

# Human Factors Engineering Applications for Infection Prevention and Control


Dr. Hugo Sax, University of Geneva  
Teleclass sponsored by GOJO ([www.gojo.com](http://www.gojo.com))


UNIVERSITÉ DE GENÈVE HUGO SAX

## Human Factors Engineering Applications for Infection Prevention and Control

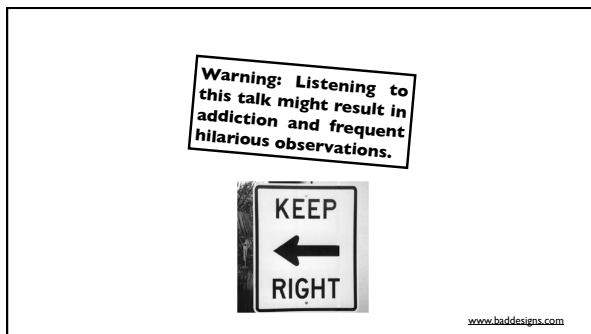
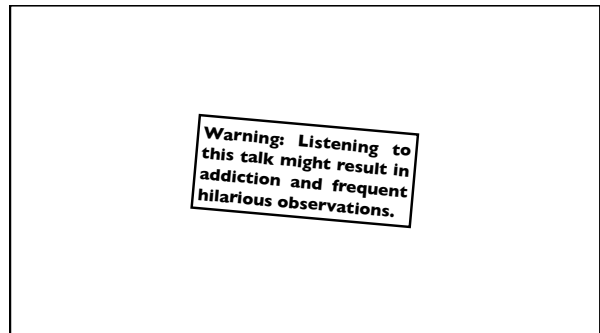
Hugo Sax, MD  
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[hugo.sax@hcuge.ch](mailto:hugo.sax@hcuge.ch)

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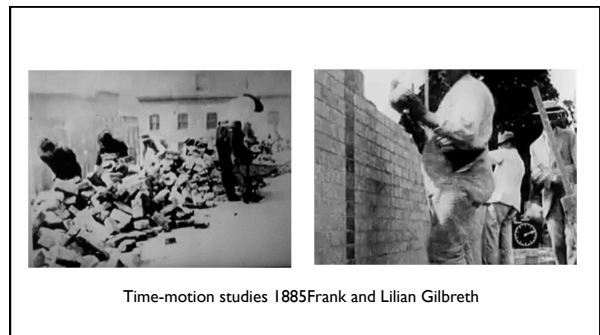


Part One >> Human Factors as a Field



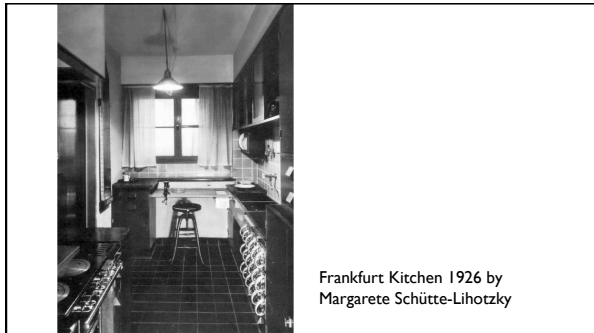
Frederick Winslow **Taylor** (1856–1915)

