Translating recommendations into practice – effective implementation strategies and tools across settings with different levels of resources

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WHO Infection Prevention and Control
Global Unit

Protecting patient and health worker lives across the world through excellence in infection prevention and control
Infection prevention and control

Surgical site infections

Surgical site infections (SSIs) occur following surgery, in the part of the body where the surgery took place, and are the most common type of health care-associated infection. The bacteria which cause SSIs can be resistant to commonly-used antibiotics and therefore threaten the lives of millions of patients every year. Ensuring that a range of preventive measures are in place will help stop the spread of germs, antibiotic resistance and reduce SSIs. The key measures include: appropriate skin disinfection before incision, ensuring that all surgical equipment is sterile, maintaining asepsis in the operating room, appropriate and timely antibiotic prophylaxis and the right surgical hand scrub.

Global WHO Guidelines for the Prevention of Surgical Site Infections

Health care-associated infections

10%
1 in 10 patients get an infection while receiving care.

Surgical site infections

50%
More than 50% of surgical site infections can be antibiotic-resistant.

Impact of infection prevention and control

30%
Effective infection prevention and control reduces health care-associated infections by at least 30%.

http://who.int/infection-prevention/en/
WHO global guidelines for SSI prevention

Decontamination and Reprocessing of Medical Devices for Health Care Facilities

GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION

Surgical site infections 1
New WHO recommendations on preoperative measures for surgical site infection prevention: an evidence-based global perspective

Introduction: Healthcare-associated infections are avoidable infections that often result in millions of people with poor health outcomes. Following a systematic review of the literature, the Centers for Disease Control and Prevention (CDC) estimated that 85% of all healthcare-associated infections (HAIs) are preventable. WHO recognizes the importance of preventing these infections and has developed guidelines for the prevention of surgical site infections (SSIs).

Methods: The WHO guidelines for the prevention of SSI are based on a systematic review of the literature and evidence-based recommendations. The guidelines are intended to provide recommendations for the prevention of SSI in surgical procedures, with a focus on reducing the risk of infection and improving patient outcomes.

Conclusion: The WHO guidelines for the prevention of SSI are intended to provide healthcare professionals with evidence-based recommendations for the prevention of SSI. By implementing these guidelines, healthcare providers can reduce the risk of SSI and improve patient outcomes.

Launched on 3 November 2016

WHO SSI Prevention Guidelines

- 27 systematic reviews & meta-analysis
- 29 recommendations on 23 topics
- 30 core chapters

Key updates on:
- Timing & duration of surgical ATB prophylaxis
- ATB use with drains
- S. aureus carriers’ decolonization
- Glucose control
- Normovolemia
- Oxygenation
- Wound irrigation
- Antimicrobial sutures & A LOT MORE....

Abstracts presented at 26th ECCMID, Amsterdam 2016
The Lancet Infectious Diseases & official launch, 3 November 2016

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SSI prevention throughout the patient journey

WHAT'S THE SOLUTION?
A range of precautions - **before, during and after surgery** - reduces the risk of infection

**BEFORE SURGERY**
- Ensure patients bathe or shower
- Do not shave patients
- Only use antibiotics when recommended
- Use chlorhexidine alcohol-based antiseptic solutions to prepare skin
- Surgical scrub technique: hand wash or alcohol-based handrub

**DURING SURGERY**
- Limit the number of people and doors being opened
- Ensure all surgical equipment is sterile and maintain asepsis throughout surgery

**AFTER SURGERY**
- Do not continue antibiotics to prevent infection - this is unnecessary and contributes to the spread of antibiotic resistance
- Check wounds for infection and use standard dressings on primary wounds

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## WHO Recommendations for SSI Prevention for the Preoperative Period

<table>
<thead>
<tr>
<th>Prevention Strategies</th>
<th>Measures</th>
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<tbody>
<tr>
<td>Carriers' decolonisation with mupirocin</td>
<td>MBP &amp; use of oral antibiotics</td>
</tr>
<tr>
<td>MBP &amp; use of oral antibiotics</td>
<td>Hair removal</td>
</tr>
<tr>
<td>Hair removal</td>
<td>SAP optimal timing</td>
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<tr>
<td>SAP optimal timing</td>
<td>Surgical hand preparation</td>
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<td>Surgical hand preparation</td>
<td>Surgical site skin preparation</td>
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<td>Surgical site skin preparation</td>
<td>Perioperative immunosuppressive agents</td>
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<td>Perioperative immunosuppressive agents</td>
<td>Enhanced nutritional support</td>
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<tr>
<td>Enhanced nutritional support</td>
<td>Preoperative bathing</td>
</tr>
<tr>
<td>Preoperative bathing</td>
<td>Antimicrobial skin sealants</td>
</tr>
</tbody>
</table>

