

XXVII^e Congrès National de la Société
Française d'Hygiène Hospitalière

1, 2 et 3 juin 2016



Integrating Human Factors with infection prevention and control

Julie Storr

Consultant to WHO & Director S3 Global

@julesstorr

#SF2H2016 #humanfactors

Links of interest disclosure

I have no interest to declare.

However – I should disclose:

- It will only be possible in 20 minutes to cover the most basic aspects of human factors in an infection prevention and control (IPC) context;
- You/we will not get all of the answers we need today;
- Human factors is a scientific discipline that requires years of training.



Setting the scene: Human factors challenges in healthcare – the guidelines paradox



Junior doctors



HIS 2014

Welcome

We are delighted to announce that the 9th Healthcare Infection Society (HIS) International Conference is being held, in association with the French Society for Hospital Hygiene (SF2H), on 16-18 November 2014 in Lyon, France. This biennial event is the major international conference focussing on infection control, attracting leading world experts in healthcare-associated infections as speakers. This conference will provide a wonderful opportunity for a wide range of professionals to understand the latest developments in this rapidly expanding and changing field.

HIS 2014 will take place at the Lyon Convention Centre, situated on the beautiful banks of the river Rhône, which is only ten minutes away from the historic city centre. Lyon is one of the world's most vibrant and cosmopolitan cities, famous for its gastronomy, silk trade and fine architecture. We very much look forward to see you there.

Professor Hilary Humphreys
Chairman of HIS 2014

2 years elapsed time

Human factors is about the interaction between:

People

&

Environment

People

&

Procedures

People

&

Machines

People

&

People

Human factors challenges in everyday life



How to get to room 10!

Signage in a London Hotel, January 2015

Human factors solutions in everyday life



Sieve - Flour



Colander - vegetables



York, England, UK, April 2015

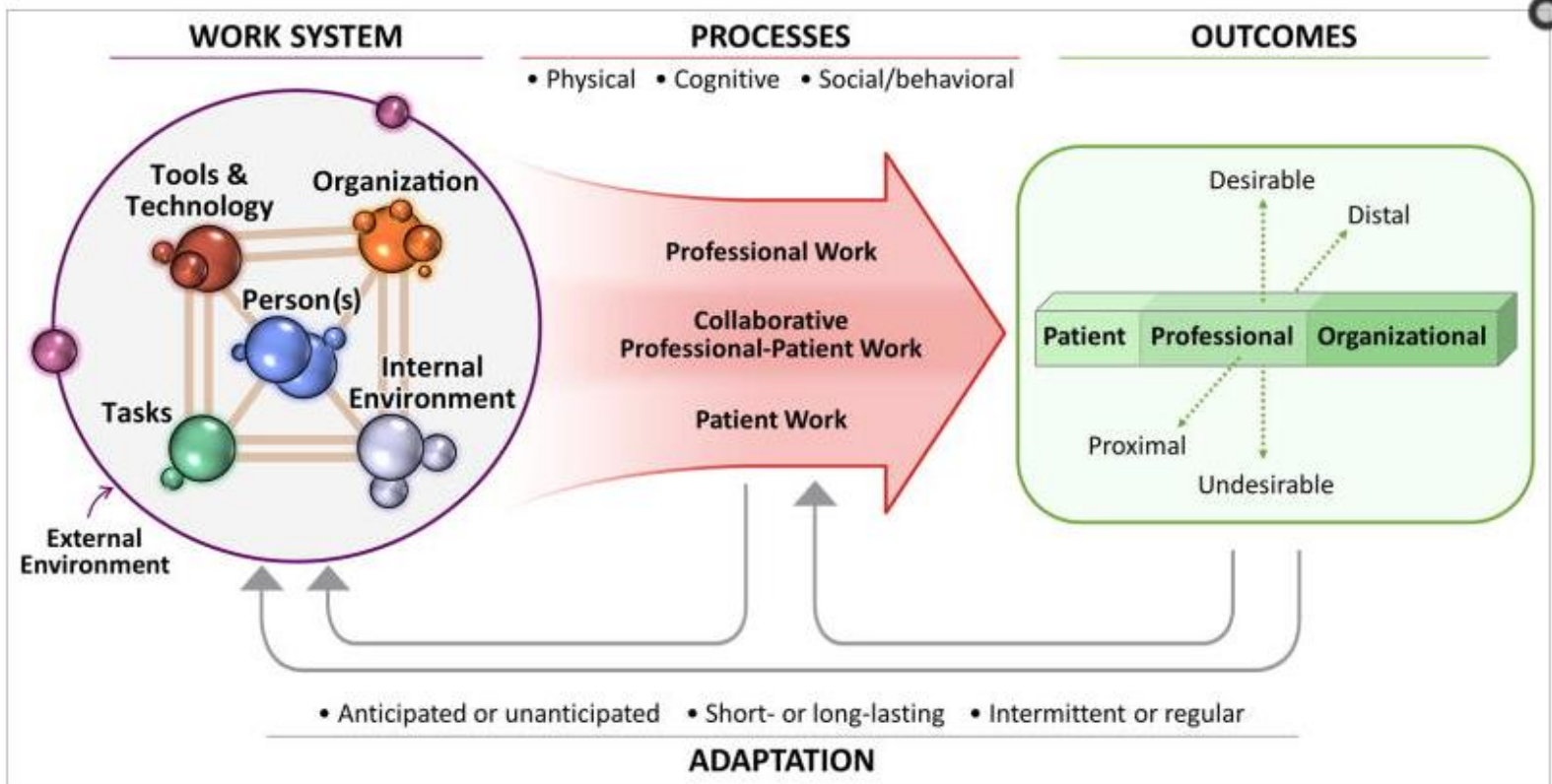
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Rapid summary of human factors in healthcare

