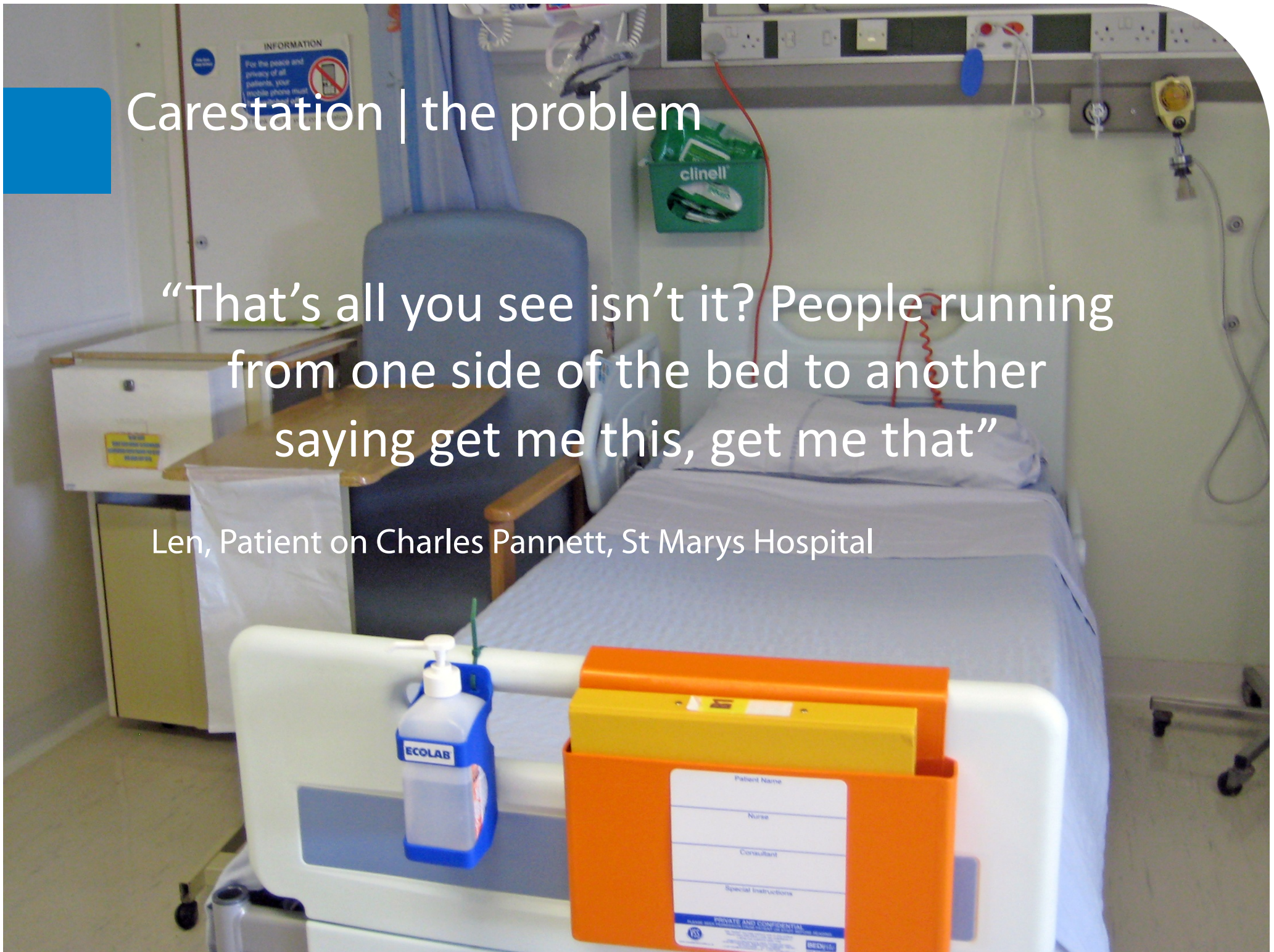
Summary of Design Interventions



Carestation | 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”

