


Technology for Monitoring Hand Hygiene in the 21st Century: Why Aren't We Using It?
Prof. Mary-Louise McLaws, University of New South Wales, Australia
A Webber Training Teleclass



Mary-Louise McLaws
Professor
Epidemiology in Healthcare Infection
Infectious Diseases Control


Never Stand Still Faculty of Medicine School of Public Health and Community Medicine

Technology for monitoring hand hygiene in the
21st century: why **aren't** we using it?

Hosted by Jane Barnett
jane@webbertraining.com


www.webbertraining.com October 19, 2016

Hand hygiene rates



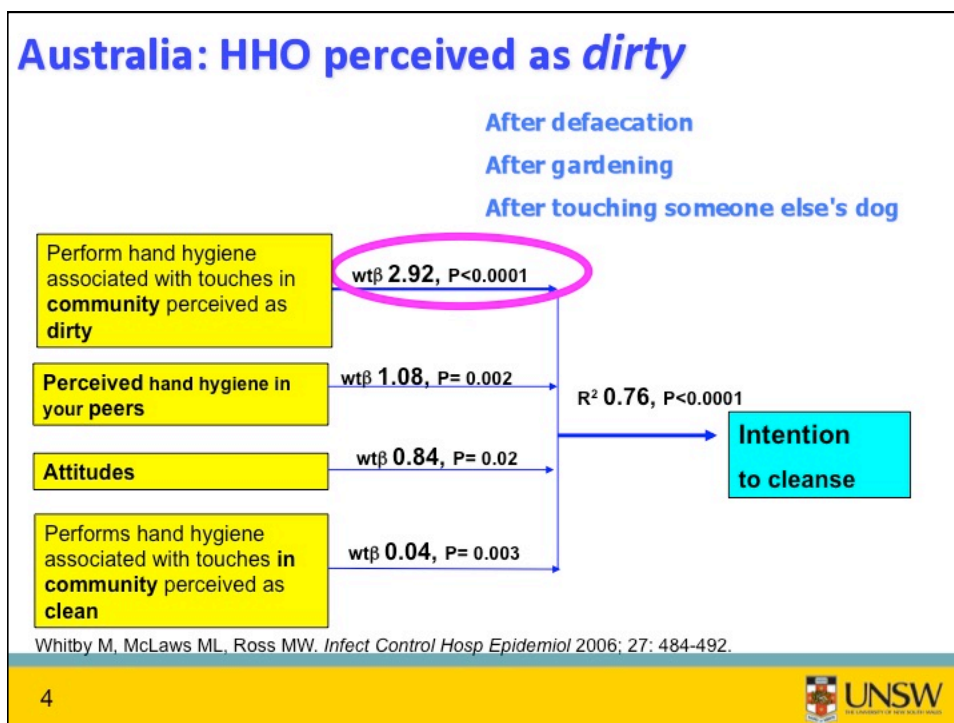
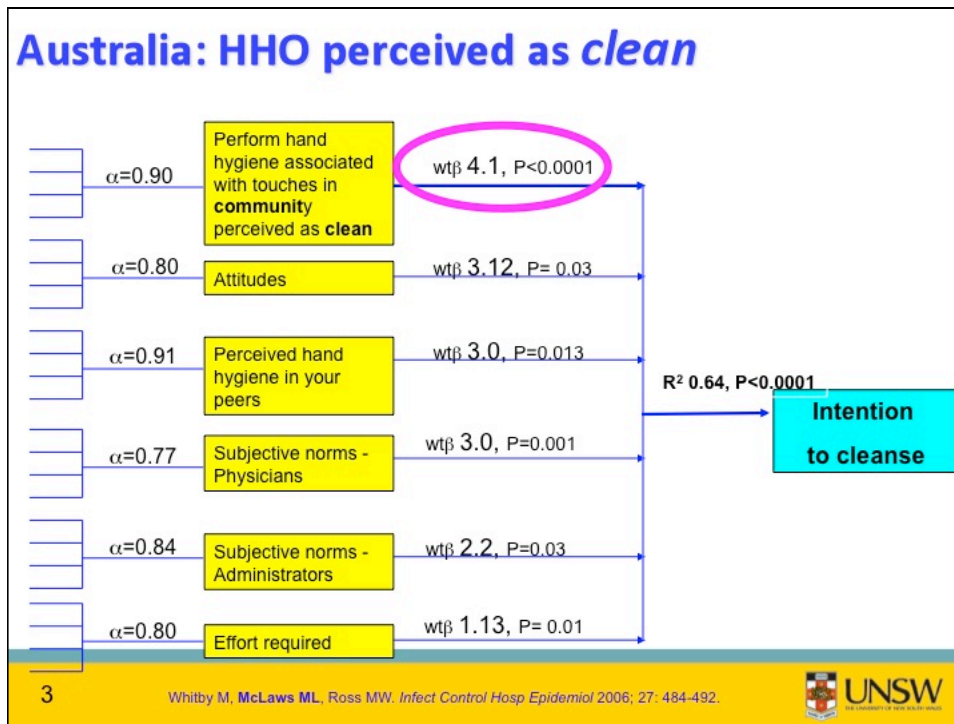
ngm.nationalgeographic.com

