

Spotlight on the Future of HAI: A Case Study to Inform Global Action
Dr Raheelah Ahmad and Professor Alison Holmes, Imperial College London
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Imperial College London

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January 14, 2015

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For researchers



For patients and public



For healthcare professionals



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Addressing the implementation gap between research and its use in the NHS.



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**NIHR Health Protection Research Unit
HCAI and AMR**

Applied molecular bacteriology

Applied data linkage, syndromic surveillance, modelling

Innovations in behaviour change, technology and patient safety

Organisational change, sustainability, economics and evaluation

Bio-bank

AMR **HCAI** **Integrated Epidemiology**

NHS
National Institute for Health Research

HPRU:HCAI and AMR

Imperial College
Alison Holmes

03/10/2014

Populations:

- Hospital and Community
- Specialist groups
- NHS workforce
- Healthy cohorts (military)
- Agriculture and animals
- 'One Health' approach

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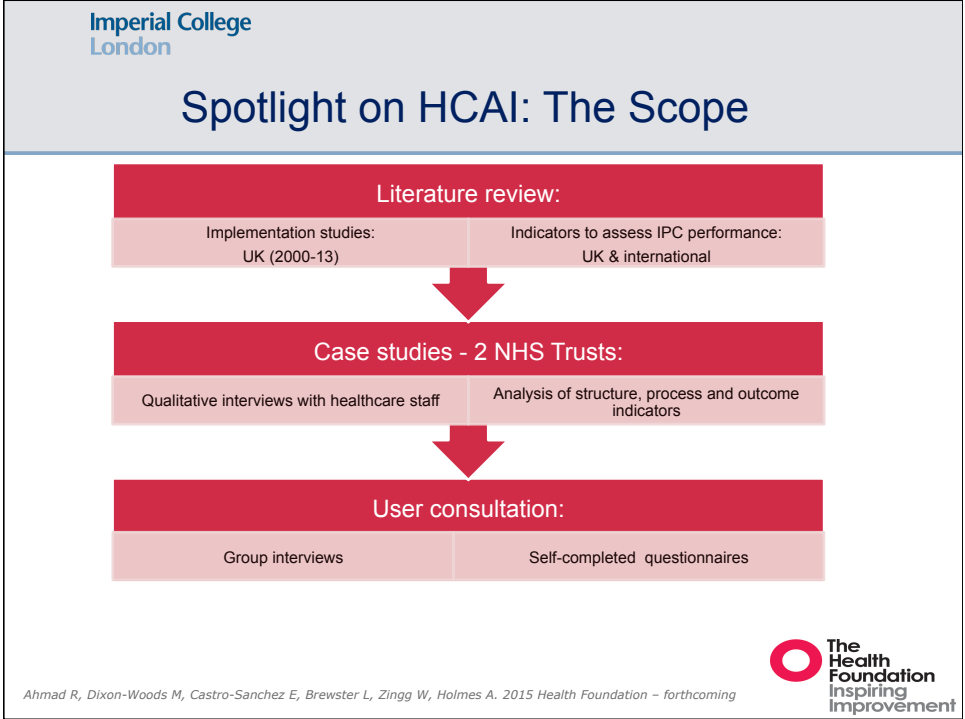
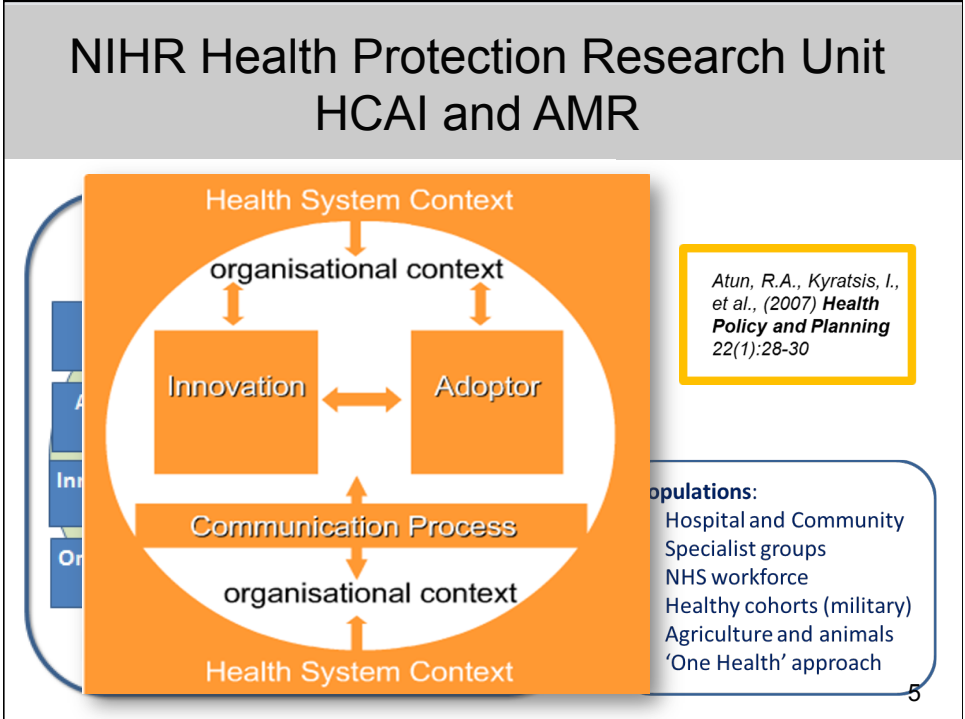
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Session objectives

1. To understand the influence of national performance measures at the hospital level (managerial and front-line staff)
2. To evaluate the role of stakeholders in addressing IPC (internal and external stakeholders)
3. To understand how to strengthen implementation evaluation to translate learning from 'success' and 'failure'

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Spotlight on HCAI: The Scope

Aims: bring together evidence
from a range of sources
to illustrate how IPC
practice in the UK could be improved.