Time-motion studies  
'Scientific management'  
1881 US National Tennis Champion

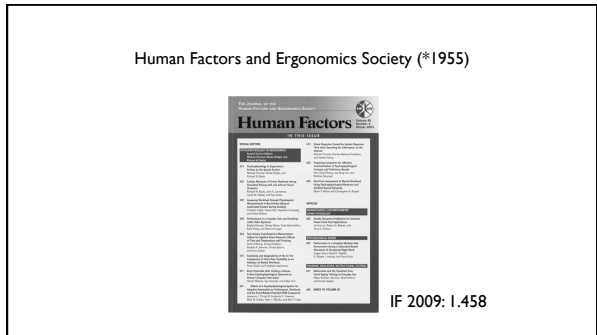
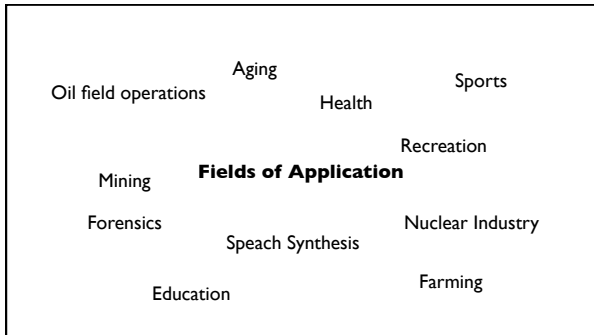
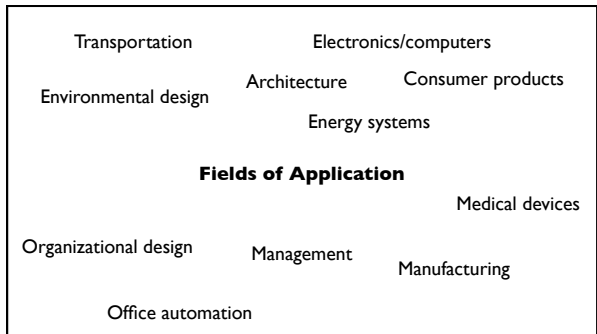


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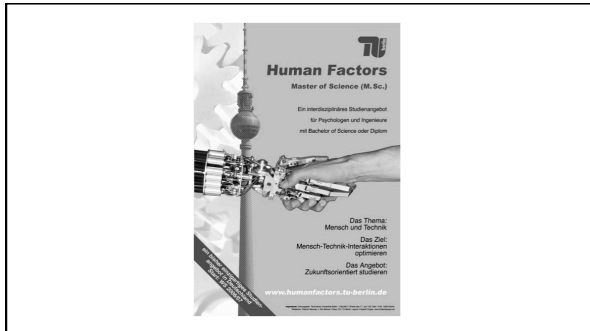
Frankfurt Kitchen 1926 by Margarete Schütte-Lihotzky



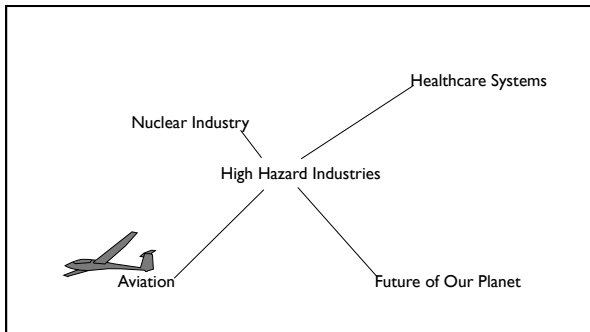
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Part Two >> Some Human Factors principles  
and their application to infection control

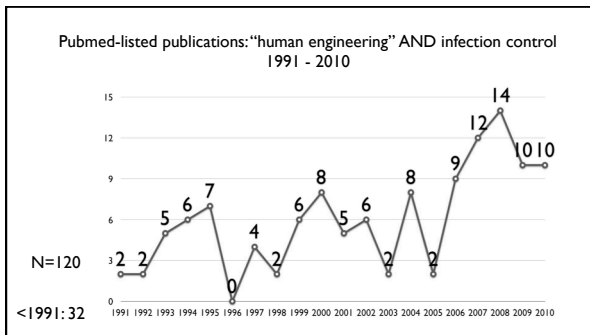


**"Latent errors** or system failures pose the greatest threat to safety in a complex system because they lead to operator errors.

They **are failures built into the system** and present long before the active error.

