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

Latest Innovations in Infection Prevention and Control

Professor Didier Pittet, MD, MS,
Infection Control Programme
WHO Collaborating Centre on Patient Safety
University of Geneva Hospitals and Faculty of Medicine, Switzerland

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& African Partnerships for Patient Safety programmes,
World Health Organization (WHO) Health Service Delivery & Safety

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November 22, 2016

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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 strategy

• 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
Data use and effectiveness in electronic surveillance of healthcare associated infections in the 21st century: a systematic review

Jeroen S de Bruin, Walter Seeling, Christian Schuh

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 (HAI)s 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. Trends

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.

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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.

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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 respond 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

at least 0.5 million each day in hospitals only
The very first requirement in a hospital is that it should do the sick no harm.
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Ignaz Philipp Semmelweis

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Maternal mortality rates,
First and Second Obstetric Clinics,
GENERAL HOSPITAL OF VIENNA, 1841-1850

Semmelweis IP, 1861

Autopsy room

1. BEFORE TOUCHING A PATIENT
2. BEFORE CLEAR / APTIX PROCESSING
3. AFTER BODY TRANSPORT EXPOSURE
4. AFTER TOUCHING A PATIENT
5. AFTER TOUCHING PATIENT SURROUNDINGS

Hand

Ward 1

Ward 2

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Early times of infection control

1847

1863

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Infection Control and Quality Healthcare in the New Millenium
Are there lessons to be learned?

Recognize
Explain
Act


Does infection control control infections?

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SENIC study
Study on the Efficacy of Nosocomial Infection Control


Relative change in NI in a 5 year period (1970-1975)

Without infection control

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>Relative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRTI</td>
<td>-27%</td>
</tr>
<tr>
<td>SSI</td>
<td>-35%</td>
</tr>
<tr>
<td>UTI</td>
<td>-31%</td>
</tr>
<tr>
<td>BSI</td>
<td>-35%</td>
</tr>
<tr>
<td>Total</td>
<td>-32%</td>
</tr>
</tbody>
</table>

With infection control

-50%

SENIC
Study on the Efficacy of Nosocomial Infection Control

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

Approach to infection control

1847
1863
1958
1970
1980

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

1st principle of infection prevention


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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1st principle of infection prevention


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- Surveillance of surgical procedures
- Hand hygiene and standard precautions

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

<table>
<thead>
<tr>
<th>UTI</th>
<th>Pre-intervention period (n=280)</th>
<th>Post-intervention period (n=259)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N ID*</td>
<td>N ID*</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>35 27.0</td>
<td>13 12.0</td>
<td>0.44 (0.24-0.81)</td>
</tr>
<tr>
<td>Orthopedic surgery</td>
<td>Intervention group</td>
<td>29 45.8</td>
<td>10 18.6</td>
</tr>
<tr>
<td>Digestive surgery</td>
<td>Control group</td>
<td>6 9.0</td>
<td>3 5.6</td>
</tr>
</tbody>
</table>

* ID: episodes per 1000 catheter-days


- Incidence density of UTI decreased by 60% after orthopedic surgery following a multimodal intervention.
- Results were maintained after 2 years.
- Fewer indwelling urinary catheters placed in the operating room.
- Decrease UTI antibiotic-related consumption.

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


ABSTRACT


- 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


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RESULTS
• UTI rates per 1000 UC days decreased by 14% between baseline and intervention
• Subgroup analysis:
  Use of UC was reduced in non-ICUs, but not in ICUs; rates of UTIs were reduced in non-ICUs only

CONCLUSIONS
A national, multifaceted intervention programme reduced the rates of UTIs in hospitals (non significant in ICUs)


1st principle of infection prevention

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
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

University of Geneva Hospitals

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Education-based, multimodal prevention strategy of CRI

Eggimann and Pittet Sepsis Monitor 2000

Prevention of vascular access line infection
Medical intensive care unit

Incidence density
episodes/1’000 patient-days

1996 1997

11.3 9.2 8.2

3.8* -67% primary BSI
3.3* -68% clinical sepsis
2.6* -63% microbiologically doc. BSI
1.2* -64% insertion site infection