What we know about hand hygiene **behavior** in Australia

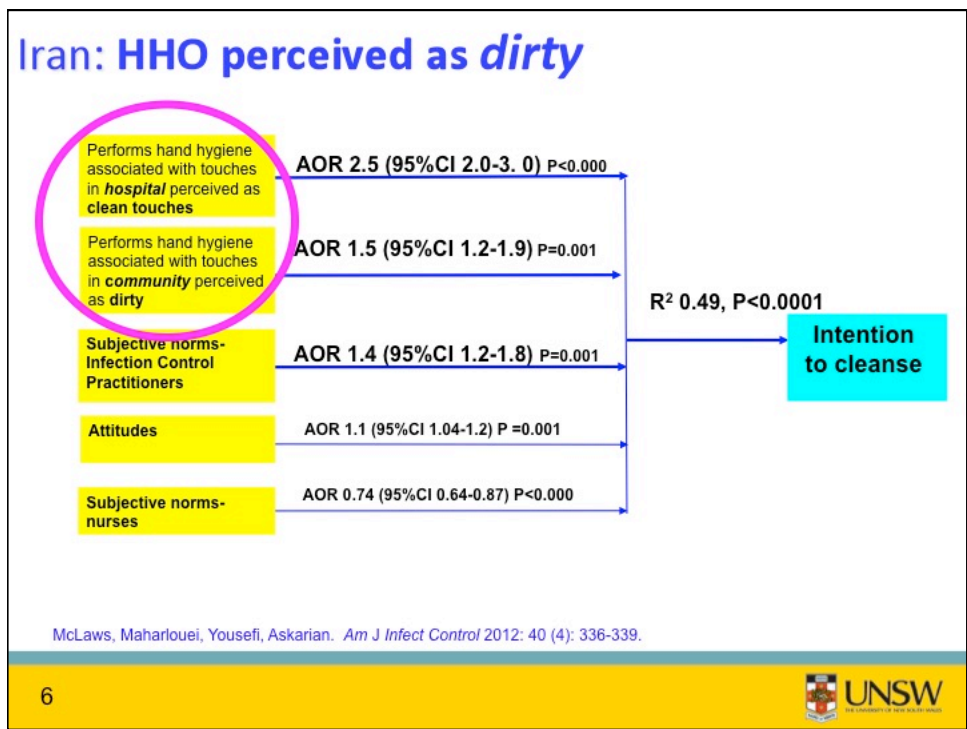
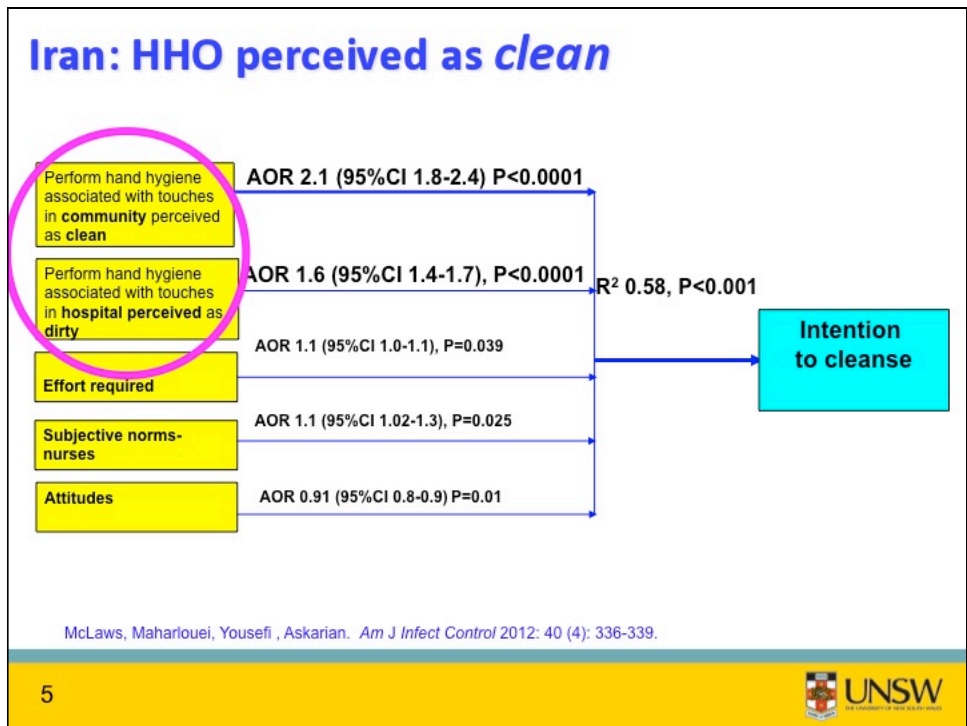
2 

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7



Hand hygiene opportunities required to be observed per quarter for rates $\geq 60\%$ to give reliable estimate i.e. (95CI 58%-63%)

	profession	5 moments
Physicians	1750	+ 1750
Nurses	1750	+ 1750
Medical students	1750	+ 1750
Nursing students	1750	+ 1750
Allied health	1750	+ 1750
Total	8750	+ 8750 = 7,500

Azim SF, McLaws ML. *Med J Aust* 2014; 200 (9):1-4.