Imperial College, Leicester University, Geneva
Hospitals collaboration



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**To understand the influence of national
performance measures at the hospital level
- managerial and front-line staff**

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International developments in benchmarking and public reporting of HCAs																					
	1970	1980	1995	1996	1997	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Introduction of voluntary national surveillance systems for nosocomial infections	USA†		France†††	England††	Germany†																
Surveillance of MRSA first mandated						Germany	England		USA†††												
Confidential reporting of HCAI indicators first mandated										USA†††	France	USA†††	Germany								
Public reporting of HCAI indicators first mandated						England			USA†††	France											*Germany
HCAI indicators first publicly reported							England				USA†††	France									
National HCAI indicator target first set										England	France										**USA
HCAI indicator first set for individual institutions										England											
Financial penalties first introduced									*France						*USA						*England

Key:
 † National Nosocomial Infections Surveillance System; since 2005, National Healthcare Safety Network.
 †† Nosocomial Infection National Surveillance Scheme; since 2002, Surgical-Site Infection Surveillance Scheme.
 ††† Inter-regional networks.
 ‡ Krankenhaus-Infektions-Surveillance-System.
 †† Illinois and Pennsylvania.
 ††† Nevada and Nebraska.
 †††† Pennsylvania.

Haustein T, Gastmeier P, Holmes A, Lucet J, Shannon R PDHS. Use of benchmarking and public reporting for infection control in four high-income countries. *Lancet Infect Dis* . 2011;11(6):471–481.

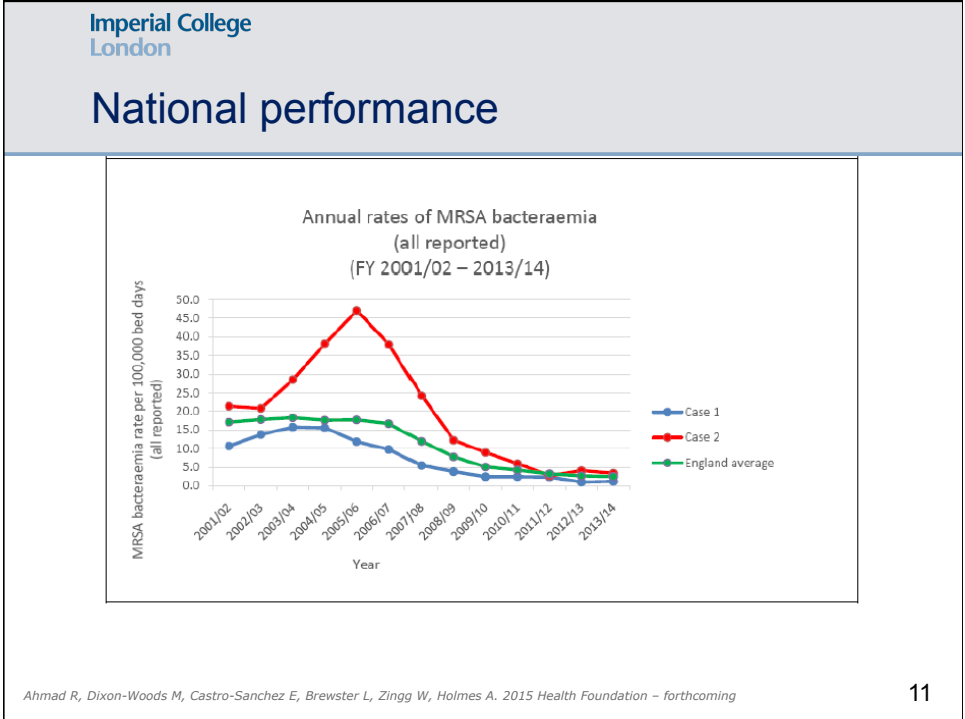
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Interventions in England – mandatory; recommendations; national campaigns													
Year	2001	2003	2004	2005	2006	2007	2008	2009	2010	2011	2013	2014	
Launch of national campaigns			Clean your hands (England and Wales) CH funded, coordinated by the National Patient Safety Agency	Shaping UoEs – housing high impact interventions based on the care bundle initiative			Patient safety pits	Matching Menzies programme					
Recommendations	First edition of epic publisher - The epic project: developing national evidence-based guidelines for preventing healthcare associated infections	Report of the Chief Medical Officer: Winning wars: guidance to reduce hospital acquired infection in England				1. Introduction of care below the elbow guidance. 2. epic. National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England	1. Prime Minister declared HCAI a 'top priority' and oversaw a programme of deep learning. 2. CH issued Clean, Safe care reducing infections and saving Lives	Some NHS trusts participated in COJRN (Commissioning for Quality and Innovation) schemes that made a percentage of their incomes dependent on demonstrating compliance.	Robert Franks inquiry Report into MRSA published by NHS Foundation Trust January 2002 – March 2006		Robert Franks QC's Report of the Mid Capstone NHS Foundation Trust public inquiry	epic: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England	
Mandatory	Surveillance of MRSA bacteraemia	Surveillance of glycopeptide-resistant Enterococci (GRE) and L-lysine sensitivity in April 2013)	1. Surveillance of C. difficile-associated diarrhea (CDAD) in patients aged 65 and over. 2. Surveillance of orthopaedic surgical site infections. 3. Patient Safety Alert issued, mandating placement of bedside alcohol handrub. 4. All NHS trusts to appoint a director of infection prevention and control	National target reduction for the number of incidents of MRSA bloodstream infections by 50% over three year period April 2005 – March 2009, compared to the 2005/04 baseline data	1. Health Act 2006, requirement for provider registration with regulator. 2. Requirement for providers to ensure HCAI and new code of practice on infections. 3. NHS by Department of Health Improvement teams to adult hospitals. 3. Chief Medical Officer makes CEOs personally responsible for the quality of infection data submitted by their trusts.	Surveillance of C. difficile infection (CCI) extended to all cases in patients aged 2 and over.	1. Health and Social Care Act 2008: required registration with the Care Quality Commission; duty to protect patients against HCAI. New code of practice. 2. National target to reduce C. difficile infection by at least 30% by March 2011, compared to the 2007/08 baseline data			1. Surveillance of methicillin sensitive S. aureus (MSSA) bacteraemia. 2. Surveillance of Escherichia coli (E. coli) bacteraemia	PGI Infection Reviews for all MRSA bloodstream infections		

