The core components of infection prevention and control programs: from guidelines to implementation in real life

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Why IPC is so important for patient outcomes

- Effective IPC programmes lead to more than a 30% reduction in HAI rates.
- Surveillance contributes to a 25-57% reduction in HAIs.
- Improving hand hygiene practices may reduce pathogen transmission in healthcare by 50%.
- Strong IPC plans, implemented across the USA between 2008 and 2014, reduced central line-associated bloodstream infections by 50%, surgical site infections (SSIs) by 17% and MRSA bacteraemia by 13%.

- MRSA declined by 56% over a four-year period in England in line with a national target.
- A safety culture and prevention programme reduced SSI risk in African hospitals by 44%.
- Between 2010 and 2015 Australia achieved and sustained 80% hand hygiene compliance in hospitals nationwide.

http://www.who.int/infection-prevention/en/
THE ROLE OF INFECTION PREVENTION AND CONTROL IN PREVENTING ANTIBIOTIC RESISTANCE IN HEALTH CARE

- On average, 1 in every 10 patients is affected by health care-associated infections (HAIs)
- Antibiotic-resistant HAIs can double or more, the likelihood of death
- Over 50% of surgical site infections can be resistant to antibiotics

Effective infection prevention and control (IPC) and water, sanitation and hygiene (WASH) stops the spread of antibiotic-resistant organisms

IPC and WASH in health care protects patients and health workers from avoidable infections

The building blocks of IPC and WASH in health care facilities are:
- effective hygiene practices, including hand hygiene
- core components of IPC programmes
- a clean, well-functioning environment and equipment

This leads to:
- less spread of antibiotic-resistant organisms
- a reduced need for antibiotics

Every infection prevented is an antibiotic treatment avoided
- Play your role in controlling antibiotic resistance!
- Ensure IPC programmes are in place and champion IPC practices

IPC saves millions of lives every year


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http://www.who.int/infection-prevention-en/
• **58.4%**: national IPC programme or operational plan and national IPC guidelines
• **14.9%**: compliance and effectiveness evaluated and reported
WHO Guidelines on Core Components of IPC Programmes at the National and Acute Health Care Facility Level

Focus on preventing HAIs and combating AMR

• http://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/
• Zingg W et al. TLID 2015
• Storr J et al. ARIC 2017
• Presley L et al. TLID 2017

Guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level

Review

Effectiveness of national and subnational infection prevention and control interventions in high-income and upper-middle-income countries: a systematic review


Zingg W et al. TLID 2015

Storr J et al. ARIC 2017

Presley L et al. TLID 2017

WHO core components for effective IPC programmes

- 8 Core components
  - 8 Facility level
  - 6 National level
- 11 evidence*-based recommendations
- 3 good practice statements

* Evidence from LMICs:
  - 7 high-quality studies
  - 22 lower quality

R= recommendation; GPS: good practice statement
Core component 1: IPC programmes

An IPC programme with a dedicated, trained team should be in place in each acute health care facility for the purpose of preventing HAI and combating AMR through IPC good practices.

Stand-alone, active national IPC programmes with clearly defined objectives, functions and activities for the purpose of preventing HAI and combating AMR through IPC good practices should be established. National IPC programmes should be linked to other relevant national programmes and professional organizations.

Evidence from 2 studies shows that IPC programmes including dedicated, trained professionals are effective in reducing HAIs in acute care facilities.

- Clearly defined objectives, functions and annual action plans
- Dedicated, trained IPC professionals (1 IPO/250 beds) & multidisciplinary team
- Budget & support from the senior management leadership
- Good quality microbiological laboratory
Critical linkages with other programmes

- Waste management
- TB/HIV
- Surveillance
- Hep B/C
- AMR
- Community engagement
- Occupational health
- WASH
- Patient Safety / Quality
- Media
- Policies & guidelines
- IPC

World Health Organization
Evidence-based guidelines should be developed and implemented for the purpose of reducing HAI and AMR. Education and training of relevant health care workers on guideline recommendations and monitoring of adherence with guideline recommendations should be undertaken to achieve successful implementation.

Evidence from 6 studies shows that guidelines on the most important IPC good practices and procedures implemented in combination with health care workers’ education and training are effective to reduce HAI.

- **Expertise** required
- **Local prioritization**
- Providing **resources for implementation**
- **HCWs education** on recommended practices
- **Monitoring** implementation
The basic set of IPC guidelines should include the following:

- **Standard precautions** (see core component 1)
- **Transmission-based precautions**, including patient identification, placement and the use of personal protective equipment.
- Aseptic technique for **invasive procedures** (including surgery) and **device management** for clinical procedures, according to the scope and type of care delivered at the facility level.
- **Specific guidelines** to prevent the most prevalent HAIs (for example, catheter-associated urinary tract infection, SSI, central line-associated bloodstream infection, ventilator-associated pneumonia) depending on the context and complexity of care.
Recent WHO IPC global guidelines

http://www.who.int/infection-prevention/en/
Core component 3: IPC education & training

At the facility level IPC education should be in place for all health care workers by utilizing team- and task-based strategies that are participatory and include bedside and simulation training to reduce the risk of HAI and AMR.

The national IPC programme should support education and training of the health workforce as one of its core functions.

Evidence (15 studies at facility level) shows that IPC education that involves frontline health care workers in a practical, hands-on approach and incorporates individual experiences is associated with decreased HAI and increased hand hygiene compliance.

