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A discovery by accident



- A fungal spore that the wind might have blown into his lab while Fleming was on vacation in 1928, forever changed the course of medicine...
- Fleming named the substance Penicillin, after the mould Penicillium notatum but was unable to isolate the substance



In the late 1930s and early 1940s, E.
 Chain & H. Florey managed to produce larger amounts of penicillin and ran successful trials on mice

Antibiotics

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- Modern medicine has only been possible because of them
 - Chemotherapy
 - Transplants
 - Implant surgery no prophylaxis means that joint replacements may become too risky
- Have added about 20 years to life in developed countries
- Unique medications
 - Are not targeted against the person taking it
 - Prescribed by non-specialists

What also changed?

- Ageing population
 - Increasing public expectancy that illness is treatable
 - More interventions and invasive techniques
- Medical Science moved forward, but infection control was left to specialists
 - Not good when you have little real influence
 - In 2000, ICPs in England were asked what percentage of infections we thought were preventable; we said between 5% and 20%
- So healthcare-associated infections increased

My early professional life in 1990

- 1 ICN for
 - 1000 District General Hospital beds
 - 1000 Mental Health beds
 - 200 nursing and residential homes
 - 56 General Practice Surgeries
 - □ 100+ schools and nurseries
- Half a medical microbiologist with no defined IC time
 - □ No administrative support
- Also was the Tissue Viability Nurse

Guidance on the ICN

Ayliffe et al (Control of Hospital Infection (1975)

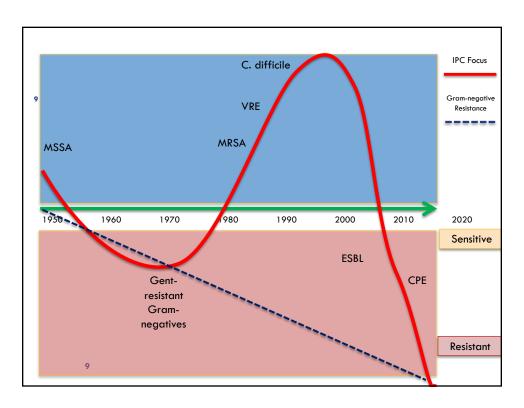
- The Infection Control Officer usually has commitments which prevent regular visits to wards...
 - At least one ICN or other suitable person should be appointed to assist
 - □ If a nurse... experience as Ward Sister or Tutor..
- Of greater importance is an agreeable personality and an ability to deal tactfully with all grades of staff

Early issues with Gram-negatives

Casewell M, Phillips, I. British Medical Journal 1977: 1316

Activity	No of Klebsiella (CFU)
Taking pulse, blood pressure	1,000
Touching hand	1,000
Oral temperature	1,000
Touching shoulder	7,000

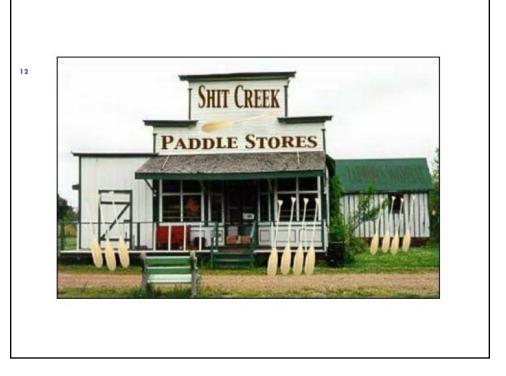
- Big outbreak
 - 17% of staff had the outbreak strain on their hands, survival time 150
 - Klebsiellas were thought to be 'sticky' organisms
- No problem lots of antibiotics were available