SEIPS – Systems Engineering Initiative for Patient Safety



Holden et al (2013)

SEIPS 2.0 model.



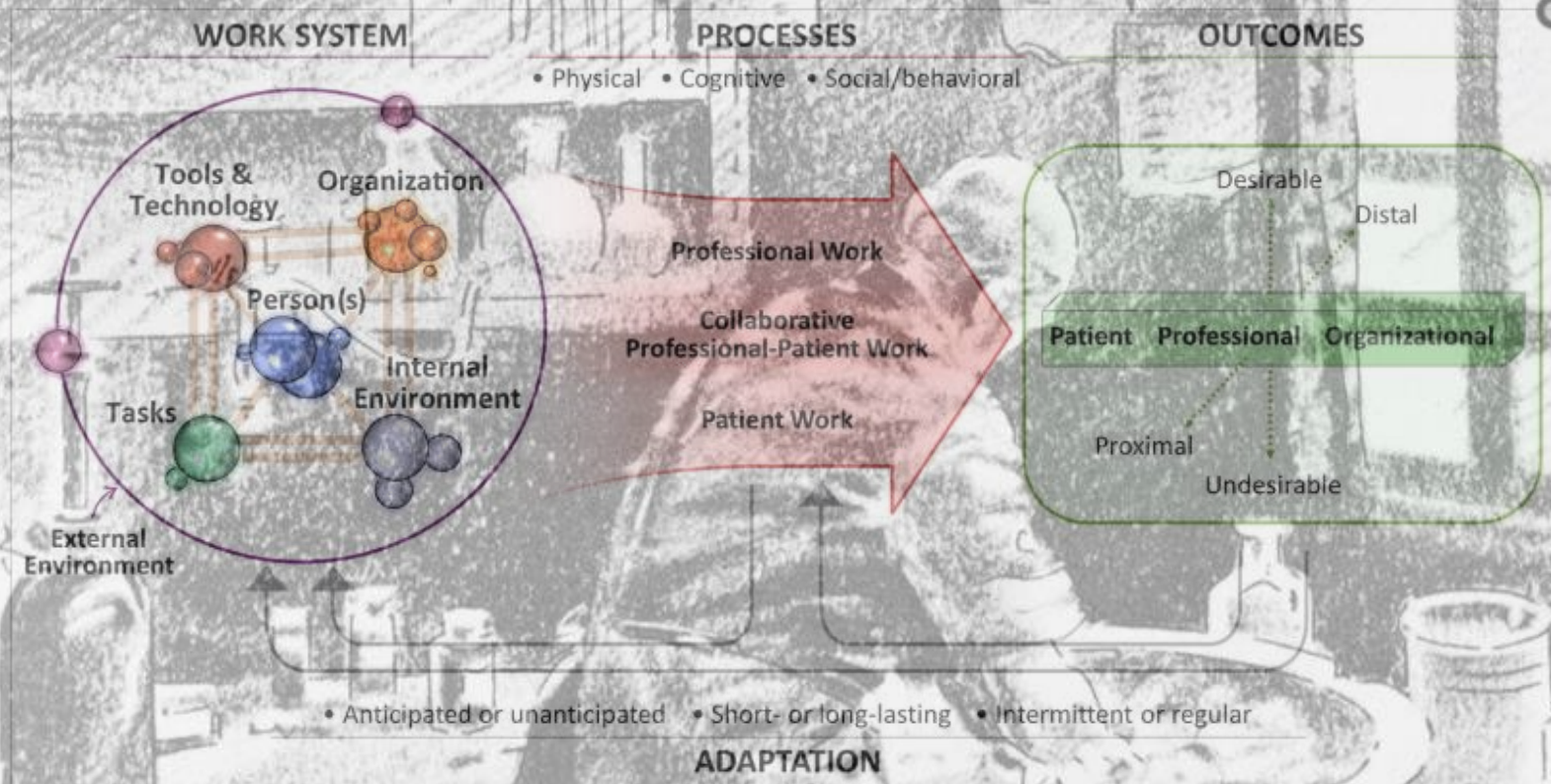
Semmelweis & human factors



Semmelweis & human factors



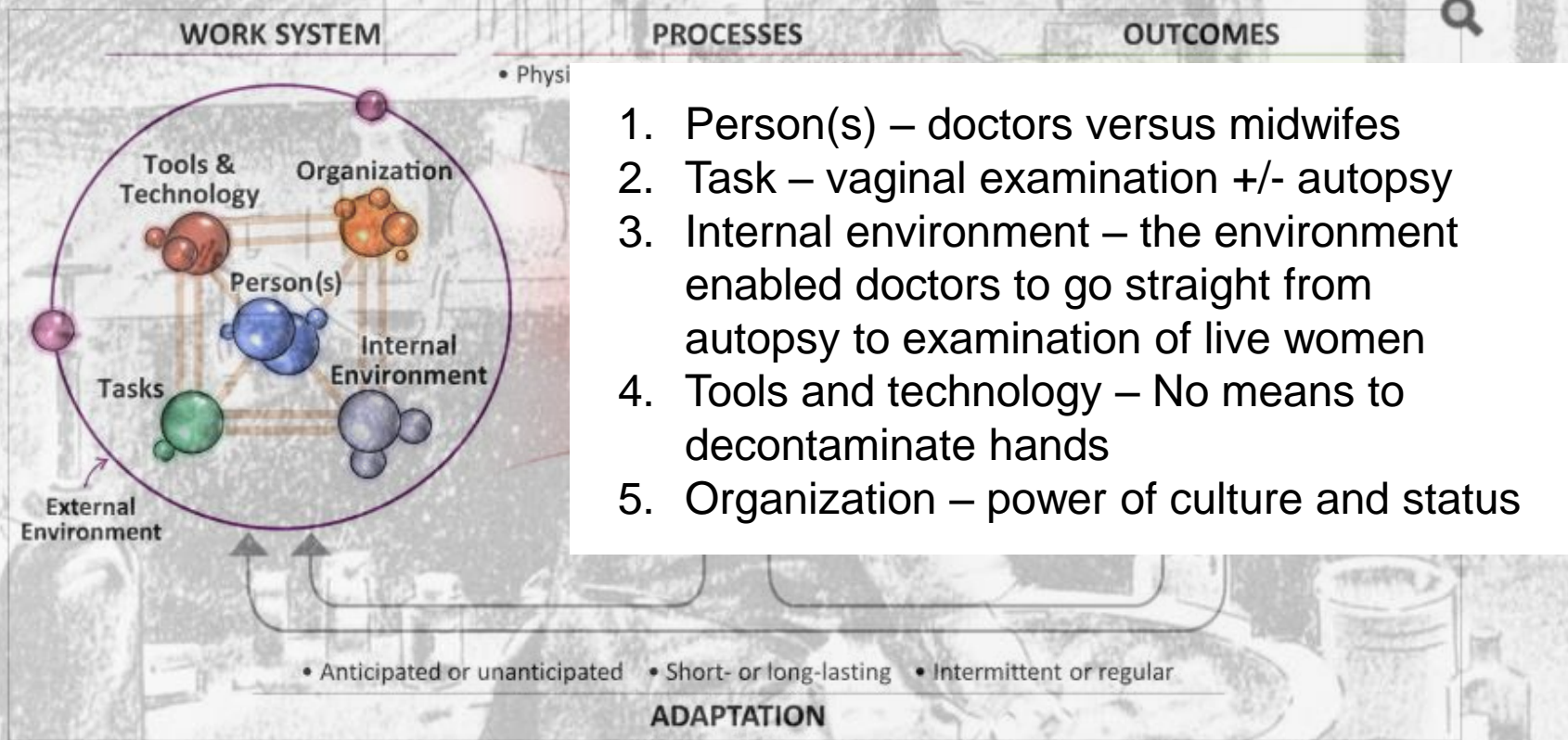
Semmelweis & human factors



SEIPS 2.0 model.

Holden et al (2013)

Semmelweis & human factors



SEIPS 2.0 model.

Holden et al (2013)

How the elements of the work system influence behaviour

	Person	Tasks	Tools and technologies	Physical environment	Organization
Nurse in intensive care unit	The physical, cognitive and psychosocial characteristics of the nurse	Administering intravenous fluids	Medical devices and equipment	Physical layout of the unit; physical characteristics of the patients room	Safety culture; teamwork; communication



Integrating IPC and Human Factors makes a lot of sense!