- Pre-graduate, post-graduate, in-service training
- Evaluations of training impact
- Collaboration with local academic institutions and professional organizations
WHO IPC Training Package

- Leadership and IPC program management
- Prevention of urinary tract infections
- Prevention of catheter-associated bloodstream infections
- Prevention of respiratory tract infections
- Prevention of surgical site infections
- Reprocessing of medical devices
- Outbreak management in healthcare settings
- IPC to control antibiotic resistance
- HAI surveillance
- Injection safety

- Slides deck
- Trainer’s manual
- Student’s handbook
- Videos
- E-learning module
Core component 4: HAI surveillance

Evidence (13 studies at facility level, 1 at national level) shows that HAI surveillance leads to a decrease in HAI (including central line-associated bloodstream infections, ventilator-associated pneumonia, SSI, catheter-related urinary tract infections and catheter-related bloodstream infections), and that timely feedback of results is influential in the implementation of effective IPC actions.

- Budget, leadership support and linkages to other surveillances and health information systems needed
- Standardized definitions, appropriate methods, good quality laboratory support, quality control needed
- Training and expertise needed
- Timely reporting and use of data to plan IPC are crucial
New protocol for surgical site infection surveillance based on SUSP testing

http://www.who.int/infection-prevention/tools/surgical/SSI-surveillance-protocol.pdf?ua=1
Core component 5: Multimodal strategies

Evidence (44 studies at facility, 14 at national level) shows that implementing IPC activities at facility level using multimodal strategies is effective to improve IPC practices and reduce HAI (particularly hand hygiene compliance, central line-associated bloodstream infections, ventilator-associated pneumonia, infections caused by MRSA and C. difficile).

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 key approach for IPC implementation**

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## The Five Components of the WHO multimodal hand hygiene improvement strategy

1. **1a. System change – alcohol-based handrub at point of care**
2. **1b. System change – access to safe, continuous water supply, soap and towels**
3. **2. Training and education**
4. **3. Evaluation and feedback**
5. **4. Reminders in the workplace**
6. **5. Institutional safety climate**

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**In other words, the WHO multimodal improvement strategy addresses these five areas:**

1. **1. Build it (system change)**
   - What infrastructure, equipment, supplies and other resources (including humans) are required to implement the intervention?
   - Does the physical environment influence how workers behave?
   - How can organisational and human factor approaches facilitate adoption of the intervention?
   - Are certain types of health workers needed to implement the intervention?
   - Practical example: when implementing hand hygiene interventions, ease of access to handrub at the point of care and the availability of WHO infrastructure (including water and soap) are important considerations. Are these available, affordable and easily accessible in the workplace? If not, action is needed.

2. **2. Teach it (training & education)**
   - Who needs to be trained? What type of training should be used to ensure the intervention will be implemented in line with evidence-based policies and how frequently?
   - Does the facility have trainers, training aids, and the necessary equipment?
   - Practical example: when implementing injection safety interventions, literacy training of those responsible for administering safe injections, including nurses and community workers, is an important consideration, as are adequate disposal methods.

3. **3. Check it (monitoring & feedback)**
   - How can you identify the gaps in IPC practices or other indicators in your setting to allow you to prioritise your intervention?
   - How can you be sure that the intervention is being implemented correctly and safely? Including at the bedside? For example, are there methods in place to observe or track practices?
   - How and when will feedback be given to the target audience and managers? How can patients also be informed?
   - Practical example: when implementing surgical site infection interventions, the use of key tools is important consideration, such as surveillance data collection forms and the WHO checklist (adopted to local conditions).

4. **4. Sell it (reminders & communications)**
   - How are you promoting an intervention to ensure that there are clear actions at the point of care and messages are reinforced to health workers and patients?
   - Do you have capacity/funding to develop promotional messages and materials?
   - Practical example: when implementing interventions to reduce catheter associated blood stream infection, the use of visual cues to activate, promotion and reminding messages, and planning for periodic campaigns are important considerations.

5. **5. Live it (culture change)**
   - Is there demonstrable support for the intervention at every level of the health system? For example, do senior managers provide funding for equipment and other resources? Are they willing to be champions and role models for IPC improvement?
   - Are teams involved in co-developing and adopting the intervention? Are they empowered and do they feel ownership and the need for accountability?
   - Practical example: when implementing hand hygiene interventions, the way that a health facility approaches this as part of safety and quality improvement and the value placed on hand hygiene improvement as part of the clinical workflow are important considerations.
WHO hand hygiene strategy impact

Meta-analysis from 22 studies confirmed that the **WHO hand hygiene strategy is effective at increasing health care workers compliance** and results of 19 studies showed **reduction of health care associated infections**

- All intervention strategies indicated improvement in compliance with hand hygiene
- WHO-5 & WHO 5+ were more effective

- Allegranzi B et al, Lancet ID 2013
- Luangasanatip N et al, BMJ 2015
Box 4. Multimodal thinking

1. What resources, infrastructures or supplies are required to facilitate practices? This includes consideration of procurement and accessibility of supplies, water availability and quality and ergonomic factors including workflow. For example, the placement of a central venous catheter set and tray (system change/"build it").

2. Who needs to be trained and/or educated to address the identified gap – how will this happen and who will undertake the training/education? This involves written information and/or oral instruction and/or e-learning and practical and interactive training sessions, including simulation and/or bedside training. For example, the training of doctors and nurses in charge of the placement and maintenance of central venous catheters on the prevention of bloodstream infection (BSI), including summarizing critical best practices in bundles (education and training/"teach it").