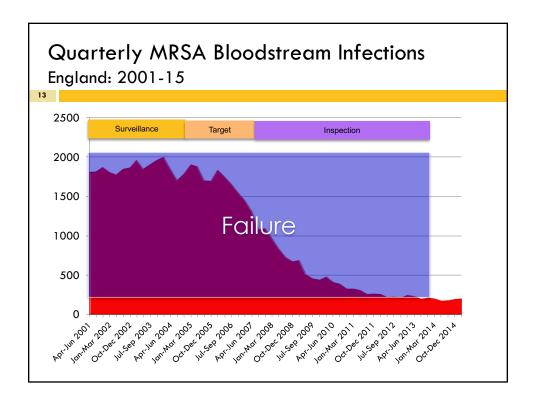


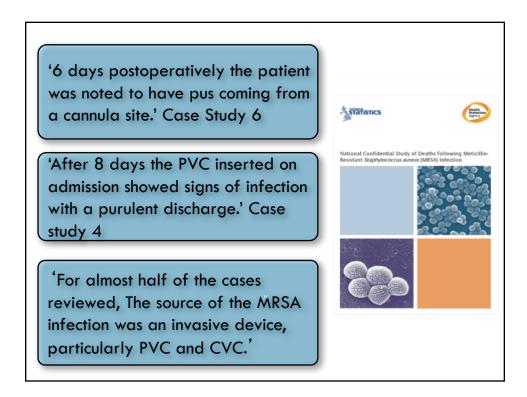
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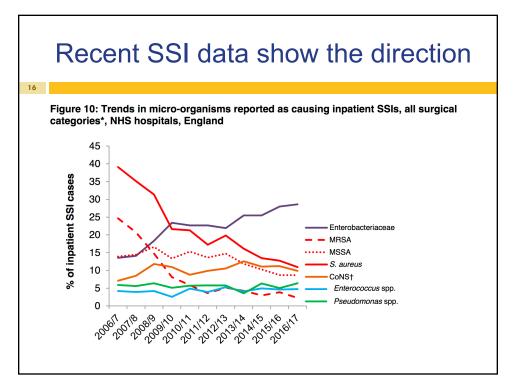
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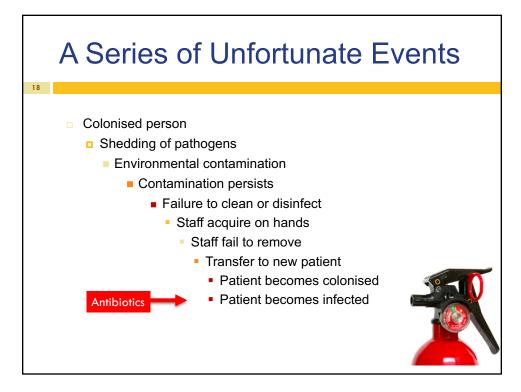
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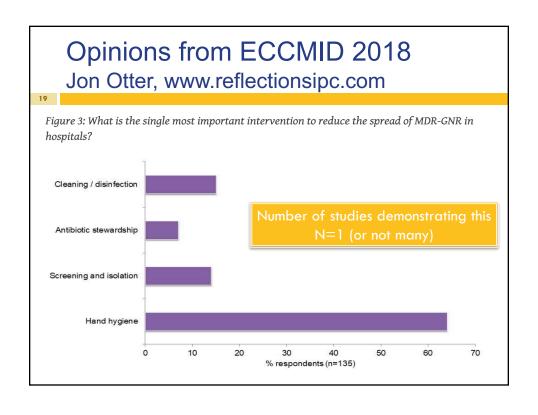
hat can we treat?		
Organism	Antibiotic effectiveness	
Streptococcus pyogenes	++++	
Staphylococcus aureus	++++	
MRSA	++++	
C. diffcile	+++	
E. coli	++++	
ESBL-E. coli	++	
CPE E. coli	+	
Acinetobacter baumanii	++	
CRE Acinetobacter baumanii	+	
Colistin-resistant A. baumanii	-	

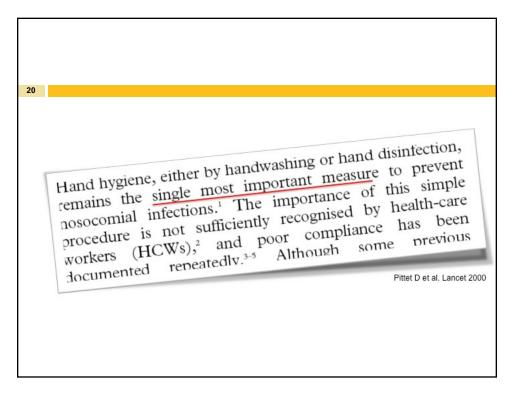


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Hand Hygiene

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- In 2006 all Hospitals in England began to audit and report Hand Hygiene compliance to the Hospital Boards via the Director of Nursing
 - Which of course normally achieve >99%, so that's all right then
- What Director of Finance will invest in a hand hygiene programme when compliance is >95%?
- If you send in a covert auditor, compliance is different..
 - But not a message that people want to hear

Hand Hygiene Audit

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- Everyone is brilliant, Hospital Boards are assured
- □ I'm not
 - Covert audits showed compliance over three months to be 23%
 - Apart from my best unit, which was a genuine 65%
 - Beggs CB et al. Increasing the frequency of hand washing by healthcare workers does not lead to commensurate reductions in staphylococcal infection in a hospital ward. BMC Infectious Diseases. 2008;8(1):114

This is embarrassing

23

- Why do we have to do this?
- Would any other professional group spend it's time monitoring other staff?
- Can we really not convince our colleagues that they really do need to do this?