8



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Average hand hygiene burden
per staff per day shift adjusted for number of beds

	Nurse	Doctor	ratio
Medical	22	6	4:1
Surgical	33	8	4:1

Decline by 14PP-22PP in night shift

9



If 5 Moments aggregated for Doctors + Nurses = 100%
Burden for Doctors vs Nurses

	Moment 1	Moments 4/5	Moments 2/3	Burden ratio
Weekday	5% vs 30%	9% vs 38%	2% vs 16%	1 : 6
Weekend	3% vs 27%	7% vs 39%	2% vs 22%	1 : 10

Conclusion: doctors have *very little burden*

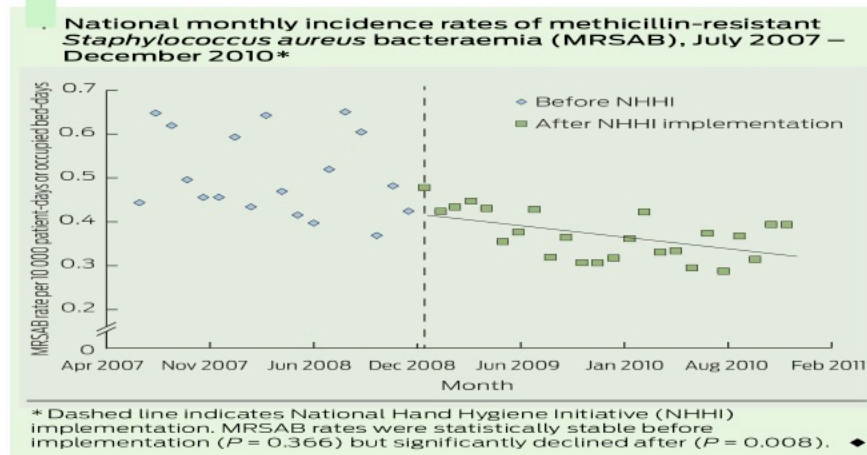
10



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Hand Hygiene rate 44% to 68% ($P < 0.001$) in 521 hospitals

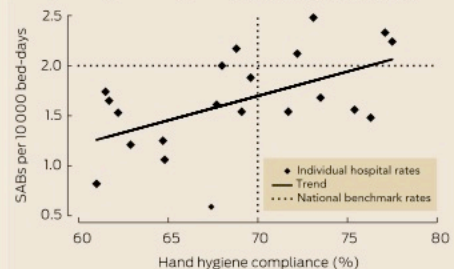


Grayson ML et al. *Med J Aust* 2011; 195 (10):615-19

11



Rates of health care-associated *Staphylococcus aureus* bacteraemia (SAB) and hand hygiene compliance for 21 large metropolitan public hospitals 1 July 2010 to 30 June 2011



21 largest Australian hospitals inverse relationship:
for every 10 PP hand hygiene compliance SAB rate increased by 0.5 case/10,000 bed-days

Playford GE, McDougall D, McLaws ML. *Med J Aust* 2012 (letter); 197 (1): 29-30.

State	Incidence rate ratio association SAB rate and Hand Hygiene rate
NSW (n=200)	0.97 (p<0.01)
QLD (n=46)	0.99 (p=0.25)
VIC (n=76)	0.99 (p=0.59)
Aggregated hospitals (N=322)	0.99 (p<0.01)

322 hospitals from 3 largest states:
just 1% of decrease in SAB rate can be attributed to current hand hygiene compliance rate

12

Azim SF, McLaws ML. *Med J Aust* 2014; 200 (9):1-4.




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Azim SF, McLaws ML. Doctor do you have a moment? *Med J Aust* 2014; 200 (9):1-4.


Margin of error for the current hand hygiene compliance rates for Moment 1 (before touching a patient) collected during 1 January to 31 March, 2013 by hospital size

National threshold (70%) compliance by hospital size	Proportion of hospitals (no. of hospitals at compliance levels/ total number of hospitals)	Moment 1 rate (95% CI) (no. of Moment 1 complied/total Moment 1 observations)		Average compliance rate for the hospital size (95% CI)
		Highest compliant hospital	Lowest compliant hospital	
>400 beds				
At or above threshold	29% (10/34)			70% (67%–73%)
Below threshold	71% (24/34)			
301–400 beds				
At or above threshold	29% (4/14)			70% (67%–73%)
Below threshold	71% (10/14)			
201–300 beds				
At or above threshold	30% (6/20)			75% (70%–77%)
Below threshold	70% (14/20)			
101–200 beds				
At or above threshold	43% (6/14)			75% (70%–79%)
Below threshold	57% (8/14)			

13 

3 Compliance rates for all five hand hygiene moments by doctors and nurses for 1 January to 31 March 2013, by hospital size regionally and by the three largest Australian states