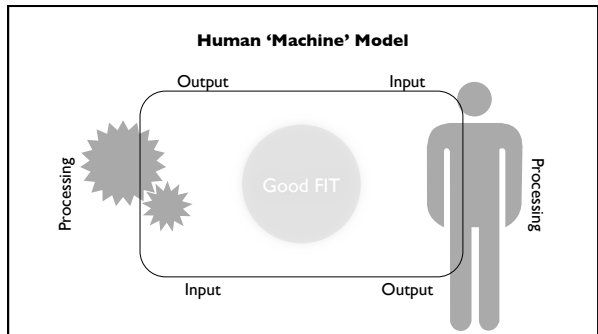
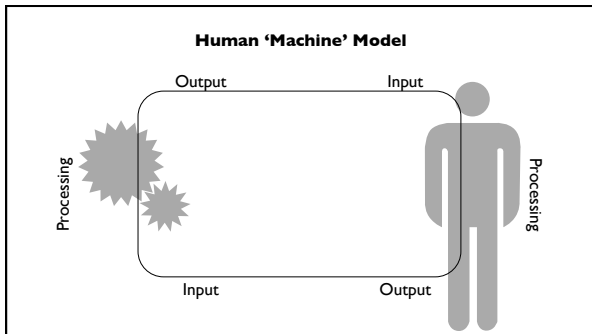
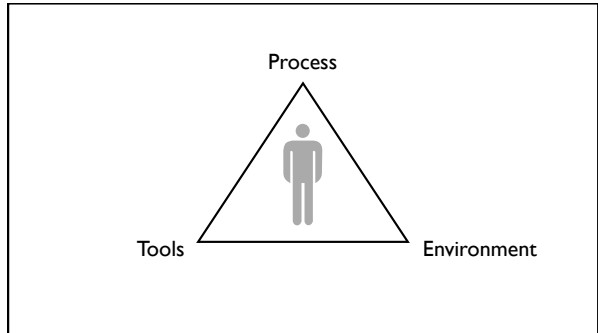
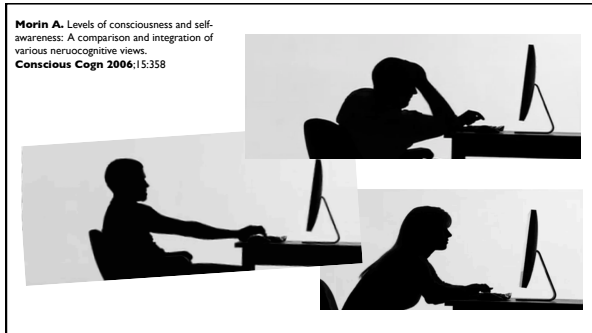
Latent errors are **difficult** for the people working in the system **to see** since they may be hidden in computers or layers of management and people become accustomed to working around the problem."

Kohn L, Corrigan J, Donaldson M. Washington, DC: Institute of Medicine; National Academy Press; 1999.