- IPC on the whole is still vertical rather than horizontal;
- Isolated rather than integrated
- The IPC community has only very recently woken up to the value of learning systems dedicated to implementation science
- IPC leaders often lack of authority to implement change
- We are seen more like the “police” rather than the behaviour change experts
- Others see IPC measures [e.g. hand hygiene] as a distraction or interruption to what they perceive as their actual task

Example 1: “IPC slows down all movement”

- “For a while, the electric thermometers we used were in short supply, and the shift started with a mad dash to nab one. We made a joke of it, but behind the laughs, I heard the clock ticking. **Infection control slows down all movement.** Hands must be washed before and after every contact with a patient, and fresh gown and gloves donned every time one enters a patient room, to be discarded when exiting. A thermometer or any other piece of equipment moved from one room to another must be cleaned too.” (Blanton 2007)

“IPC slows down all movement”

- *“I can either treat patients or I can practice infection control – you choose”*
 - *(doctor overheard talking to a nurse, 2012, UK)*

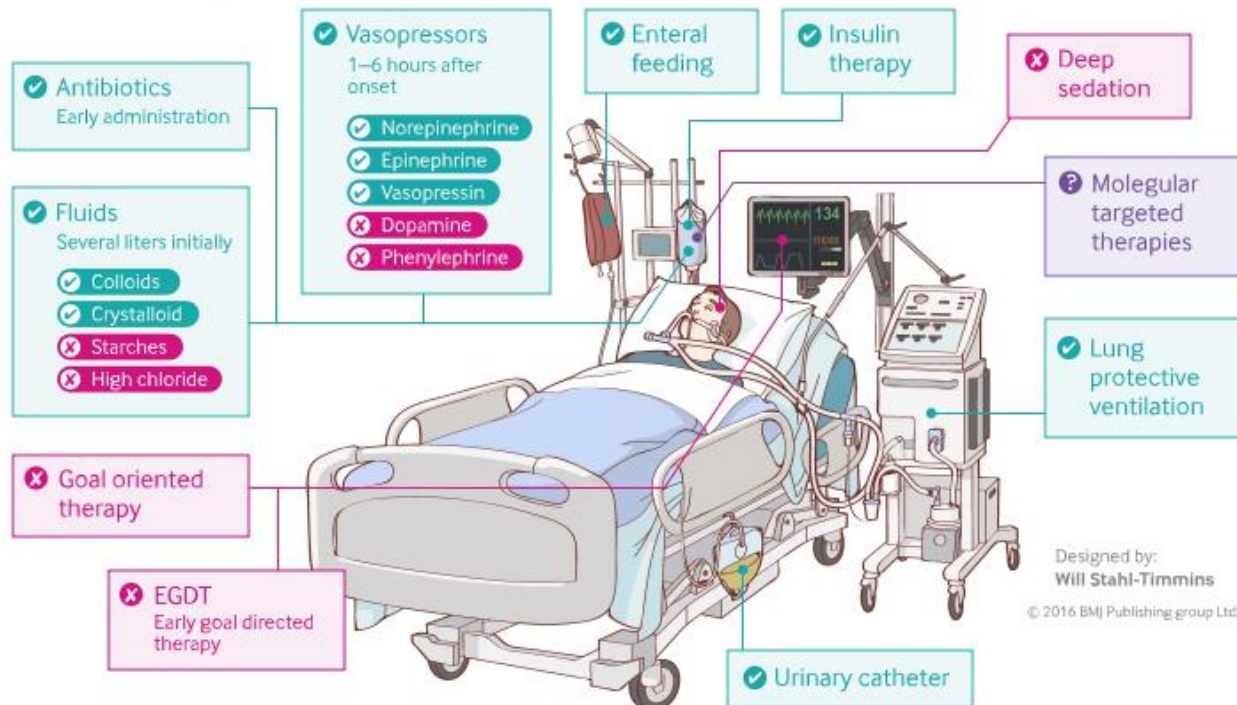
IPC – isolated or integrated?

Sepsis: pathophysiology and clinical management

BMJ 2016 ; 353 doi: <http://dx.doi.org/10.1136/bmj.i1585> (Published 23 May 2016)

