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

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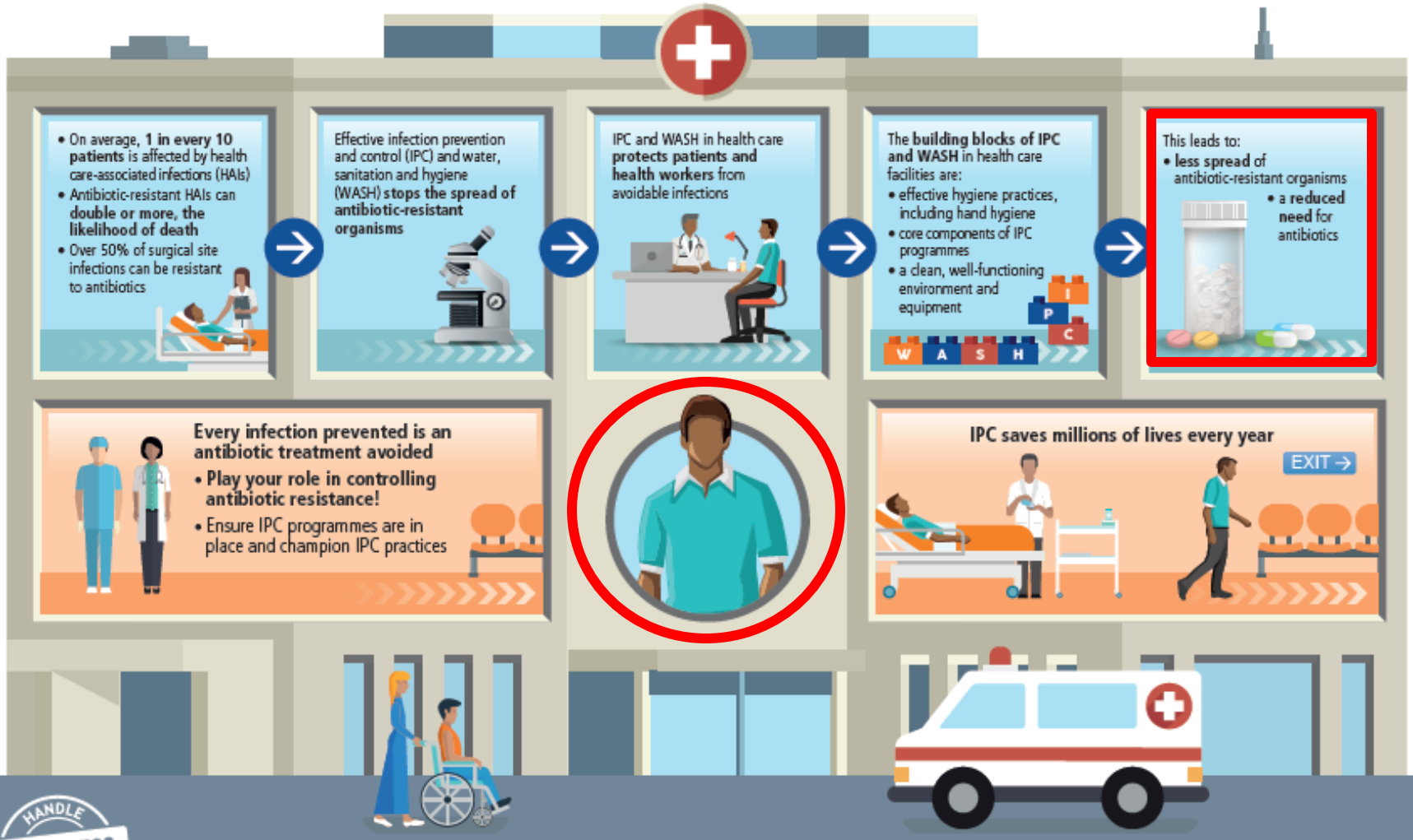
Why IPC is so important for patient outcomes

>30% Reduction	Effective IPC programmes lead to more than a 30% reduction in HAI rates
25-57% Reduction	Surveillance contributes to a 25-57% reduction in HAIs
50% Reduction	Improving hand hygiene practices may reduce pathogen transmission in health care by 50%
13-50% Reduction	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%
56% Reduction	MRSA declined by 56% over a four-year period in England in line with a national target
44% Reduction	A safety culture and prevention programme reduced SSI risk in African hospitals by 44%
80% Compliance	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



HANDLE ANTIBIOTICS WITH CARE

Sources: World Health Organization. Infection prevention and control. Available at: http://www.who.int/infection-prevention/en/ | World Health Organization. Water sanitation and hygiene. Available at: http://www.who.int/water_sanitation_health/en/

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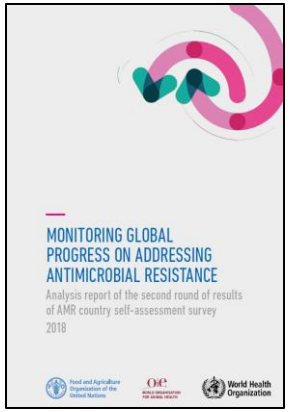
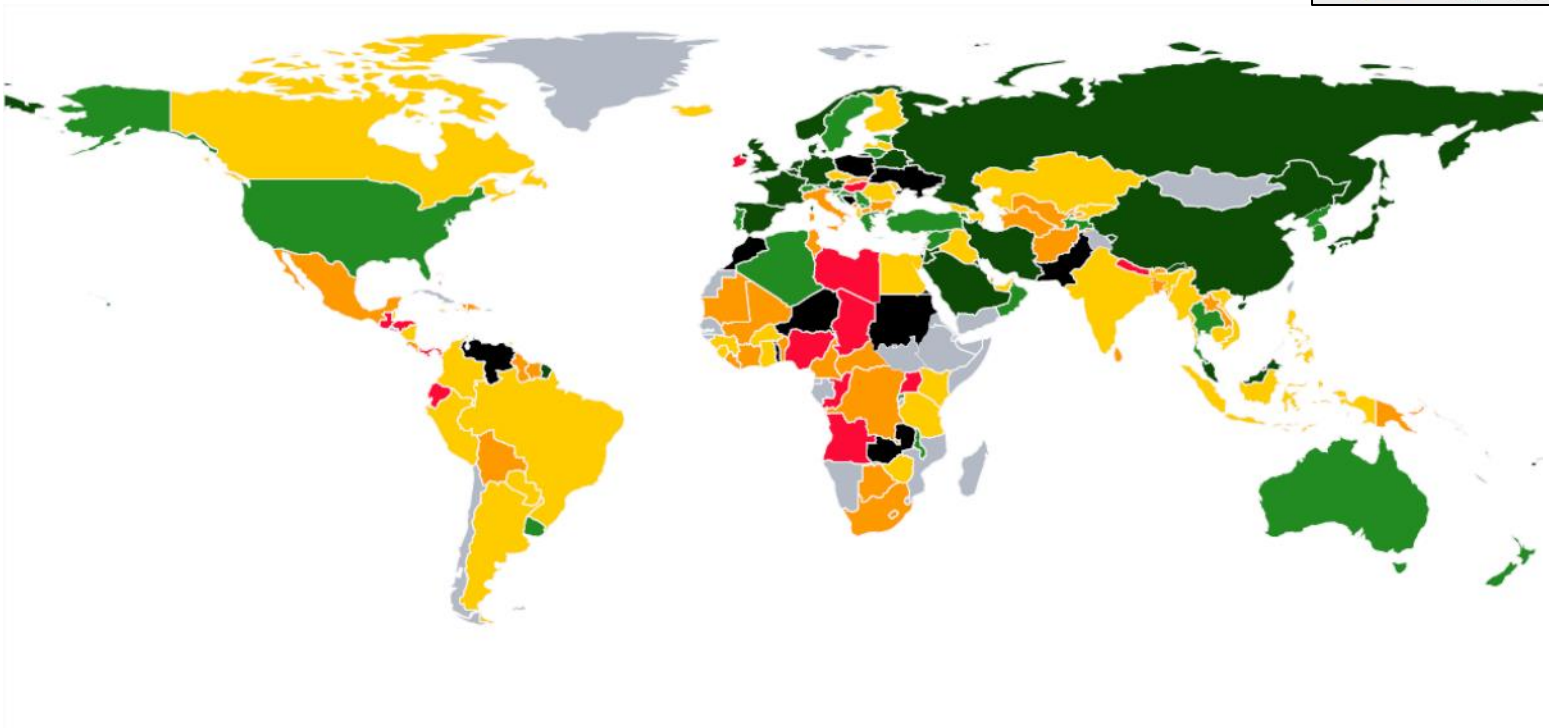
AMR survey 2017