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Drivers

I think most of the pressure actually comes internally, which is that, you know, now that we've been on a journey which has seen an improved infection rates across a number of organisms (quite markedly), there's an appetite within the trust, firstly not to let that go backwards, see a rise in infections, (INNOVATION study - Senior executive in case 1)

[Pressure to improve is] internal from the department... The [ICU] infection control procedures have to be quite stringent... And I think that's filtered down from the top. We have regular infection control emails and things like that, highlighting certain things so you know what we can do better... There's also a lot of kind of microbiology and infection control nurse-led activity. (Senior charge nurse, case 2)

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Constraints – inconsistency/sustainability?

Sometimes there is no continuity... so someone will say we need to [implement this IPC intervention] and then two days later someone else will say something different. I think that is frustrating for the staff because obviously they can't keep swapping and changing all the time. If you are going to be telling me to do something then I need to know that is what we are going to be doing. (Ward manager, site 1)

'I do think its priority level shifts according to what other pressures the trust is facing.' (IPC nurse 7)

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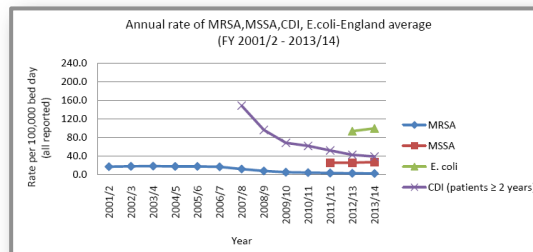
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Targets

Impact on IPC Implementation

Outcome indicators of the mandatorily reported HCAIs (MRSA and MSSA blood stream infection, and *C. difficile* infection) reached a plateau?

Are we at the point of diminishing returns on investment?



➤ evidence that practitioners can feel de-motivated

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Targets


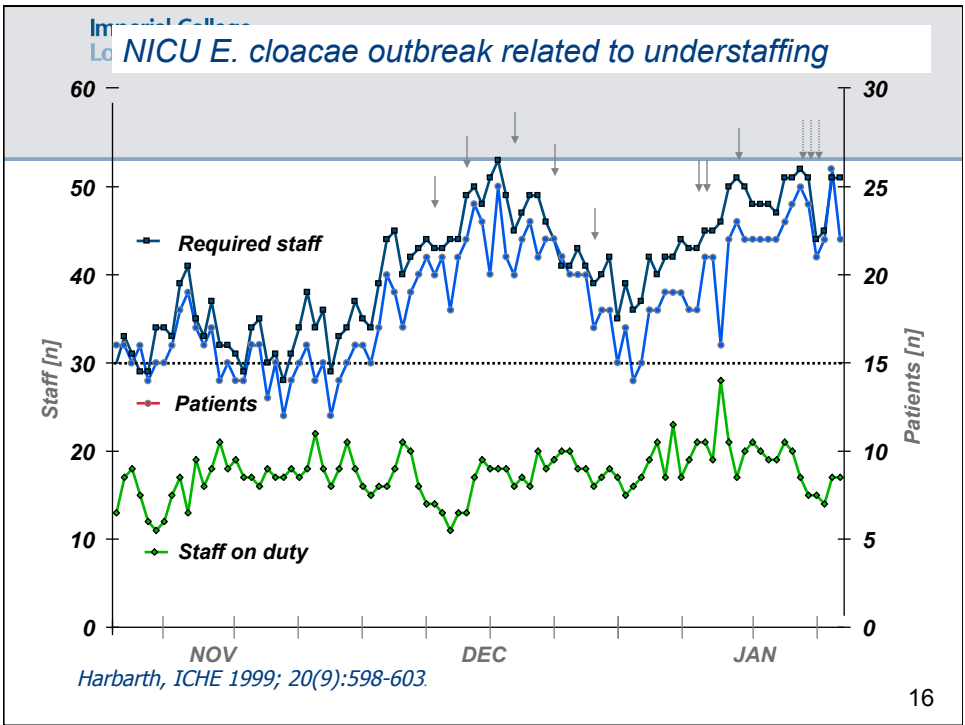
Impact on IPC Implementation

Continued managerial focus on a narrow spectrum of infections may divert attention from other increasing problems such as *E. coli* BSI and emerging threats such as Carbapenem resistance.

Maintaining credibility & relevance

Exploring impact of how we measure: "what consequences do vertical (ie. organism specific) targets have on other HCAs, infection prevention practice, or on wider patient safety"

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What are the known key elements for a hospital to deliver effective IPC programmes and **what indicators** are needed for their monitoring?