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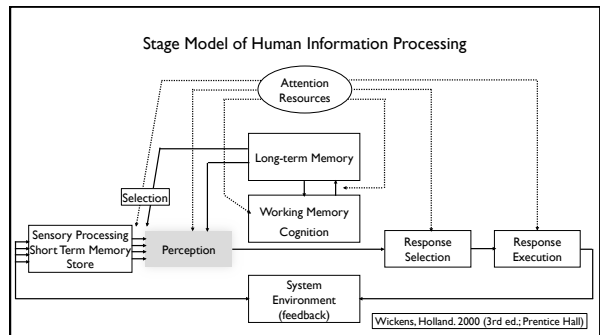
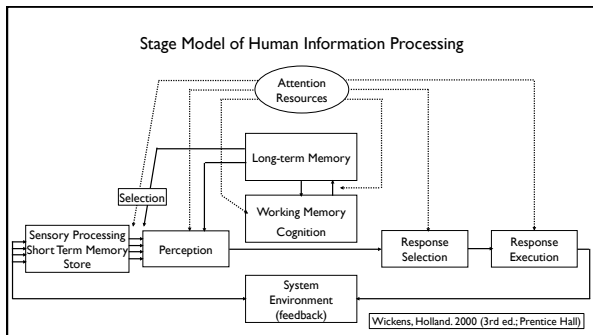
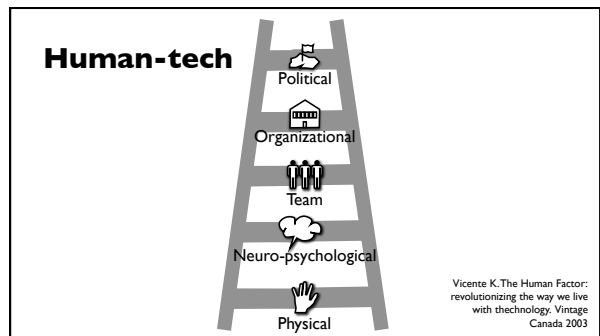
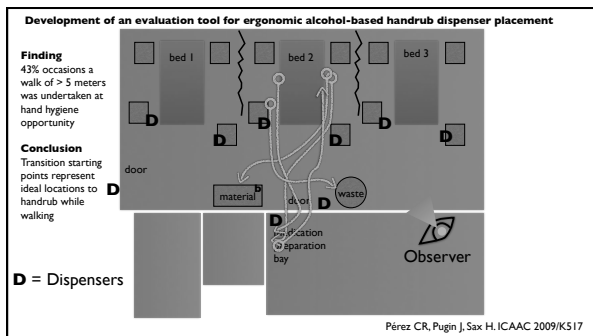
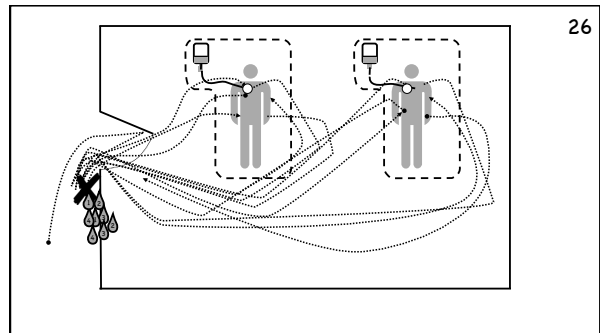
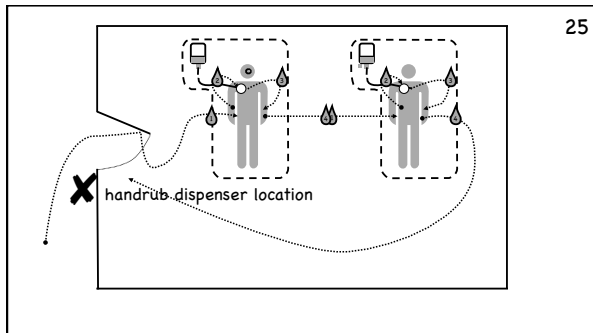


Task: Shaving



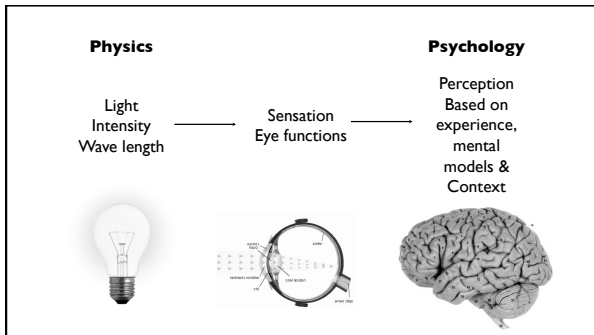
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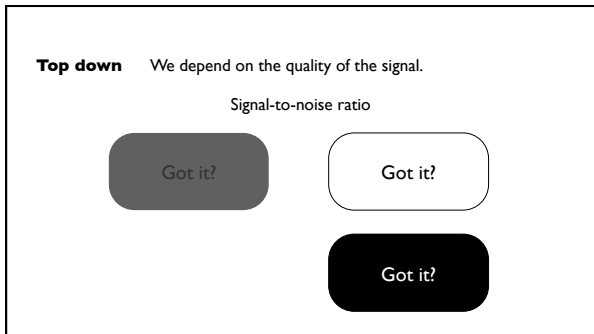
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**Top down** We depend on the quality of the signal.

**Bottom up** We see / hear what we expect to see / hear.


Expectations  
Context



**Top down** We depend on the quality of the signal.

**Bottom up** We see / hear what we expect to see / hear.

Expectations  
Context

	<p>17:06:09 (KLM first officer) – Ah roger, sir, we're cleared to the Papa Beacon flight level nine zero, right turn out zero four zero until intercepting the three two five and we're now (at take-off ??).</p> <p>17:06:13 (Captain) - We gaan. (We're going)</p> <p>17:06:19 (Tenerife control tower) - OK</p>
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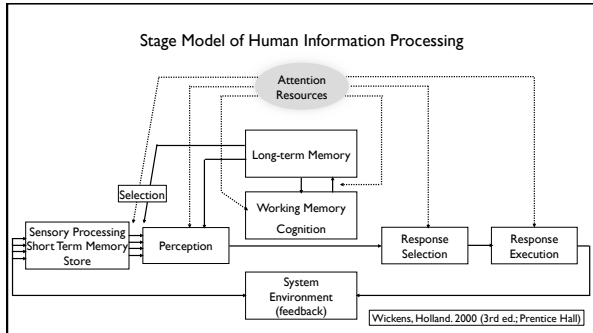
**Bottom up** We see / hear what we expect to see / hear.