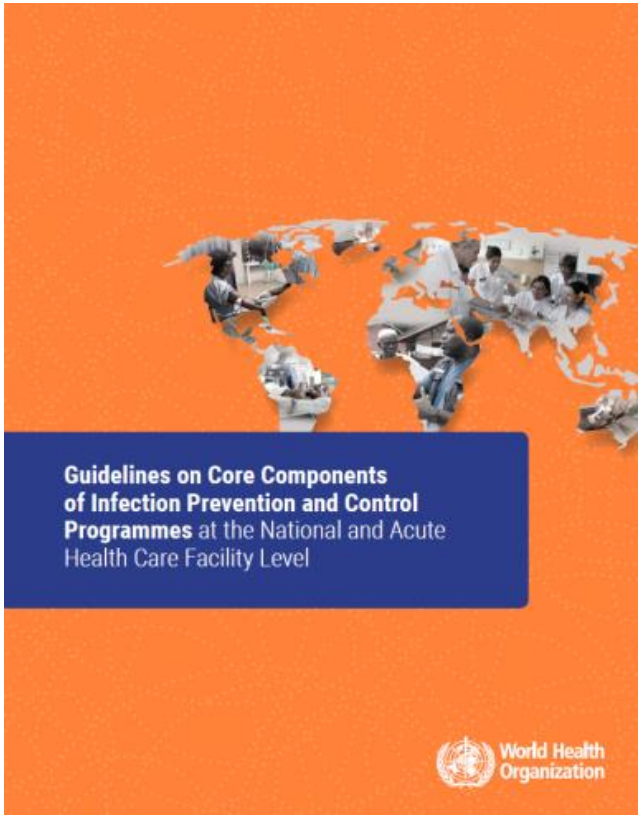


- **58.4%:** national IPC programme or operational plan and national IPC guidelines
- **14.9%:** compliance and effectiveness evaluated and reported

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

HEALTH CARE WITHOUT AVOIDABLE INFECTIONS

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*

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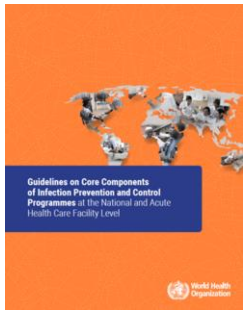
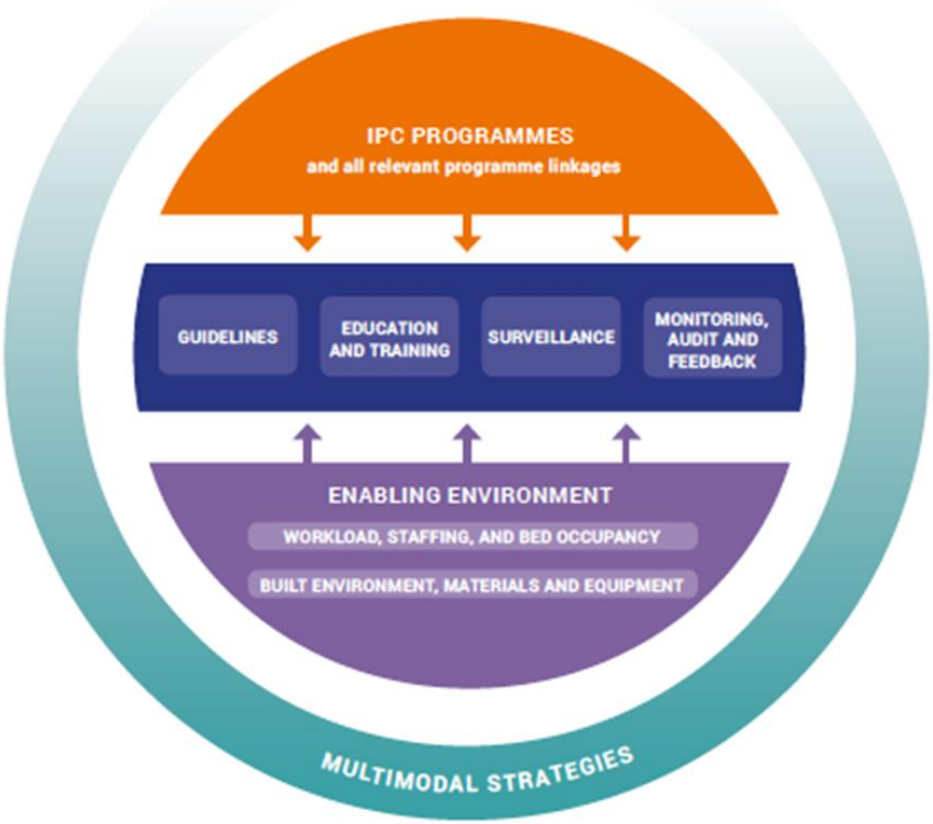


WHO core components for effective IPC programmes



- **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

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Core component 1: IPC programmes

1 IPC Programmes

R1a *Strong*

R1b *GPS*

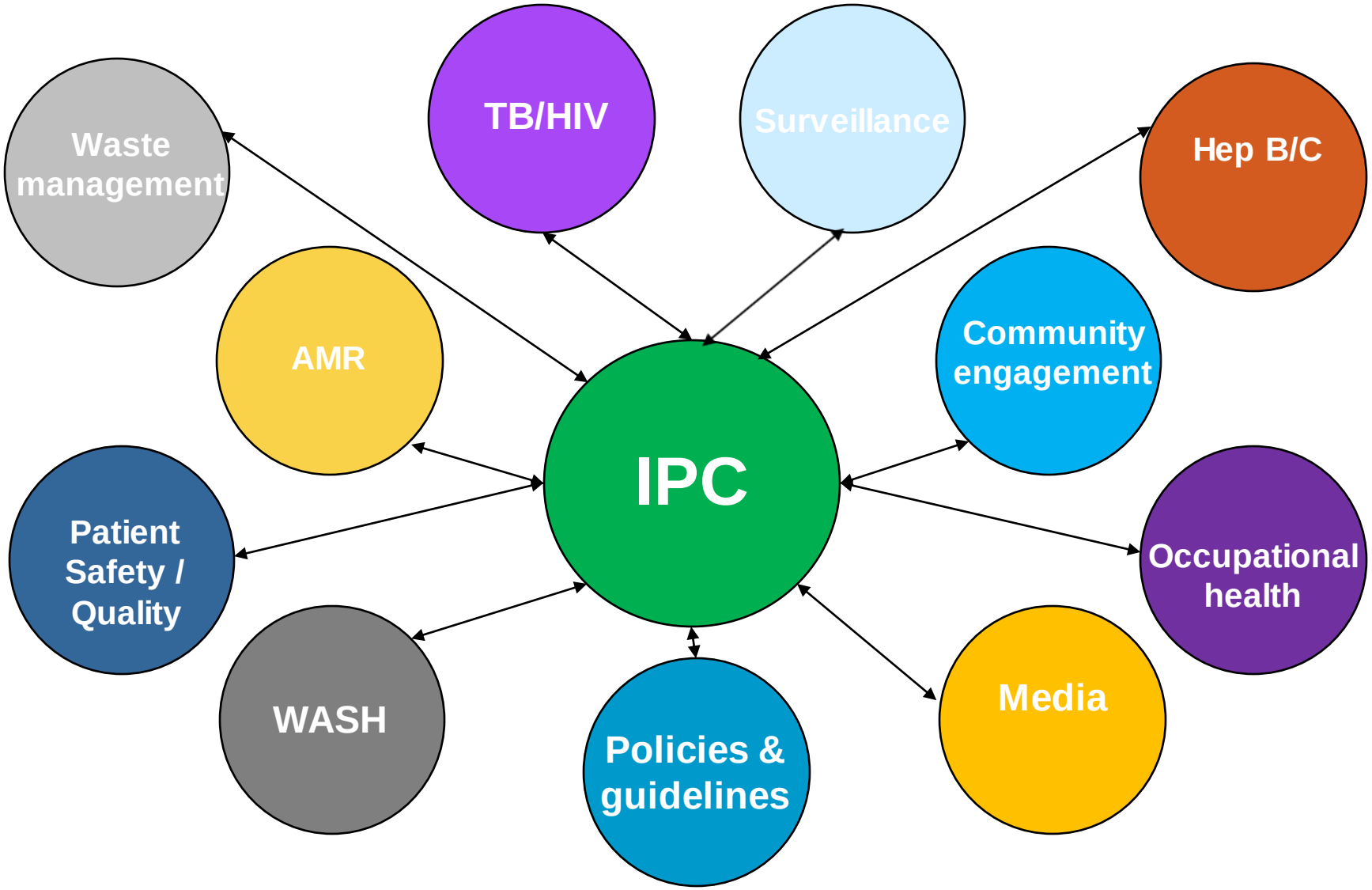
An IPC programme with a dedicated, trained team should be in place in each **acute health care facility** for the purpose of preventing HAI and combating AMR through IPC good practices.