ECDC study:

The systematic review and evidence based guidance on Organisation of Hospital infection control Programmes (SIGHT)

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Key elements within hospitals

Hospital organisation, management, and structure for prevention of health-care-associated infection: a systematic review and expert consensus



Walter Zingg, Alison Holmes, Markus Dietterich, Tim Goetting, Federica Secci, Lauren Clark, Benedetta Allegranti, Anna Pelagio Magagnoli, Didier Pittet, for the systematic review and evidence-based guidance on organisation of hospital infection control programmes (SIGHT) study group*

Despite control efforts, the burden of health-care-associated infections in Europe is high and leads to around 37 000 deaths each year. We did a systematic review to identify crucial elements for the organisation of effective infection-prevention programmes in hospitals and key components for implementation of monitoring, 92 studies published from 1996 to 2012 were assessed and ten key components identified: organisation of infection control at the hospital level, bed occupancy, staffing, workload, and employment of pool or agency nurses; availability of and ease of access to materials and equipment and optimum ergonomics; appropriate use of guidelines; education and training; auditing; surveillance and feedback; multimodal and multidisciplinary prevention programmes that include behavioural change; engagement of champions; and positive organisational culture. These components comprise manageable and widely applicable ways to reduce health-care-associated infections and improve patients' safety.

Introduction

Health-care-associated infections (HAIs) affect millions of patients worldwide every year.¹ In the European Union (EU) alone, the estimated number of HAIs is 4544 000 annually, leading directly to around 37 000 deaths and 16 million extra days of hospital stay.² Several evidence-based practice guidelines have been published in the past decade³⁻⁵ but, despite evidence suggesting that good practice strategies are sufficient, hospitals struggle to comply.⁶⁻⁸ The systematic review and evidence-based guidance on organisation of hospital infection control programmes (SIGHT) was funded by the European Centre for Disease Prevention and Control. Our objective was to provide evidence-based guidance on the organisation of infection-control programmes in hospitals. In particular, the review aimed to identify the most effective and generally applicable elements of acute-care infection-

arrangements to implement infection-control programmes, including access to qualified infection-control professionals and the roles of management and advisory committees; targets and methods of HAI surveillance; outbreak management, and the role of feedback; methods and effectiveness of educating and training health-care workers (HCWs); effectiveness of interventions on behavioural change and quality of care, particularly in the context of multimodal prevention strategies; and overview and effectiveness of local policies and resources for standard and transmission-based isolation precautions (figure 1).

We searched Medline, the Cochrane Controlled Trials Register, Embase, the Outbreak Database, PsychINFO, and the Health Management Information Consortium database for reports published between Jan 1, 1996, and Dec 31, 2012. Any landmark papers we found that were

Lancet Infect Dis 2014

Published Online

November 11, 2014

[http://dx.doi.org/10.1016/S1473-3099\(14\)70854-0](http://dx.doi.org/10.1016/S1473-3099(14)70854-0)

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Prof M Dietterich MD, T Goetting MD, Department of Environmental Health Science, WHO, Geneva, Switzerland

Dr Allegranti MD, European Centre for Disease Prevention and Control, Stockholm, Sweden

Dr Magagnoli MD, and WHO Collaborating Centre on Patient Safety, University of Geneva Hospitals and Faculty of Medicine, Geneva, Switzerland (Prof D Pittet)

www.thelancet.com/infection Published online November 11, 2014 [http://dx.doi.org/10.1016/S1473-3099\(14\)70854-0](http://dx.doi.org/10.1016/S1473-3099(14)70854-0)

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Systematic review
48079 records identified
833 articles eligible for quality assessment

Key elements identified. Expert consensus finalised components and indicators and scored implementation and EU-wide applicability

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Key component	Indicators	Quality of evidence*	Ease of implementation	EU-wide applicability
1 An effective infection-control programme in an acute-care hospital must include as a minimum standard at least one full-time specifically trained infection-control nurse per up to 250 beds, a dedicated physician trained in infection control, microbiological support, and data management support ¹²	Continuous review of surveillance and prevention programmes, outbreaks, and audits; infection-control committee in place, inclusion of infection control on the hospital administration agenda, and defined goals (eg, HAI rates); and appropriate staffing and budget for infection control	2	3	3
2 Ward occupancy must not exceed the capacity for which it is designed and staffed; staffing and workload of frontline HCWs must be adapted to acuity of care, and the number of pool or agency nurses and physicians used kept to a minimum ^{13,12,20,21,34,35,36,37,38,39}	Average bed occupancy at midnight, average numbers of frontline workers, and the average proportion of pool or agency professionals	2	2	2
3 Sufficient availability of and easy access to materials and equipment, and optimisation of ergonomics ^{44,45,52,53,54,55,56,57,58}	Availability of alcohol-based hand rub at the point of care and sinks stocked with soap and single-use towels	2	2	2
4 Use of guidelines in combination with practical education and training ^{59,60,61,62,63,64}	Adaptation of guidelines to local situation, number of new staff trained with the local guidelines, teaching programmes are based on local guidelines	2	3	3
5 Education and training involves frontline staff and is team and task oriented ^{65,66,67,68,69,70,71,72}	Education and training programmes should be audited and combined with knowledge and competency assessments	3	2	3
6 Organising audits as a standardised (scored) and systematic review of practice with timely feedback ^{73,74,75,76,77}	Measurement of the number of audits (overall, and stratified by departments/units and topics) for specified time periods	2	2	3
7 Participating in prospective surveillance and offering active feedback, preferably as part of a network ^{78,79,80,81,82,83,84,85,86,87}	Participation in national and international surveillance initiatives, number and type of wards with a surveillance, regular review of the feedback strategy	2	2	2
8 Implementing infection-control programmes following a multimodal strategy, including tools such as bundles and checklists developed by multidisciplinary teams, and taking into account local conditions ^{88,89,90,91,92,93,94,95,96,97,98,99,100,101,102}	Verification that programmes are multimodal; measurement of process indicators (eg, hand hygiene, care procedures); measurement of outcome indicators (eg, HAI rates, MDRO infections and transmission)	2	3	3
9 Identifying and engaging champions in the promotion of intervention strategies ^{103,104,105,106}	Interviews with frontline staff and infection-control professionals	3	2	2
10 A positive organisational culture by fostering working relationships and communication across units and staff groups ^{107,108,109,110,111,112}	Questionnaires about work satisfaction, crisis management, and human resource assessments of absenteeism and HCW turnover	3	2	3

See the appendix for detailed information about the studies and comments on the rating of evidence, ease of implementation and EU-wide applicability. HCW=health-care worker. HAI=health-care-associated infections. MDRO=multidrug-resistant organisms. *Median score is used.