3. How have you become aware that practices need to be improved – how will you know that an improvement has taken place? This usually involves monitoring compliance with process and practice indicators, as well as monitoring outcome indicators. For example, audits of catheter insertion and maintenance and the provision of timely and direct feedback of results to doctors and nurses (monitoring and feedback/"check it").

4. How will you publicize action on specific measures and promote improvement and best practice in this area? This may involve the use of reminders, posters or other advocacy/awareness-raising tools and cues-to-action to promote an intervention and methods/initiatives to improve team communication across units and disciplines. For example, discussion of the strategy for the prevention of BSI during clinical meetings and the use of promotional leaflets and posters to reinforce bundles of best practices (communications and reminders/"sell it").

5. How will you make and maintain this as a healthcare facility priority and engage senior leaders/managers/champions and opinion leaders over time? This is concerned with ensuring that senior managers/leaders show tangible support and act as champions and role models, including making relevant decisions and promoting an adaptive approach and strengthening a culture that supports IPC, patient safety and quality. In addition, teams and individuals are empowered so that they perceive ownership of the intervention. For example, discussion of BSI rates at the executive level facility meetings (safety climate and culture of safety/"live it").
Multimodal thinking...

1. Build it
(system change)

What infrastructures, equipment, supplies and other resources (including human) are required to implement the intervention?

Does the physical environment influence health worker behaviour? How can ergonomics and human factors approaches facilitate adoption of the intervention?

Are certain types of health workers needed to implement the intervention?

Practical example: when implementing hand hygiene interventions, ease of access to handrubs at the point of care and the availability of WASH infrastructures (including water and soap) are important considerations. Are these available, affordable and easily accessible in the workplace? If not, action is needed.
Multimodal thinking...

2. Teach it
(training & education)

Who needs to be trained? What type of training should be used to ensure that the intervention will be implemented in line with evidence-based policies and how frequently?

Does the facility have trainers, training aids, and the necessary equipment?

**Practical example:** when implementing injection safety interventions, timely training of those responsible for administering safe injections, including carers and community workers, are important considerations, as well as adequate disposal methods.
Multimodal thinking...

3. Check it
(monitoring & feedback)

How can you identify the gaps in IPC practices or other indicators in your setting to allow you to prioritize your intervention?

How can you be sure that the intervention is being implemented correctly and safely, including at the bedside? For example, are there methods in place to observe or track practices?

How and when will feedback be given to the target audience and managers? How can patients also be informed?

Practical example: when implementing surgical site infection interventions, the use of key tools are important considerations, such as surveillance data collection forms and the WHO checklist (adapted to local conditions).
Multimodal thinking...

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How are you promoting an intervention to ensure that there are cues to action at the point of care and messages are reinforced to health workers and patients?

Do you have capacity/funding to develop promotional messages and materials?

**Practical example:** when implementing interventions to reduce catheter-associated bloodstream infection, the use of visual cues to action, promotional/reinforcing messages, and planning for periodic campaigns are important considerations.
5. Live it
(culture change)

Is there demonstrable support for the intervention at every level of the health system? For example, do senior managers provide funding for equipment and other resources? Are they willing to be champions and role models for IPC improvement?

Are teams involved in co-developing or adapting the intervention? Are they empowered and do they feel ownership and the need for accountability?

**Practical example:** when implementing hand hygiene interventions, the way that a health facility approaches this as part of safety and quality improvement and the value placed on hand hygiene improvement as part of the clinical workflow are important considerations.
National & facility manuals for practical implementation support

Core Component 5: Multimodal strategies

WHO Guideline rational recommendation
National IPC programmes should coordinate and facilitate the implementation of IPC activities through multimodal strategies on a nationwide or sub-national level.

Rapid Reminder
A two-page document on the multimodal strategies concept is in Annex 4.

A multimodal strategy comprises several elements or components (three or more, usually) and is implemented in an integrated way with the aim of improving an outcome and changing behaviour. It includes tools developed by multidisciplinary teams that take into account local conditions such as bundles and checklists. The five most common components include: (i) system change (availability of the appropriate infrastructure to enable IPC good practices); (ii) education and training of health care workers and key players (for example, managers); (iii) management and implementation of processes, outcomes and providing feedback; (iv) reminders in the workplace; and (v) culture change in the establishment or the strengthening of a safety climate. It is important not to confuse the distinction between a multimodal strategy and a bundle. A bundle is an implementation tool aimed at improving the care processes and patient outcomes in a structured manner.

In other words, the strategy involves “building” the right system, “teaching” the right things, “checking” the right things, “selling” the right messages, and ultimately “living” IPC throughout the entire health system (see Annex 4). Targeting only ONE area (that is, unimodal) at the expense of the others is highly likely to result in failure. All five areas should be considered and necessary action taken, based on the local context and situation informed by periodic assessments.

Why
- A national approach to support the implementation of multimodal strategies for IPC improvement is recognized as having key benefits compared to local efforts alone.
- The use of multimodal strategies in IPC has been shown to be the best evidence-based approach to achieve sustained behaviour change for the implementation of IPC interventions, with a large body of evidence related to hand hygiene improvement.
- A multimodal approach spans all aspects of IPC and underpins all of the guideline recommendations.
- Focus on single strategies (for example, training and education) in isolation without paying attention to monitoring and feedback, infrastructures or organizational culture does not support long-term improvement.
- National facilitation and coordination in the context of sector-wide improvements supports facility-level improvements, resulting in improved practices that help reduce the spread of HAI and AMR.