When Two Become One Petrilli et al., Journal of Infection Prevention, 2017 Looked at what happened to hand hygiene when two ID units merged Looked at what happened to hand hygiene when two ID units merged Medical staff had a committed IPC champion, the nurses did not Medical staff goal adherence rate was 75–100%, while the nurses thought 50–70% adherence was acceptable

Evidence Shortage

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- Lack of evidence has been an issue, as have national dictats (in the UK)
- Smith and Pell (BMJ, 2003) undertook a systematic review and found that there was no evidence that supports the use of parachutes in preventing death and trauma from gravitational challenge

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He that complies against his will is of his own opinion still

Samuel Butler (1612-80)

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Bare below the elbows

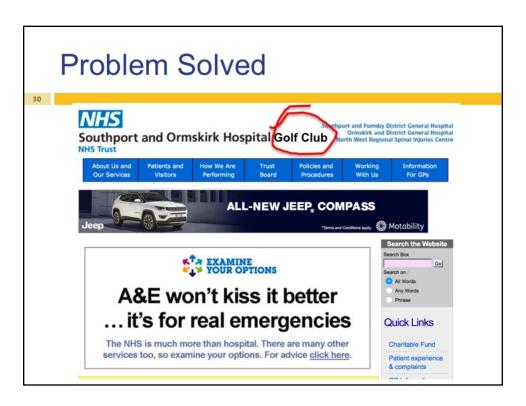
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- Great idea
 - Sends a strong positive message about the organisational culture and attitude towards infection prevention
 - Never formally UK Policy, adopted by SHEA
- Terribly implemented
 - Stick not carrot
- □ Problem: No evidence
- Some did not like being made 'look stupid'



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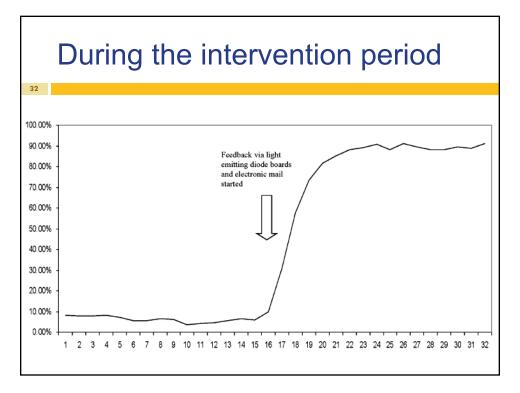


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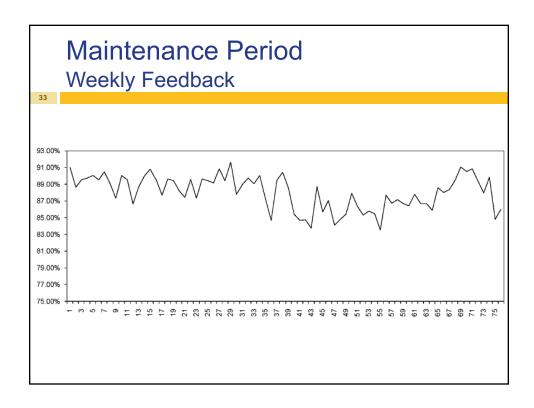
Use of Video Monitoring

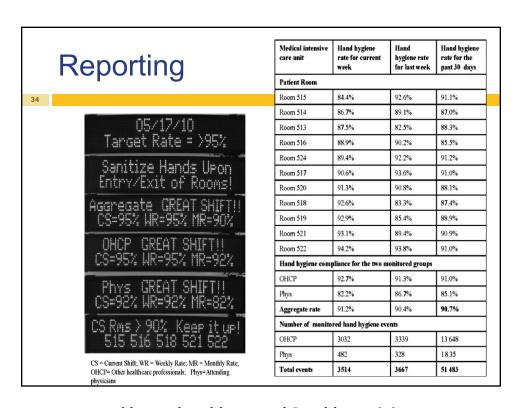
Armellino et al, Clin Infect Dis (2011)

- 2-year study in a 17-bed ICU
 - Cameras with a view of every sink and dispenser, sensors in doorways
 - □ 16-weeks no feedback, 91 with
 - HH 60% with direct observation pre-study
 - Results
 - When no feedback, compliance was 10%
 - □ First 16 weeks of feedback compliance 81.6%
 - Maintained through 75 more weeks at 87.9%
 - Performance feedback was almost real-time on video screens