Hospital size or state	No. of hospitals	Compliance rate (95% CI)		Percentage point difference between doctor and nurse compliance	P
		Doctors	Nurses		
Hospital size (no. of beds)					
> 400	34	63% (62%–64%)	80% (80%–80%)	17	< 0.01
301–400	14	62% (61%–64%)	79% (79%–80%)	17	< 0.01
201–300	20	65% (64%–66%)	82% (82%–82%)	17	< 0.01
101–200	14	65% (63%–66%)	83% (82%–83%)	18	< 0.01
State					
New South Wales	30	65% (64%–65%)	84% (83%–84%)	19	< 0.01
Queensland	19	61% (60%–62%)	79% (79%–80%)	18	< 0.01
Victoria	17	68% (67%–70%)	77% (77%–78%)	9	< 0.01

Azim SF, McLaws ML. *Med J Aust* 2014; 200 (9):1-4.
14 

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☹ **Incorrect message we give**

and

☹ **Invalid and unreliable sampling**

15



**Q. Does this mean there is little association
between *hand hygiene* and *bacteremia* ?**

A. Yes and No

It's all about the auditing

16



Little to no relationship....yet

Why ?

17



We haven't reached best practice – *why ?*



Poor followership

18



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- ☹ Behavior- rates are gamed
- ☹ Incorrect message we give

19



Gamed by ward staff and managers

"We've reached our hand hygiene KPI"

	Daily average daily use in grams per room 1gm = 1 Hand Hygiene Opportunity
	Azim, Juergens, McLaws. <i>Am J Infect Control</i> 2016; 44:777-81
Ward 1	○ medical 3 HHOs per patient per 24 hours ○ surgical 4 HHOs per patient per 24 hours <i>Average 20 patients = 70 grams</i>
Ward 2	

20




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Gamed by ward staff and managers

"We've reached our hand hygiene KPI"



Daily average daily use in grams per room
1gm = 1 Hand Hygiene Opportunity

Ward 1	Clear	1.23
	Blue	14.7
	Pink	0.87
Ward 2	Clear	0.35
	Blue	1.25
	Pink	0.2


21 

Developed validated audit method + 'added value'

Automated audit system

Tested system without *nudge*

Added value to automation using Nudge theory

22 

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Developed validated automated method
+ '*added value*'

- Developed a *validated automated surveillance system* to monitor compliance
- Transformed *compliance* into peer-lead behaviour change
- Pioneered - *daily rates + nudge theory*
- Sustained behaviour *since June 2014*
- Adapted *nudge theory*

Ethics approval: UNSW Australia; Area Health Service- test hospital

23



Developed validated automated system

Installed *Wi-Fi*

Daily compliance data gathering

- Automated numerator by depressing hand hygiene dispensers
- Use denominator from 24/7 audits of hand hygiene opportunities

Team compliance rate

Total hand hygiene compliance

24




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Map

Oct 2013	HHA audit	}	Pre-phase Human overt
Oct 12-18 2013	24/7 audit		
June - Nov 2014	Automation installation + run in	}	Covert
Dec 2014 - Nov 2015	Automation + Nudge		
Nov 6 2015	<i>8-hour audit</i>	}	Human overt

25 


24/7 Comparisons between Medical and USA weighted adjusted daily HHOs (soap and water & ABHR)

¹ 1 adult medical ward in a 850-bed teaching hospital, Sydney, in 2013
² 1 adult medical ward in a 746-bed teaching hospital, Greenville, in 2010 [10]

	Mean (95%CI) HHOs per patient-day in medical ward	
	Australia ¹	USA ²
Weekday (Mon-Fri)	77 (59-95)	76 (71-89)
Weekend (Sat-Sun)	73 (60-87)	68 (65-88)
24-hour period (Mon-Sun)	76 (65-87)	74 (69-84)

Conclusion: our estimates have validity


1.Steed C, Kelly JW, Blackhurst D, et al. Hospital hand hygiene opportunities: Where and when (HOW2)?The HOW2 Benchmark Study. *Am J Infect Control* 2011; 39:19-26

26 

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27



Reality check

28

Badass Digest Presents




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Reality check

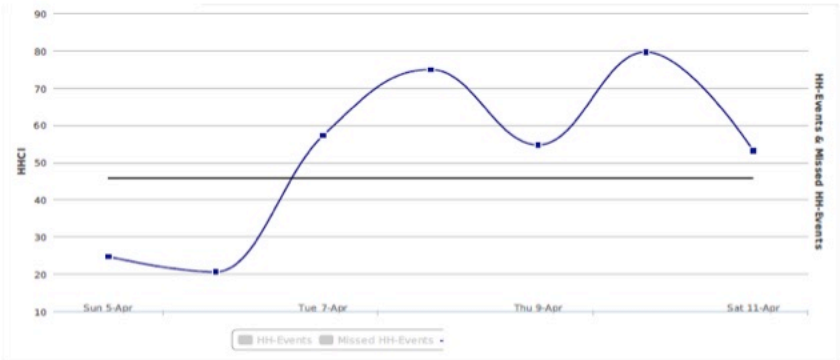
2014	2015
Automation Without nudge	Automation plus nudge
40%	60%-80%


Badass Digest Presents 

Weekly report

DebMed® GMS™
 Hand Hygiene Compliance
 Group Monitoring System 

HHCI: 05-Apr-2015 to 11-Apr-2015 (DAILY points)