When
- The use of multimodal strategies should be considered right from the start to support implementation when establishing your IPC programme.
- Where an established IPC programme already exists, consider the extent to which multimodal strategies are already embedded.

Who
- The team (lead members) with support from the IPC committee are responsible for using a multimodal approach for implementation.
- Successful multimodal strategies include the involvement of champions or role models.
- Collaboration with colleagues in quality improvement and patient safety to develop and promote multimodal strategies should be addressed.

How
- Refer to the guiding questions listed in Box 4 and Annex 2.
- The use of bundles or checklists should be incorporated into multimodal strategies.
- Remember - use multimodal thinking and consult the multimodal strategy guiding questions (Box 4 and Annex 2) and refer to Part III for more practical information on the “how” of implementation.

Core component 5. Multimodal strategies

WHAT
- IPC activities using multimodal strategies and a multidisciplinary team approach (see Part I and Annex 2) should be implemented to improve practices and reduce HAI and AMR.
- The use of multimodal strategies in IPC has been shown to be the best evidence-based approach to achieve sustained behaviour change for the implementation of IPC interventions, with a large body of evidence related to hand hygiene improvement.
- The use of multimodal strategies supports all aspects of IPC implementation and underpins all of the core component guideline recommendations.
- Multimodal thinking means that IPC practitioners do not focus only on single strategies to change practices (for example, training and education), but consider a range of strategies that target different influencers of human behaviour, for example, training and feedback, infrastructures or organizational culture.

WHY
- The use of multimodal strategies should be considered right from the start to support implementation when establishing your IPC programme.
- Where an established IPC programme already exists, consider the extent to which multimodal strategies are already embedded.

WHO
- The team (lead members) with support from the IPC committee are responsible for using a multimodal approach for implementation.
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HOW
- Refer to the guiding questions listed in Box 4 and Annex 2.
- The use of bundles or checklists should be incorporated into multimodal strategies.
- Remember - use multimodal thinking and consult the multimodal strategy guiding questions (Box 4 and Annex 2) and refer to Part III for more practical information on the “how” of implementation.

http://www.who.int/infection-prevention/tools/core-components/en/
Regular monitoring/audit and timely feedback of health care practices should be undertaken according to IPC standards to prevent and control HAI
dents and AMR at the health care facility level. Feedback should be provided to all audited persons and relevant staff.

A national IPC monitoring and evaluation programme should be established to assess the extent to
which standards are being met and activities are being performed according to the programme’s
goals and objectives. Hand hygiene monitoring with feedback should be considered as a key
performance indicator at the national level.

Evidence (6 studies at facility level, 1 at national level) showed that regular monitoring/auditing of IPC practices paired with regular feedback (individually and/or team/unit) is effective to increase adherence to care practices and to decrease overall HAI

- To achieve behaviour change or other improvements
- To document progress and impact
- Essential: timely feedback and data interpretation for action
- Integration/alignment with other monitoring systems needed
Evidence from 19 studies shows that bed occupancy exceeding the standard capacity of the facility is associated with increased risk of HAI in acute care facilities, in addition to inadequate health care worker staffing levels.

- **Overcrowding** recognized as being a public health issue that can lead to disease transmission.
- Standards for bed occupancy should be one patient per bed with adequate spacing between beds (at least 1 metre).
- HCWs staffing levels should be adequately assigned according to patient workload.

WHO Workload Indicators of Staffing Need (WISN) method ([http://www.who.int/hrh/resources/wisn_user_manual/en/](http://www.who.int/hrh/resources/wisn_user_manual/en/))
Evidence from 11 studies shows that availability of equipment and products at the point of care leads to increased compliance with good practices and reduction of HAI.

In 6/11 studies, the intervention consisted of the ready availability and optimal placement of hand hygiene materials and equipment in areas designated for patient care or where other health care procedures are performed and led to a significant increase of hand hygiene compliance.

- Appropriate clean and hygienic environment, WASH services and materials and equipment for IPC, in particular for HH
8a. Key Remarks (1)

- An appropriate environment, WASH services and materials and equipment for IPC are a core component of effective IPC programmes at health care facilities.

- Ensuring an adequate hygienic environment is the responsibility of senior facility managers and local authorities.

- The central government and national IPC and WASH programmes also play an important role in developing standards and recommending their implementation regarding adequate WASH services in health care facilities, the hygienic environment, and the availability of IPC materials and equipment at the point of care.

- WHO standards for drinking water quality, sanitation and environmental health in health care facilities should be implemented.
Core Component 8: Built environment, materials & equipment for IPC

8b. Key Remarks

- WHO standards* for the adequate number and appropriate position of hand hygiene facilities should be implemented in all health care facilities.