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My perfect HH monitoring system

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- Fully automated
 - Who has the time?
 - Standardisation of counting method
 - Includes all five moments
 - Objective not subjective
- Instant, personalised reporting
 - At the end of the shift, person logs off and they get a personal printout of how they did for the <u>patients that they cared for</u>

Daily Personal Report

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Patient	HH Opp's	HH performed	Compliance	HCAI	Chance that it was you
Seto, W. H.	16	8	50%	1	75%
Pittet, D.	10	9	90%	0	NA
Larson, E.	8	8	100%	0	NA
Kiernan, M.	20	2	10%	2	100%
Jarvis, W.	14	7	50%	1	50%

- Your hand hygiene compliance for the day was 50%
- You are 17th of 20 staff on the ward
- · Your trend in hand hygiene for the past six months has declined
- · Your lowest compliance is with Moment 2
- Red indicates that you have the lowest staff hand hygiene rate for this patient

Audit vs Bundle

37

- Audit
 - identifies whether individual measures are being implemented
- Bundle
 - To identify whether optimum care is being delivered

Are bundles effective?

Lavallee, J. F., et al (2017) Implement Sci 12(1): 142

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- Systematic review comparing care bundles with usual care to evaluate the effects of bundles on risk of negative patient outcomes
- Very low quality evidence from controlled before-after studies suggests that care bundles may reduce the risk of negative outcomes when compared with usual care
- By contrast, the better quality evidence from six randomised trials is more uncertain..

Bundles for SSI

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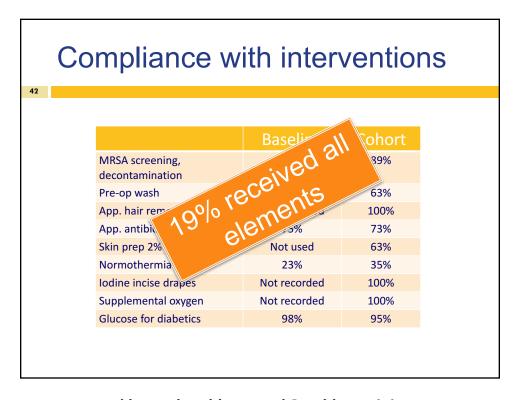
- Systematic review and meta-analysis
 - □ Tanner, J., et al., Surgery, 2015. **158**(1): p. 66-77.
- SSI rate in bundle group 7.0% and 15.1% in standard care group
 - Compliance whole bundle ranged from 2.1% to 92%
 - direct correlation between implementation (full vs. partial) of bundle and colorectal SSI rate

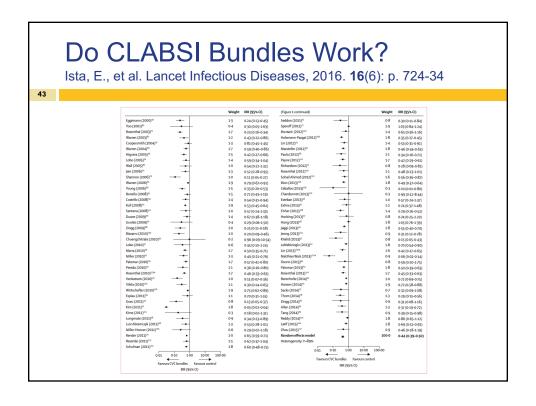
So let's see if our bundle works

40

- □ We implemented a 9-point bundle
 - Antiseptic bathing
 - 2% Alcoholic Chlorhexidine
 - MRSA Screening
 - Abx prophylaxis
 - Normothermia
 - lodine incise drapes
 - Supplemental Oxygen
 - Glucose control
 - No hair removal or clippers
 - Tanner, J., et al., Effectiveness of a care bundle to reduce surgical site infections in patients having open colorectal surgery. Ann R Coll Surg Engl, 2016: p. 1-5.