30 

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Transformed evidence of compliance into action
using every clinician

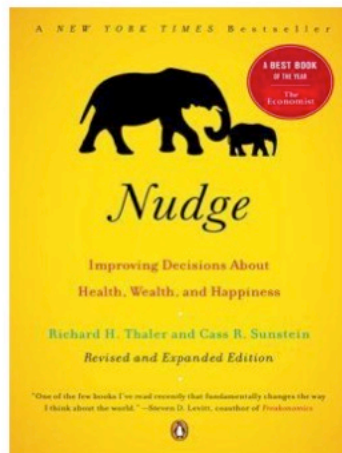
Nudging Steps for co-operation

- 1: using evidence yesterday's rate from new automated system
- 2: continuous improvement *"Did we reach our goal rate?"*
- 3: group mantra *"Hand hygiene is for the benefit of the patient"*
- 4: developing trust to ask for help *"Nudge me"*
- 5: practice nudging *"Doctors take a moment"*
- 6: *be your goal* visualise yourself cleansing your hands on entry to first patient's room

31



Nudge theory



- President Barak Obama
- Prime Minister David Cameron
- Donor registration increased 38 to 60% in the US from the drivers license department
- Toilets in Amsterdam's Schipol airport, drawings of black flies, ↓ spillage 80%
- Quit smoking rates increased
- Vaccinations uptake

32




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Nudge theory Thaler R. and Sunstein C. (2009): Nudge: Improving decisions about Health, Wealth and Happiness. Penguin Books Ltd, UK.


Behavioural economics models

- move communities towards rational targeted purchasing / preferred behaviour patterns



33 

2014	2015
Automation without nudge	Automation plus nudge
40%	70%

34 

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From following to nudging



*“Older doctors are very much on board [nudging]...and act as a role model, **2 consultants [1 is head of department]** always cleans in and out... the **rest of the team** follows and do not need to be nudged....”*

35



From following to nudging

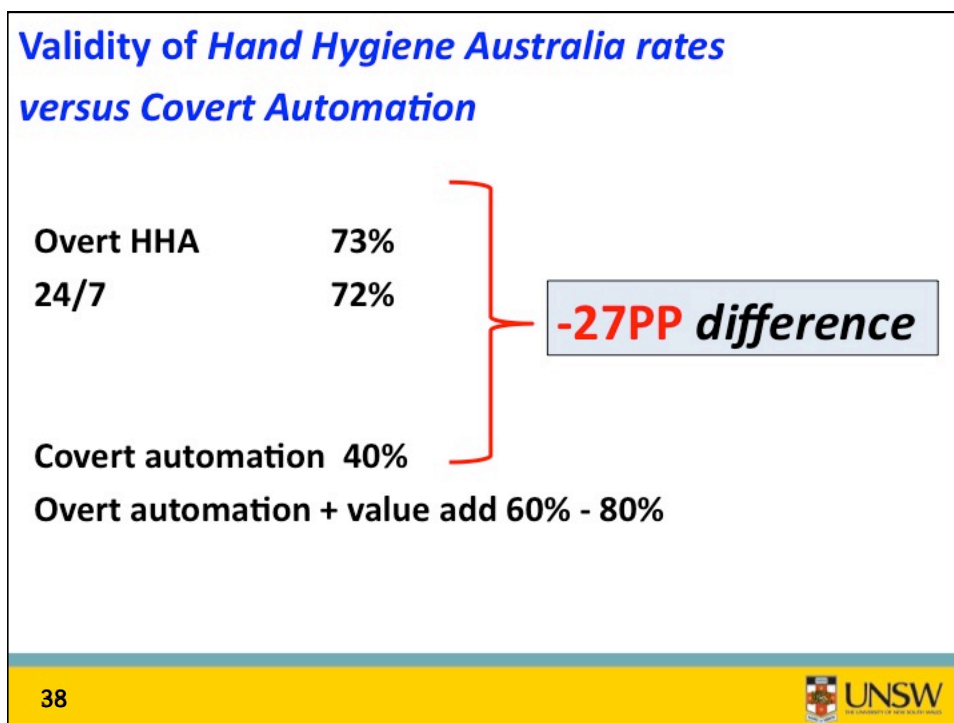
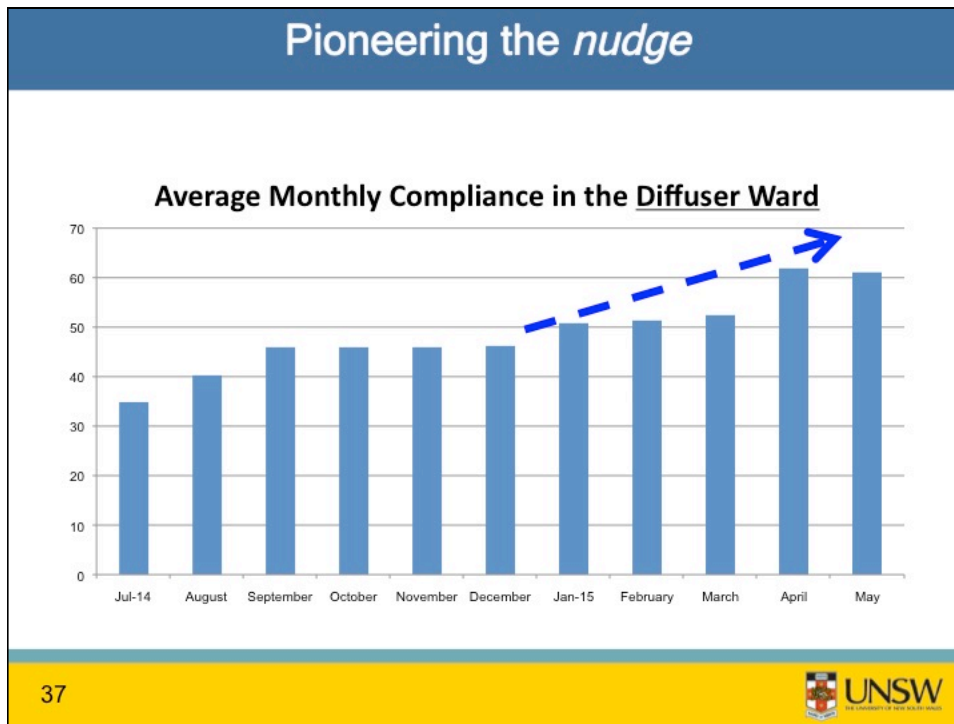
“Yes, daily I remind them [doctors] about the opportunities that they missed, not 7 steps, I don't follow all the 7 steps at the hand over, but give a reminder here and there. We [all ward staff] are very motivated as a group.”