1997. reduction

* P < 0.05


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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
**Efficacy of multimodal intervention strategies:**

<table>
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<th>Baseline</th>
<th>Intervention</th>
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<tbody>
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<td>Eggimann</td>
<td>3.1/1000 catheter-days</td>
<td>1.2/1000 catheter-days</td>
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<tr>
<td><em>Lancet 2000</em></td>
<td><em>Ann Intern Med 2005</em></td>
<td></td>
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<tr>
<td>Pronovost</td>
<td>7.7/1000 catheter-days</td>
<td>1.4/1000 catheter-days</td>
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<tr>
<td><em>NEJM 2006</em></td>
<td></td>
<td></td>
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<tr>
<td>Zingg</td>
<td>3.1/1000 catheter-days</td>
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<td><em>Crit Care Med 2009</em></td>
<td></td>
<td></td>
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*mean pooled CRBSI-episodes per 1'000 catheter-days

Eggimann P. *Lancet* 2000; 35: 290
Zingg W. *Crit Care Med* 2009; 37: 2167

**Could we do better?**
Chlorhexidine-gluconate impregnated dressings decreased major catheter-related infections:

Control dressings

ChG dressings

Cumulative Risk

Catheter-days

1.40 per 1000 catheter-days

0.60 per 1000 catheter-days

HR = 0.39; p=0.03

Timsit JF. JAMA 2009; 301: 1231

Efficacy of multimodal intervention strategies:

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</tr>
<tr>
<td>Timsit</td>
<td>1.4/1000 catheter-days</td>
<td>0.6/1000 catheter-days</td>
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<tr>
<td>Mimoz</td>
<td>1.75/1000 catheter-day</td>
<td>0.28/1000 catheter-days</td>
</tr>
</tbody>
</table>

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

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

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**Could we do even better?**

... and hospital-wide?
Zingg et al. – Geneva

Multidisciplinary task force
Anesthesiology, infection control, board of nursing

Physicians
Simulator training workshops

Education strategy, training tools

Nurses
Modular E-learning program

Zingg. PLOS One, 2014

Implementation

Preparation  Baseline  Training

Physician training: tools  Nurse training: modular E-learning program

Surveillance

2007  2008  2009  2010  2011

Workshops for physicians
Training for nurses
Adoption by school of nursing

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

Line cart

Comprehensive insertion kit

Zingg. PLOS One. In press

Simulator training

Half day training course
- Interactive theoretical lecture
- Simulation based practice on a
- Videotape review

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"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

Zingg, PLOS One, 2014

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Prevention of vascular access line infection

A multimodal and multidisciplinary strategy

1st principle of infection prevention


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

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## 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 antibiotic treatment
- Sedation

---

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

Lila Bouadma, MD; Bruno Mourvillier, MD; Veronique Deiler, RN; Bertrand Le Corre, RN; Isabelle Lelom, 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 30-45°
10. Maintain tracheal tube cuff pressures to prevent regurgitation
11. Avoid gastric overdistension
12. Promote enteral feeding
13. Careful blood sugar control in patients with diabetes
14. SDD in selected cases

A multimodal and multidisciplinary strategy

1st principle of infection prevention


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

• Use and care of urinary catheters
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Summary: Relative SSI reduction

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</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>38%</td>
<td>27%</td>
<td>18%</td>
<td>13%</td>
<td>38%</td>
<td>41%</td>
<td>25%</td>
<td>58%</td>
<td>no data</td>
</tr>
</tbody>
</table>

A multimodal and multidisciplinary 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

Mark L. Schweizer, PhD; Hsuk Yen Chiang, MS; PhD; Edward Sepkowitz, MD; Julia Mooney, MS; Barbara Braun, PhD; Joanne Hofner, RN, MS; Melissa A. Ward, MS; Jason Hicklin, MBA, RN; EF H. Paravincini, MD, MS; Daniel J. Deska, MD, CHPL, LMT; M. J. Richards, RJ, CHPL, LMT; Joseph E. Cavanaugh, PhD; Jonathan B. Perlis, MO, PhD; Lauren A. Herwaldt, MO