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



Core component 2: IPC guidelines

2	Evidence Based Guidelines	R2 *Strong*

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

Core Component 2: IPC Guidelines

Key remarks

- 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/

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Core component 3: IPC education & training

3	Education & Training	R3a *Strong*	3b *GPS*

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**

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Core component 4: HAI surveillance

4 Surveillance	R4a *Strong*	R4b *Strong*

Facility-based HAI surveillance should be performed to guide IPC interventions and detect outbreaks, including AMR surveillance with timely feedback of results to health care workers and stakeholders and through national networks.

National HAI surveillance programmes and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes should be established to reduce HAI and AMR.

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

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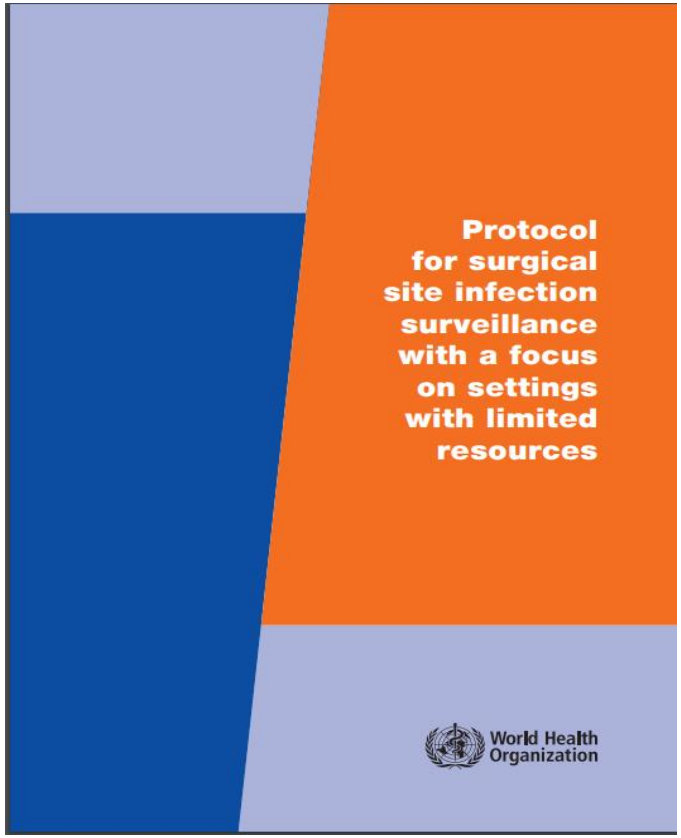
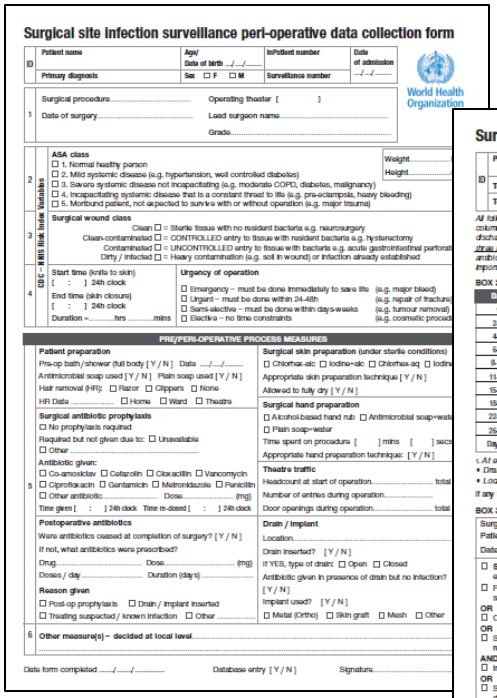
New protocol for surgical site infection surveillance based on SUSP testing




Surgical site infection surveillance peri-operative data collection form

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ID	Patient name	Age/ Date of birth …/…/……	InPatient number	Date of admission …/…/……
	Primary diagnosis	Sex ☐ F ☐ M	Surveillance number	

1 Surgical procedure…… Operating theater [ ]
Date of surgery…… Lead surgeon name……
Grade……

2 ASA class
☐ 1. Normal healthy person
☐ 2. Mild systemic disease (e.g. hypertension, well controlled diabetes)
☐ 3. Severe systemic disease not incapacitating (e.g. moderate COPD, diabetes, malignancy)
☐ 4. Incapacitating systemic disease that is a constant threat to life (e.g. pre-eclampsia, heavy bleeding)
☐ 5. Moribund patient, not expected to survive with or without operation (e.g. major trauma)
Weight……
Height……

3 Surgical wound class
Clean ☐ = Sterile tissue with no resident bacteria e.g. neurosurgery
Clean-contaminated ☐ = CONTROLLED entry to tissue with resident bacteria e.g. hysterectomy
Contaminated ☐ = UNCONTROLLED entry to tissue with bacteria e.g. acute gastrointestinal perforat
Dirty / infected ☐ = Heavy contamination (e.g. soil in wound) or infection already established

CDC – NNIS Risk Index Variables

4 Start time (knife to skin)
[:] 24h clock
End time (skin closure)
[:] 24h clock
Duration =……hrs ……mins

Urgency of operation
☐ Emergency – must be done immediately to save life (e.g. major bleed)
☐ Urgent – must be done within 24-48h (e.g. repair of fracture)
☐ Semi-elective – must be done within days-weeks (e.g. tumour removal)
☐ Elective – no time constraints (e.g. cosmetic procedu

PRE/PERI-OPERATIVE PROCESS MEASURES

5 Patient preparation
Pre-op bath/shower (full body) [Y / N] Date …/…/……
Antimicrobial soap used [Y / N] Plain soap used [Y / N]
Hair removal (HR): ☐ Razor ☐ Clippers ☐ None
HR Date …… ☐ Home ☐ Ward ☐ Theatre