* This requires that a hand hygiene product (for example, alcohol-based hand rub, if available) be **easily accessible and as close as possible** – within arm’s reach of where patient care or treatment is taking place. Point-of-care products should be accessible without having to leave the patient zone. The WHO *Guidelines on hand hygiene in health care* state: “minimum sink-to-bed ratio 1:10 and 1:1 in isolation rooms”
Implementation of the IPC Core Components

- The WHO CC are a **road map** to indicate how IPC can effectively prevent harm due to HAI and AMR
- **Implementation, including effective leadership**, is key to translate guidelines into practices
  - *not always easy and takes time*
  - **multimodal/multidisciplinary strategies**
  - monitoring approaches
  - patient-centred
  - **integrated** within clinical procedures
  - innovative and **locally adapted**
  - **tailored** to specific cultures and resource level
Main challenges to implement IPC in low- and middle-income countries

- HAIs and IPC not on the top of the national health agenda
- Gap between policy and actual implementation
- Lack of reliable data on HAIs (poor laboratory support and surveillance systems)
- Limited access to qualified and trained IPC professionals
- Limited human resources (understaffing)
- Inadequate budgets
- WASH and infrastructure gaps
- Supplies procurement challenges
- Need for adaptation or tailoring to the cultural setting and local context, and according to available resources

- Allegrenzi B et al. The Lancet 2011;377:228-41
- National and facility manuals supporting the implementation resources of the WHO IPC Core Components Guidelines (http://www.who.int/infection-prevention/tools/core-components/en/)
- M. Licker et al. J Hosp Infect 2017; 85e88
However:

- Resources invested are worth the net gain, irrespective of the context and despite the costs incurred.
- Not all solutions require additional resources.
- Some solutions can likely be low cost and local production (e.g. alcohol-based hand rubs) should be encouraged.
- Partnerships or partners’ collaborations could assist in the achievement of the core components delivery and funding.
Making improvement with limited resources

- Damani highlights three approaches to improve IPC in settings with limited resources:
  - focus on improving **no-cost** practices
  - focus on improving **low-cost** practices
  - **stop wasteful and unnecessary** practices.

- These three approaches have the potential to save money, time and improve the quality and safety of health care.

http://www.who.int/infection-prevention/tools/core-components/cc-implementation-guideline.pdf?ua=1

Reflections on IPC core components - Region of the Americas

Major **challenges** in providing IPC support and making progress

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Translating guidelines to action
Implementation resources for the WHO IPC Core Components Guidelines

http://www.who.int/infection-prevention/tools/core-components/en/
The implementation approach

WHO Guidelines

Implementation packages

National

5-Step implementation cycle

Health facility

Interim Practical Manual supporting national implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes

IPCAT2

IPCAF
Implementation manual and assessment tool for the national level

http://www.who.int/infection-prevention/tools/core-components/en/
Implementation manual and assessment framework for the health facility level

- Based on **qualitative analysis** of examples of IPC implementation in low-resource settings
- **29 interviews** with IPC professionals from low-resource settings analysed using a **qualitative inductive thematic approach**
- Identification of **common IPC implementation themes** (appearing ≥4 times) for IPC professionals to consider (according to the 8 WHO IPC core components) and **lessons learned**

New IPC facility-level assessment tool

- Structured, closed-formatted questionnaire with an associated scoring system based on the HHSASF approach; 81 indicators
- Self- or joint-assessments
- Template for data interpretation, discussion and action planning
- Tested for usability, reliability and construct validity in a sample of 181 acute health care facilities in 46 countries across the world

http://www.who.int/infection-prevention/tools/core-components/en/
Highlights from part III
Stepwise approach

Step 1: Preparing for action

Step 2: Baseline assessment

Step 3: Developing and executing the plan

Step 4: Evaluating impact

Step 5: Sustaining the programme over the long-term

Multimodal improvement strategy embedded within each step in the cycle of continuous improvement
The 5-Step approach to IPC improvement

Step 1. Preparing for action: This step ensures that all of the prerequisites that need to be in place for success are addressed, including the necessary resources (human and financial), infrastructures, planning and coordination of activities and the identification of roles and responsibilities (including key opinion leaders and champions). The facility senior managers/leaders play a critical role in this step.

Step 2. Baseline assessment: Conducting an exploratory baseline assessment of the current situation, including the identification of existing strengths and weaknesses, is critical for developing a tailor-made action plan that addresses the reality of a health care facility. A ready-to-use assessment tool based on the WHO IPC core components is available for step 2 (WHO IPC Assessment Framework [IPCAF]). Ideally, additional IPC assessment tools (for example, the Hand Hygiene Self-assessment Framework [HHSAF] and/or observation-based tools to evaluate IPC practices) could be used.

Step 3. Developing and executing an action plan: The results of the baseline assessment support the development and execution of an action plan based around a multimodal improvement strategy.

Step 4. Assessing impact: Conducting a follow-up assessment using the same tools as in step 2 is crucial to determine the effectiveness of the plan. The focus is on impact, acceptability and cost-effectiveness.

Step 5. Sustaining the programme over the long term: An important step in the cycle of improvement is to develop an ongoing action plan and review schedule to support the long-term impact and benefits of the IPC programme, thus contributing to its overall impact and sustainability.
The step-wise approach

Step 1: Preparing for action

Step 2: Baseline assessment

Step 3: Developing and executing the plan

Step 4: Evaluating impact

Step 5: Sustaining the programme over the long-term
Step 1: Preparing for action

Step 2: Baseline assessment

Step 3: Developing and executing the plan

Step 4: Evaluating impact

Step 5: Sustaining the programme over the long-term

Multimodal improvement strategy embedded within each step in the cycle of continuous improvement