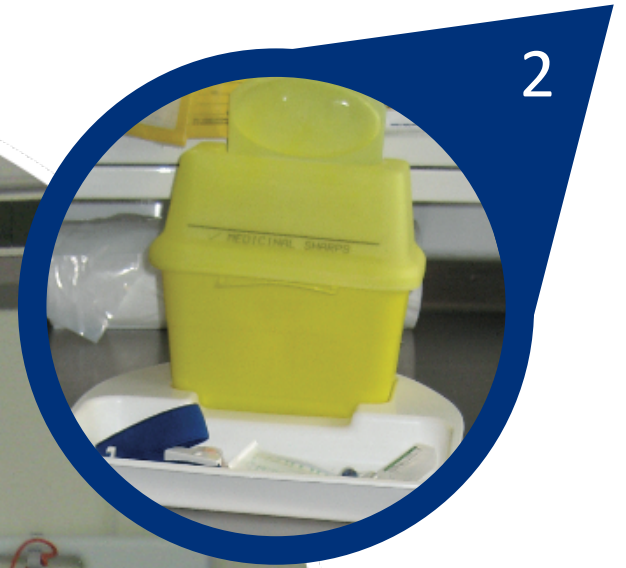
Len, Patient on Charles Pannett, St Marys Hospital





1

1. Patient medication locker



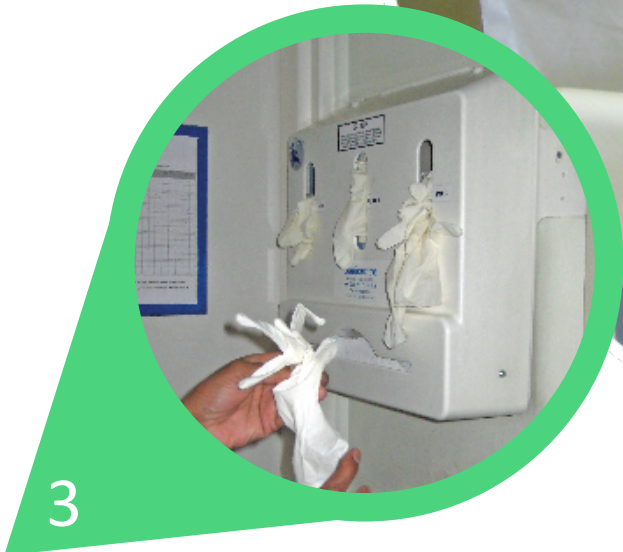
2

2. Nowhere to put sharps bin



3. Gloves and apron out of bedspace

4. No flat surface for writing



3

4





Carestation



Carestation

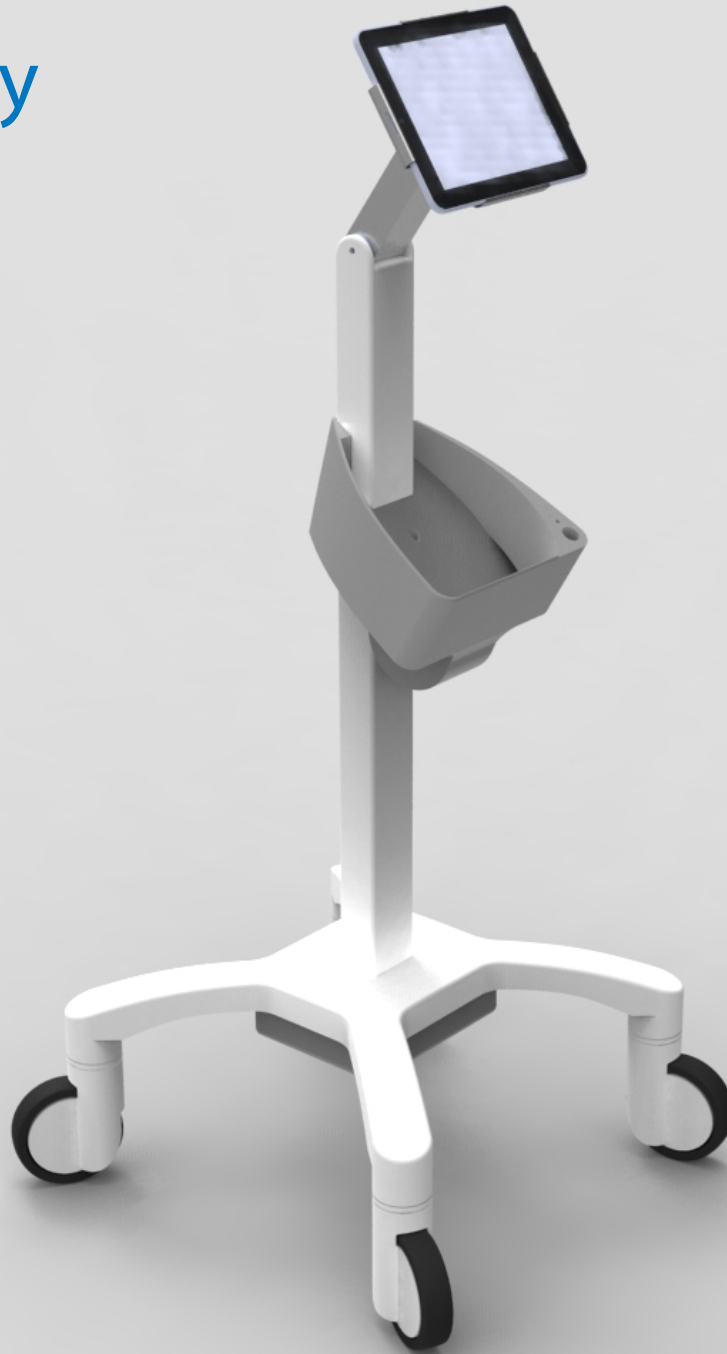


Vital signs | the problem

- Transcription errors
- Difficult to clean
- Inefficient cable management



Vital signs trolley



Hand hygiene | the problem



DON'T WALK PAST

NHS National Patient Safety Agency

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 DIARRHOEA OR VOMITING? CLEAN YOUR HANDS WITH **SOAP AND WATER**
- HANDS LOOK CLEAN? USE **ALCOHOL HANDRUB**
HANDS LOOK DIRTY? USE **SOAP AND WATER**