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1. IC programme at the hospital, appropriately staffed and supported
2. Bed occupancy, staffing, workload, and use of agency and pooled staff
3. Availability and easy access to materials, equipment and optimum ergonomics
4. Appropriate use of guidelines, with practical education and training
5. Education and training involves frontline staff and is team and task oriented
6. Auditing organised and standardised with timely feedback

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7. Participating in prospective surveillance, involvement in networks, active feedback
8. Implementing infection prevention programmes with multiple methods, strategies, accounting for local conditions
9. Identifying and engaging champions in promoting interventions

10. Positive organisational culture by fostering good working relationships and communications across units and staff groups.

Indicators: Work satisfaction, Emergency and crisis management, HR, Absenteeism , HCW turnover

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European review of recommended indicators		Indicators in England		In public domain?	Used to inform IPC management and practice at hospital level?
Theme	Indicators	Recommended at regional / national level	Data available at hospital level		
1. Effective organisation of infection control (IC) at a hospital level	No. of ongoing surveillance and prevention programmes, outbreaks, and performed audits	Orange	Green	Orange	Yes
	IC committees in place	Green	Green	Green	Yes
	Defined goals and budget for IC	Green	Green	Orange	Yes
	IC on the agenda of the hospital administration	Green	Green	Orange	Yes
	Defined outbreak management	Green	Green	Orange	Yes
	Vaccination programmes for healthcare workers	Green	Green	Orange	Yes
2. Effective bed occupancy, appropriate staffing and workload, and minimal use of pool / agency nurses	Average bed occupancy at midnight for the different units	Green	Green	Orange	Yes
	Average staffing of frontline workers	Green	Green	Orange	No
	Average proportion of pool / agency professionals	Red	Green	Red	No

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European review of recommended indicators		Indicators in England		In public domain?	Used to inform IPC management and practice at hospital level?
Theme	Indicators	Recommended at regional / national level	Data available at hospital level		
3. Accessibility of materials and optimised ergonomics	Presence of alcohol-based hand rub at the point of care	Green	Orange	Orange	No
	No. of alcohol-based hand rub at the point of care	Orange	Orange	Red	No
	Presence of sinks stocked with soap and single-use towels	Orange	Orange	Red	No
	Number of sinks stocked with soap and single-use towels	Orange	Orange	Red	No
4. Appropriate use of guidelines	The set-up and running of teaching programmes based on local guidelines	Green	Green	Red	Yes
	The number of staff trained using local guidelines	Green	Green	Red	Yes
5. Education and training	Regular audits against pre-defined checklists	Green	Green	Orange	Yes
	Regular audits against the results of knowledge tests and competency assessments	Orange	Orange	Red	Yes

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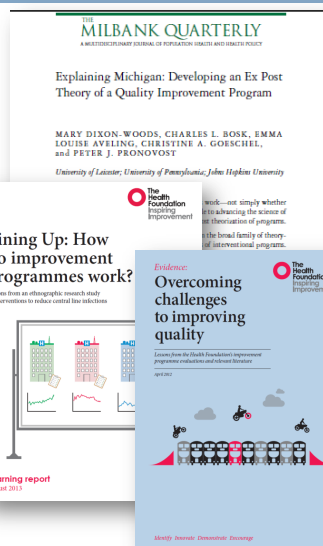
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**To evaluate the role of stakeholders in
addressing IPC
(internal and external stakeholders)**

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Clinical Leadership



- Professional organisation involvement or research collaboration enhances success
- Redefine problem as a social problem that can be solved i.e. involving human action and behaviour, not simple technical fix
- Social process, sense of community
- Systems with network and teams and sense of ownership
- Clinicians' behaviours influenced by trusted peers (*Dopson et al. 2003*).
- Leaders with authority to “breathe legitimacy” critical (*Hwang and Powell 2005*).

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Policies and guidelines

- Guidelines, policy help with decision-making, by providing knowledge and awareness
 But, they may not shift attitudes or change practice
J Carthey et al BMJ 2011; 343
- Make optimal antibiotic prescribing default, routine practice
- ‘Mindlines’ not guidelines
Gabbay, Le May. 2004; BMJ 329

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Policies and guidelines

‘The ability for individual staff to passively resist something is far greater than the position and power of any individual within the organisation. So if we want to introduce something new and if it isn’t really understood and accepted at the ground level, people will just make the right noises and not act, absolutely embrace it and do it. A lot of it is about hearts and minds.’

(Executive team member)

- Guidelines, policy help with decision-making, by providing knowledge and awareness
 But, they may not shift attitudes or change practice
- Make optimal antibiotic prescribing default, routine practice
- ‘Mindlines’ not guidelines
Gabbay, Le May. 2004; BMJ 329

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Evidence – paralysing or motivating?

More effort expended in seeking evidence to resist change
(Kyratsis Y, Ahmad R, Hatzaras K, Iwami M, Holmes A. 2014)

Greater emphasis on ‘principles’ than ‘how-to’ knowledge
(Kyratsis Y, Ahmad R, Holmes, A.2012)

Be aware that different professional groups view evidence differently
(Kyratsis Y, Ahmad R, Hatzaras K, Iwami M, Holmes A. 2014)

→ means that not everyone has bought into the evidence base of the guidelines.