STEP 2
BASELINE ASSESSMENT
Step 1: Preparing for action

Step 2: Baseline assessment

Step 3: Developing and executing the plan

Step 4: Evaluating impact

Step 5: Sustaining the programme over the long-term

STEP 3
DEVELOPING AND EXECUTING THE PLAN

<table>
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<tr>
<th>Core component</th>
<th>Rapid recap</th>
<th>Sample action plan</th>
<th>Potential barriers and solutions</th>
<th>Tools and resources</th>
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Step 5: Sustaining the programme over the long-term

Step 4: Evaluating impact

Step 3: Developing and executing the plan

Step 2: Baseline assessment

Step 1: Preparing for action

Multimodal improvement strategy embedded within each step in the cycle of continuous improvement

STEP 4
ASSESSING IMPACT
STEP 5
SUSTAINING THE PROGRAMME OVER THE LONG TERM

Step 5: Sustaining the programme over the long-term

Step 1: Preparing for action

Step 2: Baseline assessment

Step 3: Developing and executing the plan

Step 4: Evaluating impact

Step 5: Multimodal improvement strategy embedded within each step in the cycle of continuous improvement
What help you can find

**PRACTICAL TIPS, KEY CONSIDERATIONS AND ACTIONS**

**IMPLEMENTATION BARRIERS AND SOLUTIONS**

**TOOLS AND RESOURCES**

**CASE STUDY EXAMPLES**

http://www.who.int/infection-prevention/tools/core-components/en/
Liberia: core components prioritization

Core components prioritization

1. National IPC programme (2016)
2. Guidelines (2017-18)
3. Training (2015-)
4. HAI (SSI) surveillance (2018)
5. Monitoring (2015-)
6. Built environment (2016-)

Step 1: Preparing for action
Step 2: Baseline assessment
Step 3: Developing and executing the plan
Step 4: Evaluating impact
Step 5: Sustaining the programme over the long-term
Multimodal improvement strategy embedded within each step in the cycle of continuous improvement
NATIONAL QUALITY MANAGEMENT ORGANIZATION

QA Board
- Chair: Chief Medical Officer
- Secretary: National Quality Manager
- Members: All Directors (Pharmacy, County Health Service, NCDs/CDs, Labs, Diagnostics, Program heads, Quality Partners, PBF, 2 Community Reps)

Minister of Health

Chief Medical Officer

Quality Advisory Board

National Quality Director

County Quality Manager

National QM Team
- IPC
- Diagnostics
- Service Delivery
- Pharmacy
- HMIS Community Rep
- Administration

County QM Team
- IPC Focal Person
- RH Supervisor
- Child Survival FP
- CHSS M&E Office
- County Health Board Rep.

District QM Team
- District Health Team
- Community Health Development Committee Rep.

Hospital QM Team
- Facility-based QM Team
- Community Rep
- Health Dev. Committee

Hospital Med Director

QM Team Leader

QM Team

District Health Officer

District Data Clerk (QM Focal Person)
Liberia – all health care workers’ IPC training (2015-16)

- **Keep Safe Keep Serving (KSKS) training:**
  40 master trainers, 2258 HCWs
- **Safe & Quality Services (SQS) training:**
  13000 HCWs
WHO IPC Advanced Training (2017-18)

- Leadership and IPC program management
- Prevention of urinary tract infections
- Prevention of catheter-associated bloodstream infections
- Prevention of respiratory tract infections
- Prevention of infections in surgery
- Reprocessing of medical devices
- Outbreak management in healthcare settings
- IPC to control antibiotic resistance
- HAI surveillance
- Injection safety

Liberia: 37 facility, county & national IPC focal persons

Test Results

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>41%</td>
<td>65%</td>
</tr>
</tbody>
</table>

Slides deck
- Trainer's manual
- Student's handbook
- E-learning module
LIBERIA NATIONAL HEALTH QUALITY STRATEGY
2017-2021

NATIONAL INFECTION PREVENTION AND CONTROL GUIDELINES
Ministry of Health, Republic of Liberia
June 2018

June 2017

National quality policy and IPC guidelines (2018)
Liberia national IPC guidelines TOT
A multimodal infection control and patient safety intervention to reduce surgical site infections in Africa: a multicentre, before-after, cohort study

Benedetta Allegranzi, Alexander M Aiken, Nigel D A Finlay, Peter M Van den Broucke, Joep Bonsen, Gabriel Turner, Robert Moghadas, Alexander Lofheden, Jossef Jumberia, Maryam Mehdizadeh, Joseph M. Konnongor, Angela Cayot, Ajantha Samaranayake, Sibylle Butterbach

Summary
Background Surgical site infections (SSIs) are the most frequent healthcare-associated infections in developing countries. Specialty prevention measures are highly effective, but are often poorly implemented. We aimed to establish the effect of a multimodal intervention on SSIs in Africa.

Methods We did a before-after cohort study. Between March 1, 2013, and Dec 31, 2015, at five African hospitals. The multimodal intervention consisted of the implementation or strengthening of multi-SSI prevention measures, combined with an adaptive approach aimed at the improvement of teamwork and the safety climate. The primary outcome was the time occurrence of SSI, and the secondary outcome was death within 30 days post-surgery. Data on adherence to SSI prevention measures were prospectively collected. The intervention effect on SSI risk and death within 30 days post-surgery was assessed in a mixed-effects logistic regression model, after adjustment for key confounders.