Cite this as: *BMJ* 2016;353:i1585

Treating sepsis: the latest evidence

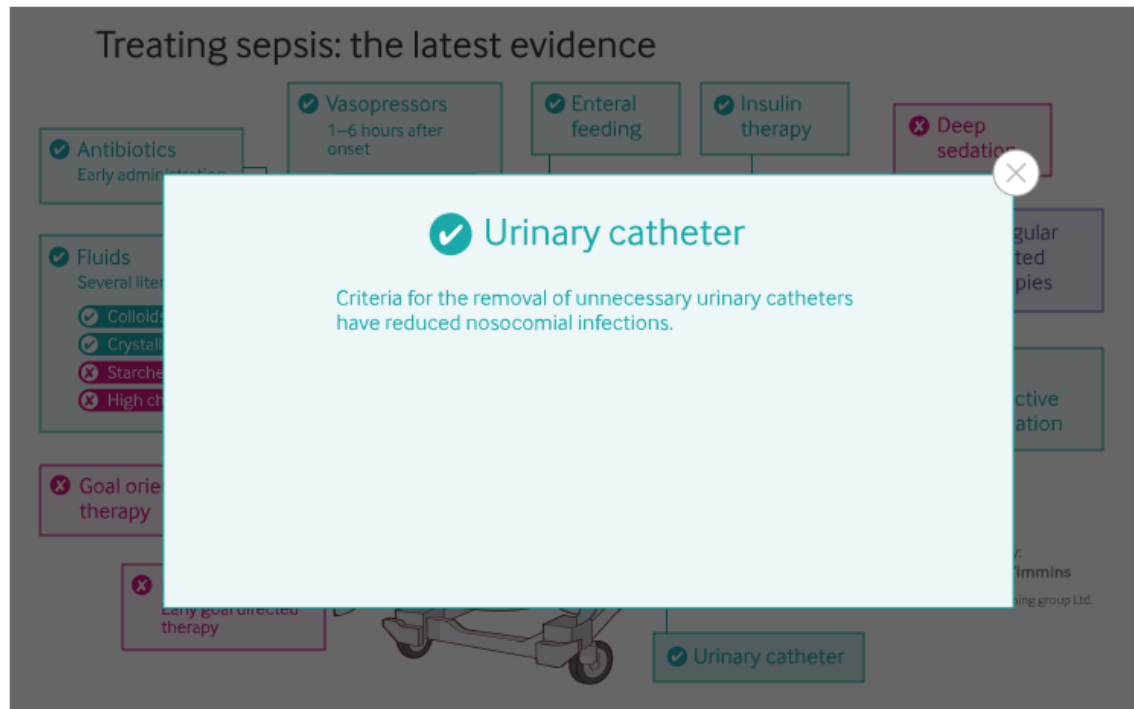


Designed by:
Will Stahl-Timmins
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Sepsis: pathophysiology and clinical management

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Cite this as: *BMJ* 2016;353:i1585



Treating sepsis: the latest evidence

- ✓ Antibiotics
Early administration
- ✓ Vasopressors
1–6 hours after onset
- ✓ Enteral feeding
- ✓ Insulin therapy
- ✗ Deep sedation
- ✓ Fluids
Several litres
- ✓ Colloid
- ✓ Crystalloid
- ✗ Starches
- ✗ High chloride
- ✗ Goal oriented therapy
- ✗ Early goal directed therapy
- ✓ Urinary catheter

✓ Urinary catheter

Criteria for the removal of unnecessary urinary catheters have reduced nosocomial infections.

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Why is IPC a challenge?

A good starting point in clarifying the “why”

Using human factors engineering to improve the effectiveness of infection prevention and control

Judith Anderson, MD; Laura Lin Gosbee, MASc; Mary Bessesen, MD; Linda Williams, RN, MSI

Human factors engineering is a discipline that studies the capabilities and limitations of humans and the design of devices and systems for improved performance. The principles of human factors engineering can be applied to infection prevention and control to study the interaction between the healthcare worker and the system that he or she is working with, including the use of devices, the built environment, and the demands and complexities of patient care. Some key challenges in infection prevention, such as delayed feedback to healthcare workers, high cognitive

workload, and poor ergonomic design, are explained, as is how human factors engineering can be used for improvement and increased compliance with practices to prevent hospital-acquired infections. (Crit Care Med 2010; 38[Suppl.]:S269–S281)

KEY WORDS: human factors engineering; infection prevention and control; delayed feedback; usability; hospital-acquired infections; simulation; hand hygiene; checklist; RCA; central catheter-associated bloodstream infection

Human factors engineering (HFE) is a discipline which, These interactions influence how humans behave and perform, and, as one observable result. If an infection does occur, it is observed at a later time by



1. Delayed feedback

Cause and effect relationship unclear



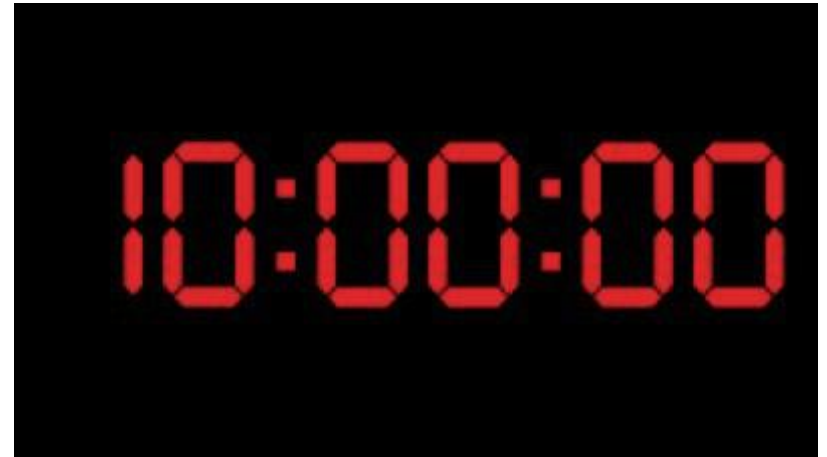
2. Lack of connection with positive result