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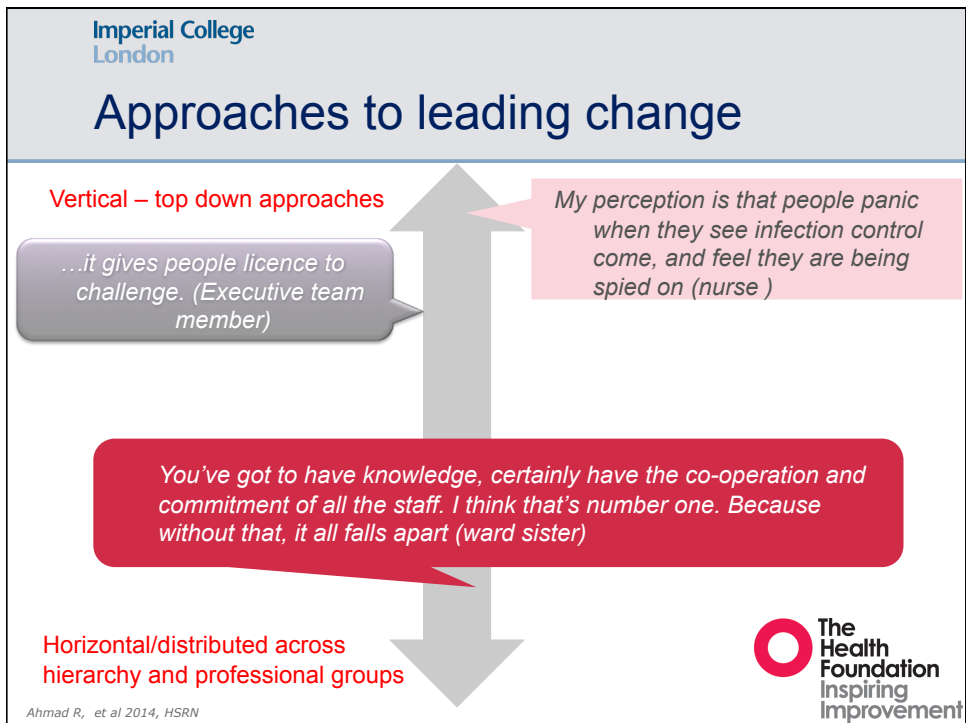
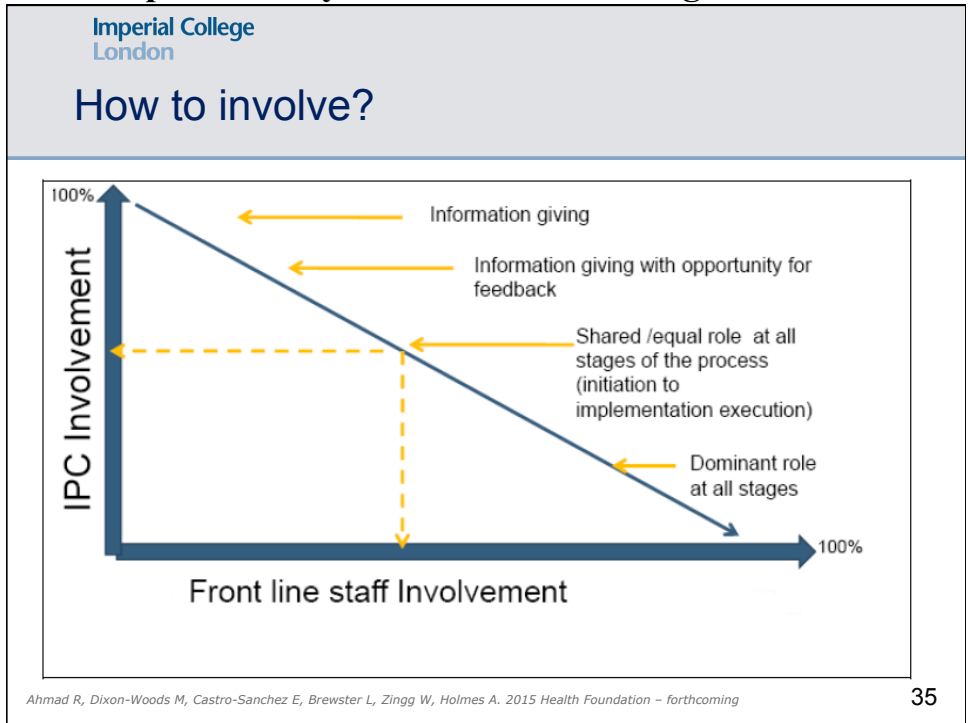
Who to involve in the process? When?

Initiation	Decision Making	Implementation planning	Implementation execution
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(Ahmad R, Kyratsis Y, Holmes, A. 2012)

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The public/patient voice

- Who is responsible for patient safety?
- What is your role?



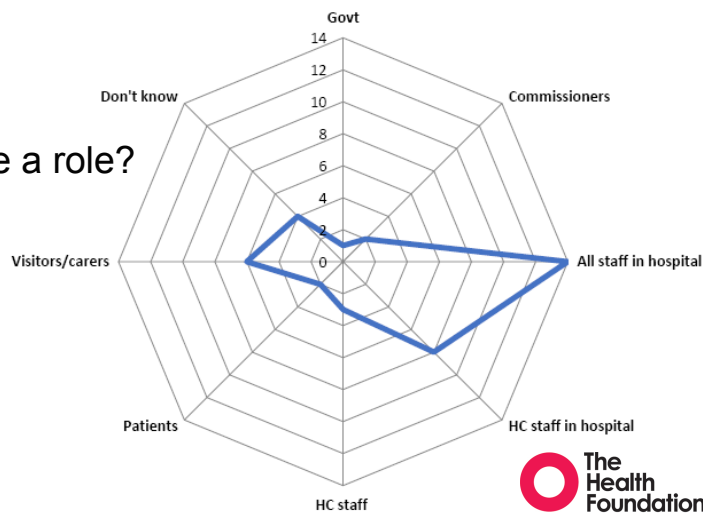
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Patient safety – who is responsible?