**SAP**: surgical antibiotic prophylaxis

[Link to the WHO guidelines](http://who.int/infection-prevention/publications/ssi-guidelines/en/)

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WHO Recommendations for SSI Prevention for the Intraoperative Period

- Perioperative oxygenation
- Normothermia
- Normovolemia
- Glucose control
- Drapes and gowns
- Wound protection devices
- Incisional wound irrigation
- Prophylactic negative pressure wound therapy
- Antimicrobial-coated sutures
- Laminar flow

Launched on 3 November 2016
WHO Recommendations for SSI Prevention for the Postoperative Period

- Surgical antibiotic prophylaxis prolongation
- Advanced dressing
- Antimicrobial prophylaxis in presence of a drain

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Implementation of IPC best practices

- Standards, innovation & adaptation
- Enabling environment & patient safety culture
- Focus on LMICs

Guidelines

Implementation strategies & tools → Behavioural change

IPC measures

Enabling environment → Impact at the point of care
Patient safety culture

Operational research

Adapted interventions → Evidence for low-resource settings
Science of implementation

- Focuses on providing practical ways for health care workers to deliver evidence-based practice
- Facilitates local uptake and plans put into place with maximum effect
- Addresses technical and cultural aspects of translating evidence into practice
- Targets multiple levels of stakeholders, including administrators and clinicians
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Foundations for the WHO implementation strategy

- **Systematic Review** on Implementation for SSI Prevention & analysis of existing guides/toolkits

- **WHO proven multimodal improvement strategy**

- **Lessons learned** from many regions/countries (patient safety, safe surgery, SUSP approach)
What is the WHO Multimodal Hand Hygiene Improvement Strategy?

Based on the evidence and recommendations from the WHO Guidelines on Hand Hygiene in Health Care (2009), made up of 5 core components, to improve hand hygiene in healthcare settings.

ONE System change
Alcohol-based handrubs at point of care and access to safe continuous water supply, soap and towels.

TWO Training and education
Providing regular training to all health-care workers.

THREE Evaluation and feedback
Monitoring hand hygiene practices, infrastructure, perceptions, & knowledge, while providing results feedback to health-care workers.

FOUR Reminders in the workplace
Prompting and reminding health-care workers.

FIVE Institutional safety climate
Individual active participation, institutional support, patient participation.
WHO Core Components for effective IPC programmes
A multimodal strategy comprises several elements or components (3 or more; usually 5) implemented in an integrated way with the aim of improving an outcome and changing behaviour. It includes tools, such as bundles and checklists, developed by multidisciplinary teams that take into account local conditions.

- The 5 most common components: (i) system change (availability of the appropriate infrastructure and supplies to enable IPC recommendations implementation); (ii) education and training of health care workers and key players; (iii) monitoring infrastructures, practices, processes, outcomes and providing data feedback; (iv) reminders in the workplace/communications; and (v) culture change within the establishment or the strengthening of a safety climate.

National level: national IPC programmes should coordinate and facilitate the implementation of IPC activities through multimodal strategies on a nationwide or subnational level.

Facility level: IPC activities using multimodal strategies should be implemented to improve practices and reduce HAI and AMR.
Mapping two implementation strategies

Critical point: implementation, whatever way you look at it, means that there are key elements for success, whatever these elements are called – these two strategies are similar and have demonstrated success.

1. WHO HAND HYGIENE MULTIMODAL IMPROVEMENT STRATEGY & The 4 E's: An action-oriented implementation model (Pronovost et al)
In other words...

1. Build it
   (system change)

2. Teach it
   (training & education)

3. Check it
   (monitoring & feedback)

4. Sell it
   (Reminders & communications)

5. Live it
   (culture change)
A WHO implementation framework

The approach includes five steps to be undertaken sequentially:

Step 1: facility preparedness – readiness for action
Step 2: baseline evaluation – establishing knowledge of the current situation
Step 3: implementation – introducing the improvement activities
Step 4: follow-up evaluation – evaluating the implementation impact
Step 5: ongoing planning and review cycle – developing a plan for the next 5 years (minimum)

The overall aim is to embed hand hygiene as an integral part of the culture in the health-care facility.