**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).

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

Figure 2. Bundled Intervention Adherence by Month During the Intervention Period (N=14316 Operations)

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WHO 5 May 2016
Let’s follow the patient’s journey in surgery

www.tinyurl.com/5momentsSurgery

313 000 000 individuals require surgical procedures every year

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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:
@etho 6,458
@DidierPittet 2,194
@HanySawat 893
@yggynast 684
@Hospitalex 640
@hosplax_unige 128
@flicom 120
@flicom 113
@flicom 93
@flicom 83

Top 10 by Tweets:
@etho 8,769
@DidierPittet 6,322
@HanySawat 2,825
@Hospitalex 2,257
@yggynast 2,000
@Hospitalex 1,545
@flicom 1,315
@flicom 1,207
@flicom 1,074
@flicom 83

Top 10 by Impressions:
@etho 54,759,993
@DidierPittet 16,688
@HanySawat 6,640
@Hospitalex 930
@yggynast 93
@Hospitalex 83

The Numbers:
97,759,993 Impressions
16,688 Tweets
6,640 Participants
930 Ag Mentions
83 Tweet Mentions

#safesurgicalhands analysis for time period 04/02/2016 00:00 to 06/16/2016 00:00 | Pacific Time | GMT 0700 | change time period

Global reach # SafeSurgicalHands

Global Guidelines for the Prevention of Surgical Site Infection
Launched 3 November 2016

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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
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Recommendations and much more

General recommendations

- 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

What can you do now?
1st principle of infection prevention


at least 35-50% of all nosocomial infections are associated with 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
Compliance < 40%

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

1. System change
2. Training and Education
3. Observation and feedback
4. Reminders in the hospital
5. Hospital safety climate

Alcohol-based handrub at point of care
Access to safe, continuous water supply, soap and towels
1st GLOBAL PATIENT SAFETY CHALLENGE

To reduce health care-associated infections
Hand hygiene as the cornerstone

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

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140 countries committed to address health care-associated infection

World population coverage: > 95%

© World Health Organization

Countries committed Oct 2005 – 5 May 2016

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Implementation toolkit

Universal – WHO Essential Medicines List

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

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, Malta, Pakistan, and Saudi Arabia. A stepwise 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, 2019.

Findings We noted 21884 hand-hygiene opportunities during 1433 sessions before the intervention and 21746 opportunities during 1784 sessions after. Overall compliance increased from 51.0% before the intervention (95% CI 45.1–56.9) to 67.2% after (61.8–72.9). Compliance was independently associated with gross national income per head, with a greater effect of the intervention in low-income and middle-income countries.

Hand hygiene compliance by indication before and after strategy implementation

Overall compliance improved: from 51% to 67%
Hand hygiene compliance rates before and after the implementation by professional categories

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

Adoption and adaptation of Clean Care is Safer Care worldwide

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

Nantasit Luangsananapit,1,2 Maliwan Hongsuwan,1 Direk Limmathurotsakul,1,3 Yoel Lubell,1,4 Andie S Lee,5,6 Stephan Harbarth,7 Nicholas P J Day,1,4 Nicholas Graves,2,7 Ben S Cooper1,4

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; I²=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 synthesis was not possible.

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.
Infection Control and Quality Healthcare in the New Millenium

Are there new lessons to be learned?

**Implementation of multidisciplinary, multimodal strategies**

Recognize
Explain
Act


Infection Control and Quality Healthcare in the New Millenium

**Multidisciplinary team approach**


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Infection Control and Quality Healthcare in the New Millennium

Multidisciplinary team approaches
Multimodal strategies including social-behavioral sciences