Do you have a role?

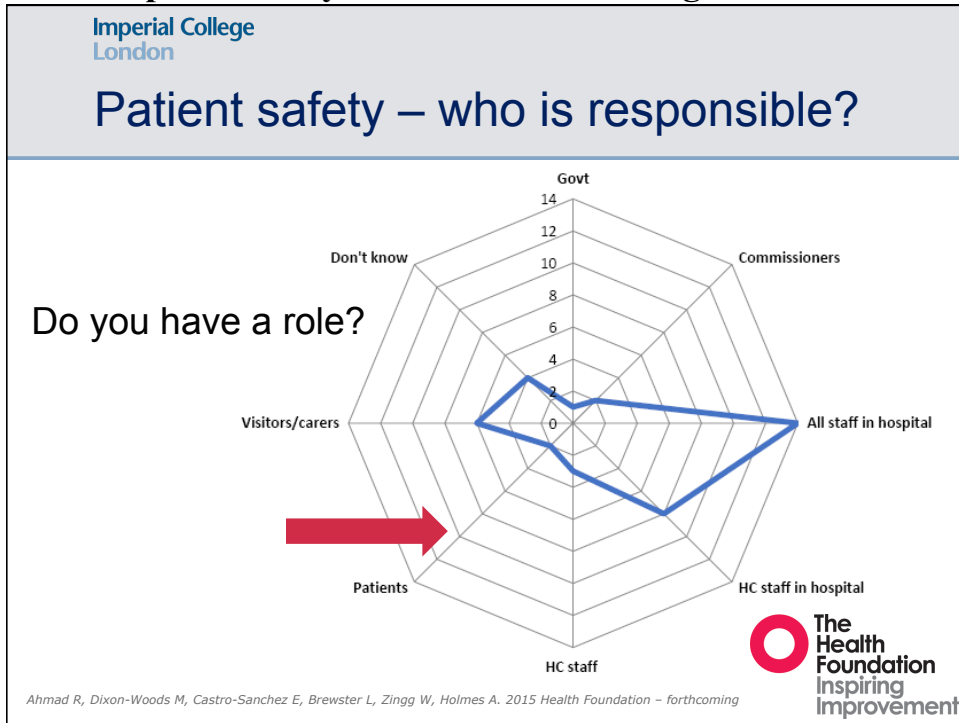


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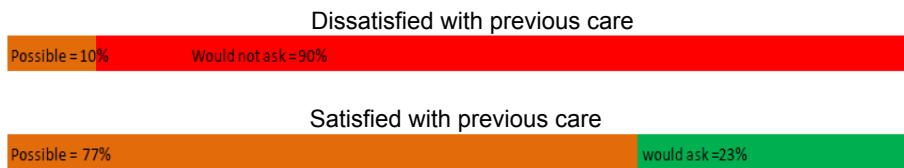
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What role?

Would you ask the question – ‘have you washed your hands?’

Overall – would not ask

However, **satisfaction** matters



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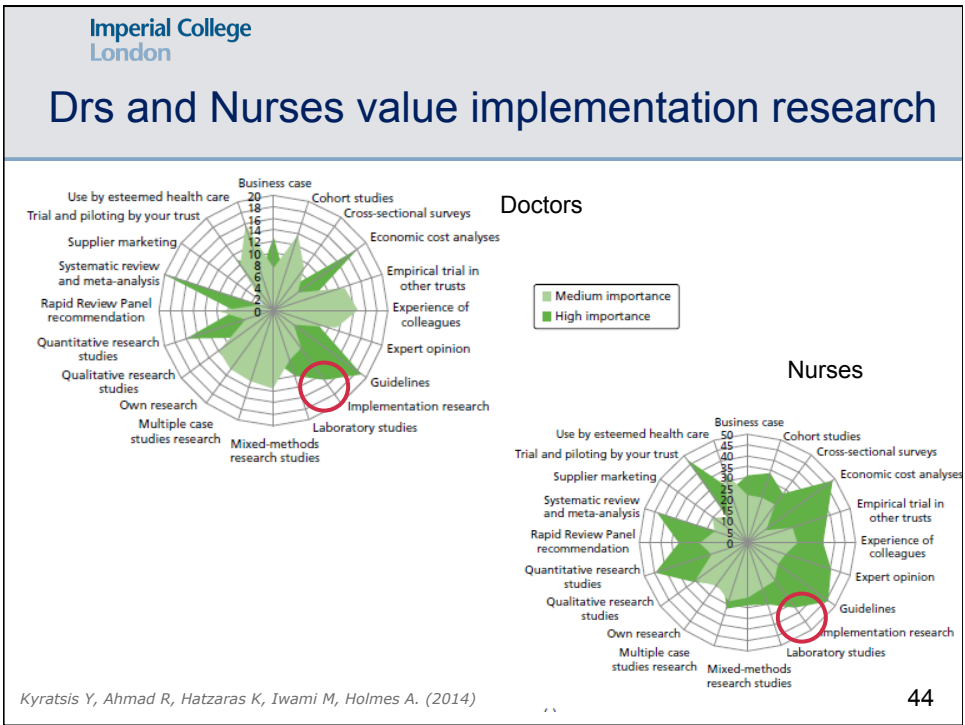
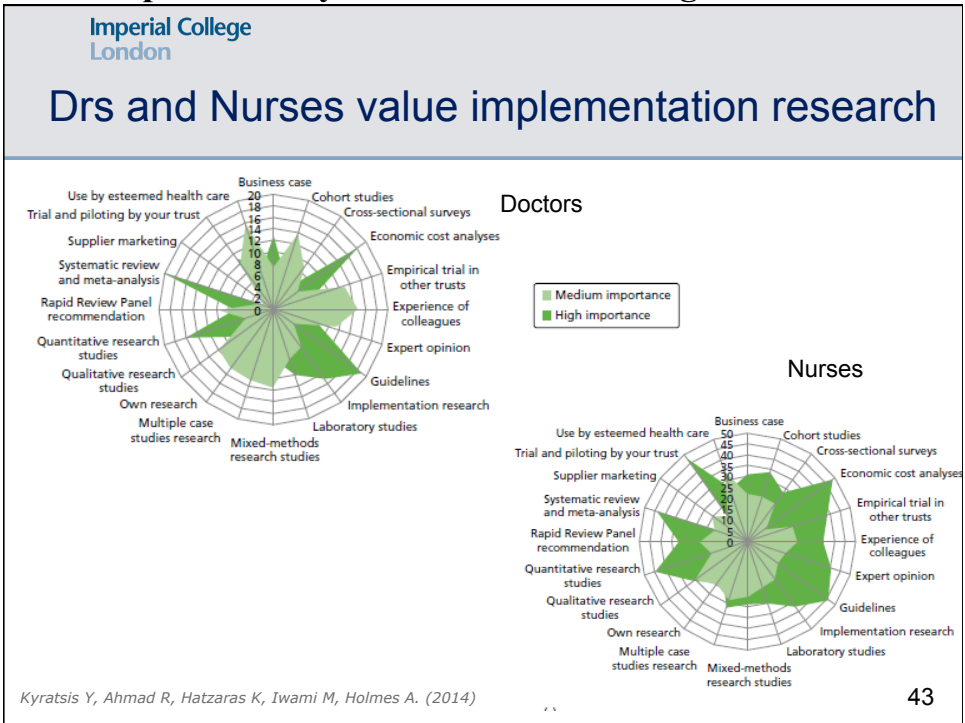
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**To understand how to strengthen
implementation evaluation to translate
learning from ‘success’ and ‘failure’**