The overall aim is to embed SSI evidence based recommendations as an integral part of the culture in the health care facility on the continuum of the surgical patient’s journey

Based on the WHO Guide to Implementation http://www.who.int/gpsc/5may/Guide_to_Implementation.pdf
SSI prevention throughout the patient journey

**WHAT'S THE SOLUTION?**

A range of precautions - **before, during and after surgery** - reduces the risk of infection

**BEFORE SURGERY**
- Ensure patients bathe or shower
- Do not shave patients
- Only use antibiotics when recommended
- Use chlorhexidine alcohol-based antiseptic solutions to prepare skin
- Surgical scrub technique; hand wash or alcohol-based handrub

**DURING SURGERY**
- Limit the number of people and doors being opened
- Ensure all surgical equipment is sterile and maintain asepsis throughout surgery

**AFTER SURGERY**
- Do not continue antibiotics to prevent infection - this is unnecessary and contributes to the spread of antibiotic resistance
- Check wounds for infection and use standard dressings on primary wounds
Multidisciplinary team

- Surgical team: OR, ward, and outpatient services
- Infection prevention & control
- Anaesthetists
- Sterilization services
- Pharmacists
- Senior managers
- Trainers
Example: surgical hand preparation

Appropriate (right product, technique & duration) surgical hand preparation is vitally important to maintain the least possible contamination of the surgical field, especially in the event of sterile glove puncture during the procedure.

**Recommendation:**

*Surgical hand preparation should be performed either by scrubbing with a suitable antimicrobial soap and water or using a suitable alcohol-based hand rub before donning sterile gloves*
## Example implementation tools - surgical hand preparation

<table>
<thead>
<tr>
<th>System change</th>
<th>Education and Training</th>
<th>Monitoring and feedback</th>
<th>Reminders in the workplace</th>
<th>Organisational safety climate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABHR formulation</td>
<td>Slidesets – featuring technical content and how to implement/change</td>
<td>Surveillance protocol and monitoring forms</td>
<td>How to handrub poster</td>
<td>Adapative/culture tools</td>
</tr>
<tr>
<td>ABHR tolerability and acceptability tools</td>
<td>Surgical hand prep poster(s)</td>
<td>HH observation tools and technical reference manual</td>
<td>How to handwash poster</td>
<td>Patient engagement tools</td>
</tr>
<tr>
<td>Example procurement guide for resources needed to meet recommendations</td>
<td>Publications list</td>
<td>Safer surgery checklist</td>
<td>Surgical scrub technique posters</td>
<td>SSI burden poster</td>
</tr>
<tr>
<td>Core Components for IPC</td>
<td>FAQs</td>
<td>Infrastructure/human factors surveys/observation tools</td>
<td>Surgical journey infographic</td>
<td>C-suite engagement tools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Moments for hand hygiene/interventions posters</td>
<td>Grand round example talking points</td>
<td>How to deal with difficult behaviour Q&amp;A</td>
</tr>
</tbody>
</table>
System Change: WHO FORMULATIONS for surgical hand preparation

Formulation I

Final concentrations: ethanol 80% v/v, glycerol 1.45% v/v, hydrogen peroxide (H2O2) 0.125% v/v.

Ingredients:
1. ethanol 96% v/v, 833.3 ml
2. H2O2 3%, 41.7 ml
3. glycerol 98%, 14.5 ml
4. Top up the flask to 1000 ml with distilled water or boiled water

Formulation II

Final concentrations: isopropyl alcohol 75% v/v, glycerol 1.45% v/v, hydrogen peroxide 0.125% v/v.

Ingredients:
1. isopropyl alcohol (with a purity of 99.8%), 751.5 ml
2. H2O2 3%, 41.7 ml
3. glycerol 98%, 14.5 ml
4. Top up the flask to 1000 ml with distilled water or boiled water
STOP INFECTIONS
AFTER SURGERY

WHAT'S THE PROBLEM?

Patients develop infections when bacteria get into incisions made during surgery. These affect patients in both...

LOW- AND MIDDLE-INCOME COUNTRIES

More than 1 in 10 people who have surgery in low- and middle-income countries (LMICs) get surgical site infections (SSIs)

People's risk of SSI in LMICs is 3 to 5 times higher than in high-income countries

Up to 1 in 5 women in Africa who deliver their baby by caesarean section get a wound infection

SSIs can be caused by bacteria that are resistant to commonly-used antibiotics

HIGH-INCOME COUNTRIES

In Europe, SSIs affect more than 500,000 people per year costing up to €19 billion

Around 1% of people who have surgery in the USA get an SSI

In the USA, SSIs contribute to patients spending more than 400,000 extra days in hospital, costing US$10 billion per year

SSIs threaten the lives of millions of surgical patients each year and contribute to the spread of antibiotic resistance

World Health Organization

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**Surgical Handrubbing Technique**

- Handwash with soap and water on arrival to OR, after having donned theatre clothing (cap/hat/bonnet and mask).
- Use 60% alcohol-based handrub (ABHR) as prelude for surgical hand preparation, by carefully following the technique illustrated in Images 1 to 17, before every surgical procedure.
- If any residual hair or biological fluids are present when gloves are removed following the operation, handwash with soap and water.