36



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8-hour audit

1,159 HHOs collected automatically >3 times HHA sample

	Medical	Surgical
Nurses	86% (95%CI 83%-90%)	75% (95%CI 70%-79%)
Doctors	88% (95%CI 76%-94%)	62% (95%CI 52%-71%)
Moment		
1	74%	79%
2	76%	78%
3	95%	86%
4	92%	82%
5	85%	44%
Total	85%	70%

39

What makes a ward a diffuser ward?

“...senior doctors, I know them well, we can talk about personal things and socialise easily”

“The senior doctors now nudge each other as they move in and out of the patient’s room”

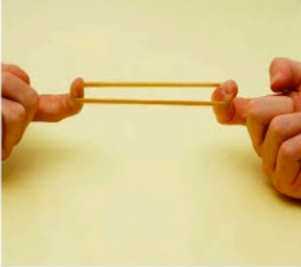
40

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**Immediate
deaths and
adverse events**


hard killers



**Slow
transmission
of pathogens**

soft killers

41




World Health Organization

A World Alliance for Safer Health Care

Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES

Clean Your Hands

Audit Tool

Observation Form

Facility: Period Number*: Session Number*:

Service: Date: (dd/mm/yy) / / Observer (initials):

Ward: Start/End time: (hh:mm) - Page N°:


Department: Session duration (mm) City**:

Country**:

Prof.cat Code N°	Prof.cat Code N°	Prof.cat Code N°	Prof.cat Code N°															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Opp.</th> <th>Indication</th> <th>HH Action</th> <th>Opp.</th> <th>Indication</th> <th>HH Action</th> <th>Opp.</th> <th>Indication</th> <th>HH Action</th> </tr> <tr> <td>1</td> <td> <input type="checkbox"/> bef.pat. <input type="checkbox"/> bef.asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft.pat. <input type="checkbox"/> aft.p.surr. </td> <td> <input type="checkbox"/> HR <input type="checkbox"/> HW <input type="checkbox"/> missed <input type="checkbox"/> gloves </td> <td>1</td> <td> <input type="checkbox"/> bef.pat. <input type="checkbox"/> bef.asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft.pat. <input type="checkbox"/> aft.p.surr. </td> <td> <input type="checkbox"/> HR <input type="checkbox"/> HW <input type="checkbox"/> missed <input type="checkbox"/> gloves </td> <td>1</td> <td> <input type="checkbox"/> bef.pat. <input type="checkbox"/> bef.asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft.pat. <input type="checkbox"/> aft.p.surr. </td> <td> <input type="checkbox"/> HR <input type="checkbox"/> HW <input type="checkbox"/> missed <input type="checkbox"/> gloves </td> </tr> </table>	Opp.	Indication	HH Action	Opp.	Indication	HH Action	Opp.	Indication	HH Action	1	<input type="checkbox"/> bef.pat. <input type="checkbox"/> bef.asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft.pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="checkbox"/> missed <input type="checkbox"/> gloves	1	<input type="checkbox"/> bef.pat. <input type="checkbox"/> bef.asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft.pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="checkbox"/> missed <input type="checkbox"/> gloves	1	<input type="checkbox"/> bef.pat. <input type="checkbox"/> bef.asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft.pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="checkbox"/> missed <input type="checkbox"/> gloves
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 | | |

http://www.who.int/gpsc/5may/tools/evaluation_feedback/en/ Page 44



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Hand Hygiene Australia methodology