Surgical antibiotic prophylaxis
☐ No prophylaxis required
Required but not given due to: ☐ Unavailable
☐ Other ……

Antibiotic given:
☐ Co-amoxiclav ☐ Cefazolin ☐ Cloxacillin ☐ Vancomycin
☐ Ciprofloxacin ☐ Gentamicin ☐ Metronidazole ☐ Penicillin
☐ Other antibiotic…… Dose…… (mg)
Time given [:] 24h clock Time re-dosed [:] 24h clock

Postoperative antibiotics
Were antibiotics ceased at completion of surgery? [Y / N]
If not, what antibiotics were prescribed?
Drug…… Dose…… (mg)
Doses / day…… Duration (days)……

Reason given
☐ Post-op prophylaxis ☐ Drain / Implant inserted
☐ Treating suspected / known infection ☐ Other ……

Surgical skin preparation (under sterile conditions)
☐ Chlorhex-alc ☐ Iodine-alc ☐ Chlorhex-aq ☐ Iodine
Appropriate skin preparation technique [Y / N]
Allowed to fully dry [Y / N]

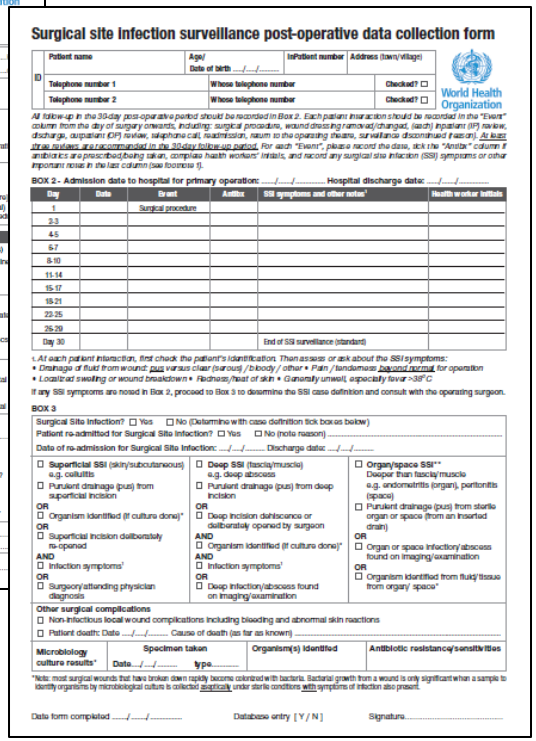
Surgical hand preparation
☐ Alcohol-based hand rub ☐ Antimicrobial soap+wate
☐ Plain soap+water
Time spent on procedure [ ] mins [ ] secs
Appropriate hand preparation technique: [Y / N]

Theatre traffic
Headcount at start of operation…… total
Number of entries during operation……
Door openings during operation…… total

Drain / Implant
Location……
Drain inserted? [Y / N]
If YES, type of drain: ☐ Open ☐ Closed
Antibiotic given in presence of drain but no infection? [Y / N]
Implant used? [Y / N]
☐ Metal (Ortho) ☐ Skin graft ☐ Mesh ☐ Other

6 Other measure(s) – decided at local level……

Data form completed …../…../…… Database entry [Y / N] Signature……


Surgical site infection surveillance post-operative data collection form

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ID	Patient name	Age/ Date of birth …/…/……	InPatient number	Address (town/village)
	Telephone number 1	Whose telephone number		Checked? ☐
	Telephone number 2	Whose telephone number		Checked? ☐

All follow-up in the 30-day post-operative period should be recorded in Box 2. Each patient interaction should be recorded in the "Event" column from the day of surgery onwards, including: surgical procedure, wound dressing removed/changed, (each) inpatient (IP) review, discharge, outpatient (OP) review, telephone call, readmission, return to the operating theatre, surveillance discontinued (reason). At least three reviews are recommended in the 30-day follow-up period. For each "Event", please record the date, tick the "Onsite" column if antibiotics are prescribed/being taken, complete health workers' initials, and record any surgical site infection (SSI) symptoms or other important notes in the last column (see footnote †).

BOX 2 - Admission date to hospital for primary operation: …../…../…… **Hospital discharge date:** …../…../……

Day	Date	Event	Antibx	SSI symptoms and other notes†	Health worker initials
1		Surgical procedure			
2-3					
4-5					
6-7					
8-10					
11-14					
15-17					
18-21					
22-25					
26-29					
Day 30				End of SSI surveillance (standard)	

† *At each patient interaction, first check the patient's identification. Then assess or ask about the SSI symptoms:*
- *Drainage of fluid from wound: pus versus clear (serous) / bloody / other*
- *Pain / tenderness beyond normal for operation*
- *Localized swelling or wound breakdown*
- *Redness/heat of skin*
- *Generally unwell, especially fever >38°C*

If any SSI symptoms are noted in Box 2, proceed to Box 3 to determine the SSI case definition and consult with the operating surgeon.

BOX 3

Surgical Site Infection? ☐ Yes ☐ No (Determine with case definition tick boxes below)
Patient re-admitted for Surgical Site Infection? ☐ Yes ☐ No (note reason) ……
Date of re-admission for Surgical Site Infection: …../…../…… Discharge date: …../…../……

☐ **Superficial SSI** (skin/subcutaneous) e.g. cellulitis ☐ Purulent drainage (pus) from superficial incision **OR** ☐ Organism identified (if culture done)* **OR** ☐ Superficial incision deliberately re-opened **AND** ☐ Infection symptoms† **OR** ☐ Surgeon/attending physician diagnosis	☐ **Deep SSI** (fascia/muscle) e.g. deep abscess ☐ Purulent drainage (pus) from deep incision **OR** ☐ Deep incision dehiscence or deliberately opened by surgeon **AND** ☐ Organism identified (if culture done)* **AND** ☐ Infection symptoms† **OR** ☐ Deep infection/abscess found on imaging/examination	☐ **Organ/space SSI**** Deeper than fascia/muscle e.g. endometritis (organ), peritonitis (space) ☐ Purulent drainage (pus) from sterile organ or space (from an inserted drain) **OR** ☐ Organ or space infection/abscess found on imaging/examination **OR** ☐ Organism identified from fluid/tissue from organ/ space*

Other surgical complications
☐ Non-infectious local wound complications including bleeding and abnormal skin reactions
☐ Patient death: Date …../…../…… Cause of death (as far as known) ……

Microbiology culture results*	Specimen taken Date…../…../…… type……	Organism(s) identified	Antibiotic resistance/sensitivities

*Note: most surgical wounds that have broken down rapidly become colonized with bacteria. Bacterial growth from a wound is only significant when a sample to identify organisms by microbiological culture is collected aseptically under sterile conditions with symptoms of infection also present.