Findings Four hospitals completed the adequate data for the entire study period: 11% in the baseline period, 7% in the intervention period, and 5% in the follow-up period (p=0.02). An absolute reduction in the follow-up and maintenance phase compared with the pre-intervention phase resulted in a significantly reduced risk of SSI (72.0% to 43.2%; p=0.04)

Interpretation Implementation of a multimodal infection control and patient safety intervention may improve patient outcomes and reduce mortality rates in the long term.


Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Contents
Table S1: Detailed description of the surgical site infection preventive measures implemented consistently across all sites, available implementation support documents, and process indicators used.

Figure S1: Foster/bean designed by the surgical team to remind staff of the surgical site infection prevention measures implemented during the study intervention period.

Figure S2: Trends of the cumulative incidence of surgical site infection per 100 surgical operations by month in the three study periods for each site.

Figure S3: Results of an interrupted time series analysis assessing the trends of the cumulative incidence of SSI on a monthly basis between the baseline and follow-up periods by site (four sites).

Figure S4: Results of an interrupted time series analysis assessing the trends of cumulative incidence of surgical site infection on a monthly basis between the follow-up and sustainability periods by site (three sites).


The surgical unit-based safety programme (SUSP)

Patient safety culture improvement (CUSP):
- science of safety education
- staff safety assessment
- leadership
- learning from defects
- team work and communication

Infection prevention best practices
- evidence-based and identified according to local staff assessment

Improvement of the patient safety climate

Reduction of:
- SSIs
- surgical complications
Stepwise approach

Step 1: Preparing for action

Step 2: Baseline assessment

Step 3: Developing and executing the plan

Step 4: Evaluating impact

Step 5: Sustaining the programme over the long-term

Multimodal improvement strategy embedded within each step in the cycle of continuous improvement
Understanding your current situation

What tools do you use?

Discuss the following questions from the SUSP Perioperative Staff Safety Assessment Tool:

1. Please briefly describe the most frequent ways (list maximum 3) in which patients may get a surgical site infection in your surgical services/facilities

2. Please describe what you think can be done to prevent this surgical site infection

Organizational culture change

- Antibiotic prophylaxis
- OR discipline
- Surgical site skin preparation
- Surgical hand preparation
- No Hair removal
- Pre-op Bath
- Modified WHO checklist
Multidisciplinary local teams
Tools to address the culture

Core CUSP toolkit
Created for clinicians by clinicians, the CUSP toolkit is modular and modifiable to meet individual unit needs. Each module includes teaching tools and resources to support change at the unit level, presented through facilitator notes that take you step-by-step through the module, presentation slides, tools, videos.

CUSP for Safe Surgery  
Perioperative Staff Safety Assessment

- **Purpose of this form:** The purpose of this form is to tap into your experiences at the frontlines of patient care to find out what risks jeopardize patient safety in your clinical area.
- **Who should complete this form:** All staff members.
- **How to complete this form:** Provide as much detail as possible when answering the 4 questions. Drop off your completed safety assessment form in the location designated by the SUSP team.
- **When to complete this form:** Any staff member can complete this form at any time.

CUSP for Safe Surgery (SUSP)  
Safety Issues Worksheet for Senior Executive Partnership

<table>
<thead>
<tr>
<th>Date of Safety Rounds:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit:</td>
</tr>
<tr>
<td>Attendees:</td>
</tr>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
</tr>
<tr>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
</tr>
</tbody>
</table>

(Please use back of form for additional attendees.)

Understanding and influencing the local culture: tools created by SUSP teams in African hospitals

Take 3 steps to make your surgical patient safe by preventing wound infections!

1. Pre-operative
   - Patient briefing: Make sure the patient takes a shower or bath and washes with soap on the day of the operation or the evening before. This helps remove bacteria from the skin and reduces the risk of wound infection.
   - Avoid hair removal: Avoid removing hair manually or with clippers or electric shavers before surgery. This can damage the skin, which can lead to infection.

2. Intra-operative
   - Appropriate skin preparation: Clean the surgical site with soap and water for 3-5 minutes.
   - Use chlorhexidine-based solution for 3-4 min.

3. Post-operative
   - Post-operative care: Maintain good hygiene, and ensure that the patient's surgical site is kept clean.
   - Monitor the patient for signs of infection, such as redness, swelling, and increased pain.

http://www.who.int/infection-prevention/countries/surgical/en/
System change - modified WHO formulations for surgical hand preparation

**Formulation I**

Final concentrations: ethanol 80% wt/wt, glycerol 0.725% vol/vol, hydrogen peroxide 0.125% vol/vol.

**Ingredients:**

1. ethanol (absolute), 800 g
2. H₂O₂ (3%), 4.17 ml
3. glycerol (98%), 7.25 ml (or 7.25 x 1.26 = 9.135 g)
4. top up to 1000 g with distilled or boiled water

**Formulation II**

Final concentrations: isopropanol 75% wt/wt, glycerol 0.725% vol/vol, hydrogen peroxide 0.125% vol/vol.

**Ingredients:**

1. isopropanol (absolute), 750 g
2. H₂O₂ (30%), 4.17 ml
3. glycerol (98%), 7.25 ml (or 7.25 x 1.26 = 9.135 g)
4. top up to 1000 g with distilled water

**Sources:**


System change - surgical skin preparation

Local preparation of 2% chlorhexidine isopropanol solution

1. Isopropanol: 62.7 % g/g
2. chlorhexidine 12.1% g/g taken from a 18.8% g/g chlorhexidine digluconate water solution
3. Top up with distilled water up to 100%


Tools for monitoring impact

94% of patients had ≥2 follow-up interactions (inpatient reviews, outpatient clinic, telephone interviews); 80% had ≥3 interactions during their 30-day surveillance period.