Expectations  
Context

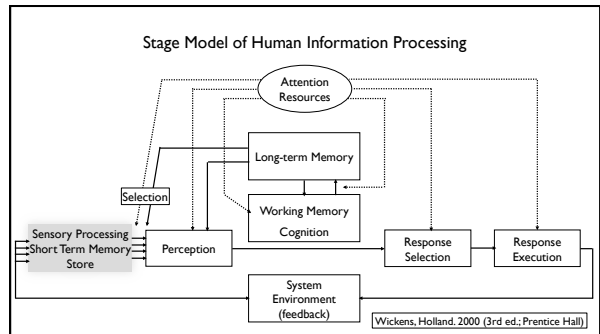
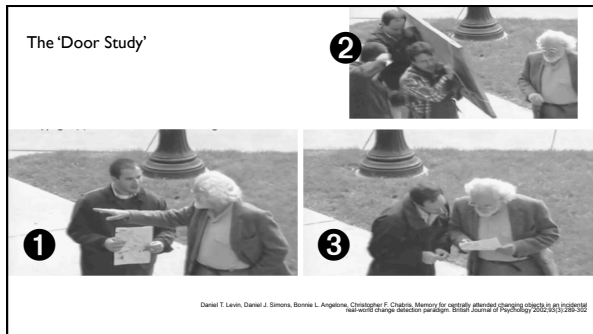
	
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Experiment



Experiment

CIAFBKGBDNABBCUKCNNUSA

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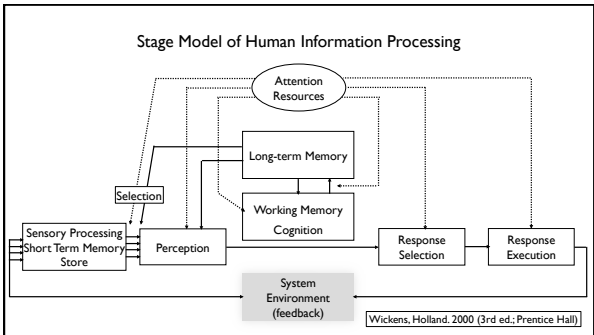
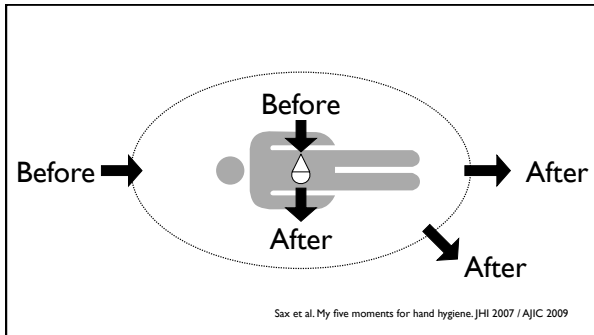
CIA FBI KGB DNA BBC UK CNN USA

**Chunking** enhances memory

Miller GA.  
The magical number seven plus or minus two: some limits on our capacity for processing information.  
Psychol Rev 1956;63:81-97

$7 \pm 2$  items

Before touching a patient  
 Before a clean/aseptic task  
 After body fluid exposure risk  
 After touching a patient  
 After touching the patient surroundings



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Infection control and prevention suffers from a  
**action/feedback disconnect**



