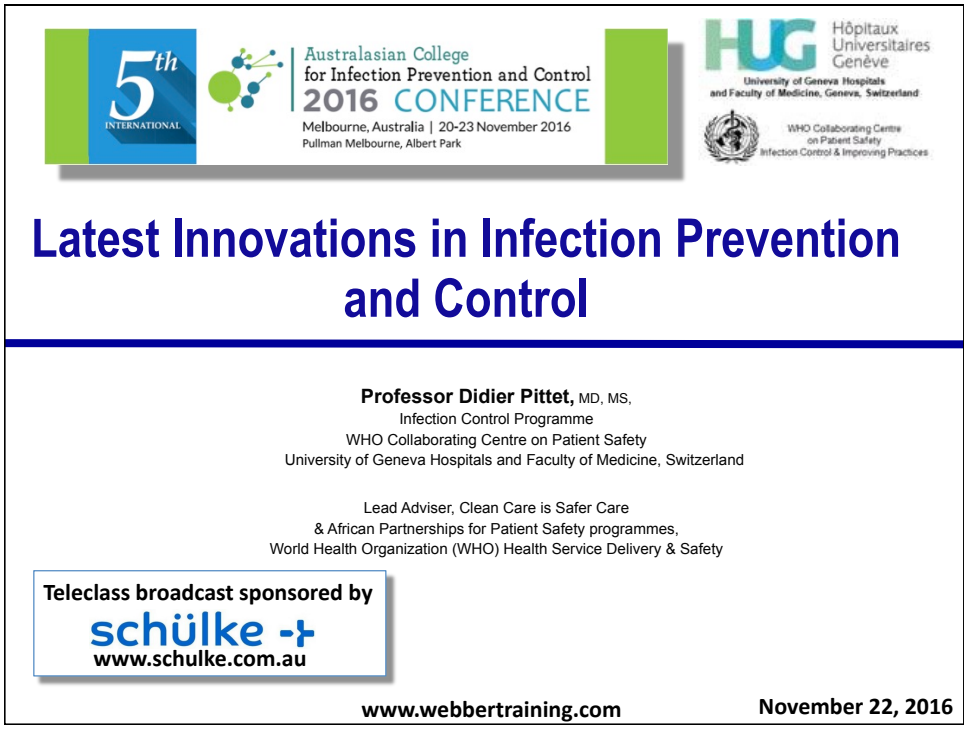
Latest Innovations in Infection Prevention and Control
Prof. Didier Pittet, University of Geneva Hospitals and Faculty of Medicine
Broadcast live from the 2016 conference of the Australasian College of Infection Prevention and Control



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Permanent challenges in infection control

New challenges are frequent

Basic principles remain key

Basic principles remain key to handle new challenges

Innovation is to be discussed in this context

Innovations

- Technology-driven (MedTec)
  - Laboratory
  - Device-related
- Information systems
- From IT systems to the use of Big Data
- Evidence-based systematic reviews
- Implementation statregy
- Behavior-related
- Organizational level
- Social innovation

Scientific Changes

• shift away from culture based to genomic surveillance

• point-of-care testing (POCT) or use either by professionals or by patients without healthcare supervision

• knowledge of the human microbiome Likewise ICP understanding of basic host defense mechanisms will expand exponentially

• more is to be learned about metagenomics and gene sequencing

Technology Changes

• change in information system-based surveillance

- algorithmic detection models integrated into existing IT platforms; 3 dimensions of expert knowledge required: clinical, IT & surveillance

- the emergence of electronic surveillance depends heavily on IT architecture

- the use of electronic surveillance systems offers ICPs an opportunity to envision their role in a dramatically different way

Review

Editor's choice
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Data use and effectiveness in electronic surveillance of healthcare associated infections in the 21st century: a systematic review

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Section for Medical Expert and Knowledge-Based Systems, Center for Medical Statistics, Informatics, and Intelligent Systems, Medical University of Vienna, Vienna, Austria

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Received 12 June 2013
Revised 24 December 2013
Accepted 31 December 2013
Published Online First 14 January 2014

ABSTRACT

Objective As more electronic health records have become available during the last decade, we aimed to uncover recent trends in use of electronically available patient data by electronic surveillance systems for healthcare associated infections (HAIs) and identify consequences for system effectiveness.

Methods A systematic review of published literature evaluating electronic HAI surveillance systems was performed. The PubMed service was used to retrieve publications between January 2001 and December 2011. Studies were included in the review if they accurately described what electronic data were used and if system effectiveness was evaluated using sensitivity, specificity, positive predictive value, or negative predictive value. Trends were identified by analyzing changes in the number and types of electronic data sources used.

Results 26 publications comprising discussions on 27 electronic systems met the eligibility criteria. Trend

To detect HAIs, electronic surveillance systems utilize electronically available patient data, such as clinical, microbiological, pharmaceutical, and administrative patient records. Over the last decade, more types of electronic health records have become available in hospitals, providing opportunities to improve the effectiveness of electronic HAI detection systems in the detection of both old and new threats. We initiated this systematic review to assess more recent trends in electronic data usage by HAI surveillance systems and resulting consequences for system effectiveness by analyzing systems created in the first decade of the 21st century.

METHODS

Search strategies and information sources

We conducted a systematic search of published literature that evaluated electronic surveillance systems for HAIs. Searches were conducted both electronically and manually: we used the PubMed service to search

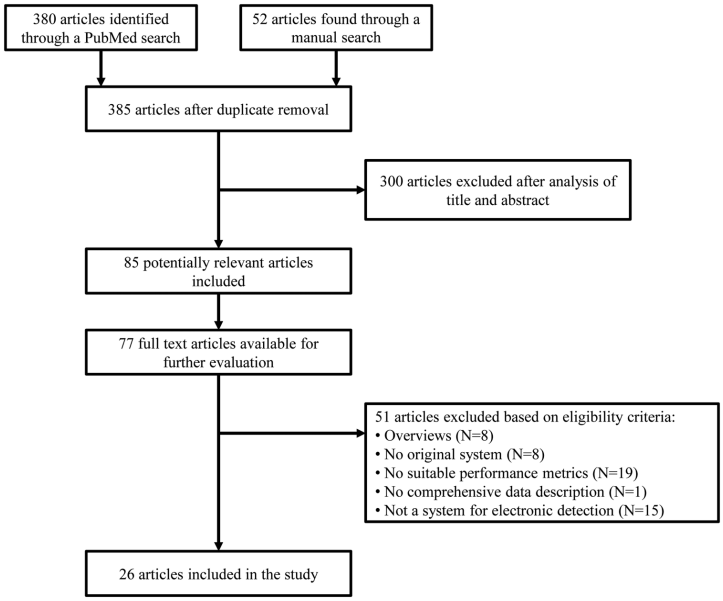


Figure 2 Study selection flow diagram.

de Bruin JS, *et al*. *J Am Med Inform Assoc* 2014;**21**:942–951. doi:10.1136/amiajnl-2013-002089

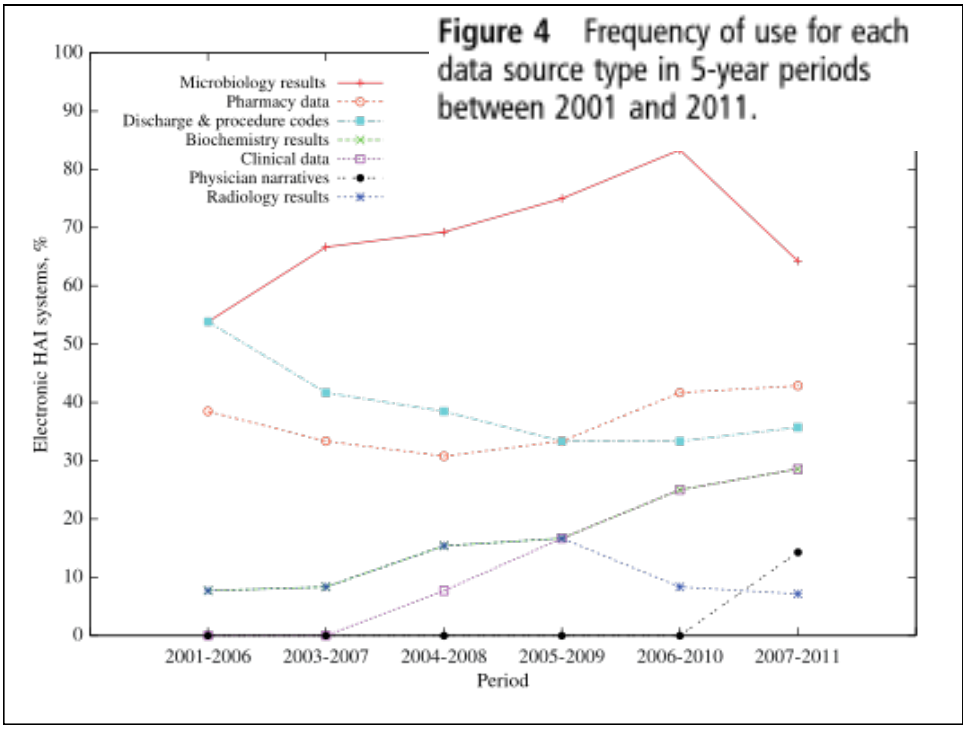


Figure 4 Frequency of use for each data source type in 5-year periods between 2001 and 2011.

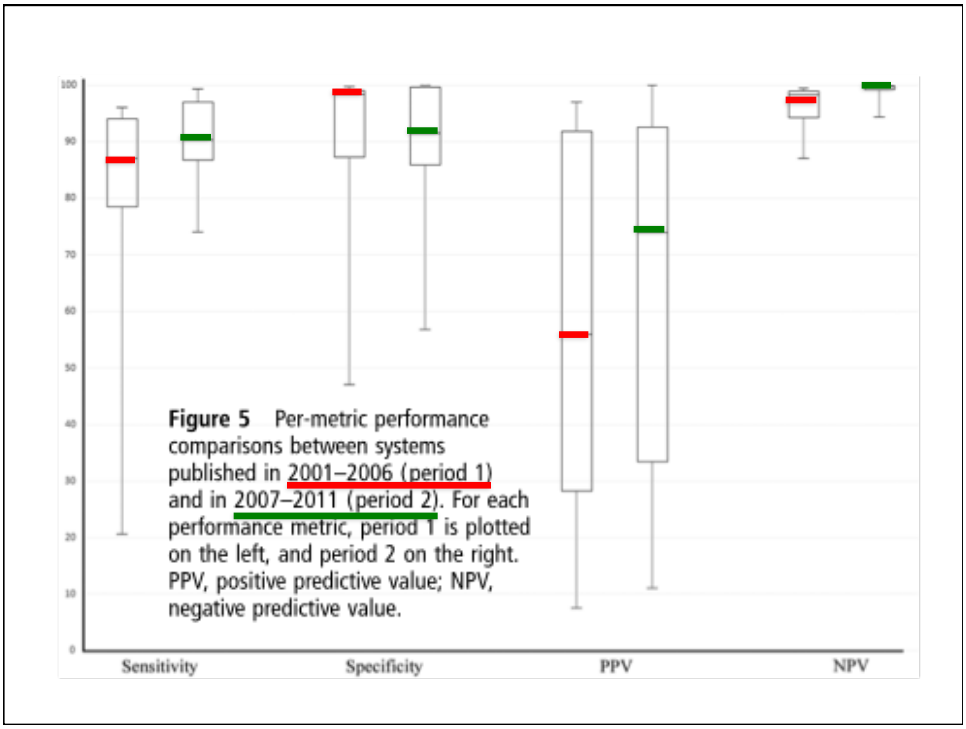


Figure 5 Per-metric performance comparisons between systems published in 2001–2006 (period 1) and in 2007–2011 (period 2). For each performance metric, period 1 is plotted on the left, and period 2 on the right. PPV, positive predictive value; NPV, negative predictive value.

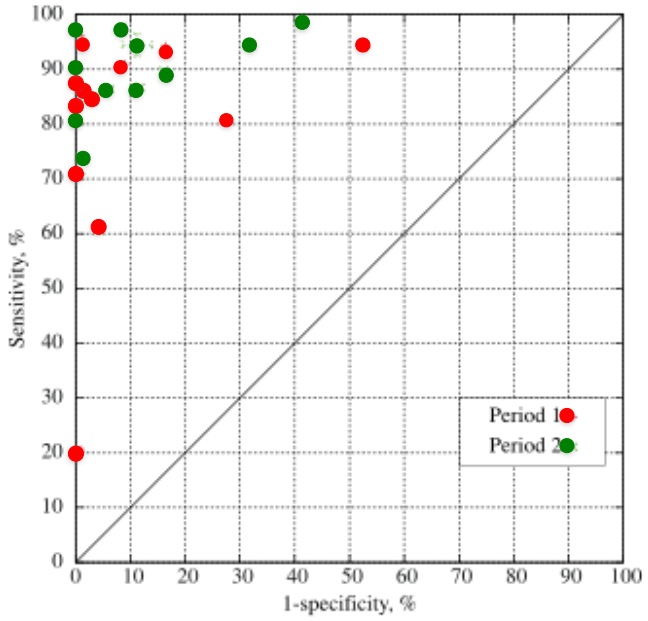
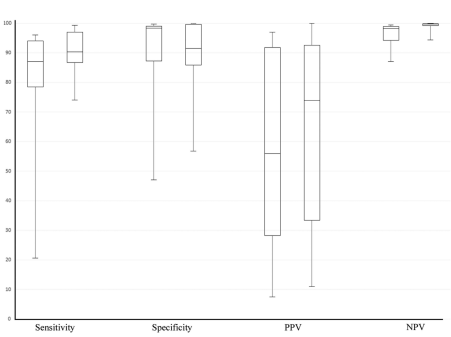


Figure 6 The receiver operating characteristic graph for systems published in 2001–2006 (period 1) and in 2007–2011 (period 2).



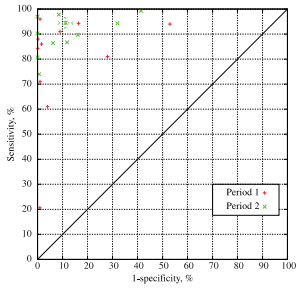


Figure 6 The receiver operating characteristic graph for systems published in 2001–2006 (period 1) and in 2007–2011 (period 2).

Conclusions Driven by the increased availability of electronic patient data, electronic HAI surveillance systems use more data, making systems more sensitive yet less specific, but also allow systems to be tailored to the needs of healthcare institutes' surveillance programs.