Images 1-7: Spread the hands on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (15-30 seconds).

Repeat steps 1-7 for the left hand and forearm.

Images 8-11: Put approximately 5ml (5 doses) of ABHR in the palm of your left hand as illustrated, or rub both hands at the same time up to the wrists, following all signs in images 12-17 (20-30 seconds).

Cover the whole surface of the hands up to the wrist with ABHR, rubbing palm against palm with a rotating movement.

Rub the back of the left hand, including the wrist, moving the right palm back and forth, and vice versa.

Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement.

When the hands are dry, sterile surgical clothing and gloves can be donned.

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Surgical Handrubbing Technique

- Handwash with soap and water on arrival to OR, after having donned theatre clothing (cap/hat/bonnet and mask).
- Use an alcohol-based handrub (ABHR) product for surgical hand preparation, by carefully following the technique illustrated in Images 1 to 17, before every surgical procedure.
- If any residual talc or biological fluids are present when gloves are removed following the operation, handwash with soap and water.

Images 3-7: Smear the handrub on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds).
**My 5 Moments for Hand Hygiene**

Focus on caring for a patient with a post-operative wound

**1. BEFORE TOUCHING A PATIENT**

Before touching a patient

**2. BEFORE INITIATING A Procedure**

Before initiating a procedure

**3. AFTER WOUND EXPOSURE Risk**

After wound exposure risk

**4. AFTER TOUCHING A PATIENT**

After touching a patient

**5. AFTER TOUCHING PATIENT SURROUNDINGS**

After touching patient surroundings

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**Key additional considerations for post-operative wounds**

- Avoid unnecessary touching of the post-operative wound site, including by the patient.
- Wear gloves if contact with body fluids is anticipated, the need for hand hygiene does not change even if gloves are worn, as per the WHO 5 Moments.
- Follow local procedures when performing post-operative wound care or any required dressing changes or wound procedures.
- Don’t touch dressings for at least 48 hours after surgery, unless leakage or other complications occur.
- Routine post-operative wound dressings should be thick dressings (e.g., absorbent or low adherence dressings).
- When approaching a patient for the examination of a wound, the healthcare worker may also perform other tasks (e.g., accessing a urinary catheter, drawing blood samples, checking urinary catheter), Hand hygiene may be needed before and after these specific tasks, to once again fulfill Moments 1 and 3, for example (refer to WHO dedicated 5 Moments posters for line or catheter management).
- When indicated, pre-operative surgical antibiotic prophylaxis (SAP) should be administered as a single-parented dose 2 hours or less before the surgical incision, while continuing the half-life of the antibiotic. Do not delay surgery.
- Antibiotic therapy for any proven surgical site infection would ideally be administered based on wound site culture and sensitivity results.
- Symptom signs and symptoms of wound infection: pain or tenderness, localized swelling, erythema, heat, or purulent drainage from the superficial incision.
- This guidance does not include information on complicated post-operative wound care, when specific treatments or therapies may be required.

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SAVE LIVES
CLEAN YOUR HANDS
### Evaluation and feedback

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation</strong></td>
<td>Feedback on surgical procedures, patient care, and hospital processes.</td>
</tr>
</tbody>
</table>

#### Peri-operative form

<table>
<thead>
<tr>
<th>Field</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>John Doe</td>
</tr>
<tr>
<td>Age</td>
<td>35</td>
</tr>
<tr>
<td>Surgery Type</td>
<td>General</td>
</tr>
</tbody>
</table>

#### Post-operative form

<table>
<thead>
<tr>
<th>Day</th>
<th>Event (Box 1)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation</td>
<td>Procedures</td>
</tr>
</tbody>
</table>

**Box 1:** Relevant post-op events should include:
- All patient reviews (IP/OP/Aftercare)
- Discharge from hospital
- Prescription of antibiotics
- Reanimation to hospital
- Return to theater
- Reported occurrence from elsewhere
- Patient death or serious cause

**Box 2:** Important symptoms for SSI:
- Drains or fluid from wound
- Wound discharge from hospital
- Pain or tenderness (pyschotic, bloody/other)
- Severe pain/bleeding/heat of skin
- Wound breakdown
- Generally unwell, esp. fever >38°C