Data form completed …../…../…… Database entry [Y / N] Signature……

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

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Core component 5: Multimodal strategies

5 Multimodal Strategies NEW

R5a *Strong*

R5b *Strong*

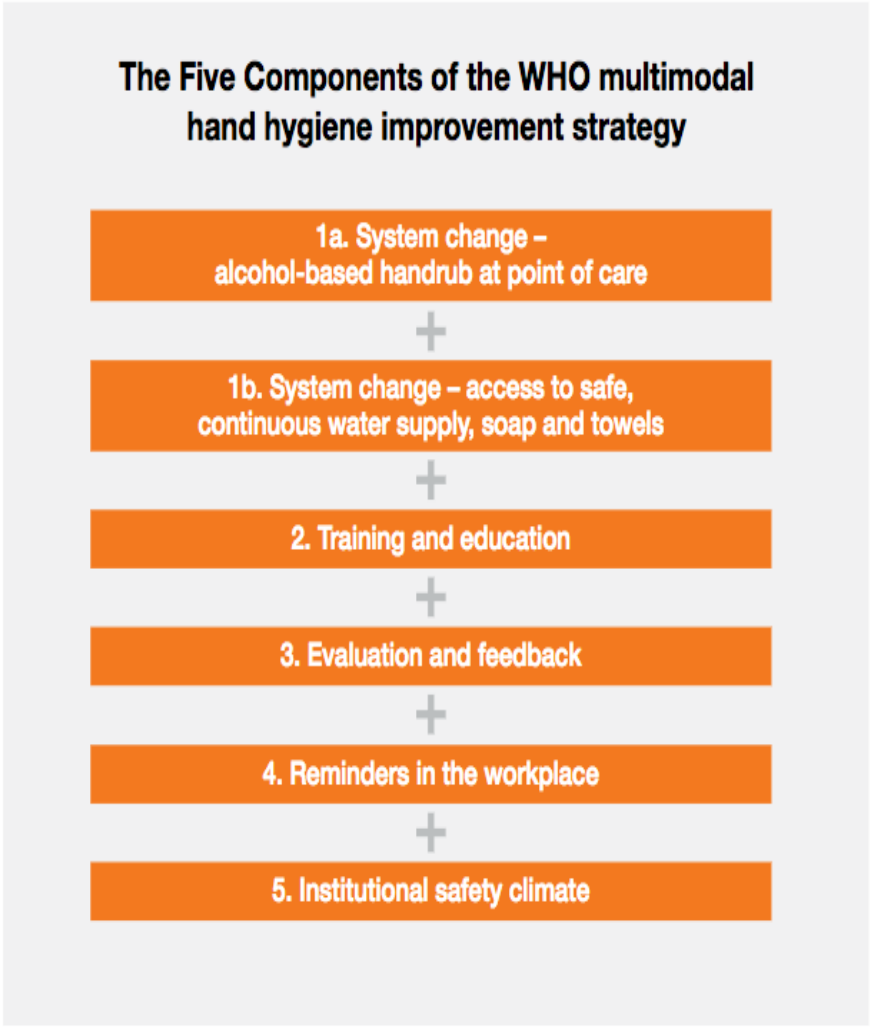
At the **facility** level IPC activities should be implemented using multimodal strategies to improve practices and reduce HAI and AMR.

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

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



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

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.

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.

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).

4. Sell it
(reminders & communications)

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.

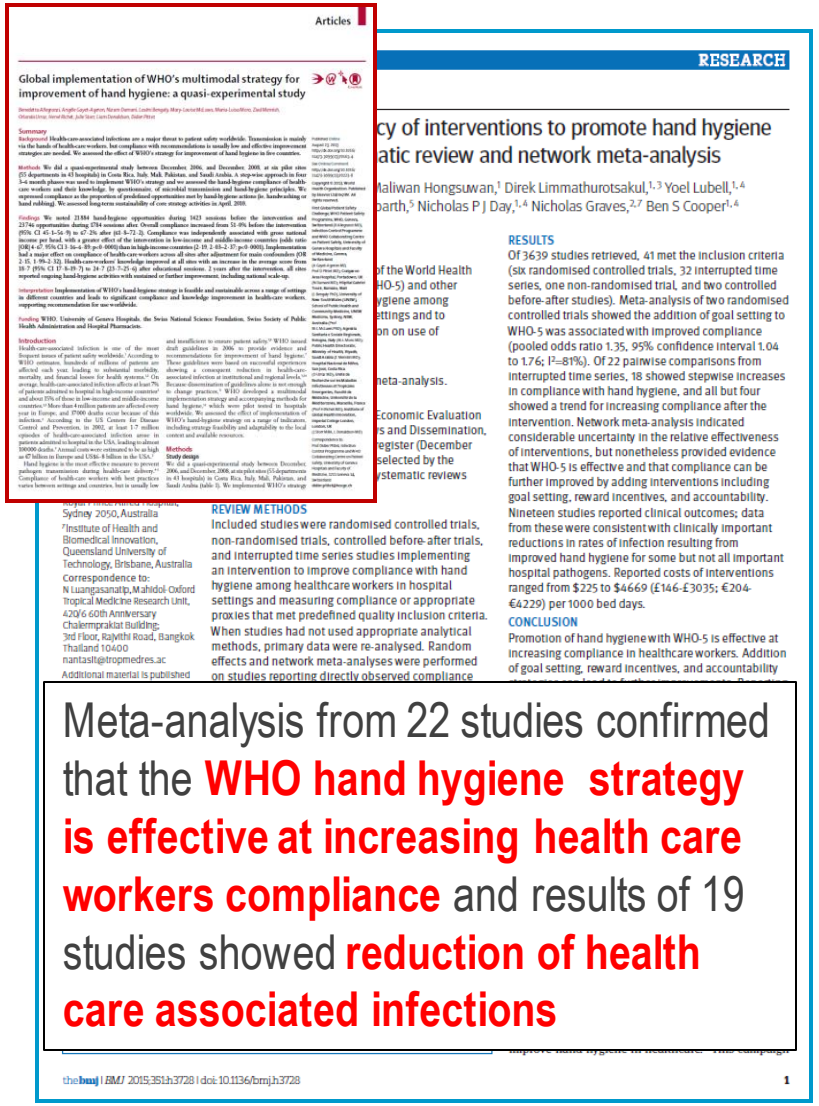
5. Live it
(culture change)

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.

WHO hand hygiene strategy impact



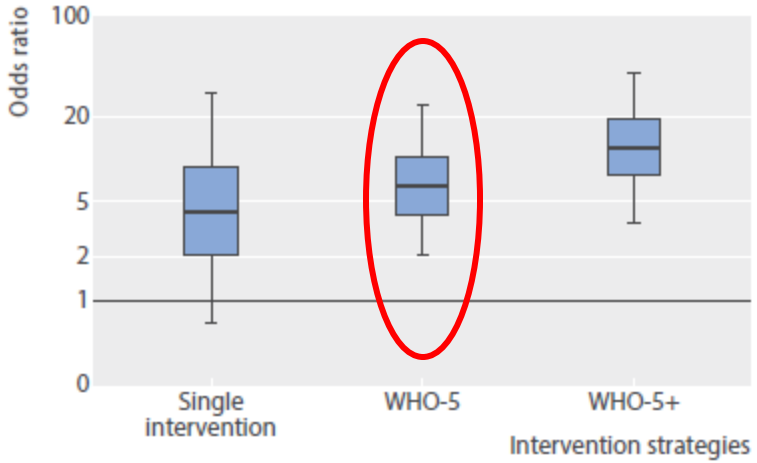
Articles

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

RESEARCH

cy of interventions to promote hand hygiene
atic review and network meta-analysis

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*

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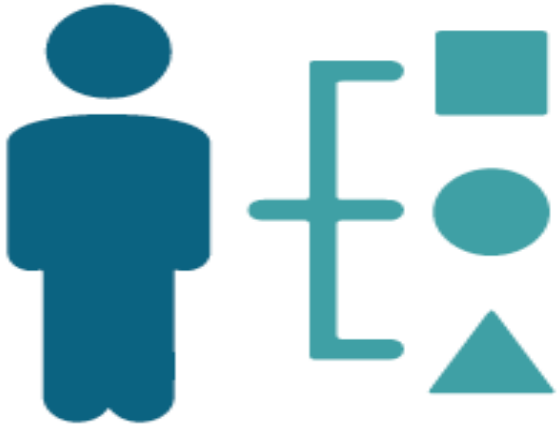
Multimodal thinking



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 health care 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…

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(training & education)

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Multimodal thinking…

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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…

4. Sell it

(reminders & communications)

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Multimodal thinking…

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?

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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 national recommendation

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

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.

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 five) 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 and supplies to enable IPC good practices); (ii) **education and training** of health care workers and key players (for example, managers); (iii) **monitoring** of 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. It is important to note the distinction between a multimodal strategy and a bundle. A bundle is an implementation tool aiming to improve the care process and patient outcomes in a structured manner.