Cognitive disconnect between action & outcome



3. Complexity and inefficiency

Workarounds

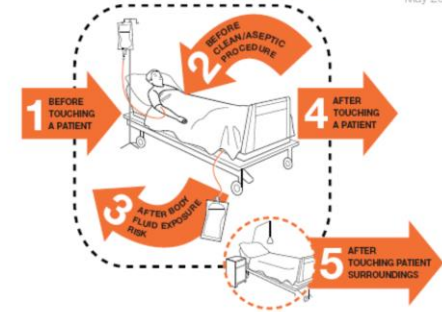


4. Time pressure and high cognitive workload

And competing tasks

Your 5 Moments for Hand Hygiene

May 2009



1	BEFORE TOUCHING A PATIENT	WHY?	<ul style="list-style-type: none"> Clean your hands before touching a patient when performing hand hygiene. To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ASEPTIC PROCEDURE	WHY?	<ul style="list-style-type: none"> Clean your hands immediately before performing a clean/aseptic procedure. To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHY?	<ul style="list-style-type: none"> Clean your hands immediately after an exposure risk to body fluids (and after glove removal). To protect yourself and the health-care environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHY?	<ul style="list-style-type: none"> Clean your hands after touching a patient and/or his immediate surroundings, when leaving the patient's side. To protect yourself and the health-care environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHY?	<ul style="list-style-type: none"> Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched. To protect yourself and the health-care environment from harmful patient germs.



World Health Organization

SAVE LIVES
Clean Your Hands

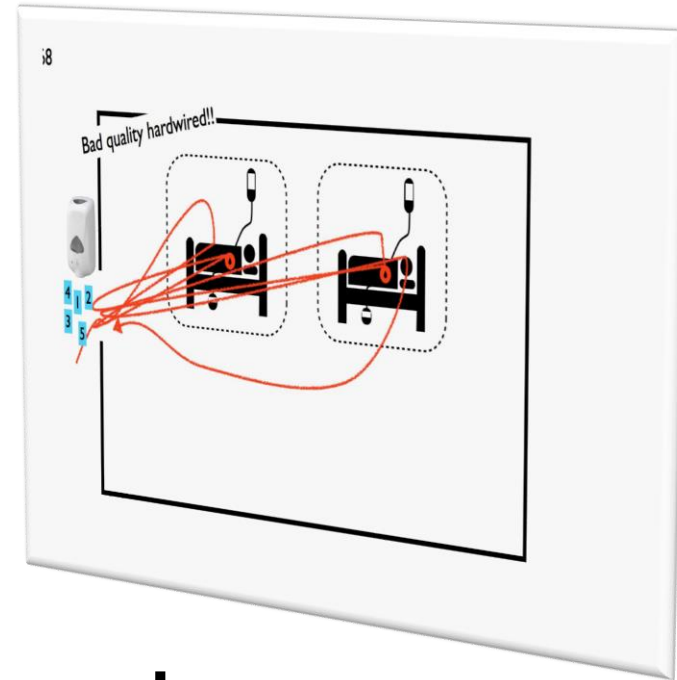


Παγκόσμια Οργάνωση Υγείας

ΣΩΣΕ ΤΗ ΖΩΗ
ΚΑΘΑΡΙΣΤΕ ΤΑ ΧΕΡΙΑ

5. Few infection control cues

Embedding habits that endure reliably



6. Inconsistent ergonomic design practice

Placement of the tools for the job

Five strategies to enhance guideline uptake (Pronovost 2013)

1. Include an unambiguous **checklist** with interventions linked in space and time;
2. Work with **implementation scientists** to help clinicians identify and mitigate barriers and share successful implementation strategies;
3. Collaborate to integrate **guidelines for conditions that co-exist**;
4. Rely more on **systems** than the actions of individuals to ensure recommended practice;
5. Create trans-disciplinary teams and pool expertise from clinical epidemiology, implementation science and **systems engineering (human factors)** to deliver guidelines that are practice focused