**Wound complications**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial SSI</td>
<td>(skin/sub-cut)</td>
</tr>
</tbody>
</table>

**Microbiology:**

- *S. aureus*
- *E. coli*

**Date forms completed:**

- Computer input: 12/03/2023
- Signature: John Doe

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Reminders and communications: Integration of IPC actions in the flow of patient care

HAND HYGIENE AND THE SURGICAL PATIENT JOURNEY

- 313M people undergo surgery every year - which is the number of babies born in the world
- 61% of health workers do not clean their hands at the right moments
- Hand hygiene reduces the risk of surgical site infection
- Hand hygiene reduces the risk of patient colonization with germs
- Hand hygiene supports safe surgical care

Moments for Hand Hygiene

- Surgery Site Preparation
- 3-20 days after surgery
- Post-op recovery
- 24-48 hours after discharge
- Dressing removal
- 3-20 days after surgery
- Patient safety discharged

Refer to WHO 5 Moments for Hand Hygiene material for further guidance:
www.who.int/gpsc/5mom

#SAFESURGICALHANDS
SAVE LIVES CLEAN YOUR HANDS

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Reminders and communications

See your hands
Hand hygiene supports safe surgical care

Surgical patients are IN your hands. See what's ON your hands. Practice hand hygiene for surgical patients from admission to discharge.

#SafeSurgicalHands
Save lives. Clean your hands.
Culture change: leaders’ engagement
Foundations for the WHO implementation strategy

- Systematic Review on Implementation for SSI Prevention & analysis of existing guides/toolkits
- WHO proven multimodal improvement strategy
- Lessons learned from many regions/countries (patient safety, safe surgery, SUSP approach)
Technical Work

Evidence-based interventions

Adaptive Work

Safety culture
## Patient Safety Culture Approach

### Comprehensive Unit-based Safety Program (CUSP)

1. Educate staff on science of safety
2. Identify defects
3. Assign executive to adopt unit
4. Learn from one defect per quarter
5. Implement teamwork tools

### Translating Evidence Into Practice (TRiP)

1. Summarize the evidence in a checklist.
   - Clean your hands, clean skin with alcohol-based chlorhexidine, avoid femoral site, use barrier precautions, ask daily if you need the catheter
2. Identify local barriers to implementation
3. Measure performance
4. Ensure all patients get the evidence
   - Engage
   - Educate
   - Execute
   - Evaluate

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*Berenholtz SM et al, CCM 2004*
*Pronovost P et al, NEJM 2006*
*Pronovost P et al, BMJ 2010*
*Pronovost P et al, AJMQ 2015*
The Surgical Unit-based Safety Program (SUSP) approach

Patient safety culture improvement (CUSP):
- Science of safety education
- Staff safety assessment
  - Leadership
  - Learning from defects
- Team work & communications

+ Infection prevention best practices identified according to local staff assessment

Improvement of the patient safety climate

Reduction of:
- Surgical site infections
- Surgical complications
SUSP cohorts in USA and Africa

IPC MEASURES - USA
- Pre-op bathing
- Mechanical bowel preparation & oral antibiotics
- Glucose control
- Surgical site skin preparation
- Antibiotic prophylaxis

IPC MEASURES - AFRICA
- Pre-op bathing
- Hair removal
- Surgical hand preparation
- Alcohol-based skin prep
- OR Discipline
- Antibiotic prophylaxis

195 Hospitals

5 Hospitals
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## SUSP Africa – Why it worked
### Qualitative evaluation

### Facilitators
- Influential and motivated individuals (surgeon, anaesthetist, nursing champions, data collector and manager)
- Sense of ownership
- Involving a wide range of stakeholders
- Concrete leadership support
- Boundary spanners
- Peer-to-peer and inter-institution learning
- Implementation fitness
- Regular and timely feedback

### Barriers
- Organisational ‘constipators’
- Significant workload
- Difficulty building the trust of staff in the institution
- Staff turnover
- Absence of patient safety culture
Lessons learned and conclusions

- Use multimodal strategies (not just checklists & bundles)
- Have a step-wise action plan
- Map recommendations acc to surgical patient journey
- Empower teams and involve front-line staff
- Engage leadership
- Let teams take the lead on adaptation
- Catalyze collective and individual ownership
- Use data to create awareness
- Award teams and work with a safety culture spirit
New WHO SSI prevention implementation strategy and toolkit

http://www.icpic.com/about-icpic/
5 May 2017

- Health workers
- Hospital CEO & Administrators
- Policy-makers
- IPC leaders

THANK YOU!!!

WHO Infection Prevention and Control
Global Unit

Learn more at: http://who.int/infection-prevention/en/