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 behavioural 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.
- A focus only 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 wider quality improvement supports facility-level improvements, resulting in improved practices that help reduce the spread of HAIs and AMR.

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.

WHY

- The use of multimodal strategies in IPC has been shown to be the best evidence-based approach to achieve sustained behavioural 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., monitoring and feedback, infrastructures or organizational culture.

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 and 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.

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

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Core component 6: Monitoring/audit of IPC practices & feedback

6 **Monitoring, Audit & Feedback** NEW

R6a *Strong*

R6b *Strong*

Regular monitoring/audit and timely feedback of health care practices should be undertaken according to IPC standards to prevent and control HAIs 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

Core Component 7: Workload, staffing & bed occupancy (facility level)

7 NEW **Workload, Staffing & Bed Occupancy** — **R7** *Strong*

In order to reduce the risk of HAI and the spread of AMR the following should be addressed: (1) bed occupancy should not exceed the standard capacity of the facility; (2) health care worker staffing levels should be adequately assigned according to patient workload.

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/)

World Health Organization

Core Component 8: Built environment, materials & equipment for IPC (facility level)

8 NEW **Built Environment, materials & Equipment**

8a *GPS*

R8b *Strong*

At the **facility** level patient care activities should be undertaken in a clean and/or hygienic environment that facilitates practices related to the prevention and control of HAI, as well as AMR, including all elements around the WASH infrastructure and services and the availability of appropriate IPC materials and equipment.

At the **facility** level materials and equipment to perform appropriate hand hygiene should be readily available at the point of care.

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

World Health Organization

Core Component 8: Built environment, materials & equipment for IPC

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

- *Allegranzi 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*

World Health Organization

IPC implementation: implications for low- and middle-income countries

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

Damani N. Simple measures save lives: an approach to infection control in countries with limited resources. J Hosp Infect. 2007;65(Suppl. 2):151-154.

World Health Organization

Reflections on IPC core components - Region of the Americas

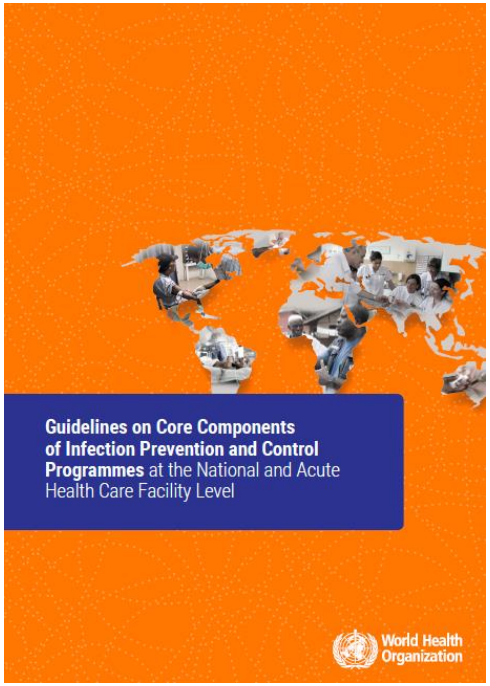
Major **challenges** in providing IPC support and making progress

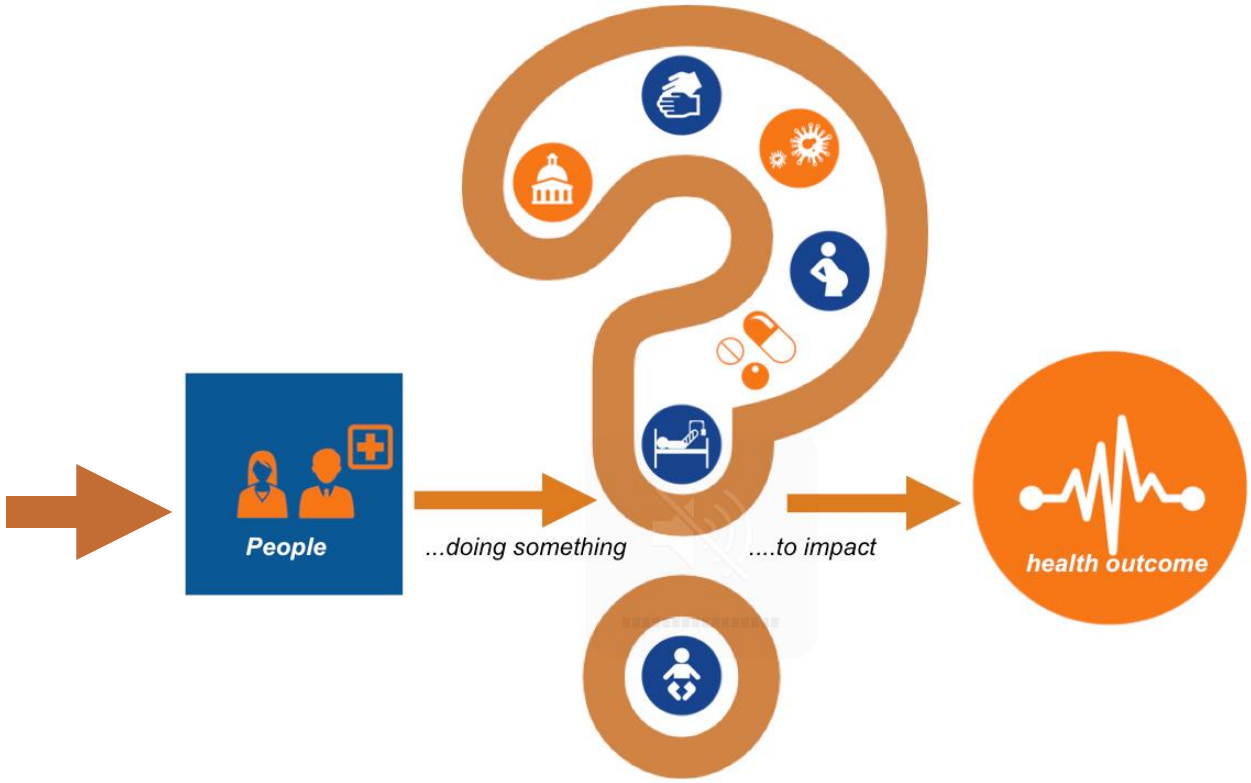
Core Component	Comment
1 – IPC programmes	• Political commitment for IPC in MoH • Organized and functional IPC program at the hospital level • Weak National IPC program
2 – IPG guidelines	• Implementation science and knowledge transfer
3 – IPC education and training	

4 – Surveillance	• Surveillance data – lack of standards and trendlines
	• Laboratory support
	  • readiness
	  • "outbreaks of SCN" (data misinterpretation)
	• The AMR Agenda and Pillar 3

5 – Multimodal strategies	• Not understood
6 – Monitoring/ audit of IPC practices and feedback	• M&E of IPC Program • M&E culture / environment
7 – Workload, staffing and bed occupancy	• Trained Human Resources – National and Hospital – • High turnover of HCW
8 – Built environment, materials and equipment for IPC at the facility level	• Funds not allocated