cleanyourhands[®] campaign

422/01

onefourthree[®] NHS B. BRAUN ECOLAB gojo





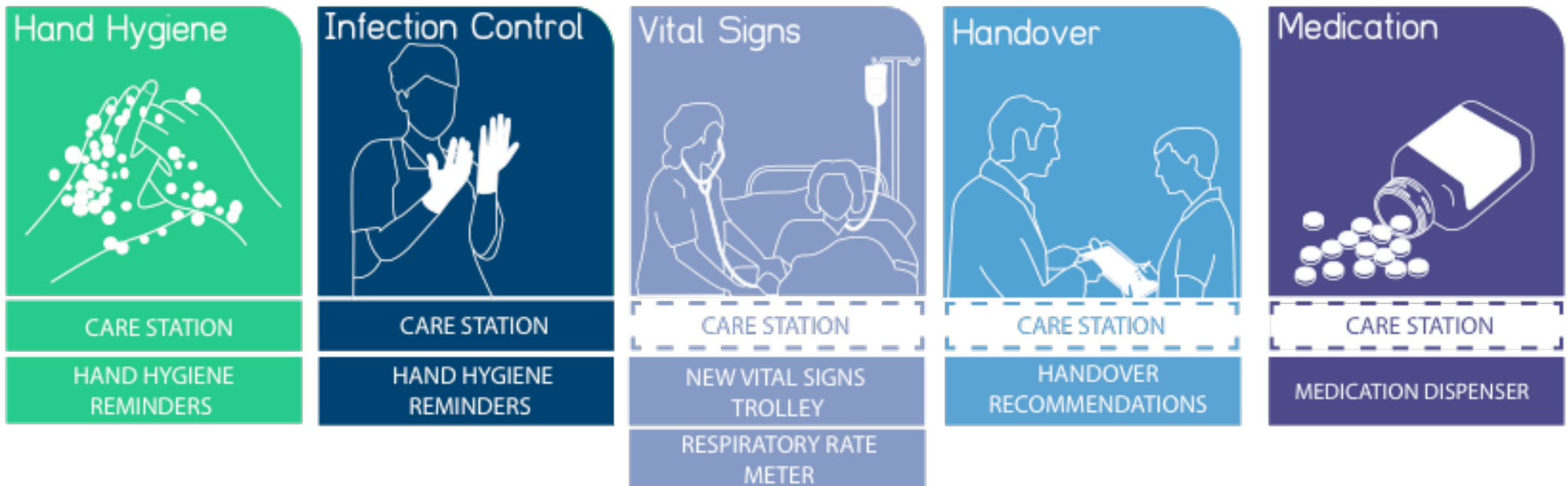
**Clean
your
hands**

Hand Hygiene Signage





Summary of Design Interventions



Prototyping and Simulation



Engagement with manufacturers





Simulation



Trials



Next steps

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

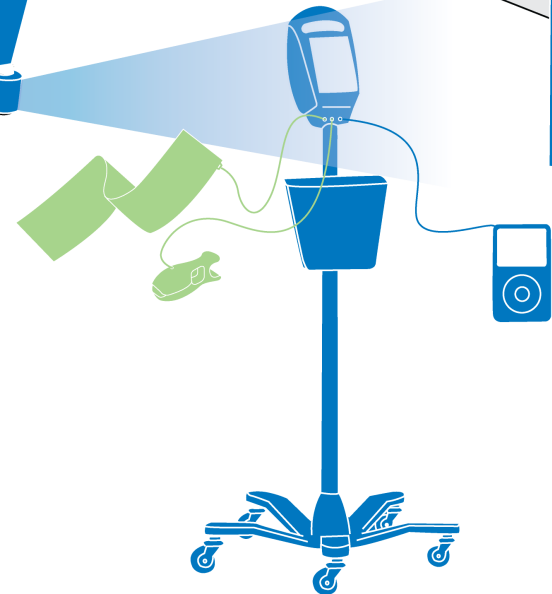
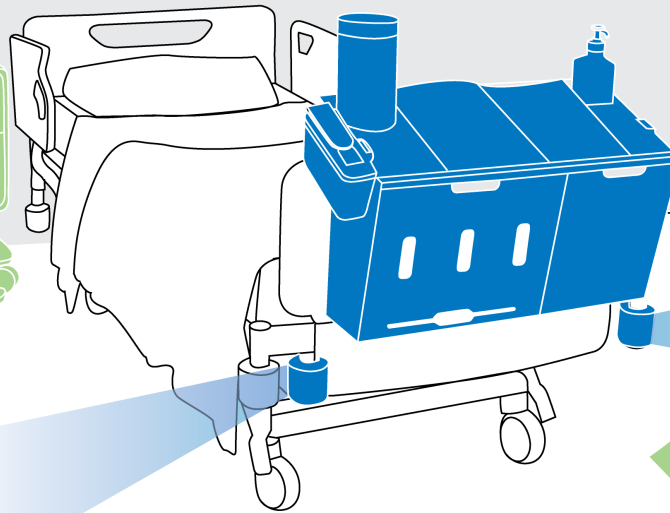