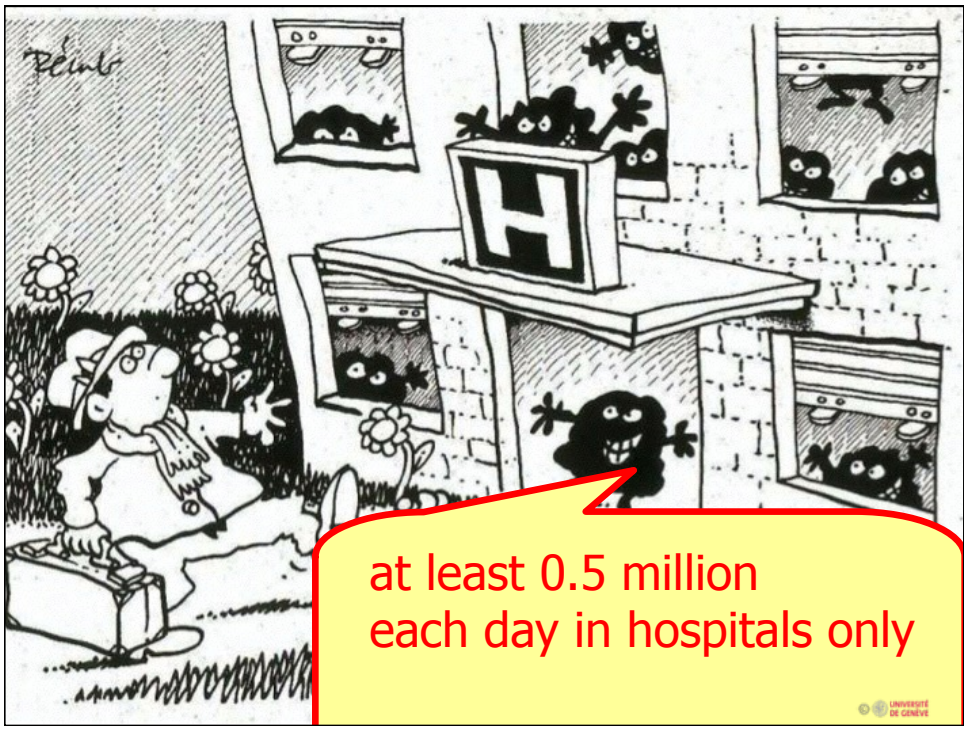
The Risk of Role Obsolescence

• Given the changes in science and technology, the current IPC role will change ! Whether or not it will become obsolete depends on how the IPC community prepares for and responds to the changes

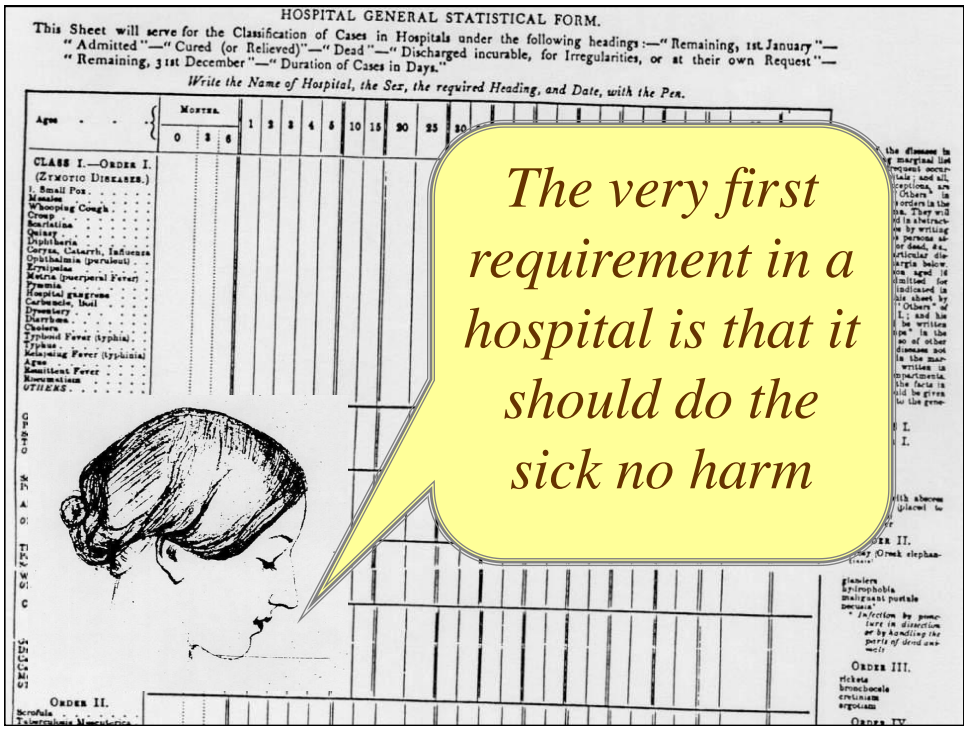
Obsolescence is only one of several possibilities

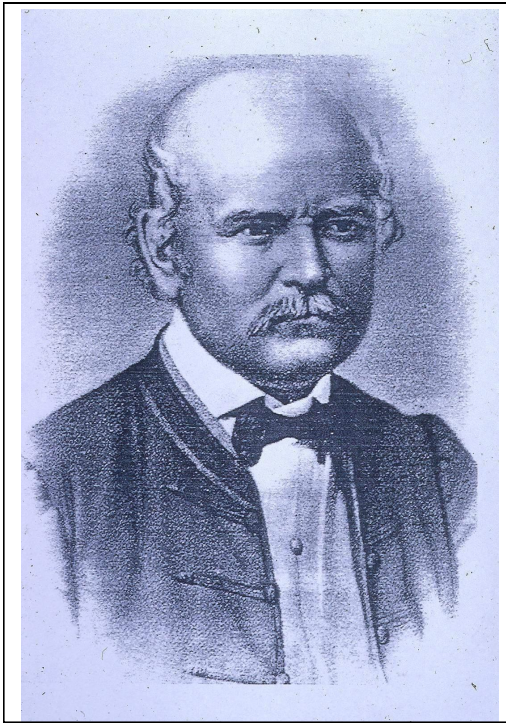
The traditional IPC replaced by a highly trained individual

Time saved required for traditional data management tasks would make it possible for the ICP position to be redesigned as an expert clinical role

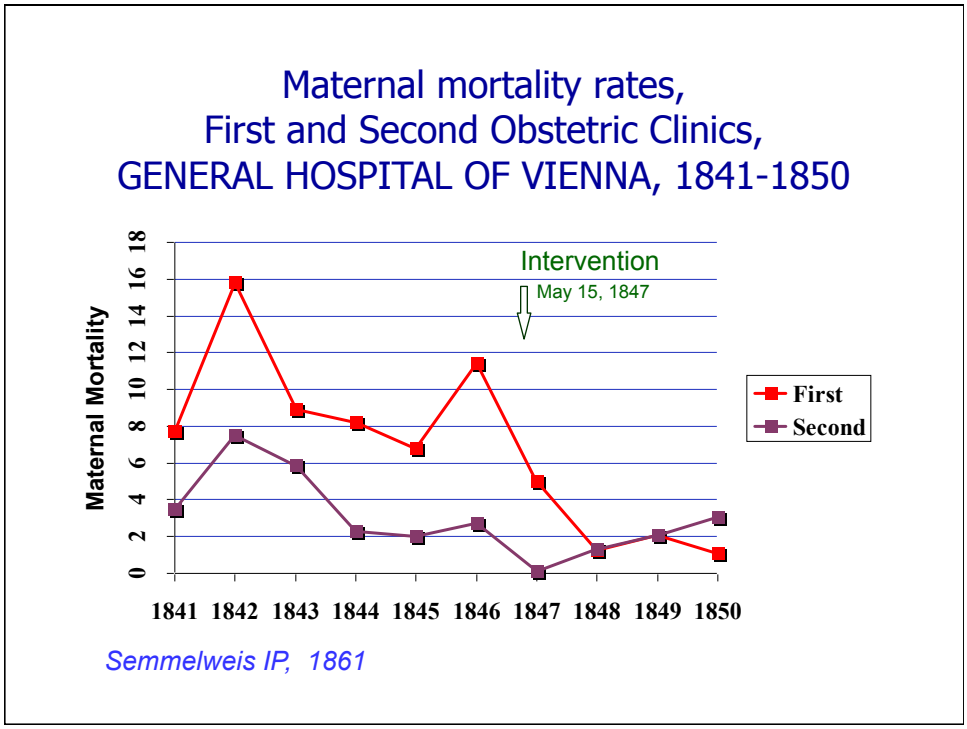


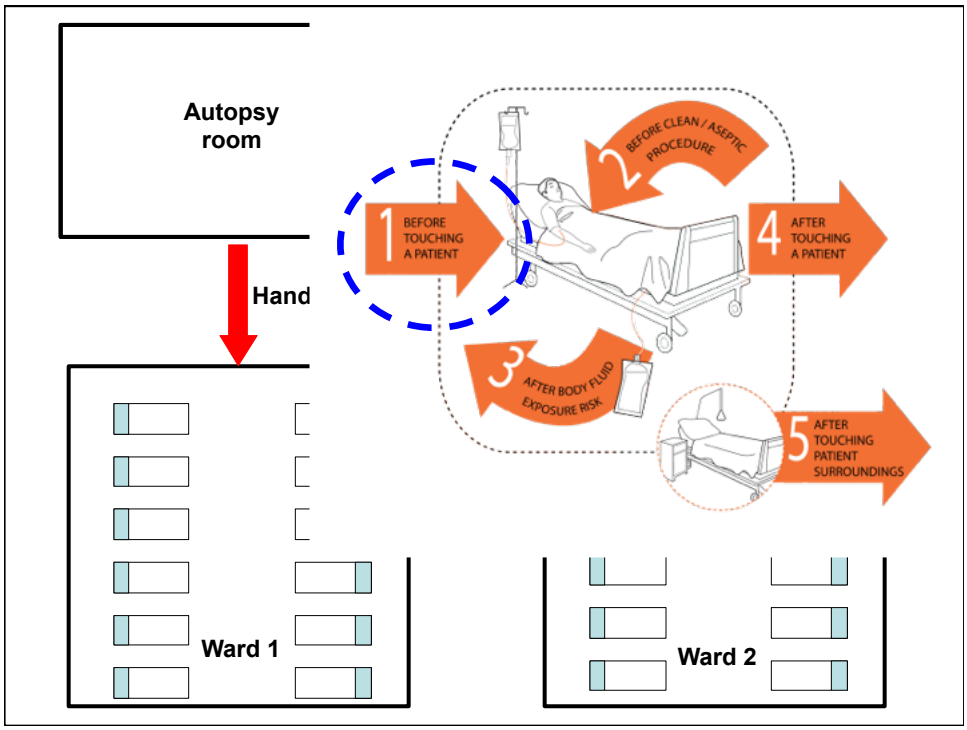
Florence Nightingale, 1820 - 1907

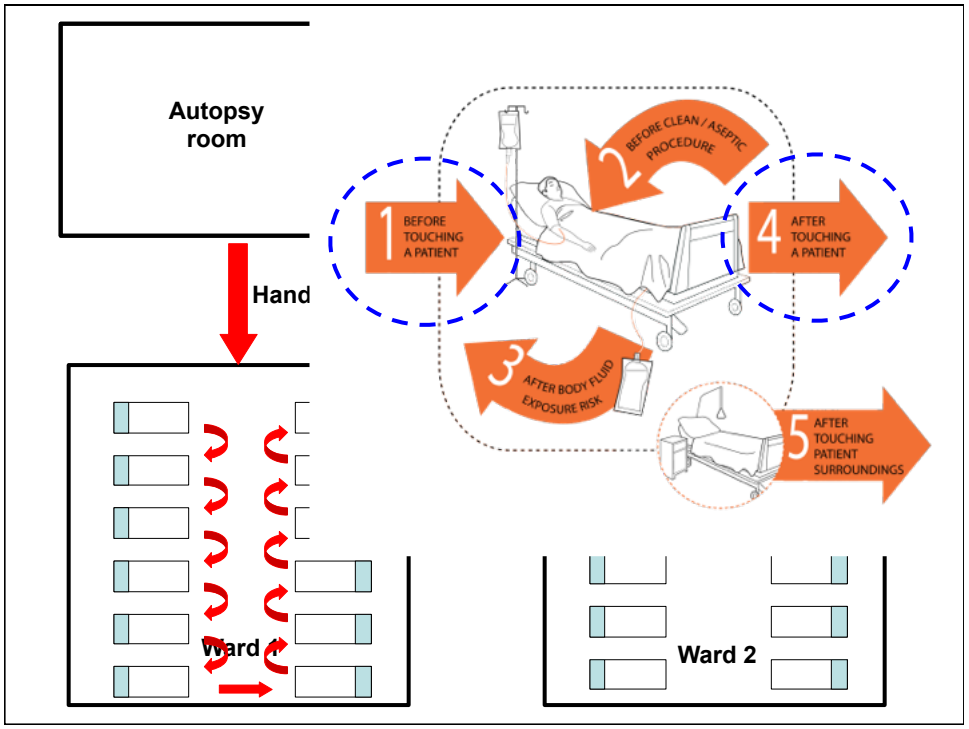




Ignaz Philipp Semmelweis


Maternal mortality rates,
First and Second Obstetric Clinics,
GENERAL HOSPITAL OF VIENNA, 1841-1850
Intervention
May 15, 1847
Maternal Mortality
0 2 4 6 8 10 12 14 16 18
1841 1842 1843 1844 1845 1846 1847 1848 1849 1850
First
Second
Semmelweis IP, 1861


Autopsy room
Hand
Ward 1
Ward 2
1 BEFORE TOUCHING A PATIENT
2 BEFORE CLEAN / ASEPTIC PROCEDURE
3 AFTER BODY FLUID EXPOSURE RISK
4 AFTER TOUCHING A PATIENT
5 AFTER TOUCHING PATIENT SURROUNDINGS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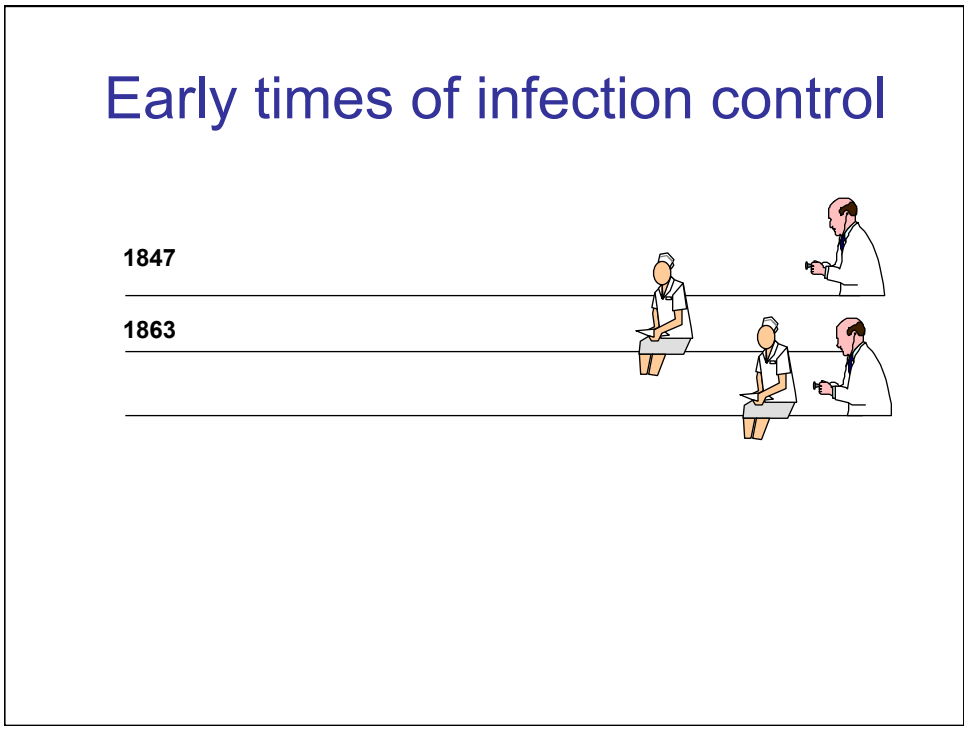
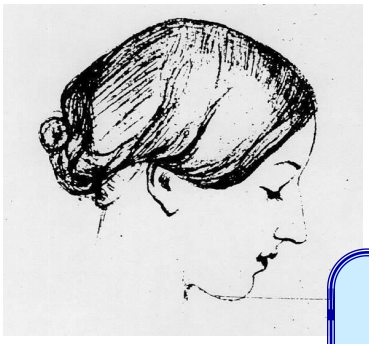
Ward 2


Early times of infection control
1847
1863

Infection Control and Quality Healthcare in the New Millenium

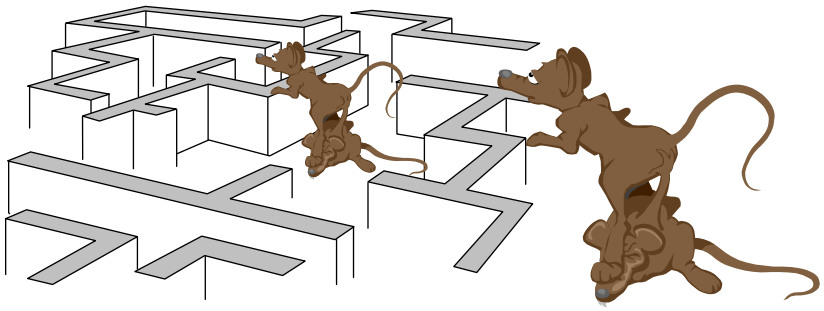
Are there lessons to be learned ?