Translating guidelines to action





Implementation resources for the WHO IPC Core Components Guidelines

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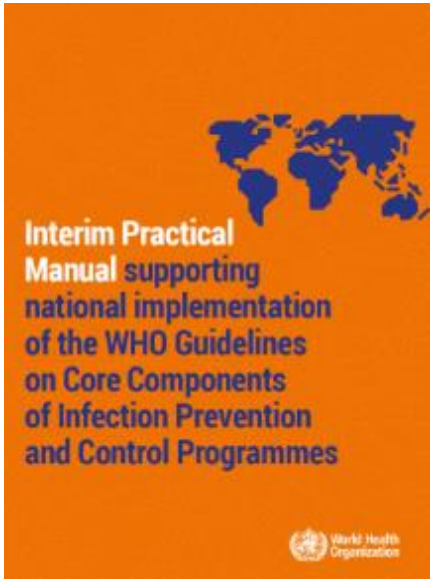
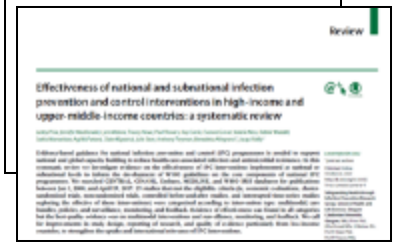
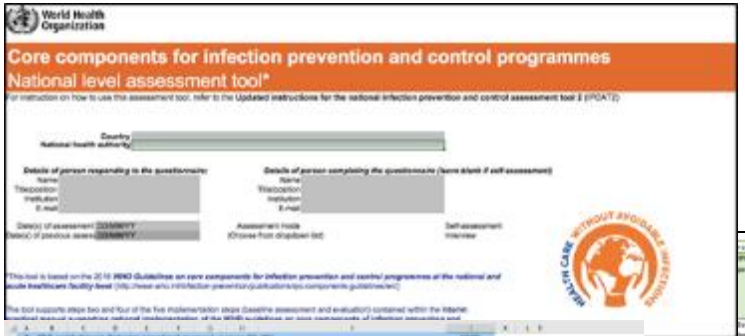
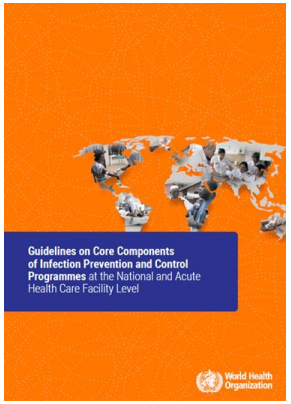






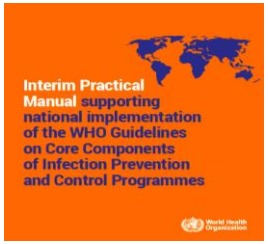
http://www.who.int/infection-prevention/tools/core-components/en/