Baseline (127) Cohort (166) Superficial SSI 9% 17% Deep SSI 15% 11% Total SSI 24% 28%	Hang on a	a minute	
Superficial SSI 9% 17% Deep SSI 15% 11%			
Deep SSI 15% 11%		Baseline (127)	Cohort (166)
·	Superficial SSI	9%	17%
Total SSI 24% 28%	Deep SSI	15%	11%
	Total SSI	24%	28%





Bundles work but the story is compliance Ista, E., et al. The Lancet Infectious Diseases, 2016. 16(6): p. 724-734 Systematic review and meta-analysis Conclusion: Bundles work (although 37% of 79 studies say they don't) Importantly, described bundle compliance in the analysis Determined (or reported) in only 24% of pre-and postimplementation and in a further 11% postimplementation studies That leaves 65% of papers not reporting on compliance at all □ In the ones that did report, it was suboptimal in every one Blog post https://reflectionsipc.com/2017/06/12/the-big-c/

Good and Bad

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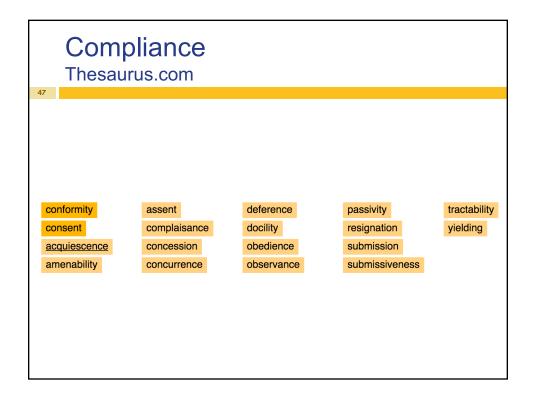
- The elements in a bundle are best practice based on evidence, and all should be very familiar with them
 - Sometimes the fact that clinical staff are aware of them may make them dismiss the bundle as 'nothing new'
- We must acknowledge that clinical practice is variable
 - During central line insertion, use chlorhexidine for site disinfectant and maximum sterile barrier precautions
 - 2 practices highly recommended to prevent catheter-related bloodstream infection were carried out less than 75% of the time (Saint et al, ICHE 2010)

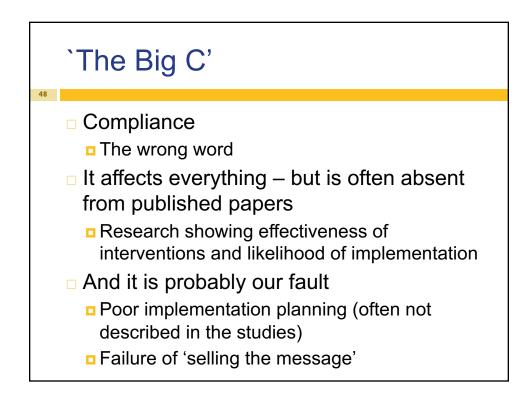
Why was CAUTI not reducing?

Meddings, J. Abstract SHEA Spring Meeting, April 2018

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- Qualitative approach:grouped challenges and successes into intervention domains
 - Used rich data to construct a comprehensive ICU CAUTI reduction program include at least one strategy from each of 4 domains
 - Standardize use and care
 - Improve communication about catheter need
 - Build capacity for alternatives
 - Feedback data in real time
 - Basically, professionals like to be given a choice





Compliance with interventions

Buchanan et al, American Journal of Infection Control (2018) In Press (last week)

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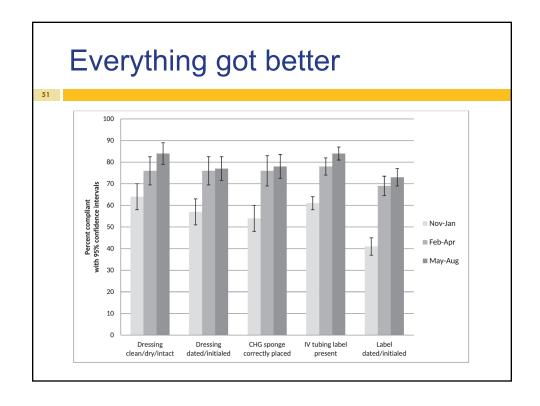
- Embedded a compliance coach (RN with experience in central line management into units managing these devices
 - conducted routine, housewide, unannounced audits of central venous access device dressings and intravenous (IV) tubing, using a model of observation, data capture, coaching, and reporting, followed by focused education
- Results
 - □ Clean/dry/intact dressing compliance improved from 64% to 84% (P = .0001)
 - □ CHG sponge placement improved from 54% to 78% (P = .0001)
- Feedback was instant and non-punitive

Peer review

50

- Person undertaking the procedure is primarily focusing
- Person undertaking the review is primarily scanning
- There must be excellent communication between the two for the procedure to go as expected





Review of a National CPE Toolkit

J Hosp Infect. 2018 Mar 9. pii: S0195-6701(18)30145-2. doi: 10.1016/j.jhin.2018.03.007