Recognize
Explain
Act

Pittet D, *Am J Infect Control* 2005, 33:258

Does infection control

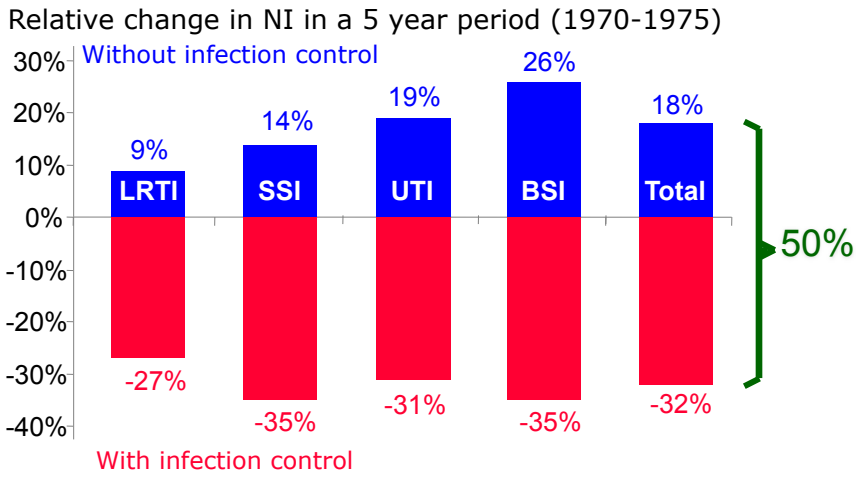


control infections ?

SENIC study

Study on the **E**fficacy of **N**osocomial **I**nfection **C**ontrol

Haley RW et al. Am J Epidemiol 1985;121(2):182-205



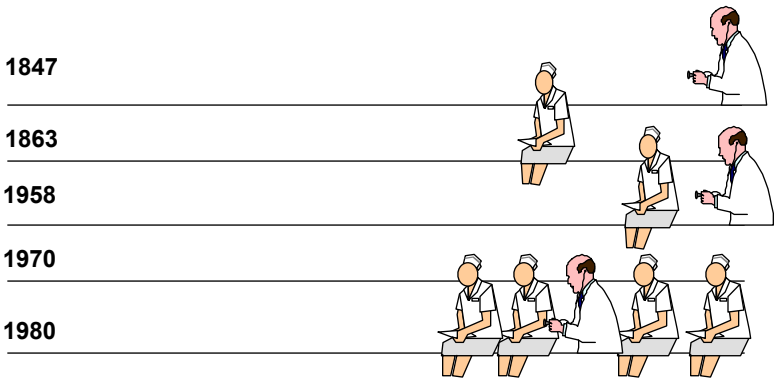
SENIC

Study on the Efficacy of Nosocomial Infection Control

- 1 infection control nurse per ~~200 to 250~~ per 110 beds
- 1 hospital epidemiologist per ~~hospital~~ (1000 beds)
- Organized surveillance for nosocomial infections
- Feedback of nosocomial infection rates

Haley RW et al. Am J Epidemiol 1985;121(2):182-205

Approach to infection control



Pittet D, *Am J Infect Control* 2005, 33:258

1st principle of infection prevention

Haley RW et al. Am J Epidemiol 1985;121(2):182-205

at least 35-50% of all healthcare-associated infections are associated with only 5 patient care practices:

- Use and care of urinary catheters
- Use and care of vascular access lines
- Therapy and support of pulmonary functions
- Surveillance of surgical procedures
- Hand hygiene and standard precautions

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Haley RW et al. Am J Epidemiol 1985;121(2):182-205

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Prevention of Catheter-Associated Urinary Tract Infection (CA-UTI)

Two main principles

Avoid unnecessary catheterization

Limit the duration of catheterization

Incidence of UTI, before and after a multimodal intervention

Stéphan F. et al D, *Clin Infect Diseases* 2006, 42:1544

UTI	Pre-intervention period (n=280)		Post-intervention period (n=259)		RR (95%-CI)
	N	ID*	N	ID*	
Overall	35	27.0	13	12.0	0.44 (0.24-0.81)
Orthopedic surgery *Intervention group*	29	45.8	10	18.6	0.41 (0.20-0.79)
Digestive surgery *Control group*	6	9.0	3	5.6	0.62 (0.14-2.50)

* ID: episodes per 1000 catheter-days

Stéphan F. et al D, **Reduction of UTI and antibiotic use after surgery: a controlled, prospective, before-after intervention study**
Clin Infect Diseases 2006, 42:1544

- Incidence density of UT… …0% after orthopedic… multimod…
- …ed after 2 years
- …elling urinary catheters placed in t… …perating room
- Decrease UTI antibiotic-related consumption

A multimodal strategy

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JUNE 2, 2016 VOL. 374 NO. 22

A Program to Prevent Catheter-Associated Urinary Tract Infection in Acute Care

Sanjay Saint, M.D., M.P.H., M. Todd Greene, Ph.D., M.P.H., Sarah L. Krein, Ph.D., R.N., Mary A.M. Rogers, Ph.D., David Ratz, M.S., Karen E. Fowler, M.P.H., Barbara S. Edson, R.N., M.B.A., M.H.A., Sam R. Watson, M.S.A., C.P.P.S., Barbara Meyer-Lucas, M.D., M.H.S.A., Marie Masuga, R.N., M.S.N., Kelly Faulkner, M.S.P.A., Carolyn V. Gould, M.D., M.S.C.R., James Battles, Ph.D., and Mohamad G. Fakih, M.D., M.P.H.

ABSTRACT

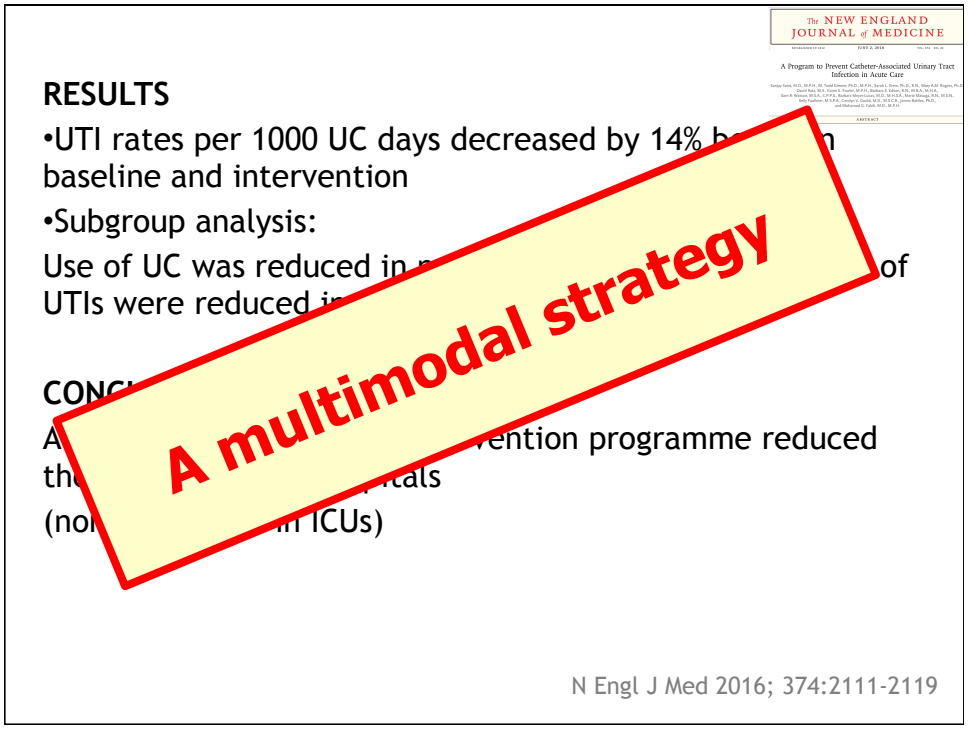
N Engl J Med 2016; 374:2111-2119

- Multimodal intervention
- 926 ICUs and non-ICUs; 603 hospitals
- 32 states, Puerto Rico, Wash DC

INTERVENTION

- Collecting data
- Assessing the necessity of UC daily
- Encouraging HCWs to reduce use of UC and to use alternative urinary collection methods
- Aseptic techniques
- Regular report to hospital staff on use of catheters and UTI rates

N Engl J Med 2016; 374:2111-2119



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- Use and care of vascular access lines
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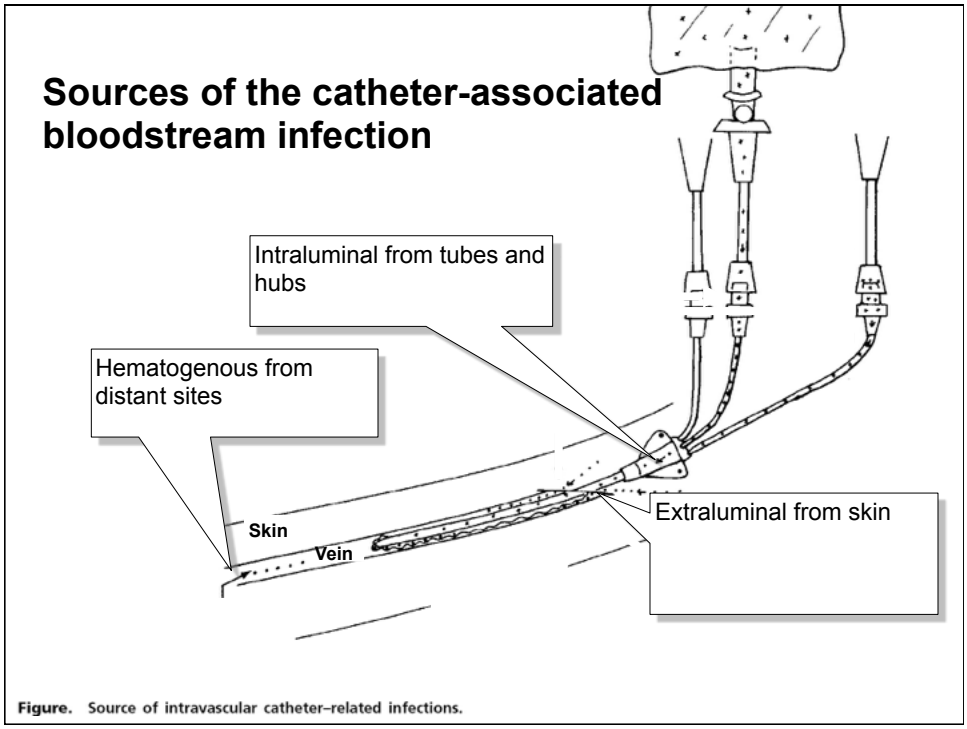
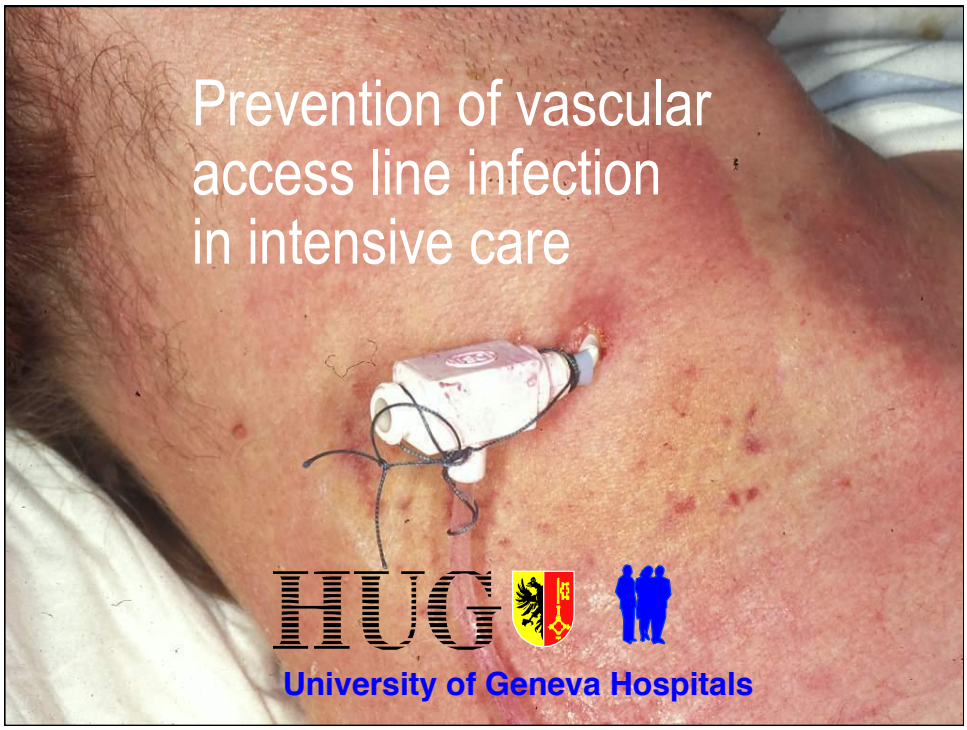
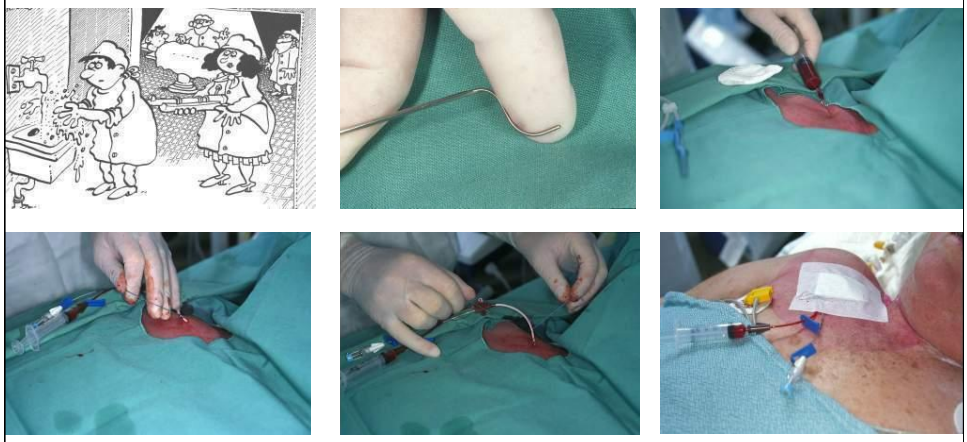
- Experience with surgical procedures
- Hand hygiene and standard precautions


Sources of the catheter-associated bloodstream infection
Intraluminal from tubes and hubs
Hematogenous from distant sites
Extraluminal from skin
Skin
Vein
Figure. Source of intravascular catheter–related infections.