Teaching hospitals 2450 from 6 wards
1 ICU+ 2 high risk wards+ 4 other wards

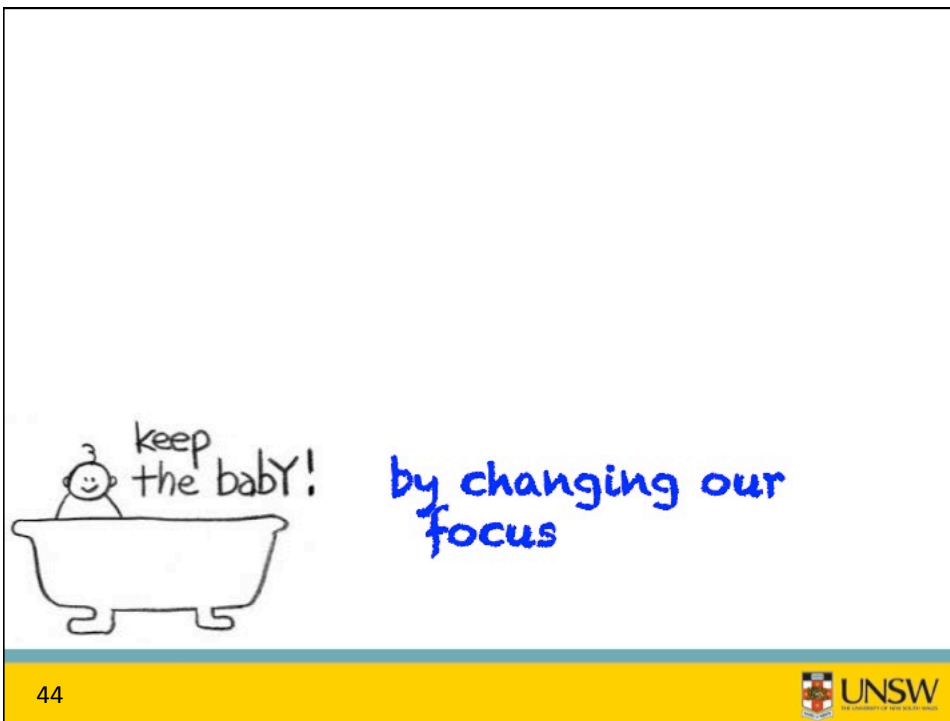
Geneva n~350 HH rate=80% (95%CI 76%-84%)

But HHA 350 per ward

if HH rate = 65% (95%CI 60%-70%)
If HH rate = 70% (95%CI 65%-75%)

Unreliable at
10PP width

43



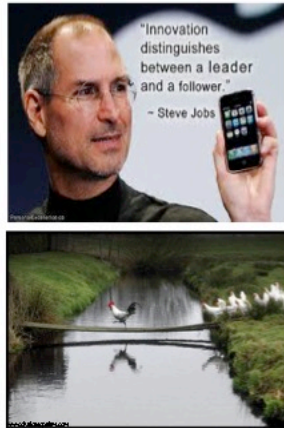
44



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Mindfully selected diffusers to lead ward and hospital

Diffuser ward



Non diffuser ward



45



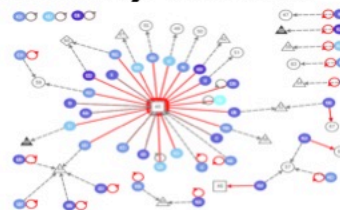
Can nudge be adapted elsewhere ?

Nudge works with

♥ *leader is a diffuser*

diffuser is not always *clinically perfect*

Does *nudge* need to be led by doctor?



File K, McLaws ML. (in press)

46



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Can't lead unless you follow

47

NSW collaborates – select differs who follow then lead

Overall Hand Hygiene Compliance by Profession Group

Group	Precampaign	Aug-06	Nov-06	Feb-07
Nurses	54.5%	54.5%	69.3%	69.0%
Doctors	29.6%	30.6%	59.1%	45.7%
Allied Health	40.2%	51.7%	54.9%	63.2%
Other Staff	24.5%	45.0%	61.9%	57.6%

Data Collection Period

SUPPLEMENT

A statewide approach to systematising hand hygiene behaviour in hospitals: *Clean hands save lives, Part I*

Annette C Pantle, Kimberley R Fitzpatrick, Mary-Louise McLaws and Clifford F Hughes

CLEAN HANDS SAVE LIVES

Culture change for hand hygiene: *Clean hands save lives, Part II*

Kimberley R Fitzpatrick, Annette C Pantle, Mary-Louise McLaws and Clifford F Hughes

SUPPLEMENT

Improvements in hand hygiene across New South Wales public hospitals: *Clean hands save lives, Part III*

Mary-Louise McLaws, Annette C Pantle, Kimberley R Fitzpatrick and Clifford F Hughes

SUPPLEMENT

More than hand hygiene is needed to affect methicillin-resistant *Staphylococcus aureus* clinical indicator rates: *Clean hands save lives, Part IV*

Mary-Louise McLaws, Annette C Pantle, Kimberley R Fitzpatrick and Clifford F Hughes

48

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**Followership success:
rolled out 2012 to *all* Australian public ICUs**



RESEARCH

Aseptic insertion of central venous lines to reduce bacteraemia
The Central Line Associated Bacteraemia in
NSW Intensive Care Units (CLAB ICU) Collaborative

Anthony R Burrell, Mary-Louise McLaws, Margherita Murgu, Edo Calabria, Annette C Parfitt and Robert Herkes
MJA 2011; 194: 583-587

Zero risk for central line-associated bloodstream infection: Are we there yet??