Example 1: WHO Multimodal Hand Hygiene Improvement Strategy

The Five Components of the WHO multimodal hand hygiene improvement strategy

1a. System change –
alcohol-based handrub at point of care

+

1b. System change – access to safe,
continuous water supply, soap and towels

+

2. Training and education

+

3. Evaluation and feedback

+

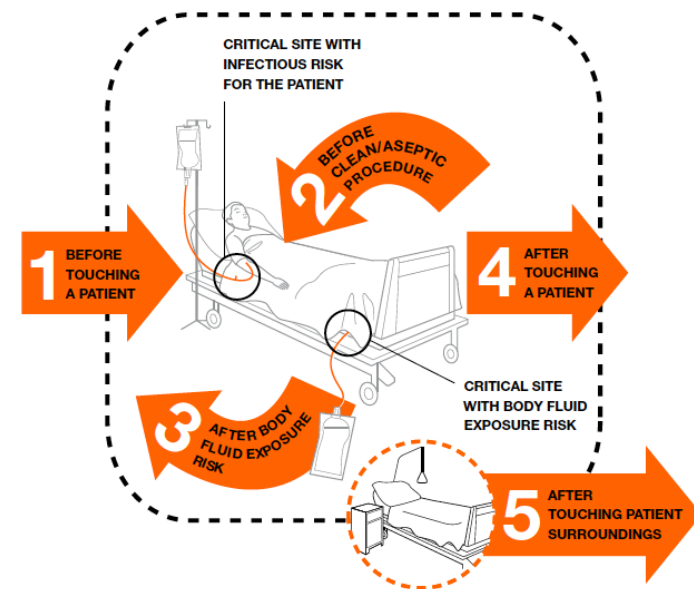
4. Reminders in the workplace

+

5. Institutional safety climate

Example 2: The Five Moments

- Lean risk based approach
- Based on the 80/20 principle
- Addresses overuse, underuse and misuse of hand hygiene in health care
- Influenced by ergonomics and workflow, neuroscience, psychology and **based on germ transmission**



Example 3: outbreaks of highly transmissible disease

Steps to take off personal protective equipment (PPE) including gown

1 Always remove PPE under the guidance and supervision of a trained observer (colleague). Ensure that infectious waste containers are available in the doffing area for safe disposal of PPE. Separate containers should be available for reusable items.

3 Remove apron leaning forward and taking care to avoid contaminating your hands. When removing disposable apron, tear it off at the neck and roll it down without touching the front area. Then untie the back and roll the apron forward.



4 Perform hand hygiene on gloved hands.

5 Remove outer pair of gloves and dispose of them safely. Use the technique shown in Step 17

6 Perform hand hygiene on gloved hands.

2 Perform hand hygiene on gloved hands.²

7 Remove head and neck covering taking care to avoid contaminating your face by starting from the bottom of the hood in the back and rolling from back to front and from inside to outside, and dispose of it safely.



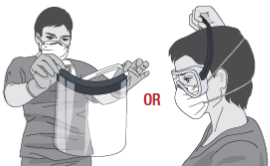
9 Remove the gown by untying the knot first, then pulling from back to front rolling it from inside to outside and dispose of it safely.



8 Perform hand hygiene on gloved hands.

10 Perform hand hygiene on gloved hands.

11 Remove eye protection by pulling the string from behind the head and dispose of it safely.



13 Remove the mask from behind the head by first untying the bottom string above the head and leaving it hanging in front; and then the top string next from behind head and dispose of it safely.



14 Perform hand hygiene on gloved hands.

12 Perform hand hygiene on gloved hands.

15 Remove rubber boots without touching them (or overshoes if wearing shoes). If the same boots are to be used outside of the high-risk zone, keep them on but clean and decontaminate appropriately before leaving the doffing area.²