Prevention of vascular access line infection in intensive care
HUG
University of Geneva Hospitals

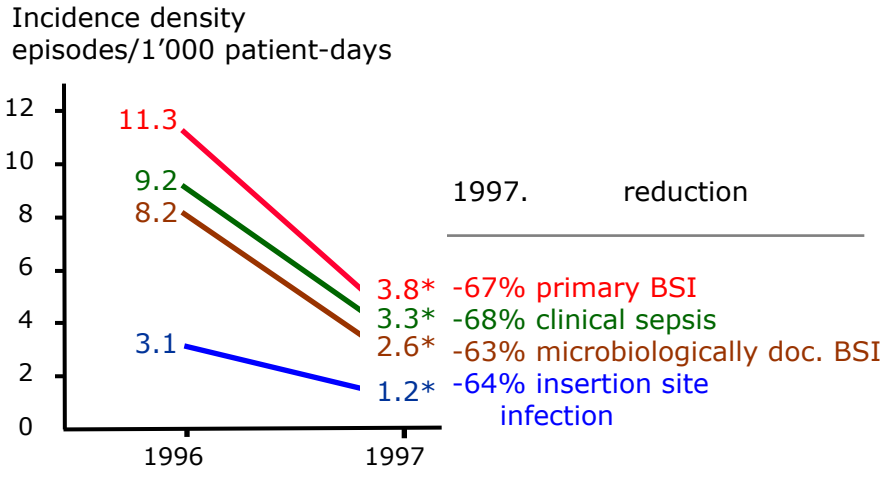
Education-based, multimodal prevention strategy of CRI



Eggimann and Pittet *Sepsis Monitor* 2000

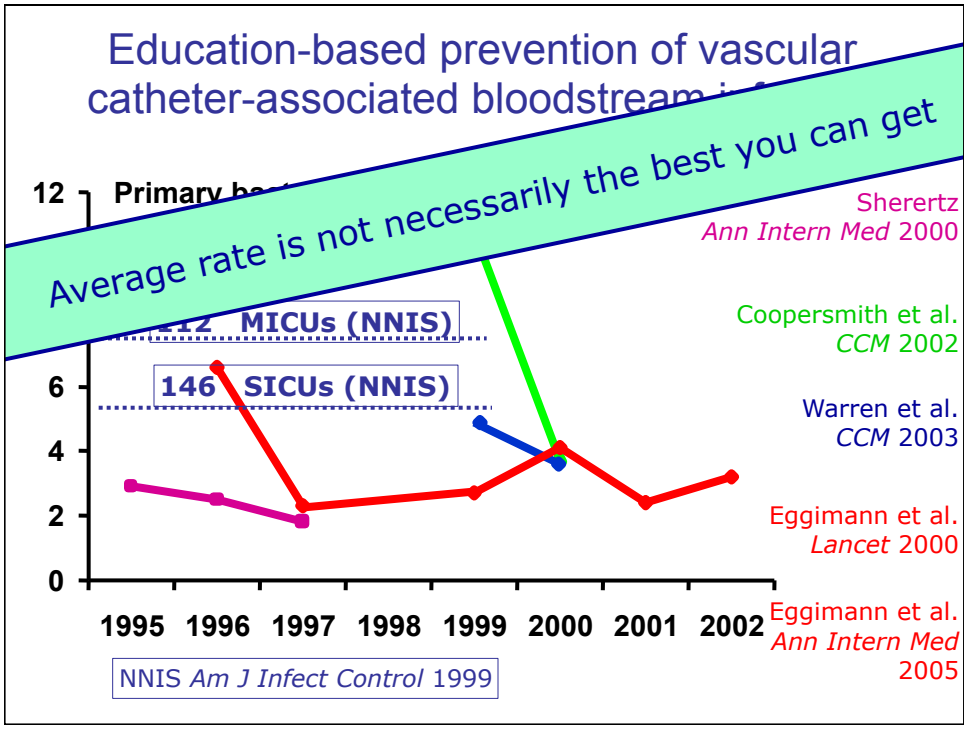
Prevention of vascular access line infection
Medical intensive care unit

HUG



Eggimann et al. Lancet 2000; 355:1864

* $P < 0.05$



Multimodal intervention strategies to reduce catheter-associated bloodstream infections:

- Hand hygiene
- Maximal sterile barrier precaution at insertion
- Skin antisepsis with alcohol-based chlorhexidine-containing products
- Subclavian access as the preferred insertion site
- Daily review of line necessity
- Standardized catheter care using a non-touch technique
- Respecting the recommendations for dressing change

Eggimann P. *Lancet* 2000; 35: 290
Pronovost P. *N Engl J Med* 2006; 355: 26
Zingg W. *Crit Care Med* 2009; 37: 2167

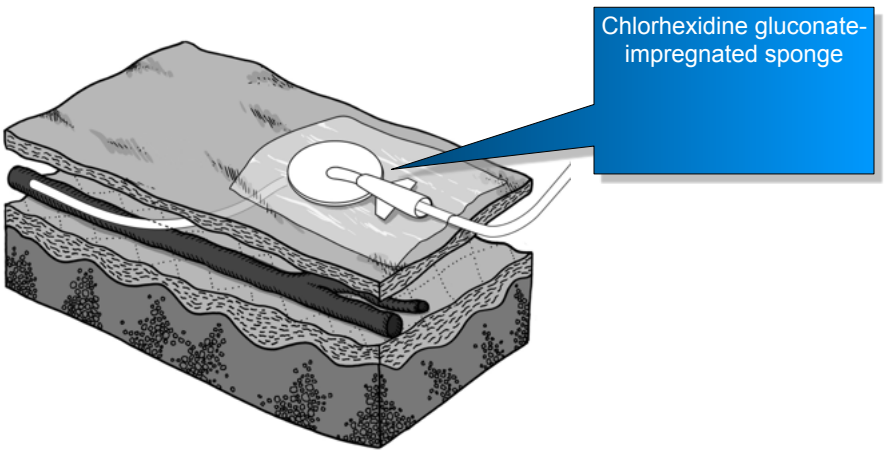
Efficacy of multimodal intervention strategies:

	Baseline	Intervention
Eggimann *Lancet* 2000 *Ann Intern Med* 2005	3.1/1000 catheter-days	1.2/1000 catheter-days
Pronovost *NEJM* 2006	*7.7/1000 catheter-days	*1.4/1000 catheter-days
Zingg *Crit Care Med* 2009	3.1/1000 catheter-days	1.1/1000 catheter-days

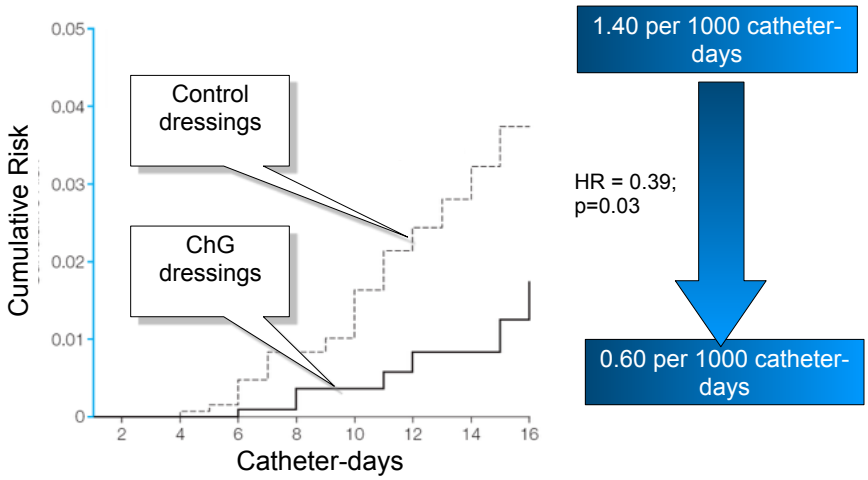
***mean** pooled CRBSI-episodes per 1'000 catheter-days

Eggimann P. *Lancet* 2000; 35: 290
Eggimann P. *Ann Intern Med* 2005; 142: 875 – 5 year follow-up
Pronovost P. *N Engl J Med* 2006; 355: 26
Zingg W. *Crit Care Med* 2009; 37: 2167

Could we do better ?



Chlorhexidine-gluconate impregnated dressings decreased major catheter-related infections:



Timsit JF. *JAMA* 2009; 301: 1231

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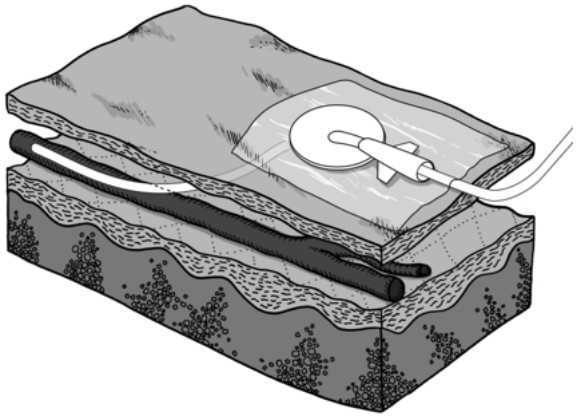
Zingg	3.1/1000 catheter-days	1.1/1000 catheter-days
Timsit	1.4/1000 catheter-days	0.6/1000 catheter-days
	povidone-Iodine-alcohol	*chlorhexidine-alcohol*
Mimoz	1.75/1000 catheter-day	0.28/1000 catheter-days

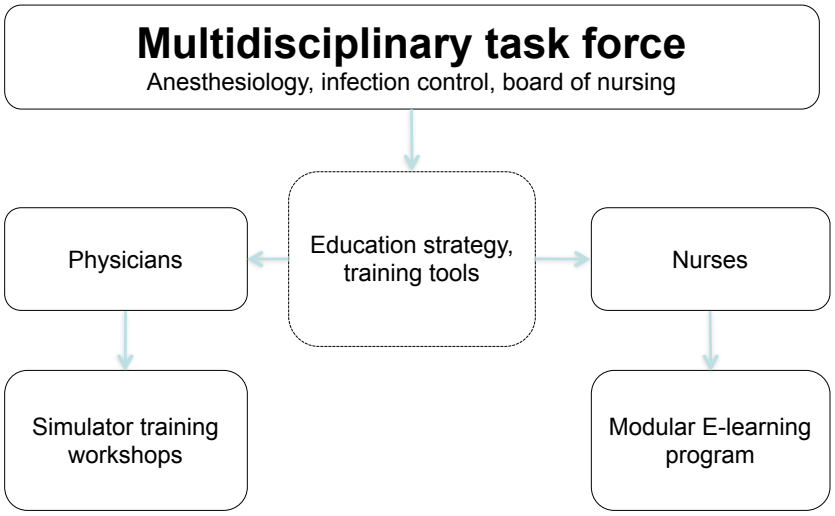
***mean** pooled CRBSI-episodes per 1'000 catheter-days

Eggimann P. *Lancet* 2000; 35: 290
Pronovost P. *N Engl J Med* 2006; 355: 26
Zingg W. *Crit Care Med* 2009; 37: 2167
Timsit JF. *JAMA* 2009; 301: 1231
Mimoz O. *Lancet; online 17 sept 2015*

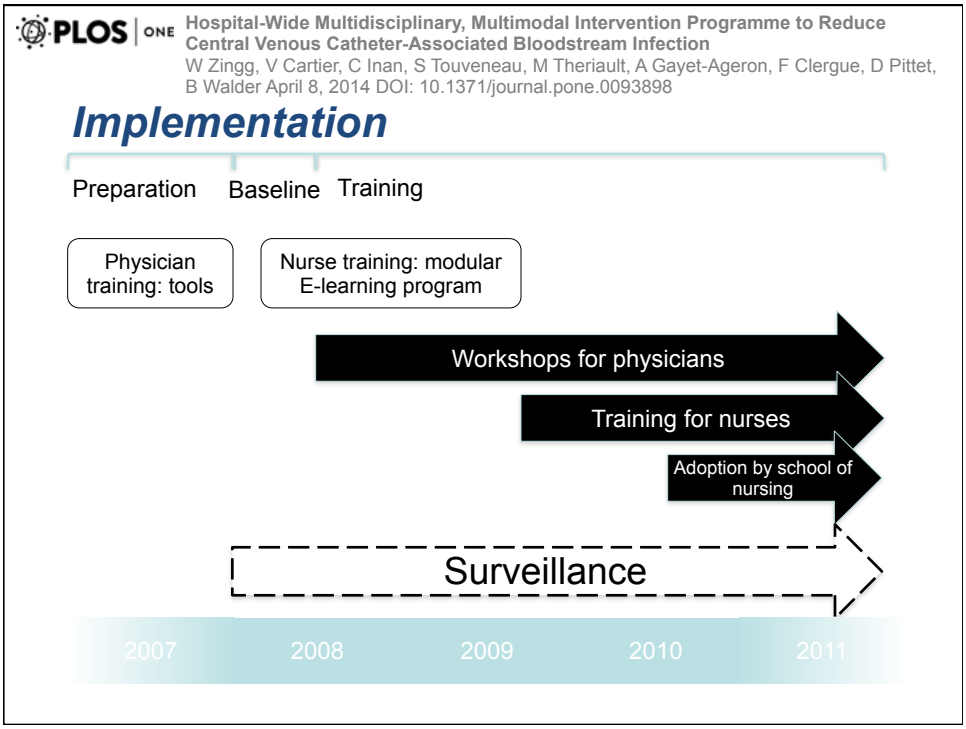
Could we do even better ?
… and hospital-wide ?



Zingg et al. – Geneva



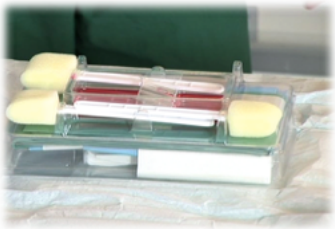
Zingg. *PLOS One*, 2014



Availability of and easy access to material and equipment and optimized ergonomics

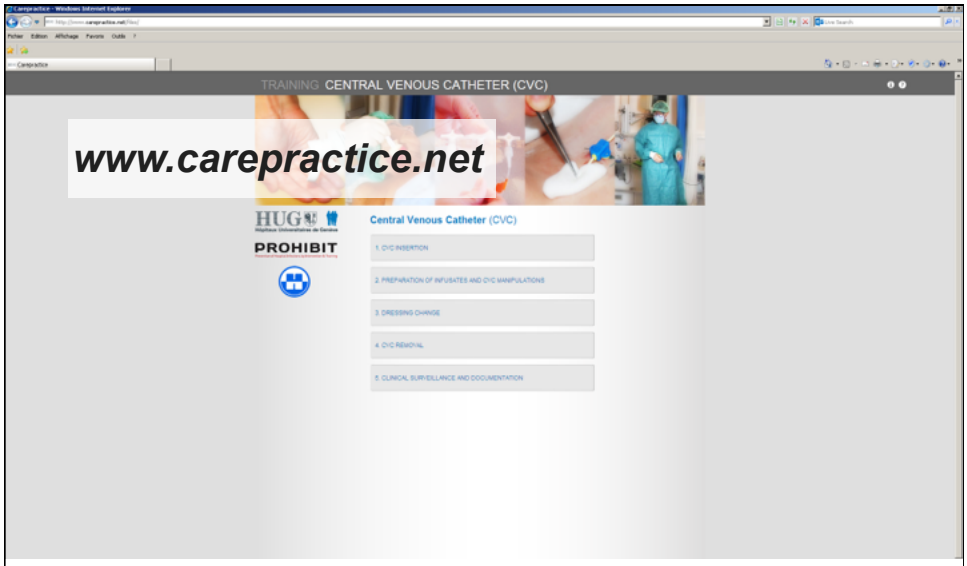
Line cart

Comprehensive insertion kit



Zingg. *PLOS One*. In press

HUG Hôpitaux Universitaires de Genève

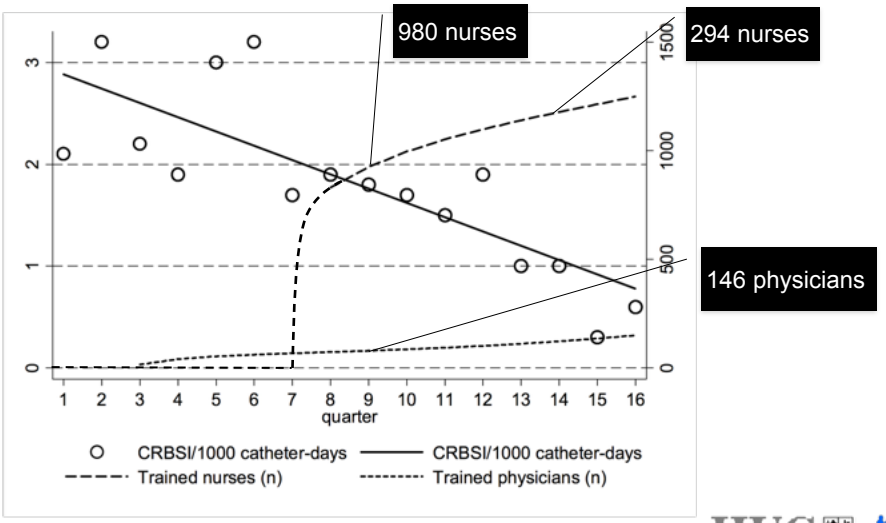


"Train the trainer" Two workshops per clinical service:

- Presentation of the E-learning tool
- Simulated training sessions

Catheter-related BSI – Hospital-wide

-8.2%; 95% CI -3.9-12.6%; P < 0.001



PLOS ONE Zingg. *PLOS One*, 2014

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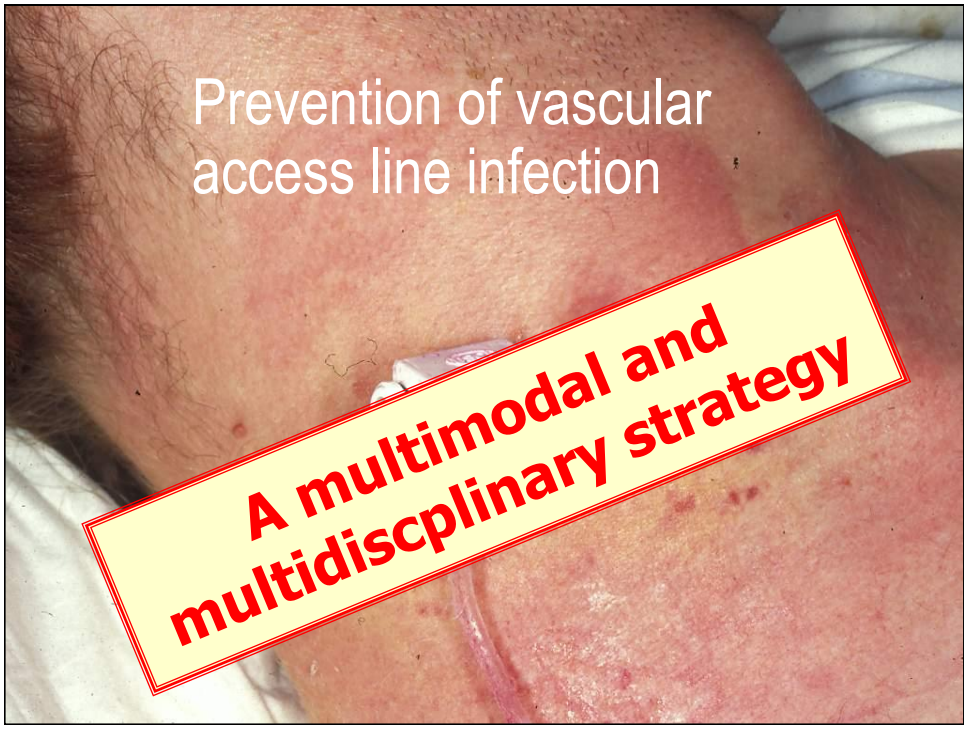


1st principle of infection prevention

Haley RW et al. Am J Epidemiol 1985;121(2):182-205

at least 35-50% of all healthcare-associated infections are associated with only 5 patient care practices:

- Use and care of urinary catheters
- Use and care of vascular access lines
- Therapy and support of pulmonary functions
- Experience with surgical procedures
- Hand hygiene and standard precautions

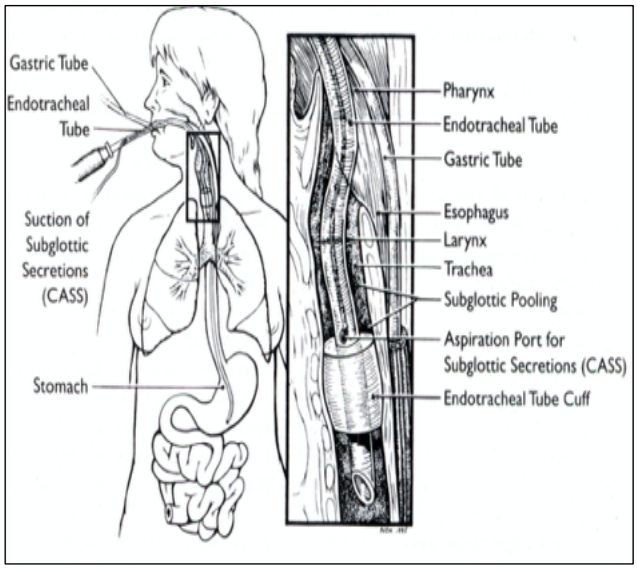
Risk factors for Ventilator-Associated Pneumonia (VAP)

Patient

- Age
- Burns
- Coma
- Lung disease
- Immunosuppression
- Malnutrition
- Blunt trauma

Devices

- Invasive ventilation
- Duration of invasive ventilation
- Reintubation
- Medication
- Prior antiobiotic treatment
- Sedation



A multifaceted program to prevent ventilator-associated pneumonia: Impact on compliance with preventive measures*

Lila Bouadma, MD; Bruno Mourvillier, MD; Véronique Deiler, RN; Bertrand Le Corre, RN; Isabelle Lolom, BS; Bernard Régnier, MD; Michel Wolff, MD; Jean-Christophe Lucet, MD, PhD

Crit Care Med 2010: volume 38: 789-96

2 year intervention study:
Compliance with preventive measures increased
VAP prevalence rate decreased by 51%

6. Gastric overdistention avoidance
7. Good oral hygiene
8. Elimination of non-essential tracheal suction

VAP Prevention

1. Hand hygiene before and after patient contact, preferably using alcohol-based handrubbing
2. Avoid endotracheal intubation if possible
3. Use of oral, rather than nasal, endotracheal tubes
4. Minimize the duration of mechanical ventilation
5. Promote tracheostomy when ventilation is needed for a longer term
6. Glove and gown use for endotracheal tube manip

VAP Prevention (con't)

7. Avoid non-essential tracheal suction
8. Oral hygiene with chlorhexidine
9. Backrest elevation 30-45º
10. Maintain tracheal tube cuff
    prevent regurgitation
11. Avoid gastric
12. Prom
13. trol in patients with
14. SL ected cases

A multimodal and multidiscplinary strategy

1st principle of infection prevention

Haley RW et al. Am J Epidemiol 1985;121(2):182-205

at least 35-50% of all healthcare-associated infections are associated with only 5 patient care practices:

- Use and care of urinary catheters
- Use and care of vascular access lines
- Therapy and support of pulmonary functions
- Experience with surgical procedures
- Hand hygiene and standard precautions

Summary: Relative SSI reduction

-	Active surveillance	38%	Haley et al, A… demiol 1985
		55%	Rio… ect 2007
-	Multimodal intervention	2…	…2008
-	Correct an… antib…		…et al, Ann Surg 2009
		13%	Kurz et al, NEJM 1996
-		38%	Ambiru et al, J Hosp Infect 2008
-	C… exdidine-alcohol?	41%	Darouiche et al, NEJM 2010
-	*Suppl. oxygen?*	25%	Qadan et al, Arch Surg 2009
-	*Nasal mupirocin for MSSA?*	58%	Bode et al, NEJM 2010
-	Surgical hand antisepsis no data	no random	Widmer et al, J Hosp Infect 2010

A multimodal and multidiscplinary strategy

Original Investigation

Association of a Bundled Intervention With Surgical Site Infections Among Patients Undergoing Cardiac, Hip, or Knee Surgery

JAMA 2015 ;313:2162-71

Marin L. Schweizer, PhD; Hsiu-Yin Chiang, MS, PhD; Edward Septimus, MD; Julia Moody, MS; Barbara Braun, PhD; Joanne Hafner, RN, MS; Melissa A. Ward, MS; Jason Hickok, MBA, RN; Eli N. Perencevich, MD, MS; Daniel J. Diekema, MD; Cheryl L. Richards, MJ, LPN, LMT; Joseph E. Cavanaugh, PhD; Jonathan B. Perlin, MD, PhD; Loreen A. Herwaldt, MD

IMPORTANCE Previous studies suggested that a bundled intervention was associated with lower rates of *Staphylococcus aureus* surgical site infections (SSIs) among patients having cardiac or orthopedic operations.

OBJECTIVE To evaluate whether the implementation of an evidence-based bundle is associated with a lower risk of *S aureus* SSIs in patients undergoing cardiac operations or hip or knee arthroplasties.

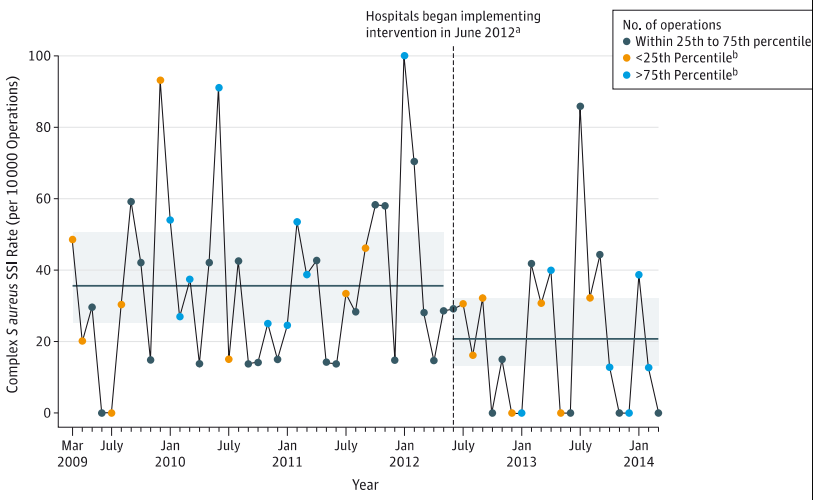
DESIGN, SETTING, AND PARTICIPANTS Twenty hospitals in 9 US states participated in this pragmatic study; rates of SSIs were collected for a median of 39 months (range, 39-43) during the preintervention period (March 1, 2009, to intervention) and a median of 21 months (range, 14-22) during the intervention period (from intervention start through March 31, 2014).

Editorial page 2131
Supplemental content at jama.com

20 hospitals
9 states (USA)

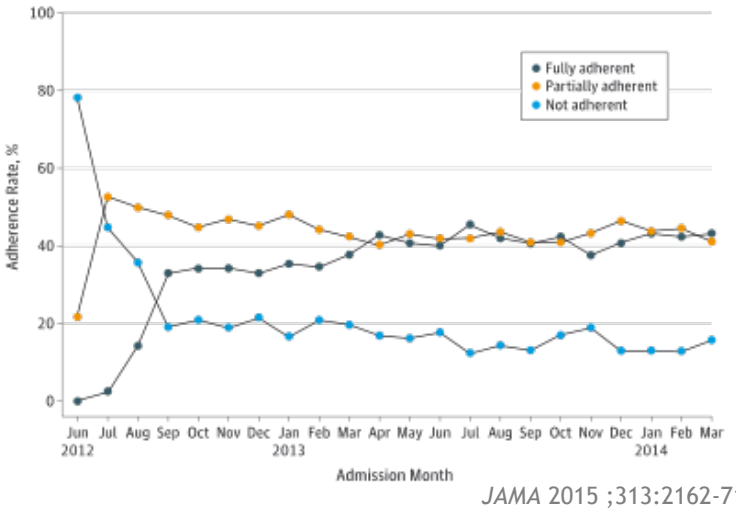
CONCLUSIONS AND RELEVANCE In this multicenter study, a bundle comprising *S aureus* screening, decolonization, and targeted prophylaxis was associated with a modest, statistically significant decrease in complex *S aureus* SSIs.

Figure 1. Pooled Rate of Complex *Staphylococcus aureus* Surgical Site Infections (SSIs) by Admission Month

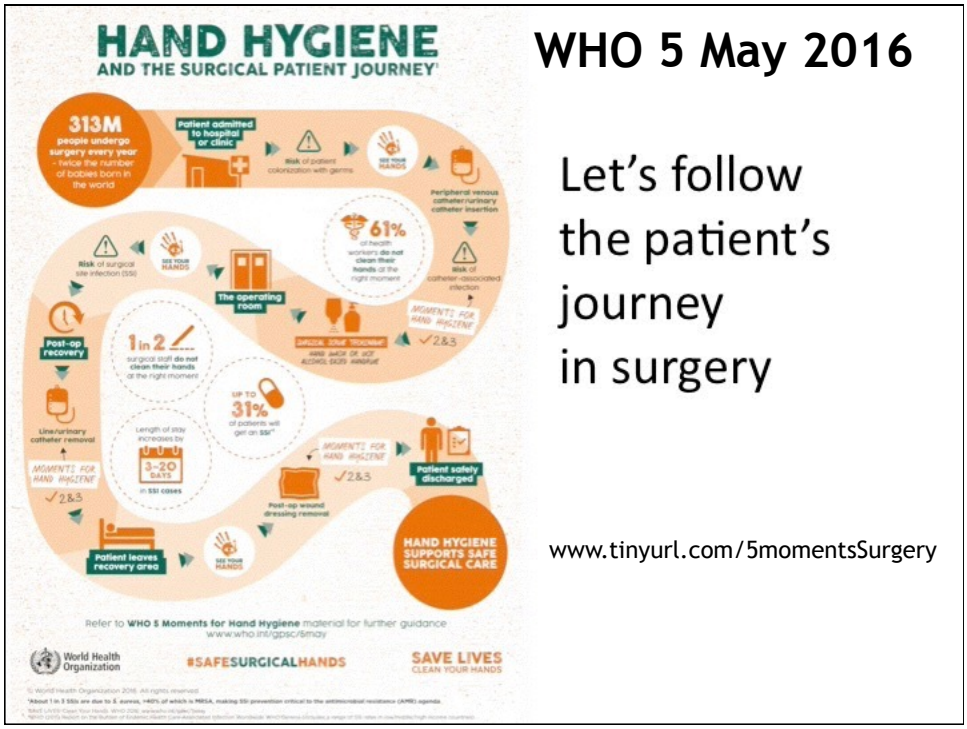


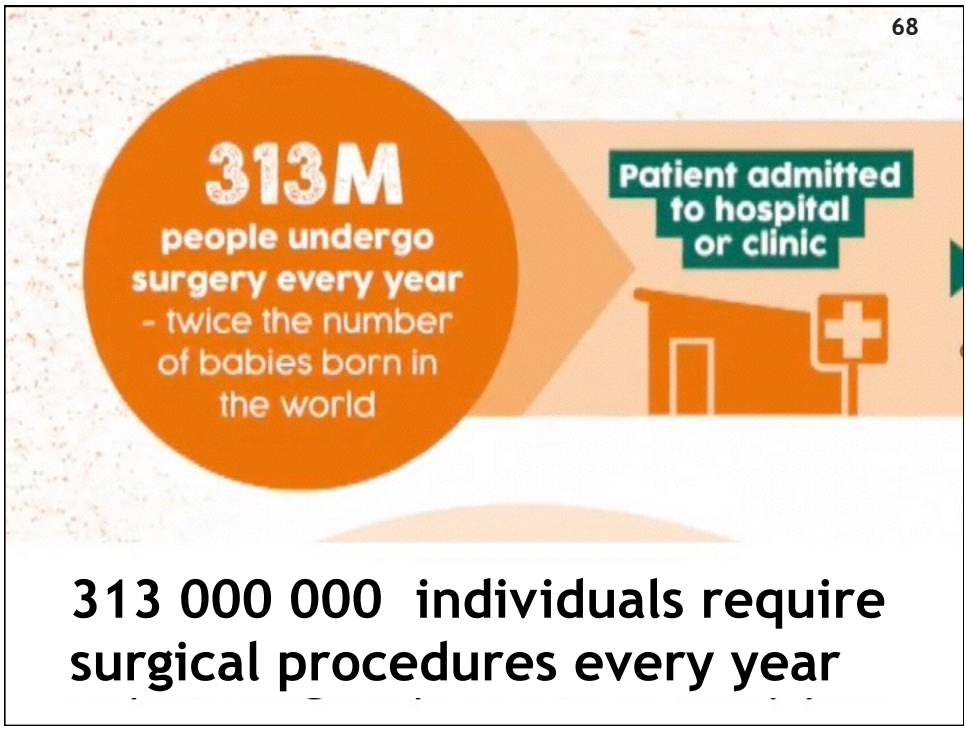
JAMA 2015 ;313:2162-71

Figure 2. Bundled Intervention Adherence by Month During the Intervention Period (N=14 316 Operations)



JAMA 2015 ;313:2162-71


HAND HYGIENE
AND THE SURGICAL PATIENT JOURNEY
313M
people undergo surgery every year - twice the number of babies born in the world
Patient admitted to hospital or clinic
The operating room
Post-op recovery
Patient leaves recovery area
Patient safely discharged
61%
1 in 2
31%
3-20 DAYS
MOMENTS FOR HAND HYGIENE
HAND HYGIENE SUPPORTS SAFE SURGICAL CARE
Refer to WHO 5 Moments for Hand Hygiene material for further guidance
World Health Organization
#SAFESURGICALHANDS
SAVE LIVES
CLEAN YOUR HANDS
WHO 5 May 2016
Let's follow the patient's journey in surgery
www.tinyurl.com/5momentsSurgery


68
313M
people undergo surgery every year - twice the number of babies born in the world
Patient admitted to hospital or clinic
313 000 000 individuals require surgical procedures every year

Latest Innovations in Infection Prevention and Control
Prof. Didier Pittet, University of Geneva Hospitals and Faculty of Medicine
Broadcast live from the 2016 conference of the Australasian College of Infection Prevention and Control

www.who.int/gpsc/5may/video/en/

New WHO Guidelines on Surgical Site Infection prevention
International group of experts - 30 meta-analyses - Sept 2016