McLaws ML, Burrell A. Crit Care Med 2012;40:388-93.

49 


Conclusions

Automation provides superior data

Human auditors - *in situ* contemporaneous education

***"Take a moment"* nudging some improvement but more likely proxy for high functioning ward**

Diffusers - followers - leaders - improve hand hygiene

50 

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Move from auditing for data

Stop just documenting ⇒ leads to “gaming”

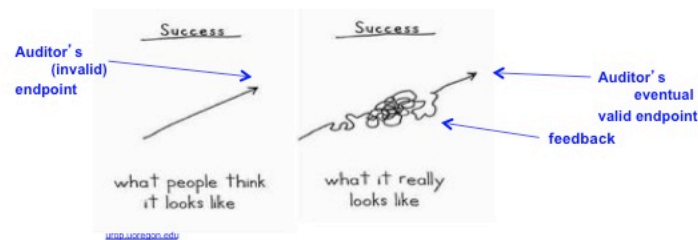
Instead provide immediate feedback at time of observation “take a moment”

Document ⇒ *number of time correction feedback given*

21st century replace human auditing with automation

Saves \$US 124,000 per hospital per year Page K et al JHI 2014;88:141-8

Daily/weekly feedback to correct team efforts



51



Coming Soon

October 20 (FREE Teleclass)

THE HISTORY OF CBIC AND WHY CERTIFICATION IS STILL IMPORTANT TODAY

Certification Board of Infection Control

October 27 **ANTIMICROBIAL ENVIRONMENTAL SURFACES IN HEALTHCARE SETTINGS – CAN THEY BE BENEFICIAL?**

Prof. Jean-Yves Maillard, Cardiff University, Wales

November 10 **NOROVIRUS AND HEALTHCARE FACILITIES: HOW TO KEEP THE VIRUS OUT AND WHAT TO DO WHEN IT GETS IN**

Dr. Ben Lopman, Centers for Disease Control and Prevention, and
Prof. Miren Ituriza-Gomara, University of Liverpool

November 23 **AIR TRAVEL AND INFECTION CONTROL**

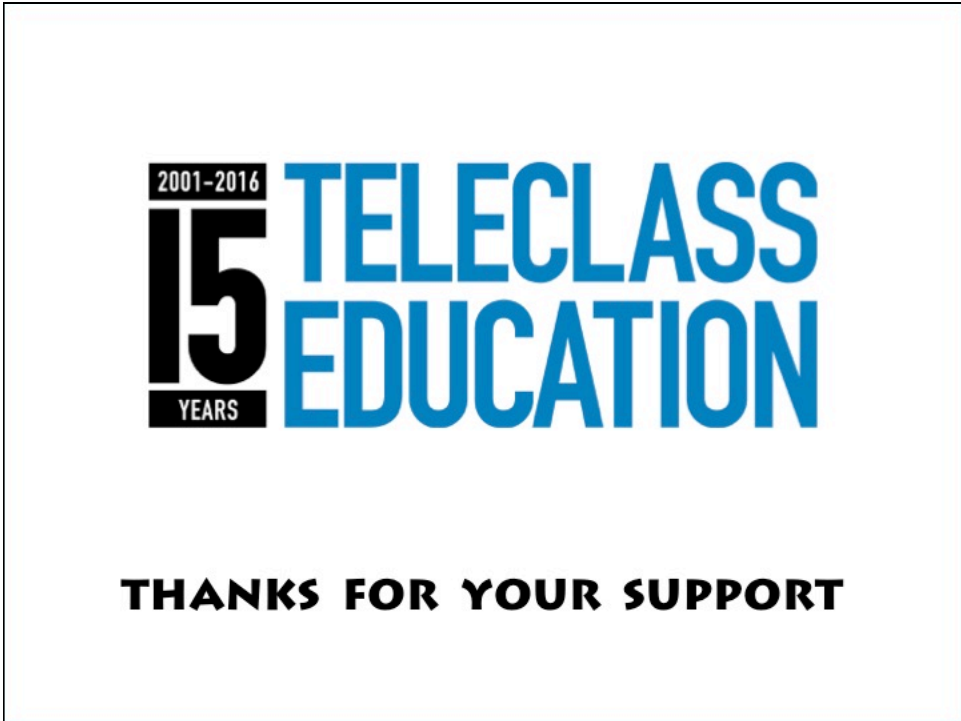
Dr. Paul Edelson, CDC, JFK Airport Quarantine Station, New York

December 8 **VIABILITY OF BACTERIA ON FABRICS**

www.webbertraining.com/schedulepl.php

Hosted by Jane Barnett jane@webbertraining.com
www.webbertraining.com

Technology for Monitoring Hand Hygiene in the 21st Century: Why Aren't We Using It?
Prof. Mary-Louise McLaws, University of New South Wales, Australia
A Webber Training Teleclass



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