- 52
- Few reported consistent compliance with screening and isolation of CPE risk patients
 - Lower prioritization and weaker senior management support for CPE prevention associated with poorer compliance
- 80% did not believe that the guidance offered an effective means to prevent CPE or was practical to follow
 - Successful implementation can be hindered by a complex set of factors related to their practical execution, insufficient resources and a lack of confidence in the effectiveness of the guidance
- Future CPE guidance would benefit from substantive user involvement

Meanwhile back on the planet.. Erik Hollnagel

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- Work as imagined
 - Policy, procedure etc
 - The 'best' way, the basis for design, training and control
- Work as done
 - What really happens, what we have to do to get the job done
 - Er.. Often suboptimal
- How well do those (us) writing a policy or guideline really understand the issues at the point of delivery?
 - A policy or guideline that has taken years to develop may fail within hours at the sharp end

Head above the parapet

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- WHO Hand Hygiene technique
 - Work as imagined or work as done?
 - Tschudin-Sutter, S., M. L. Rotter, R. Frei, D. Nogarth, P. Hausermann, A. Stranden, D. Pittet and A. F. Widmer (2017). "Simplifying the WHO 'how to hand rub' technique: three steps are as effective as six-results from an experimental randomized crossover trial." Clin Microbiol Infect 23(6): 409 e401-409 e404.
 - Easier to teach and do?
- 5 moments or ABC?

Bridging the image gap

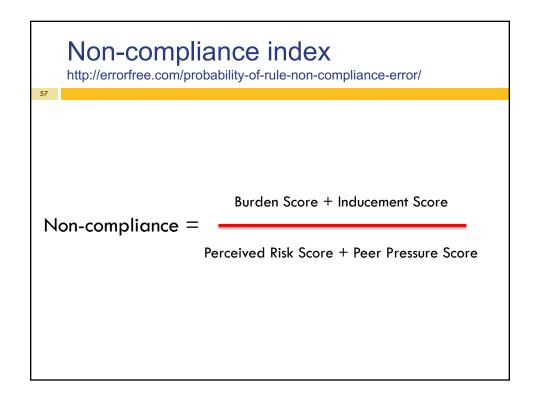
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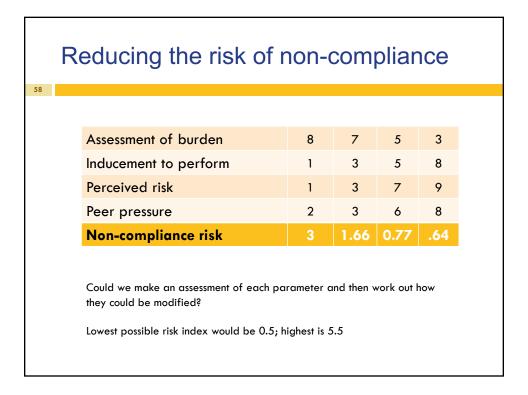
- Problem is not that different images of work exist
 - They arise when organizations (or individuals within them) are not sufficiently aware of the gap (or the extent) between images
- Having a gap is not an indication of a dysfunctional organization, but not knowing about it and not learning why, is
- It we ignore the gap, we may be investing in the wrong things

Narrowing the gap

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- We have to realize how difficult it is for the entire organization to clearly understand and "buy-in" to the vision and goals of the upper management
 - Therefore we must recognize that we have "work-as-imagined" and "work-as-done" throughout healthcare
- Before we plan an intervention, we must collect real data on this gap to allow us to see the magnitude and extent of the problem so that we can put the right resources and right methodology to close the gap

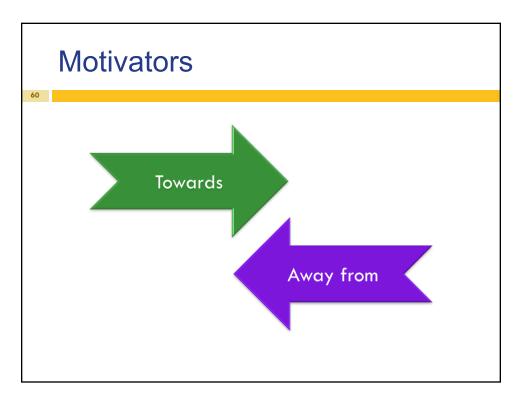




We have to teach old dogs new tricks

59

- You can do that and there is science to prove it
 - □ Lisa J. Wallis, Zsófia Virányi, Corsin A. Müller, Samuel Serisier, Ludwig Huber and Friederike Range (2016). Aging effects on discrimination learning, logical reasoning and memory in pet dogs. Age, 38:6 DOI 10.1007/s11357-015-9866-x
- Humans are far more difficult but the principle is the same
 - Treats!