#SafeSurgicalHands 2016

More than 15 000 photos in a few days from > 100 countries

www.CleanHandsSaveLives.org/SafeSurgicalHands

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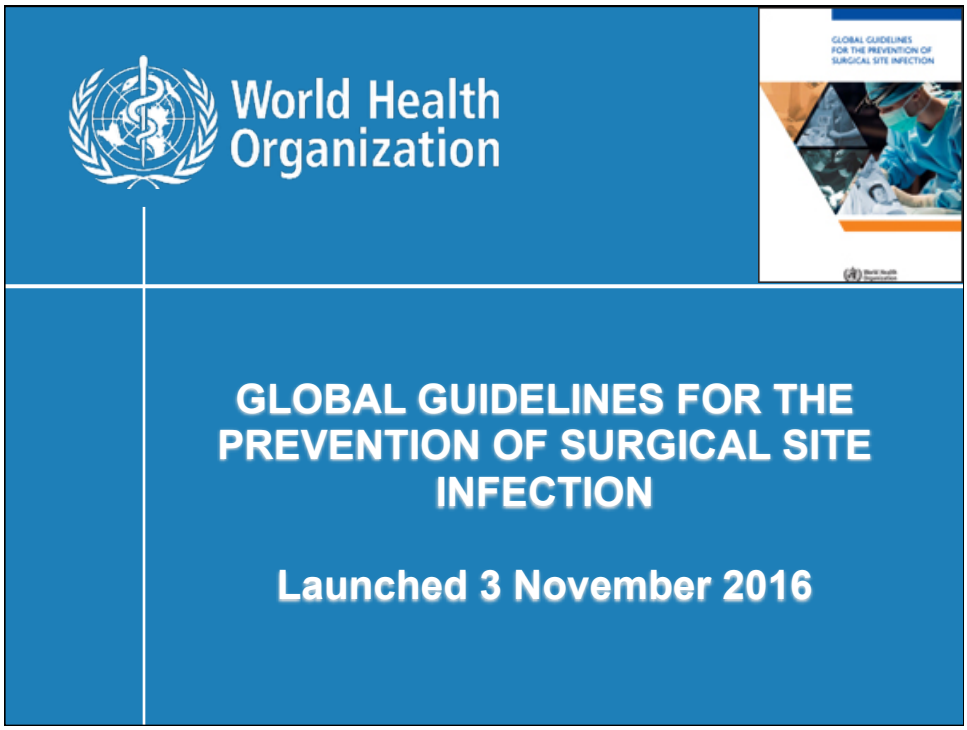
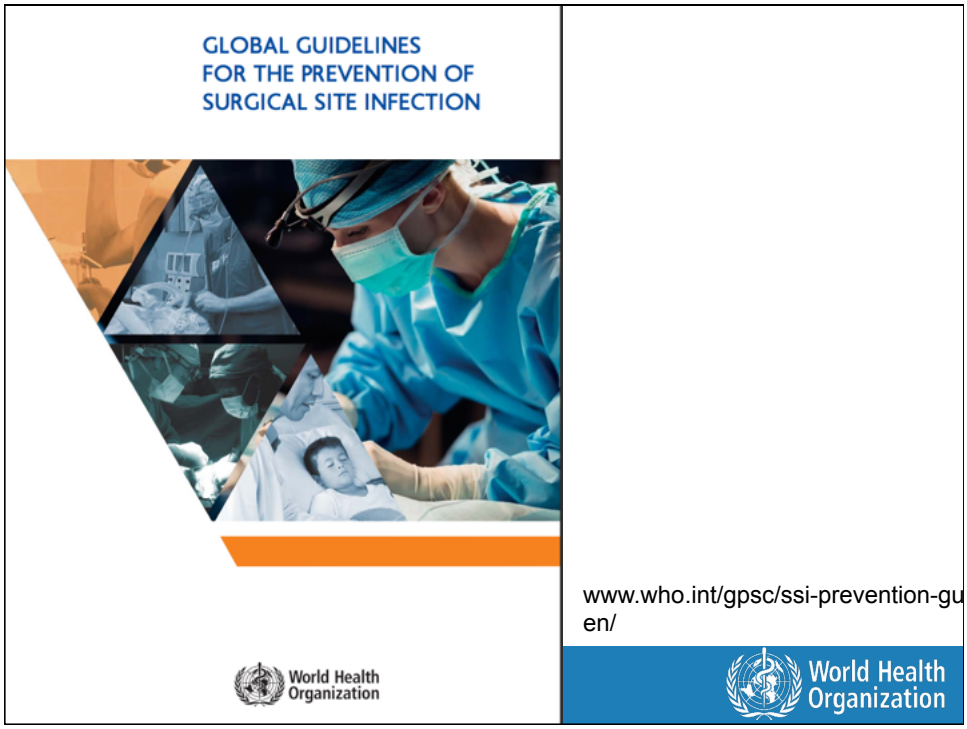
Global reach # SafeSurgicalHands
The #safesurgicalhands Influencers
Top 10 by Mentions
@who 9,458
@didierpittet 2,194
@claireekt 930
@jgonseth 591
@hguayaquil 568
@safehands_2016 556
@opsoms 457
@ips_infection 332
@hopitaux_unige 300
@jesshtmc 280
Tweet
Top 10 by Tweets
@safehands_2016 818
@didierpittet 699
@claireekt 257
@jgonseth 168
@hopitaux_unige 128
@ppgcas 128
@julesstorr 113
@fksc_ 100
@tcheunb 100
@calidadlaperla 93
Tweet
Top 10 by Impressions
@who 54,789,415
@un 14,322,149
@didierpittet 1,825,235
@safecaremag 1,285,810
@tufoola 1,013,119
@4locum 729,434
@claireekt 714,697
@hopitaux_unige 685,558
@fksc_ 525,522
@nnuh 441,756
Tweet
The Numbers
97,759,993 Impressions
16,688 Tweets
6,640 Participants
9 Avg Tweets/Hour
3
Tweet
#safesurgicalhands analytics for time period 04/01/2016 00:00 to 06/14/2016 00:00 (Pacific Time: GMT-0700) [change time period]


World Health Organization
GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION
GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION
Launched 3 November 2016



Main reasons for developing surgical site infection prevention guidelines

- ❑ High global epidemiological burden
- ❑ Highly preventable infection
- ❑ No recent evidence-based guidelines
- ❑ Need for a global perspective
- ❑ Need for taking into account balance between benefits and harms, evidence quality level, cost and resource use implications, and patient values and preferences

World Health Organization

Recommendations and much more

http://www.who.int/gpsc/ssi-prevention-guidelines/en/

World Health Organization

What can you do now?

- Go to www.who.int/gpsc/SSI-guidelines/en and download the Guidelines and supporting materials – available now with more to be added through 2017
- 2 associated publications in the Lancet Infectious Diseases

World Health Organization

1st principle of infection prevention

Haley RW et al. Am J Epidemiol 1985;121(2):182-205

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1st principle of infection prevention

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associated with

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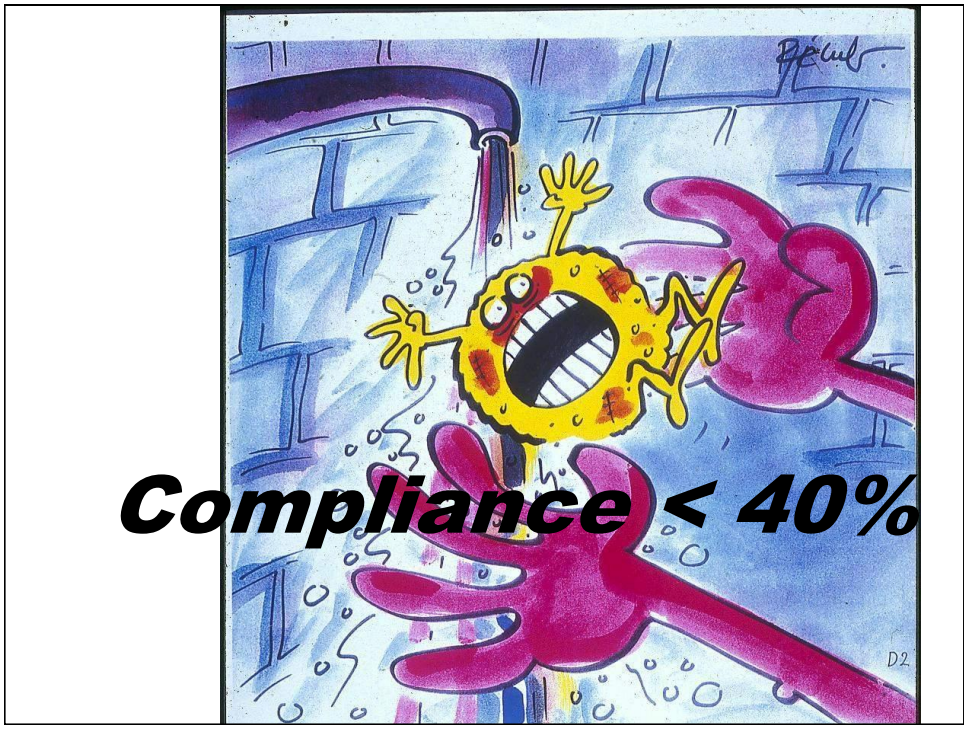
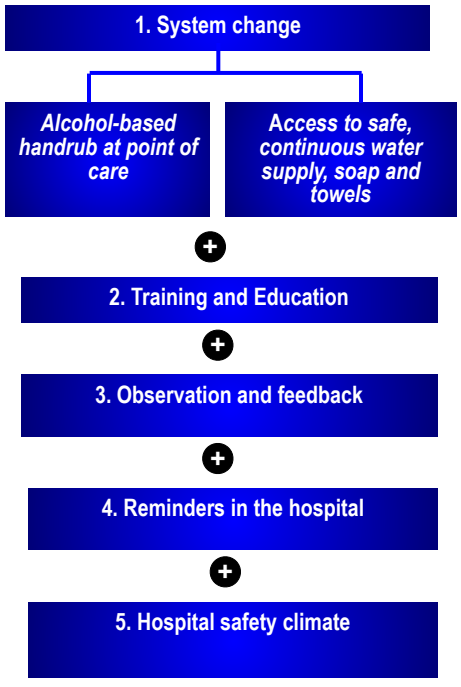
- Hand hygiene



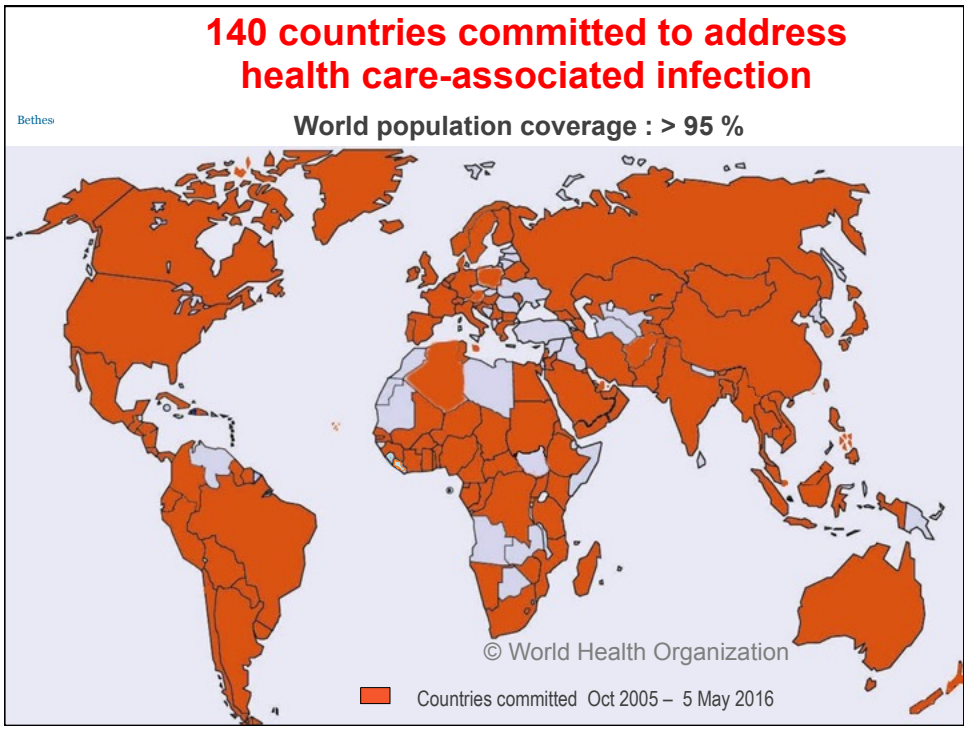
- The 5 core components of the WHO Multimodal Hand Hygiene Improvement Strategy




World Alliance for Patient Safety
World Health Organization
Clean Care is Safer Care
1st GLOBAL PATIENT SAFETY CHALLENGE
Clean Care is Safer Care
To reduce
health care-associated infections
Hand hygiene as the cornerstone


Launch of the
1st Global Patient Safety Challenge
WHO HQ, 13 October 2005

Latest Innovations in Infection Prevention and Control
Prof. Didier Pittet, University of Geneva Hospitals and Faculty of Medicine
Broadcast live from the 2016 conference of the Australasian College of Infection Prevention and Control



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Implementation
toolkit


Universal – WHO Essential Medicines List
Clean Care
is Safer Care
World Alliance for Patient Safety

Allegranzi B. et al. Lancet Infectious Diseases, 2013; Aug 22

Global implementation of WHO's multimodal strategy for improvement of hand hygiene: a quasi-experimental study

Benedetta Allegranzi, Angèle Gayet-Ageron, Nizam Damani, Loséni Bengaly, Mary-Louise McLaws, Maria-Luisa Moro, Ziad Memish, Orlando Urroz, Hervé Richet, Julie Storr, Liam Donaldson, Didier Pittet

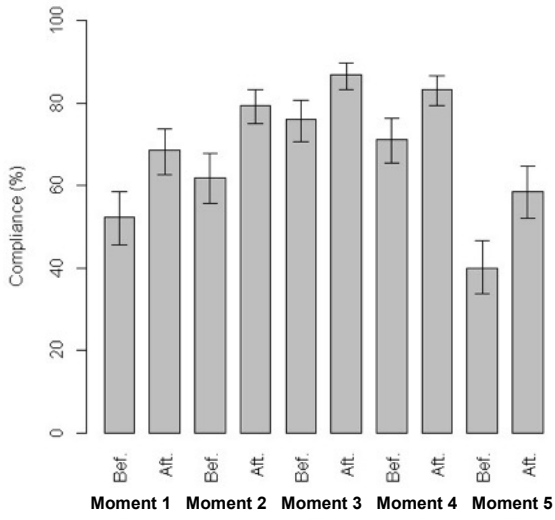
Summary

Background Health-care-associated infections are a major threat to patient safety worldwide. Transmission is mainly via the hands of health-care workers, but compliance with recommendations is usually low and effective improvement strategies are needed. We assessed the effect of WHO's strategy for improvement of hand hygiene in five countries.

Methods We did a quasi-experimental study between December, 2006, and December, 2008, at six pilot sites (55 departments in 43 hospitals) in Costa Rica, Italy, Mali, Pakistan, and Saudi Arabia. A step-wise approach in four 3–6 month phases was used to implement WHO's strategy and we assessed the hand-hygiene compliance of health-care workers and their knowledge, by questionnaire, of microbial transmission and hand-hygiene principles. We expressed compliance as the proportion of predefined opportunities met by hand-hygiene actions (ie, handwashing or hand rubbing). We assessed long-term sustainability of core strategy activities in April, 2010.