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Challenge of reviewing implementation studies

Application of a novel integrated quality criteria tool (ICROMS) allowed for the review of multiple study designs.

Zingg W, Holmes A, et al. 2014, Lancet Infectious Diseases 2014 – SIGHT study;
 Zingg, Castro-Sanchez, et al, 2015 Integrating Quality Criteria for Systematic Review of Multiple Study Designs within Healthcare (ICROMS) Public Health

UK

47 included

3632 reviewed

=

3 - evaluating national campaigns

49% included organisational factors in analysis

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Implementation Quality Index

1. Identify which stakeholders the intervention is aimed at (<i>who?</i>)	<ul style="list-style-type: none"> Healthcare professionals (which ones) Patients Public
2. Clearly define the intervention and components (<i>what?</i>)	eg. Technology , guideline, protocol
3. Specify the organisational level of implementation (<i>where?</i>)	<ul style="list-style-type: none"> Professional group Department Ward Hospital
4. Most interventions are based on an assumption of human behaviour – be explicit (<i>how?</i>)	eg. <i>feedback-based models - internal and external factors interact to shape how we behave. (IC Link nurses wearing different uniforms to ward nurses)</i>

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<p>Imperial College London</p> <h2 align="center">Implementation Quality Index</h2>	
<p>5. Specify the unit of analysis? – quantitative and qualitative (<i>where?</i>)</p>	<p>Professional group, department, ward, hospital</p>
<p>6. Employ a theoretical framework for evaluation ie. theory of change. (<i>how?</i>)</p>	<p>Should be consistent with underlying assumptions of behaviours on which the intervention is based; but also look at different levels (individual, organisational) e.g. <i>diffusion theory, double loop learning</i> <small>(Greenhalgh et al, 2004; Argyris & Schon, 1996)</small></p>
<p>7. Systematically consider barriers/facilitators to implementation (<i>why?</i>)</p>	<p>Structural/cultural/individual/organisational/ macro</p>
<p>8. Quantify the duration of exposure (ie. <i>adequate dose?</i>)</p>	<p>Length of time (and which components if stepwise).</p>
<p align="right">  </p> <p align="left"><small>Ahmad R, Dixon-Woods M, Castro-Sanchez E, Brewster L, Zingg W, Holmes A. 2015 Health Foundation – forthcoming</small></p>	

<p>Imperial College London</p> <h2 align="center">Summary – tools to appraise practice</h2>
<ul style="list-style-type: none"> • Consider whether your hospital deliver on the ECDC 10 key components – process and organisational as well as outcome indicators • Involving organisational members is important – but timing and method of this involvement is critical • Organisational members value implementation research but recognise that there are gaps. The Implementation Quality Index can support practice and evaluation of guideline/ intervention implementation. • Service users are temporary organisational members and dissatisfaction with care can result in disengagement - do you know what your patients/carers are concerned about?

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Future Research must...

Provide a robust evidence base of the *why*, *how* and *why not*?

Understand, the 'soft periphery' of an intervention - the organisational structure, systems and people to fully implement a guideline/intervention.

(Denis JL, Hébert Y, Langley A, et al. 2002)

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The next WHO teleclass

February 11, 2015

**WHO GUIDELINE AND SYSTEMATIC REVIEW ON HAND HYGIENE
AND THE USE OF CHLORINE IN THE CONTEXT OF EBOLA**

**Dr. Joost Hopman, Radboud University Medical Center
Nijmegen, The Netherlands**

Objectives

- Reflect on the updated WHO guideline on hand hygiene in the context of Ebola Virus Disease
- Discuss the evidence about microbiological efficacy of chlorine in health care settings, concentrations and minimum time required for achieving the desired antimicrobial effect
- Discuss the evidence about tolerability and possibly side effects of chlorine in health care settings

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