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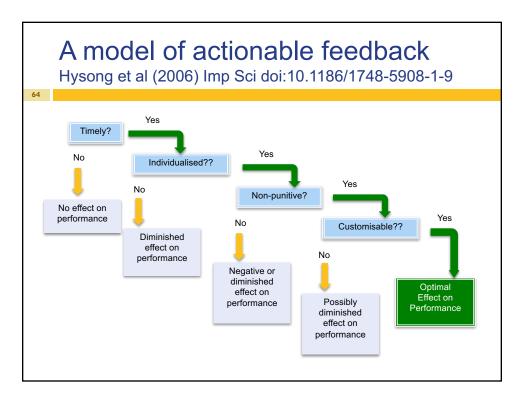
McClung, L., et al., Am J Infe	ivates Staff? ect Control, 2017
	I
Subconstruct	Theme
Patient needs and resource	Patient safety is primary motivation for prevention efforts
Available resources	Sufficient resources for some activities
Goals, monitoring, and feedback	Closer monitoring of improvements made, in combination with greater personal feedback and data transparency, would provide greater motivation
Culture	The idea that the organisation is "the best" motivates individuals to do their best
Leadership engagement	Leadership as great advocates for health care workers' needs



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Be Positive!

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- The power of positive reinforcement
 - Skinner (1904-90)
 - Research suggests that positive reinforcement shows a 17% increase in performance
- Studies of hand hygiene in healthcare also show this
 - Lent, V., et al., Evaluation of patient participation in a patient empowerment initiative to improve hand hygiene practices in a Veterans Affairs medical center. Am J Infect Control, 2009. 37(2): p. 117-20.
 - Mayer, J., et al., Dissemination and sustainability of a hospital-wide hand hygiene program emphasizing positive reinforcement. Infect Control Hosp Epidemiol, 2011. 32(1): p. 59-66.



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We will need leadership

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- The process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task
 - □ Chemers M. (1997) An integrative theory of leadership
- The art of mobilising others to want to struggle for shared aspirations
 - Kounzes JM, Posner BZ. The leadership challenge. Jossey-Bass. New York:1995
- Some have argued that leaders are born, not created
 - Galton (1869) Hereditary Genius
 - The plethora of books and self-help manuals suggests otherwise

Successful leaders in IPC Saint et al, ICHE (2010)

66

- Think strategically while acting locally
 - involves canvassing before crucial committee meetings and votes
 - Deal directly with resistant staff
 - leverage personal prestige to move initiatives forward
 - form partnerships across disciplines
- Hospital epidemiologists and infection preventionists often played more important leadership roles in their hospital's patient safety activities than did senior executives

We will have to display leadership

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Leadership inaction vs.
Leadership in action

Watch for Resistors and Constipators

Saint et al, Joint Commission Journal Quality and Safety 2009 35(5)

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- □ Two types of person impede HCAI activities
 - Active Resistors hospital personnel who vigorously and openly oppose changes in practice; increase the difficulty of implementing new methods to prevent infection
 - Organizational Constipators mid- to high level executives who prevent or delay actions without active resistance, thereby acting as covert barriers to change by increasing the work required to implement evidence based practice

Overcoming the Resistor

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- Effective championing by an engaged and respected change agent that can speak the language of the staff they are guiding (e.g., a surgeon to other surgeons)
- Participation in collaborative efforts that generally align hospital leadership and clinicians in the goal of reducing health care—associated infection
- Data feedback comparing local infection rates to national rates
- Data feedback comparing rates of compliance with the practices to rates of others in the same area

Hospital Management

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Dealing with Constipators

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- Include organizational constipators early in group discussions in order to improve communication and obtain buy-in
- Work around individuals (only short-term solution)
- Take advantage of 'turnover opportunities' when the constipator leaves the organization by hiring a person who has a very high likelihood of being effective
- Terminate the constipator's employment

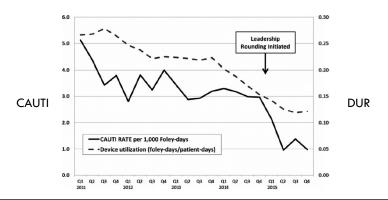
Use of Leadership Rounds

Knobloch, M. et al (2018) AJIC 46(3) 303-310

- Explored unit-based HAI leadership rounds (LRs) at a large academic hospital
 - Two executive leaders (associate chief medical officer and the associate chief nursing officer) had a goal of visiting units regularly to determine whether evidence-based and best practices were being routinely integrated into daily unit operations
- Staff members disclosed unit-specific problems and readily engaged in problem-solving with top hospital leaders
 - Findings revealed that leaders used words that demonstrated fallibility and modelled curiosity, 2 factors associated with learning climate and psychologic safety

Clinical impact of LRs?