Findings We noted 21884 hand-hygiene opportunities during 1423 sessions before the intervention and 23746 opportunities during 1784 sessions after. Overall compliance increased from 51·0% before the intervention (95% CI 45·1–56·9) to 67·2% after (61·8–72·2). Compliance was independently associated with gross national

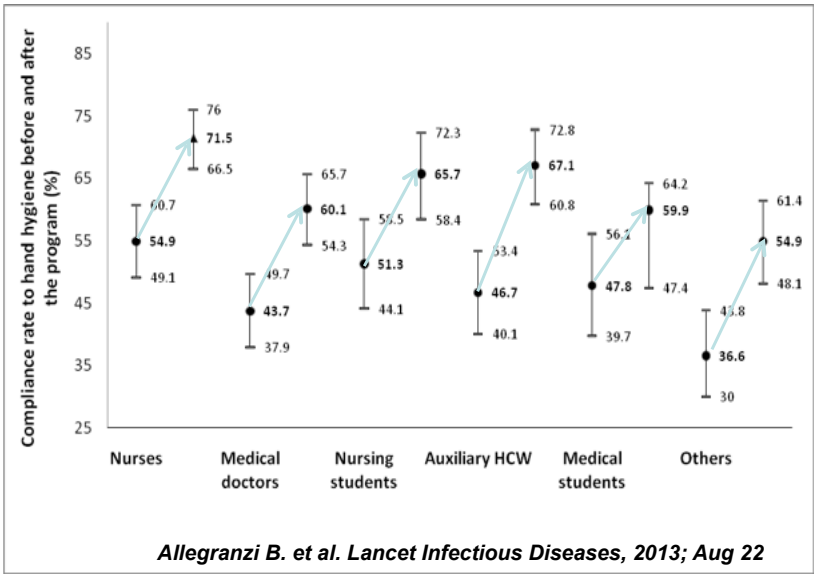
Hand hygiene compliance by indication before and after strategy implementation



Overall compliance improved:
from 51% to 67%

Allegranzi B. et al. Lancet Infectious Diseases, 2013; Aug 22

Hand hygiene compliance rates before and after the implementation by professional categories



Allegranzi B. et al. Lancet Infectious Diseases, 2013; Aug 22

Adoption and adaptation of *Clean Care is Safer Care* worldwide

Latest Innovations in Infection Prevention and Control
Prof. Didier Pittet, University of Geneva Hospitals and Faculty of Medicine
Broadcast live from the 2016 conference of the Australasian College of Infection Prevention and Control

Comparative efficacy of interventions to promote hand hygiene in hospital: systematic review and network meta-analysis

Nantasit Luangasanatip,[1,2] Maliwan Hongsuwan,[1] Direk Limmathurotsakul,[1,3] Yoel Lubell,[1,4] Andie S Lee,[5,6] Stephan Harbarth,[5] Nicholas P J Day,[1,4] Nicholas Graves,[2,7] Ben S Cooper[1,4]

BMJ 2015;351:h3728

ABSTRACT

OBJECTIVE
To evaluate the relative efficacy of the World Health Organization 2005 campaign (WHO-5) and other interventions to promote hand hygiene among healthcare workers in hospital settings and to summarize associated information on use of resources.

DESIGN
Systematic review and network meta-analysis.

DATA SOURCES
Medline, Embase, CINAHL, NHS Economic Evaluation Database, NHS Centre for Reviews and Dissemination, Cochrane Library, and the EPOC register (December 2009 to February 2014); studies selected by the same search terms in previous systematic reviews (1980-2009).

REVIEW METHODS
Included studies were randomised controlled trials

RESULTS
Of 3639 studies retrieved, 41 met the inclusion criteria (six randomised controlled trials, 32 interrupted time series, one non-randomised trial, and two controlled before-after studies). Meta-analysis of two randomised controlled trials showed the addition of goal setting to WHO-5 was associated with improved compliance (pooled odds ratio 1.35, 95% confidence interval 1.04 to 1.76; I^2=81%). Of 22 pairwise comparisons from interrupted time series, 18 showed stepwise increases in compliance with hand hygiene, and all but four showed a trend for increasing compliance after the intervention. Network meta-analysis indicated considerable uncertainty in the relative effectiveness of interventions, but nonetheless provided evidence that WHO-5 is effective and that compliance can be further improved by adding interventions including goal setting, reward incentives, and accountability. Nineteen studies reported clinical outcomes; data

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Infection Control and Quality Healthcare in the New Millenium

Are there new lessons to be learned ?

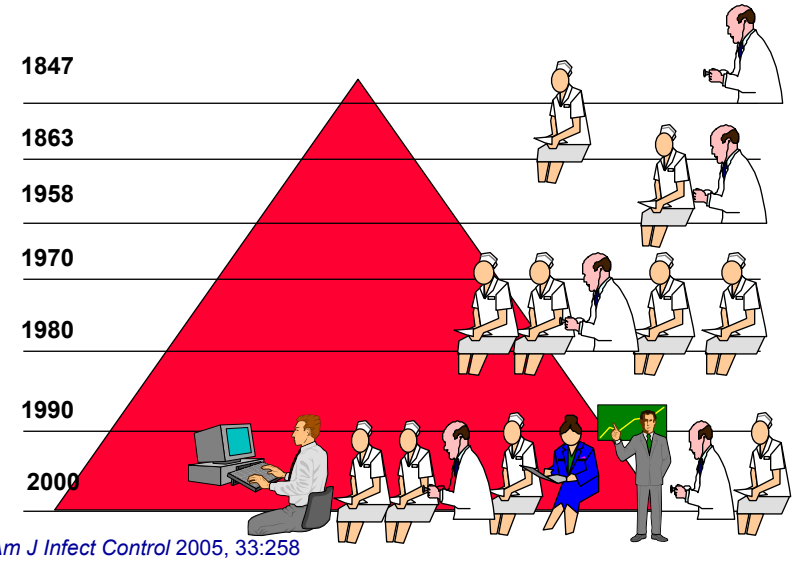
Implementation of multidisciplinary, multimodal strategies

Recognize
Explain
Act

Pittet D, *Am J Infect Control* 2005, 33:258

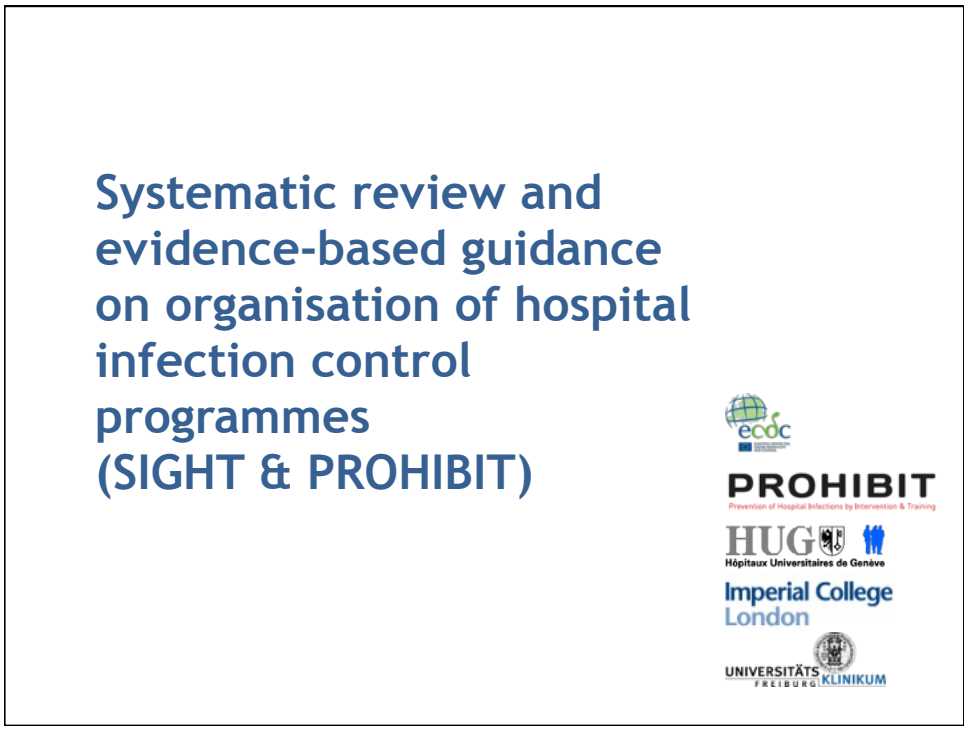
Infection Control and Quality Healthcare in the New Millenium

Multidisciplinary team approach



Pittet D, *Am J Infect Control* 2005, 33:258


Infection Control and Quality H
um
Multidisciplin
Multiple-task activities
Multiple partners
Multidisciplinary team
approaches
Multimodal strategies
including social-behavioral
sciences
Pittet D, Am J In
05, 33:258


Systematic review and
evidence-based guidance
on organisation of hospital
infection control
programmes
(SIGHT & PROHIBIT)
ecdc
PROHIBIT
HUG
Hôpitaux Universitaires de Genève
Imperial College
London
UNIVERSITÄTS KLINIKUM
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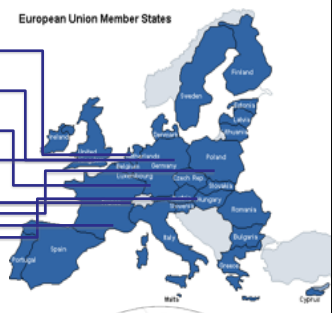
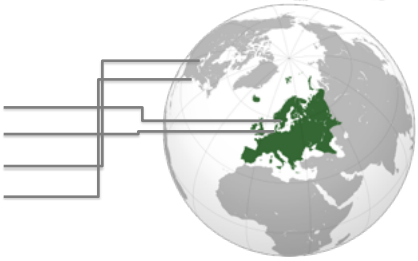
University of Geneva	UniGE	Geneva, Switzerland
Rijksinstituut voor Volksgezondheid en Mileu	RIVM	Bilthoven, Netherlands
Charité Universitätsmedizin	CUB	Berlin, Germany
Universitätsklinikum Freiburg	UKL-FR	Freiburg, Germany
Imperial College London	ICL	London, UK
World Health Organization	WHO	Geneva, Switzerland
Jagiellonian Medical College	JUMC	Krakow, Poland
Orszagos Epidemiologai Központ	NCE	Budapest, Hungary
Centre Hospitalier Régional de Marseille	APHM	Marseille, France



Collaborations

European Centres for Disease Control	ECDC
Universitair Medisch Centrum Groningen	UMCG
University of Michigan Ann Arbor, USA	UMich
Johns Hopkins School of Public Health, Baltimore, USA	JHSP



Systematic review and evidence-based guidance on organization of hospital infection control programmes (SIGHT)

Objective: to identify the most effective and generally applicable elements of hospital infection prevention and control programmes to support the broadest possible implementation across Europe

	Key components	Indicators
1	An effective infection control programme in an acute care hospital must include at least: one full-time specifically trained IC-nurse ≤ 250 beds; a dedicated physician trained infection control; microbiological support; data management support	• Detailed infection control activities: number of ongoing surveillance and prevention programmes, outbreaks, number of performed audits • Established infection control: appropriate staffing, IC committee in place, defined goals for IC, identified IC budget, IC on the agenda of the hospital administration, defined outbreak management, vaccination programmes for health-care workers
2	To make sure that the ward occupancy does not exceed the capacity for which it is designed and staffed; staffing and workload of frontline health-care workers must be adapted to acuity of care; and the number of pool/agency nurses and physicians minimized	• Average bed occupancy at midnight • Average staffing of frontline workers • Average proportion of pool/agency professionals
3	Sufficient availability of and easy access to material and equipment and optimized ergonomics	• Alcohol-based handrub at the point of care • Sinks stocked with soap and single-use towels
4	Use of guidelines in combination with practical education and training	• Guidelines locally adapted • Number of new staff trained using the local guidelines • Teaching programmes are based on local guidelines
5	Education and training involves frontline staff, and is team- and task-oriented	• Audit of education and training programmes • Results of knowledge tests and competency assessments
6	Organizing audits as a standardized (scored) and systematic review of practice with timely feedback	• Number of audits (overall, and stratified by departments/units and topics) for specified time period
7	Participating in prospective surveillance and offering active feedback, preferably as part of a network	• Participation of (inter-) national surveillance initiatives • Number and type of wards with a surveillance • Regular review of the feedback strategy
8	Implementing infection control programmes follow a multimodal strategy including tools such as bundles and checklists developed by multidisciplinary teams and taking into account local conditions	• Verification that established prevention programmes follow a multimodal strategy • Process indicators: hand hygiene compliance, compliance with medical/care procedures by checklists, compliance with cleaning/disinfection procedures • Outcome indicators: standardized rates for HAI, infections with MDROs, transmission of MDROs
9	Identifying and engaging champions in the promotion of a multimodal intervention strategy	• Interviews with frontline staff and infection control professionals
10	A positive organizational culture by fostering working relationships and communication across units and staff groups	• Questionnaires about work satisfaction • Crisis management • Human resource indicators: absenteeism, health-ca[illegible]

Zingg W. *Lancet Infect Dis*. 2015;15:212

The ECDC "SIGHT"- Project

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1	An effective infection control programme in an acute care hospital must include at least: one full-time specifically trained IC-nurse ≤ 250 beds; a dedicated physician trained infection control; microbiological support; data management support	• Detailed infection control activities: number of ongoing surveillance and prevention programmes, outbreaks, number of performed audits • Established infection control: appropriate staffing, IC committee in place, defined goals for IC, identified IC budget, IC on the agenda of the hospital administration, defined outbreak management, vaccination programmes for health-care workers
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Zingg W. *Lancet Infect Dis*. 2015;15:212

Development of multimodal strategies and tools

Implementing infection control programmes follow a **multimodal strategy** including tools such as bundles and checklists developed by **multidisciplinary** teams and taking into account **local conditions**

Evidence	2
Ease of implementation	3
EU-wide applicability	3

Zingg W. *Lancet Infect Dis.* 2015;15:212

The ECDC "SIGHT"-Project

4	Use of guidelines in combination with practical education and training
5	Education and training involves frontline staff, and is team- and task-oriented
6	Organizing audits as a standardized (scored) and systematic review of practice with timely feedback
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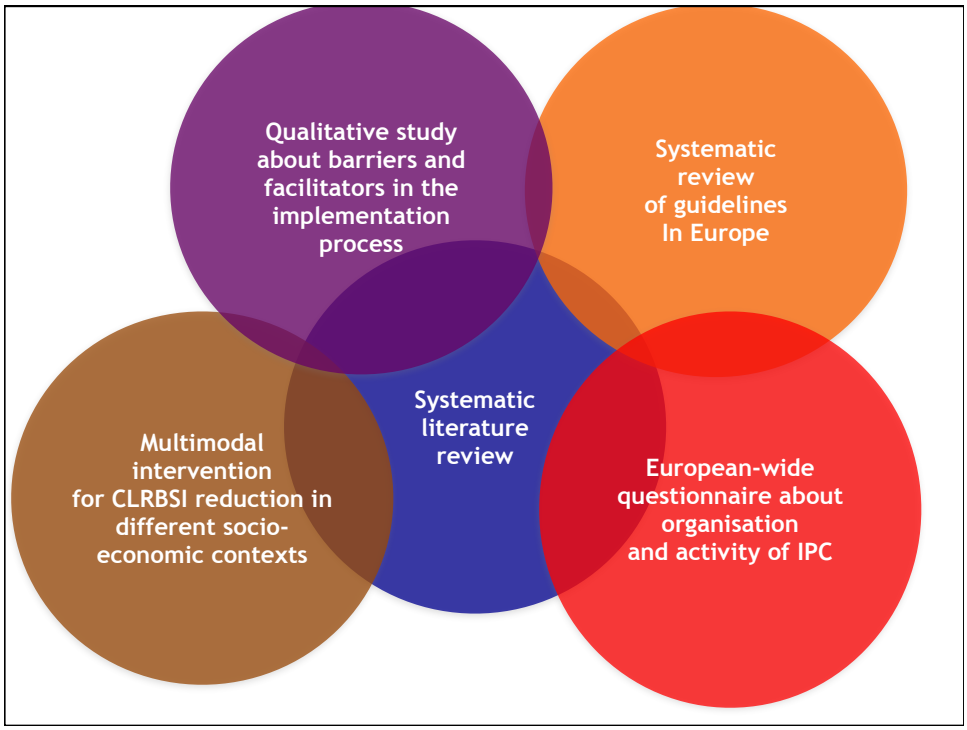
Zingg W. *Lancet Infect Dis.* 2015;15:212

Prevention of hospital infection by intervention and training

(PROHIBIT)

Objective: to provide a global perspective of IPC activities in Europe on several levels:
-availability of published guidelines and recommendations
-management and organisation of infection control
-capacity of hospitals to implement a multimodal intervention programme
-identification of barriers and facilitators in implementing IPC programmes (in European hospitals)