Multiple-task activities
Multiple partners

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

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

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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
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<table>
<thead>
<tr>
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<td>1 An effective infection control programme in an acute care hospital must include at least one full-time specifically trained Infection Control Nurse (ICN) ≥ 250 beds; a dedicated physician trained infection control microbiological support; data management support</td>
<td>- Detailed infection control activities; number of ongoing surveillance and prevention programmes; outcomes; number of sentinel sites. - Established infection control; appropriate staff; ICN in place. - Audited infection control; medical isolation procedures; outbreak intervention; infection control; team capacity; training. - Equipment and supply management; vaccination programmes for healthcare workers</td>
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<td>2 To make sure that the ward occupancy does not exceed the capacity for which it is designed and staffed; staffing and workload of front line healthcare workers must be adapted to meet the needs of care; and the number of public health nurses and physicians minimized</td>
<td>- Average bed occupancy at midnight. - Average staffing of frontline nurses. - Average proportion of public health professionals</td>
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<td>- A stock-based inventory at the point of care. - Time and work in front-line activities</td>
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<td>4 Use of guidelines in combination with practical education and training</td>
<td>- Guidelines adapted. - Number of new staff trained using the local guidelines. - Teaching programmes are based on local guidelines.</td>
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<td>5 Education and training involves frontline staff, and is team- and task-oriented</td>
<td>- Audit of adherence and training programmes. - Results of knowledge tests and competency assessments.</td>
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<td>6 Organizing audits as a standardized (scored) and systematic review of practice with timely feedback</td>
<td>- Random audit; evaluated by the point of care. - Random audits; evaluated by departments and topics for specific time period.</td>
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<td>7 Participating in prospective surveillance and offering active feedback, preferably as part of a network</td>
<td>- Participation in international surveillance initiatives. - Number of bedside audits with a surveillance. - Regular review of the feedback strategy.</td>
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<td>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</td>
<td>- Verification that established infection prevention programmes follow a multimodal strategy. - Proactive indicators: hand hygiene compliance; compliance with guidelines/protocols; compliance with infection prevention procedures. - Outcomes: hand hygiene compliance, hand hygiene compliance with guidelines/protocols, compliance with infection prevention procedures.</td>
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<td>- Questionnaires about work satisfaction. - Cross-management. - Human resource indicators: absenteeism, turnover.</td>
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Zingg W. Lancet Infect Dis. 2015;15:212

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The ECDC “SIGHT” - Project

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

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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.

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

Use of guidelines in combination with practical education and training

The ECDC “SIGHT”-Project

1. Education and training involves frontline staff, and is team- and task-oriented
2. Organizing audits as a standardized (scored) and systematic review of practice with timely feedback
3. Participating in prospective surveillance and offering active feedback, preferably as part of a network
4. 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
5. Identifying and engaging champions in the promotion of a multimodal intervention strategy
6. A positive organizational culture by fostering working relationships and communication across units and staff groups

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

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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)
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Randomized controlled trial

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

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

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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.

---

**Multimodal strategy to reduce catheter-related bloodstream infections in ICU**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Hazard ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene alone</td>
<td>0.49</td>
<td>0.26-0.92</td>
</tr>
<tr>
<td>CVC bundle alone</td>
<td>0.63</td>
<td>0.38-1.06</td>
</tr>
<tr>
<td>Both interventions</td>
<td>0.49</td>
<td>0.30-0.81</td>
</tr>
</tbody>
</table>

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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.


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
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New WHO Guidelines on Core Components of IPC Programmes at the National and Acute Health Care Facility Level

Launched during WAAW, on 15 November 2016

Background supporting the recommendations

A Systematic Literature Review on Core Components for Infection Prevention and Control (IPC) Programmes at the National Level

Core elements of effective infection prevention and control programmes in acute health care facilities: a systematic review (update of the SIGHT review)

Country experiences and lessons learned

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9 Dimensions

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

New WHO core components for IPC programmes

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

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Infection Control and Quality Healthcare in the New Millennium
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

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**Involve patients**
**Innovate**
**Advise on Governance**

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Are there lessons to be learned?

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4th ICPIC, 20-23 June 2017, Geneva, Switzerland

www.icpic.com

Semmelweis at ICPIC

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Prof. Jerry H. Kavouras, University of Illinois at Chicago

December 15 (FREE Teleclass)
INFECTION CONTROL IN ELDERLY CARE INSTITUTIONS – WHERE SHOULD WE GO?
Prof. Andreas Voss, Radboud University Medical Centre, The Netherlands

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