 Because of a significant and rapid reduction in CAUTI rates after LR initiation, executives continued the initiative and, over a span of 6 months, LRs expanded to include CLABSI and CDI



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Interview Themes

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- Listening is a strength of leaders
- Modelling curiosity is a strength
 - "There's nothing people like better than being recognized as an expert. And if the associate Chief Medical Officer says I don't know what you're talking about, can you draw me a picture; that de-escalates his profile, elevates the other person in front of them even momentarily"
- Showing fallibility is a strength
 - "If you start off by showing your own fallibility, they (staff or others) start taking their armour off, and you can stand there face to face and have an honest conversation"

Unlearning

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- Getting someone to discard old knowledge and practices and overwrite with new is difficult as there has to be an acceptance that they have been wrong all this time..
 - Better to argue that these should now be set aside as no longer appropriate
 - □ There is almost an element of negotiation
 - The art of not losing face
- This will not only apply to others, we also have to 'unlearn'

Are Infection Preventionists good followers?

Todd Greene and Saint (2015) AJIC

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- Two surveys, one looking at followership characteristics, one looking at whether IPC Interventions are in place
 - Majority fell into the 'exemplary category (self reported, so possible social desirability bias)
 - Hospitals with truly exemplary followers in infection control roles may be more likely to use recommended prevention practices



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If I could predict the future









Thoughts from a Soccer Coach Gareth Southgate, July 2018

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- 'If players feel you respect them, they are more likely to follow you...'
- "I like players to have responsibility; to think about what we are asking them to do, to have an opinion on the way we are asking them to play and the way we are asking them to train,"
- "I think if the players have some ownership of what's going on then that's going to help them make better decisions on the field and also buy into the way that we are trying to progress."
- "I like the players to speak up in meetings... like them to have an opinion on the game, because in the 85th minute they have got to make a decision that might win or lose the game and we can't make all those decisions from the sideline."
- Cross out 'player' and insert colleague, nurse, doctor, manager.
- "I think it is important to listen and I think it is important to get a feel of what motivates the individual."

The future of Infection Prevention Patel & Kallen (2018) ICHE 39(7)

- 81
- Will be based on human factors and systems engineering
 - Commentary on Leback et al ICHE (2018);39:84
 - Paper looking at barriers and facilitators of injection safety
 - Problems
 - low generalizability meaning resource intensive
 - Lack of human factors and systems engineering expertise

The overall outlook

- 82
- Is bright
 - In fact so bright, many cannot see it because of the glare
- Infection control was our past before antibiotics; in a world without them infection prevention becomes critical if healthcare is to be provided at the same level
 - We have evidence for interventions, we must help colleagues to reliably implement them and look for new ones

Final Points

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- It is likely that new drugs will be developed at some stage but for now, this is our opportunity to embed best practice
 - Never waste a crisis
- Prevention is better than cure
 - Especially when there is no cure

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July 17, 2018	(FREE European Teleclass) HOSPITAL INFECTION CONTROL FROM A DEVELOPING COUNTRY'S PERSPECTIVE Speaker: Dr. Aamer Ikram, Director, National Institute of Health, Islamabad, Pakistan		
July 19, 2018	FLOOD REMEDIATION IN HEALTHCARE FACILITIES – INFECTION CONTROL IMPLICATIONS Speaker: Michael Buck, University of Minnesota		
August 16, 2018	(FREE Teleclass) INTERPRETING RESEARCH EVIDENCE: A KEY SKILL FOR INFECTION CONTROL PROFESSIONALS Speaker: Prof. Donna Moralejo , Memorial University School of Nursing, Newfoundland		
September 6, 2018	MOLECULAR DIAGNOSTICS AND ITS ROLE IN INFECTION PREVENTION Speaker: Sanchita Das, University of Chicago		
September 13, 2018	(FREE Teleclass) NEONATAL SEPSIS PREVENTION IN LOW-RESOURCE SETTINGS Speaker: Prof. Dr Angela Dramowski, Stellenbosch University, Cape Town		
	THE SILENT TSUNAMI OF AZOLE-RESISTANCE IN THE OPPORTUNISTIC		