Instructions for data-entry and data-analysis using Epi Info™

After collecting data using the forms in the SUSP AFRICA Toolkit data can be entered and analysed using Epi Info™ database files developed specifically for these forms. These database files can be downloaded from your dropbox folder on the computer you have chosen from the shared link. To use these files, the main Epi Info™ software also needs to be downloaded.

Using Epi Info™ in 5 steps

1. **Prepare the data for entry**
   - Ensure all necessary form fields are completed.
   - Verify that data is entered accurately.

2. **Enter the data**
   - Use Epi Info™ software to open the database file.
   - Follow the form structure to enter data.

3. **Check the data**
   - Review the entered data for accuracy.
   - Use validation checks if available.

4. **Analyze the data**
   - Use Epi Info™ tools to create summaries, graphs, and reports.
   - Interpret the results to inform decision-making.

5. **Report the findings**
   - Prepare a summary of findings for stakeholders.
   - Share results with relevant parties for action.

**Notes:**
- Ensure data is entered accurately to avoid errors.
- Use the software features to enhance data quality and analysis.
- Regularly update and backup data to ensure security and compliance.
Impact on preventive measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Baseline (n=1604)</th>
<th>Follow-up (n=1827)</th>
<th>p value</th>
<th>Sustainability period (n=891)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative patient bathing</td>
<td>1238 (77.2)</td>
<td>1544 (84.5)</td>
<td>&lt;0.0001</td>
<td>799 (89.7)</td>
</tr>
<tr>
<td>Appropriate hair removal</td>
<td>1169 (73.1)</td>
<td>1702 (93.5)</td>
<td>&lt;0.0001</td>
<td>880 (98.8)</td>
</tr>
<tr>
<td>Appropriate skin preparation</td>
<td>330 (20.7)</td>
<td>1644 (90.2)</td>
<td>&lt;0.0001</td>
<td>845 (94.8)</td>
</tr>
<tr>
<td>Quality of surgical hand preparation</td>
<td>1213 (78.7)</td>
<td>1694 (94.4)</td>
<td>&lt;0.0001</td>
<td>865 (97.4)</td>
</tr>
<tr>
<td>Appropriate use of antibiotic prophylaxis</td>
<td>205 (12.8)</td>
<td>714 (39.1)</td>
<td>&lt;0.0001</td>
<td>635 (71.3)</td>
</tr>
<tr>
<td>Theatre discipline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theatre door openings per hour of operation time</td>
<td>14.8 (17.8)</td>
<td>14.2 (16.1)</td>
<td>0.3771</td>
<td>19.0 (21.6)</td>
</tr>
<tr>
<td>Number of individuals present at the start of the operation</td>
<td>8.3 (3.4)</td>
<td>7.7 (2.5)</td>
<td>&lt;0.0001</td>
<td>7.4 (2.5)</td>
</tr>
<tr>
<td>Number of entries during the operation</td>
<td>5.0 (4.1)</td>
<td>4.8 (4.9)</td>
<td>0.1758</td>
<td>4.2 (2.7)</td>
</tr>
</tbody>
</table>

Data are mean (SD). Data per variable and percentage missing data are also given. SSI—surgical site infection.

Table 2: Process indicators for SSI prevention intervention measures across study periods in four (baseline and follow-up) and three (sustainability period) hospitals
Figure 2: Unadjusted SSI cumulative incidence overall and by site at baseline and follow-up in four sites
Error bars show 95% CIs. SSI—surgical site infection.
Summary of success factors

- Use of multimodal strategies (this does not mean checklists and bundles)
- Having a step-wise action plan
- Mapping recommendations according to the surgical patient journey
- Empowering teams and involving front-line staff
- Engaging leadership
- Letting teams take the lead on adaptation
- Catalysing collective and individual ownership
- Using data to create awareness
- Awarding teams and work demonstrating a safety culture spirit
New WHO SSI Prevention Implementation Package

Protocol for surgical site infection surveillance with a focus on settings with limited resources

WHO SSI Prevention Hospital Implementation Guide

WHO Adaptive Tools to Support SSI Prevention Implementation

Fact sheets on SSI recommendations

NEW IMPLEMENTATION PLATFORM Launching Soon!

http://www.who.int/infection-prevention/tools/surgical/en/

SURGICAL SITE INFECTION PREVENTION
Key facts on decolonization of nasal carriers of Staphylococcus aureus

NEW IMPLEMENTATION PLATFORM
Launching Soon!
Tools: IPC Assessment Framework (IPCAF)* & Hand Hygiene Self-assessment Framework (HHSAF)**

Timeline:
- Preparations: September-December 2018
- Survey conduct: January-March 2019
- Survey analysis: April-June 2019

Sample:
- Open voluntary participation by health care facilities around the world
- Randomised weighted sub-sample

Planning:
- Month 1: preparations
- Month 2: IPCAF
- Month 3: HHSAF

I. Tools completion on paper at HCF level  ➞  II. Submission online or by email

Report: to be issued by WHO by 2019

*http://www.who.int/infection-prevention/tools/core-components/IPCAF-facility.PDF?ua=1
**http://www.who.int/gpsc/country_work/hhsa_framework_October_2010.pdf?ua=1
THANK YOU!!!

WHO Infection Prevention and Control Global Unit

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