PROHIBIT
Prevention of Hospital Infections by Intervention & Training



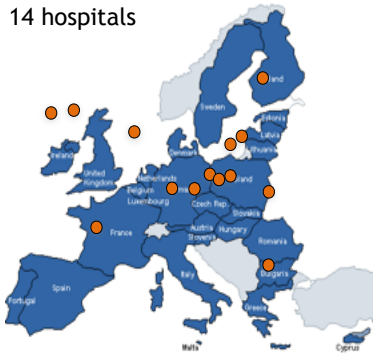
Randomized controlled trial

Stepped-wedge randomization; 1/2011 – 6/2013

Multimodal strategy to reduce catheter-related bloodstream infections in ICU

Compare "catheter bundles" / hand hygiene promotion / both together
Train-the-trainer method based on a successful Geneva model

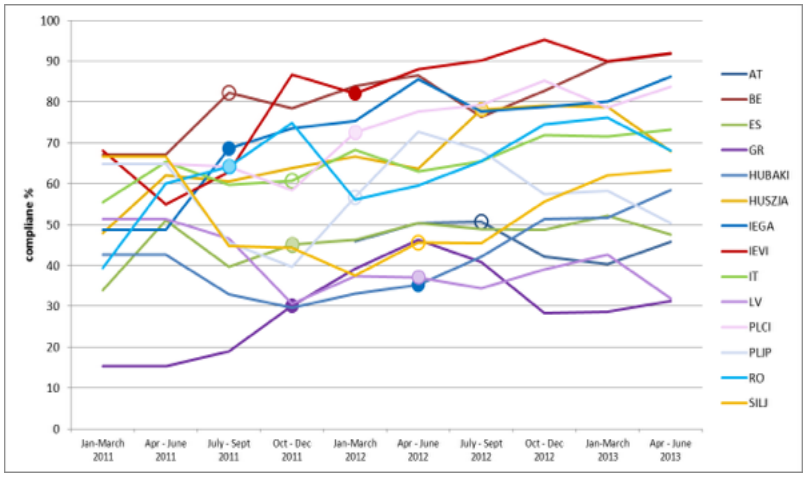
14 hospitals



Zingg. *PLOS One* 2014;9:e93898

PROHIBIT
Prevention of Hospital Infections by Intervention & Training

The intervention study required weekly audits of hand hygiene and catheter insertion – Results were fed back on a regular basis



59122 HH opportunities for HH were observed in 6749 sessions

PROHIBIT
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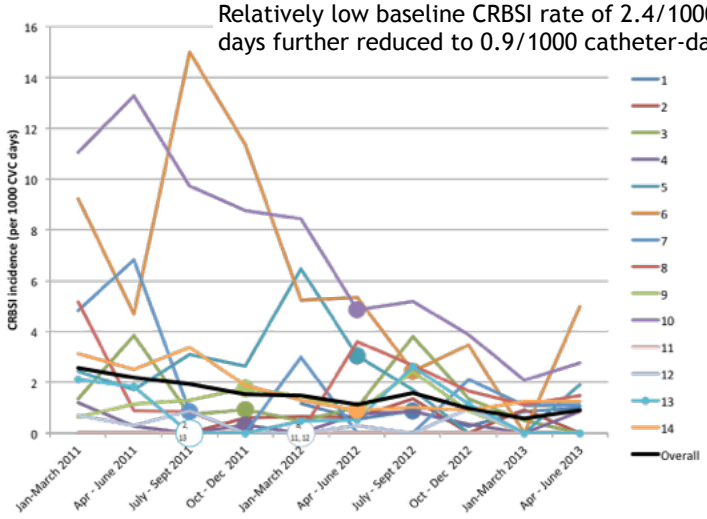
Quarterly CRBSI incidence densities per hospital

Relatively low baseline CRBSI rate of 2.4/1000 catheter-days further reduced to 0.9/1000 catheter-days



The dots indicate the start of the intervention.

PROHIBIT
Prevention of Hospital Infections by Intervention & Training

Multimodal strategy to reduce catheter-related bloodstream infections in ICU

Intervention	Hazard ratio	95% CI
Hand hygiene alone	0.49	0.26-0.92
CVC bundle alone	0.63	0.38-1.06
Both interventions	0.49	0.30-0.81

PROHIBIT
Prevention of Hospital Infections by Intervention & Training

SUMMARY

Key components for effective ICP/strategies identified by SIGHT address a coordinated interplay between infrastructure, hospital policies, the presence of qualified professionals in adequate number, administrative support, and a positive organisational culture

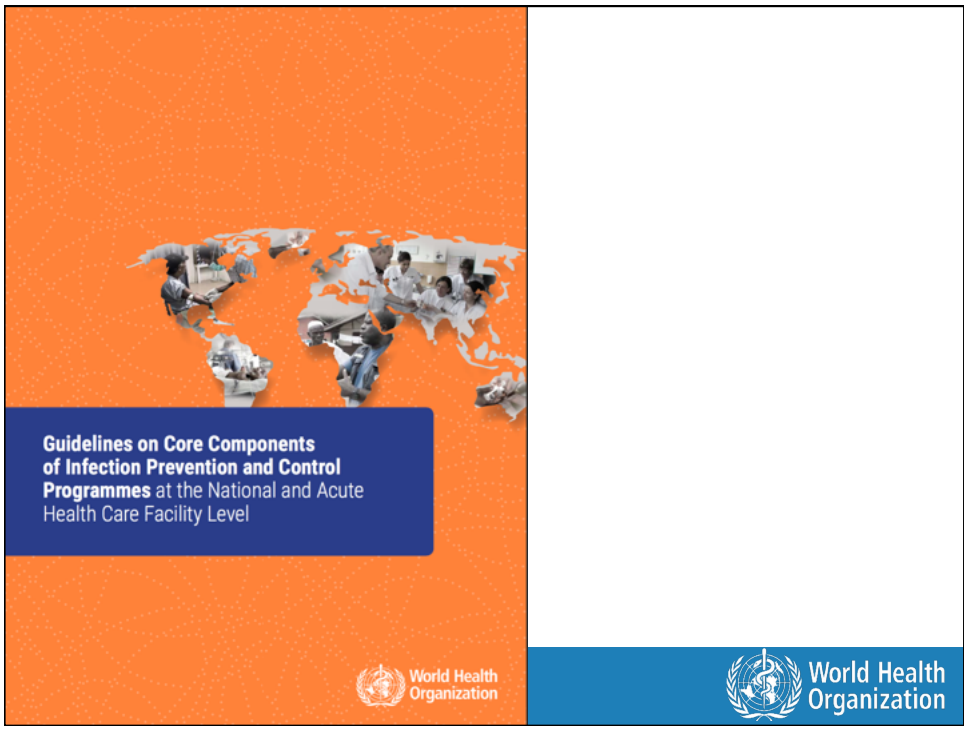
Zingg W et al. *Lancet Infect Dis.* 2015;15:212

The results of PROHIBIT reflect the evidence-based key components of the SIGHT project and provide further evidence for the support of effective ICP interventions (in the context European hospitals)

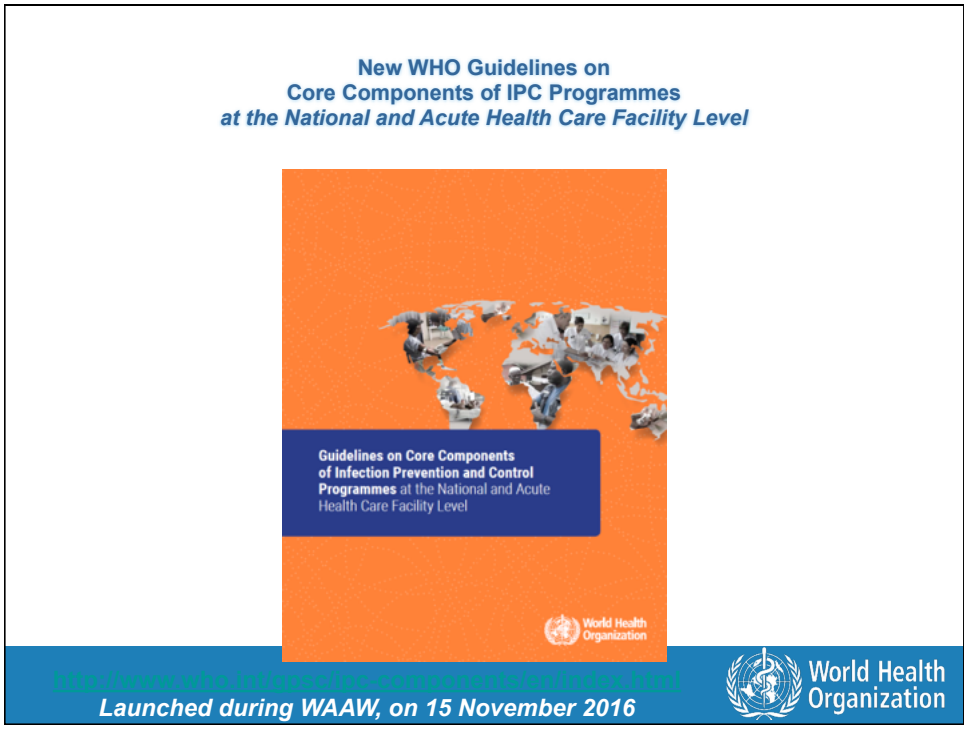
Zingg W et al. *ECCMID & Microbes* 2016

ecdc

PROHIBIT
Prevention of Hospital Infections by Intervention & Training



Latest Innovations in Infection Prevention and Control
Prof. Didier Pittet, University of Geneva Hospitals and Faculty of Medicine
Broadcast live from the 2016 conference of the Australasian College of Infection Prevention and Control



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9 Dimensions

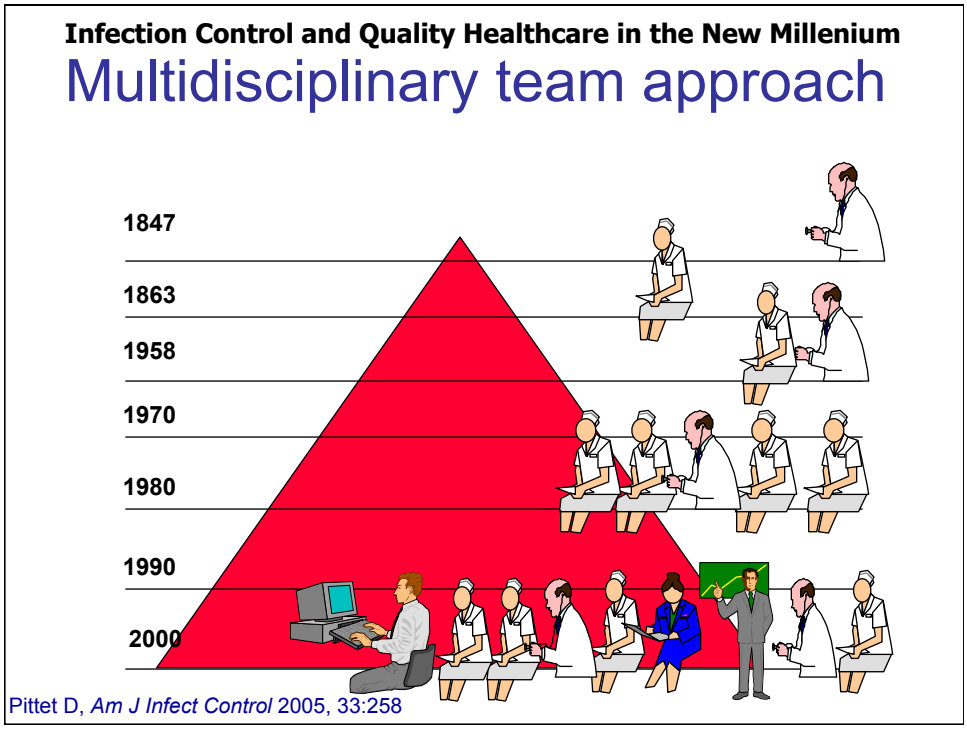
#	Thematic Area	Description
1	Organization & Structure	Organizational and structural arrangements Access to IPC professionals and role of mgmt
2	Surveillance	Targets and methods of HAI surveillance, outbreak management and role of feedback
3	Education and training	Methods and effectiveness of educating and training HCWs
4	Behaviour change strategies	Multimodal/bundle strategies
5	Standard and transmission based precautions	Effectiveness of local policies and resources for standard and transmission based isolation strategies
6	Auditing	Process of auditing
7	Patient participation	Patient empowerment and involvement
8	Target setting	Setting targets or goals
9	Knowledge management	Range of strategies to identify, create and distribute information and data within and out of an institution

New WHO core components for IPC programmes

- **8 Core components**
- 11 evidence based recommendations
- 3 good practice statements

R= recommendation; GPS: good practice statement

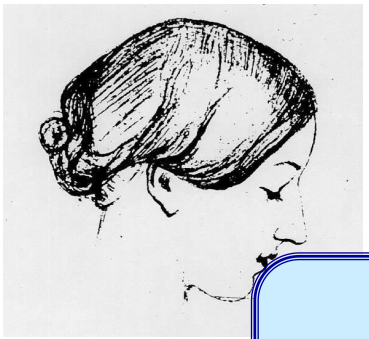
World Health Organization


Infection Control and Quality Healthcare in the New Millenium
Multidisciplinary team approach
1847
1863
1958
1970
1980
1990
2000
Pittet D, Am J Infect Control 2005, 33:258

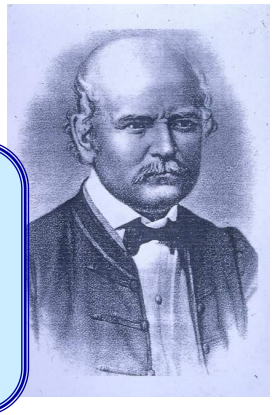

Multiple-task activities
Multiple partners
Multidisciplinary team approaches
Multimodal strategies including social-behavioral sciences

Infection Control and Quality Healthcare in the New Millenium

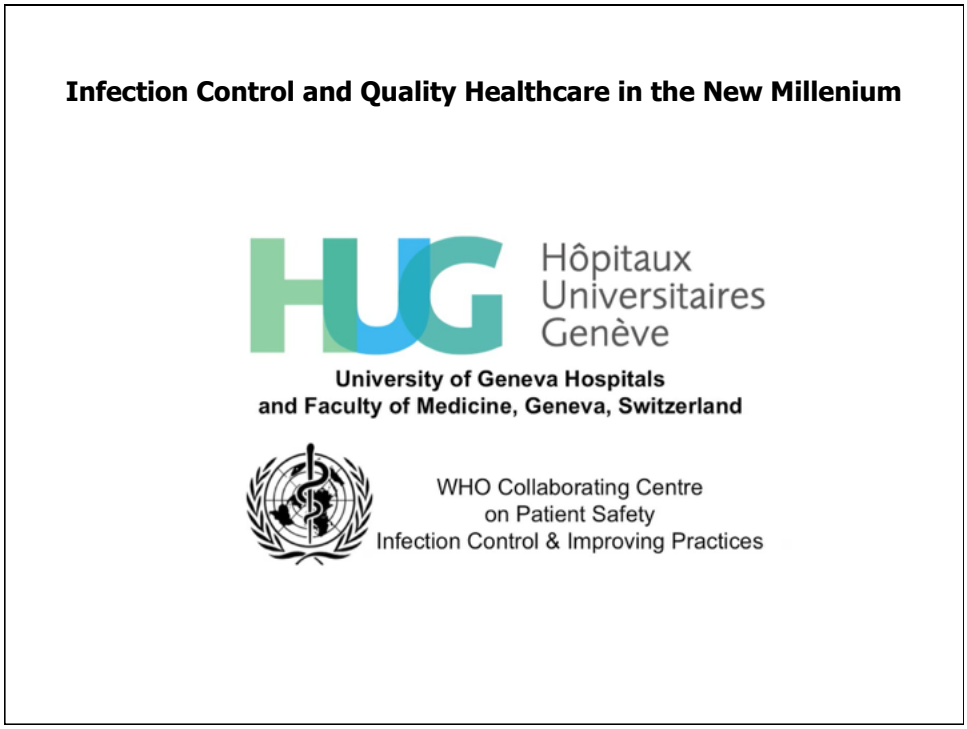
Are there lessons to be learned ?



Today,
Let's Teach and
Learn the Science
of Implementation



Pittet D, *Am J Infect Control* 2005, 33:258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Prof. Andreas Voss, Radboud University Medical Centre, The Netherlands

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