17 Remove gloves carefully with appropriate technique and dispose of them safely.



16 Perform hand hygiene on gloved hands.

18 Perform hand hygiene.



World Health Organization

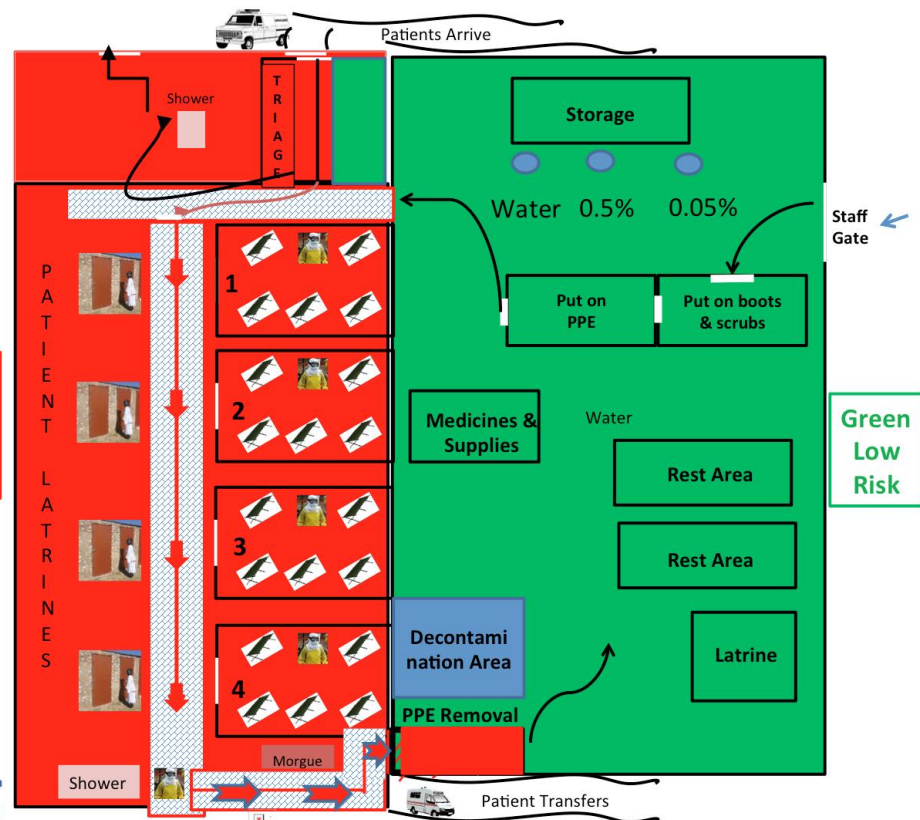
1 While working in the patient care area, outer gloves should be changed between patients and prior to exiting (change after seeing the last patient)
2 Appropriate decontamination of boots includes stepping into a footbath with 0.5% chlorine solution (and removing dirt with stiff brush if heavily soiled with mud and/or organic materials) and then wiping all surfaces with 0.5% chlorine solution. At least once a day boots should be decontaminated by soaking in a 0.5% chlorine solution for 30 min, then rinsed and dried.

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Red
Very
High
Risk



World Health Organization
Adapted for Sierra Leone
Ebola outbreak 2014 - 2015



Summary table: Human Factors approaches to prevent HAI

Human factors approach	HAI/IPC example
<ul style="list-style-type: none"> • Use of visual controls/ cues to action 	<ul style="list-style-type: none"> • Hand hygiene
<ul style="list-style-type: none"> • Avoid reliance on memory – SMS/automation/Stop Orders 	<ul style="list-style-type: none"> • CAUTI
<ul style="list-style-type: none"> • Simplification and standardization of procedures – “system change” 	<ul style="list-style-type: none"> • SSI, Hand hygiene
<ul style="list-style-type: none"> • Use of constraints/forcing functions – nurse empowerment 	<ul style="list-style-type: none"> • CLABSI
<ul style="list-style-type: none"> • Use of protocols/checklists 	<ul style="list-style-type: none"> • CLABSI/SSI
<ul style="list-style-type: none"> • Reduce interruptions or distractions & improve workflow 	<ul style="list-style-type: none"> • CLABSI; SSI; Hand hygiene
<ul style="list-style-type: none"> • Instill habits 	<ul style="list-style-type: none"> • Hand hygiene
<ul style="list-style-type: none"> • Promote effective team functioning 	<ul style="list-style-type: none"> • Hand hygiene, CLABSI

Some suggested next steps

- Refocus on IPC through a human factors lens;
- Don't overlook excellent examples of human factors thinking e.g. hand hygiene improvement approaches;
- Develop a roadmap for action;
- Form a coalition;
- Reach out;
- Ignite research;
- Use safety culture assessments prior to implementing guidelines;



Integrating human factors with infection prevention and control

Julie Storr, Dr Neil Wigglesworth, Claire Kilpatrick

In this thought paper, the authors discuss the application of human factors principles within infection prevention and control activities. They argue that the time has come to strengthen infection prevention and control capacity and capability by embedding human factors principles, methods, expertise and tools. They suggest that, in order to develop interventions that work safely within the complex sociotechnical system that is healthcare, a root and branch review of infection prevention measures through a human factors lens is a way forward.

At the Health Foundation, we are working to identify, test and demonstrate ways to manage risk in systems of care, and reduce the number of failures. We are conducting research and running improvement programmes in order to provide vital evidence and learning that can be shared across the health service.

Health Foundation thought papers present the authors' own views. We would like to thank Ms Storr, Dr Wigglesworth and Ms Kilpatrick for their work, which we hope will stimulate ideas, reflection and discussion.

Thought paper
May 2013

In summary

- If we get better at understanding the value of addressing human factors in IPC:
 - Life will be easier
 - Staff will be happier
 - Patients will be safer

Human factors – people to look out for



Pascale
Carayon



Steven Shorrock
@StevenShorrock



Shelly Jeffcott
@drjeffcott



Martin Bromiley
@MartinBromiley



Ken Catchpole
@KenCatchpole



Ayse Gurses



Clara Alvarado



Hugo Sax
@hugo_sax



Neil Wigglesworth
@Neilwigg



Claire Kilpatrick
@claireekt

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Thank you for inviting me to Nantes

“We cannot change the human condition, but we can change the conditions in which humans work” (James Reason)

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- Hugo Sax
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