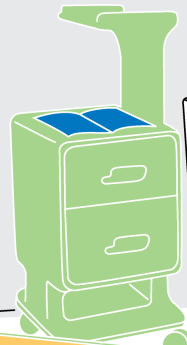
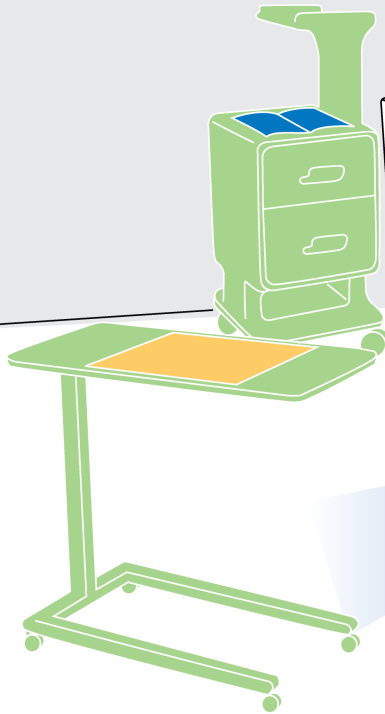
Exhibition

Info Graphics
Info Graphics



A patient with MRSA costs the NHS £9,000

Clean your hands



Upcoming Dates



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

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



**helen hamlyn
centre for design**

www.hhc.rca.ac.uk



Designing Out Medical Error

www.domeproject.org.uk