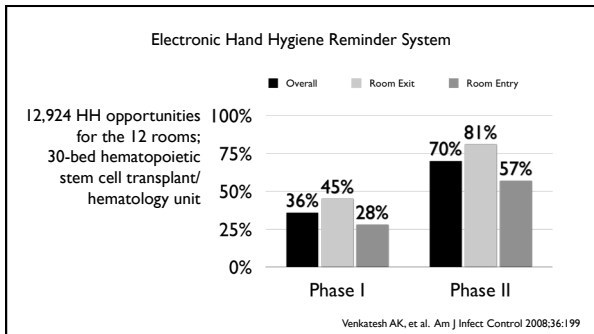
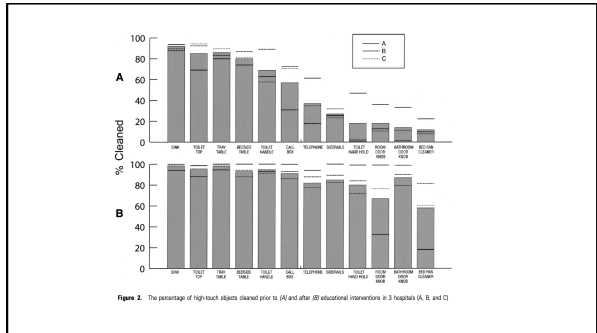
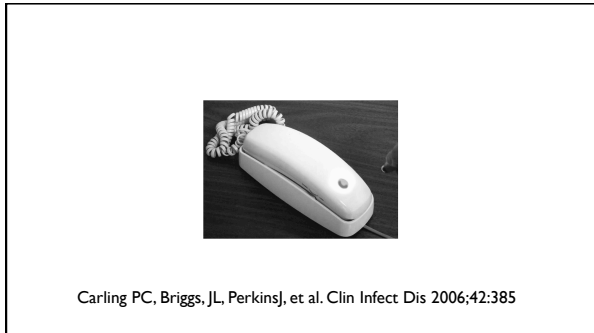
Making things visible/tangible

Speed Indicator Device



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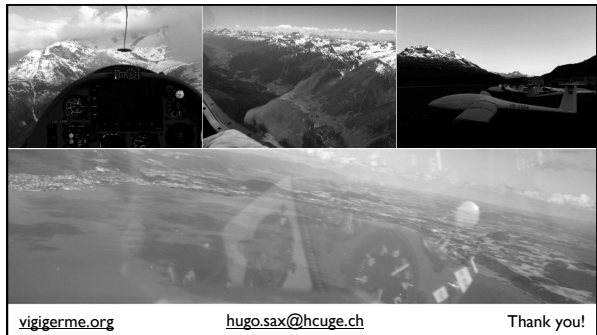
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Khan BA, Hui KY, Hui SL, Gulati R, Tricker J, Campbell NL, Farber MO, Boustani MA, Buckley JD.

**Time-Motion Analysis** of Health Care Workers' Contact With Patients and Workers' Hand Hygiene: Open vs Closed Units.  
 Am J Crit Care. 2011 May;20(3):e75-e79.

- Typical HF evaluation methods
- Ethnographic analysis
  - Focus groups
  - Iterative design
  - Meta-analysis
  - Subjects-in-tandem
  - Surveys and questionnaires
  - Task analysis
  - Think aloud protocols
  - User analysis (persona)
  - 'Wizard of Oz' experiments



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*COMING SOON ...*

26 May 11 **Safe Injection Devices: 10 Years Out ... Where are the Gaps?**  
Speaker: Ed Krisiunas, WNNW International Inc.

30 May (Free Teleclass – Live Broadcast from CHICA-Canada Conference)  
**Benchmark and Performance Measurement**  
Speakers: Zahir Hirji, Bridgepoint Hospital (Toronto) and  
Leslie Forrester, Vancouver Coastal Health  
Sponsored by GOJO (www.gojo.com)

9 June 11 **Using Checklists to Prevent Healthcare Associated Infections**  
Speaker: Prof. Peter Pronovost, Johns Hopkins University  
Sponsored by: Virox Technologies Inc (www.virox.com)

14 June 11 (Free Teleclass – 10<sup>th</sup> Anniversary Lecture) **Environmental Surfaces and Pathogen Spread: After 10 Years, Are We Really Any Better Off?**  
Speaker: Prof. Syed A. Sattar, University of Ottawa  
Sponsored by: Virox Technologies Inc (www.virox.com)  
and Diversey (www.diversey.com)

[www.webbertraining.com/schedulep1.php](http://www.webbertraining.com/schedulep1.php)

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