The implementation approach



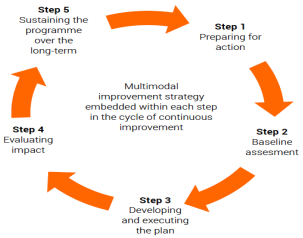
WHO Guidelines

Implementation packages



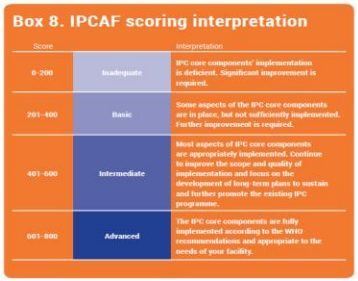
National

Health facility



5-Step implementation cycle

IPCAT2

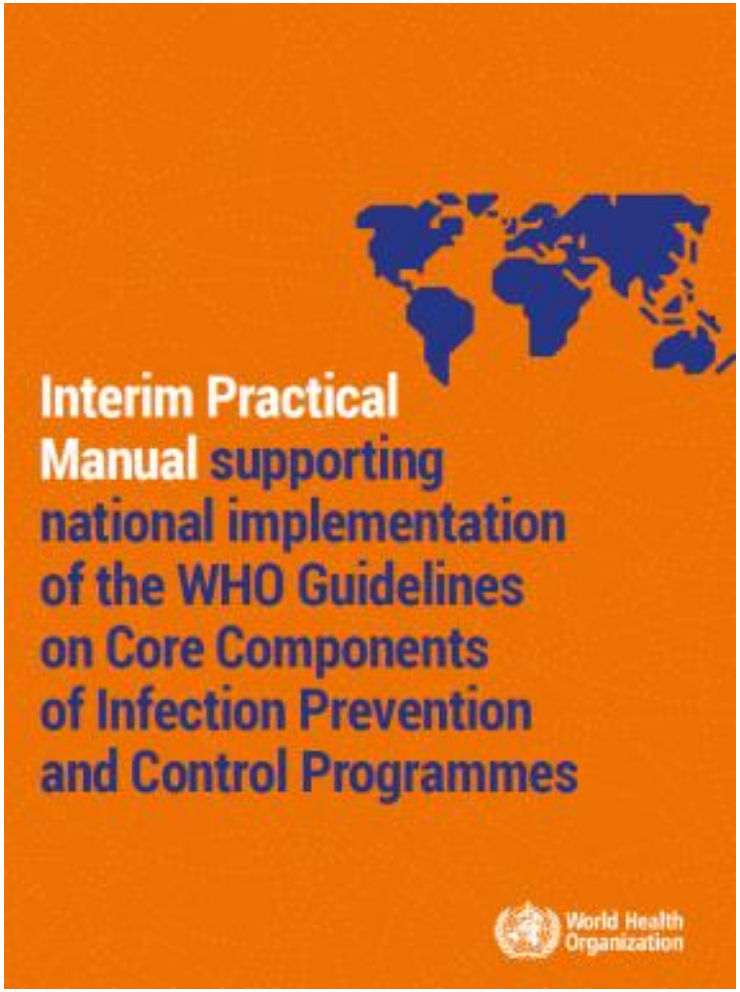


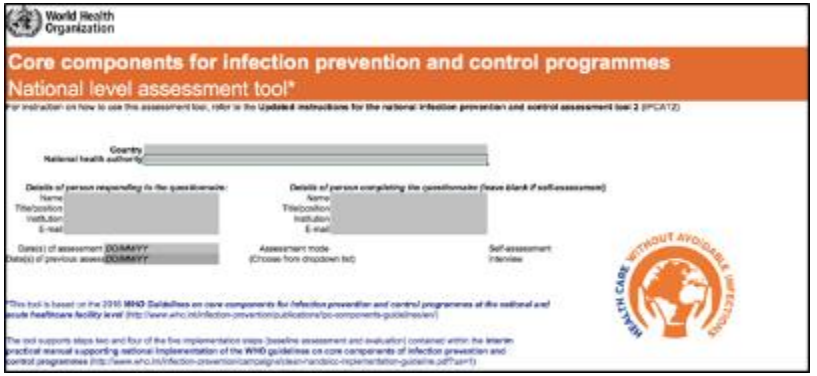
IPCAF

World Health Organization

Implementation manual and assessment tool for the national level

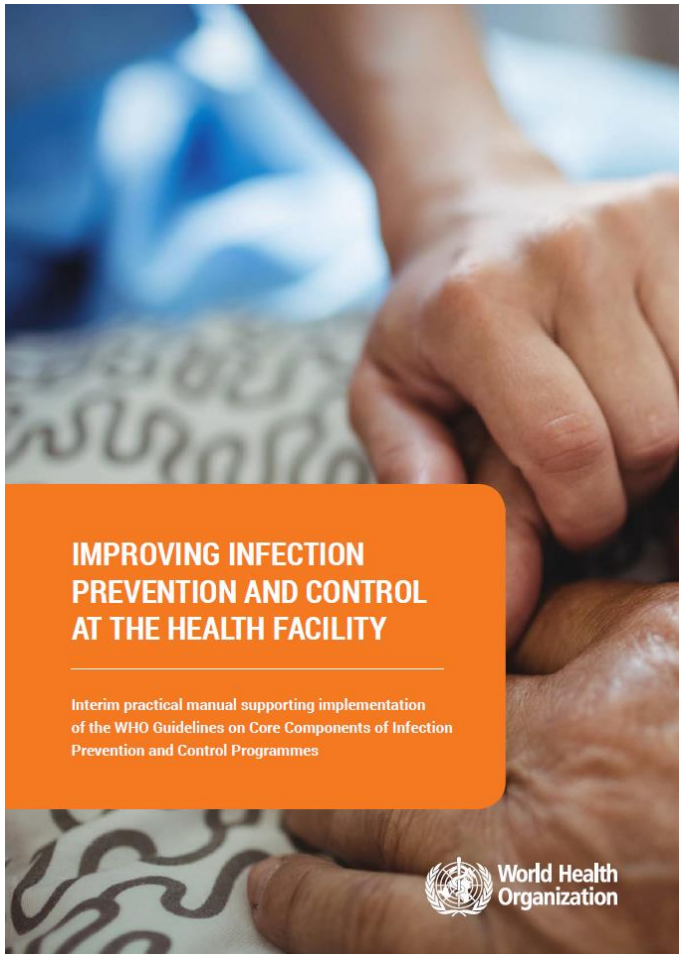
World Health Organization





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

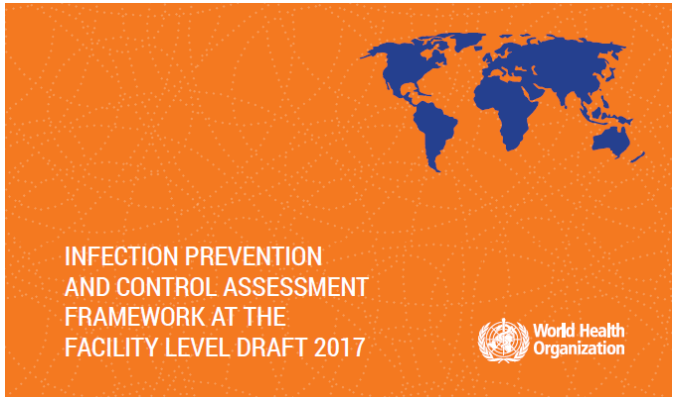
Implementation manual and assessment framework for the health facility level



- 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**

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

New IPC facility-level assessment tool



Core component 8: Built environment, materials and equipment for IPC at the facility level[27]

Question	Answer	Score
Water		
1. Are water services available at all times and of sufficient quantity for all uses (for example, hand washing, drinking, personal hygiene, medical activities, sterilization, decontamination, cleaning and laundry)? Choose one answer	☐ No, available on average < 5 days per week	0
	☐ Yes, available on average ≥ 5 days per week or every day but not of sufficient quantity	2.5
	☐ Yes, every day and of sufficient quantity	7.5
2. Is a reliable safe drinking water station present and accessible for staff, patients and families at all times and in all locations/wards? Choose one answer	☐ No, not available	0
	☐ Sometimes, or only in some places or not available for all users	2.5
	☐ Yes, accessible at all times and for all wards/groups	7.5
Hand hygiene and sanitation facilities		
3. Are functioning hand hygiene stations (that is, alcohol-based handrub solution or soap and water and clean single-use towels) available at all points of care? Choose one answer	☐ No, not present	0
	☐ Yes, stations present, but supplies are not reliably available	2.5
	☐ Yes, with reliably available supplies	7.5
4. In your facility, are ≥ 4 toilets or improved latrines[28] available for outpatient settings or ≥ 1 per 20 users for inpatient settings? Choose one answer	☐ Less than required number of toilets or latrines available and functioning	0
	☐ Sufficient number present but not all functioning	2.5
	☐ Sufficient number present and functioning	7.5

Box 8. IPCAF scoring interpretation

Score		Interpretation
0-200	Inadequate	IPC core components' implementation is deficient. Significant improvement is required.
201-400	Basic	Some aspects of the IPC core components are in place, but not sufficiently implemented. Further improvement is required.
401-600	Intermediate	Most aspects of IPC core components are appropriately implemented. Continue to improve the scope and quality of implementation and focus on the development of long-term plans to sustain and further promote the existing IPC programme.
601-800	Advanced	The IPC core components are fully implemented according to the WHO recommendations and appropriate to the needs of your facility.

- **Structured, closed-formatted questionnaire** with an associated scoring system based on the HHSAF 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/

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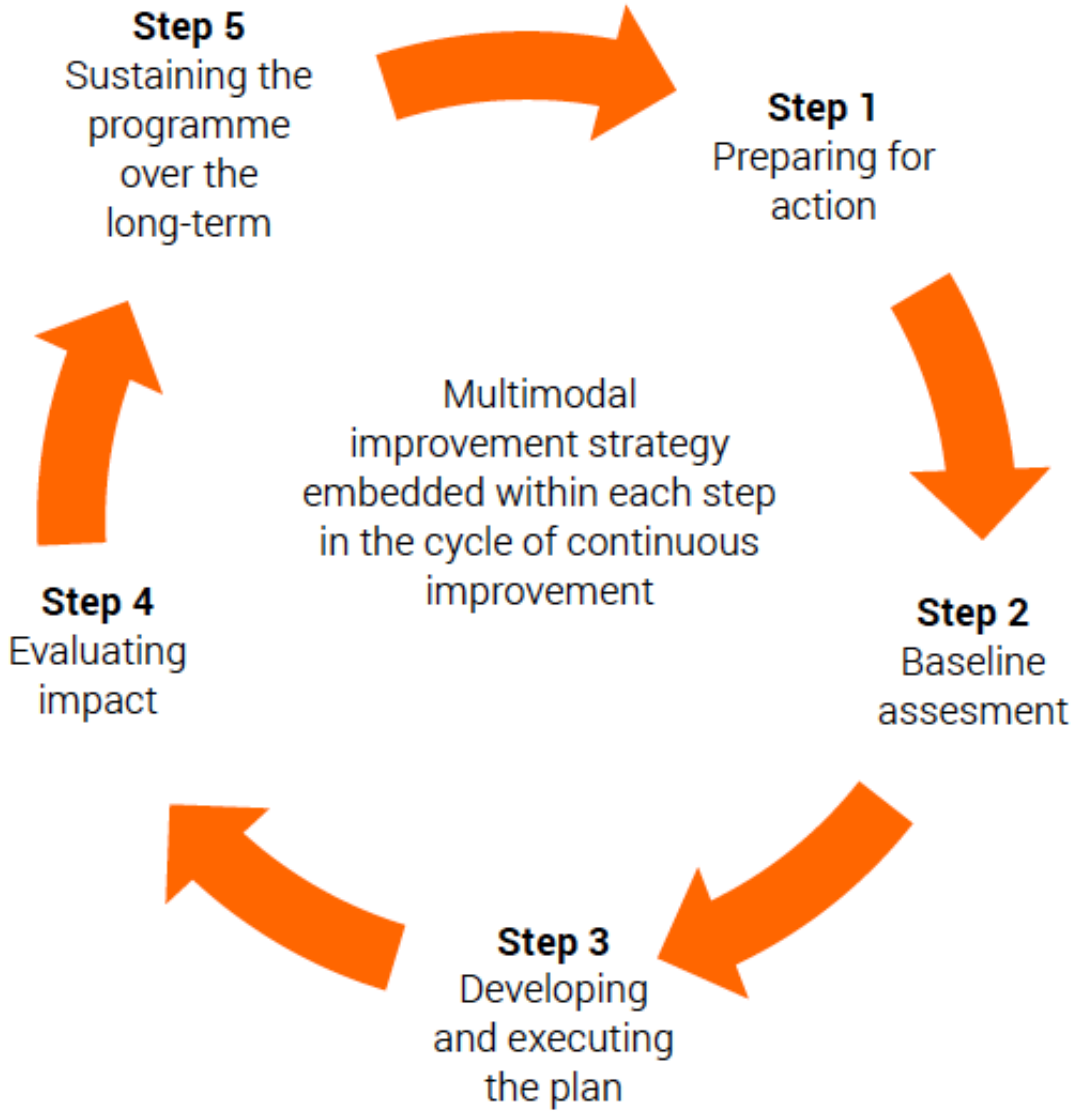
Highlights from part III

Stepwise approach



The 5-Step approach to IPC improvement

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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

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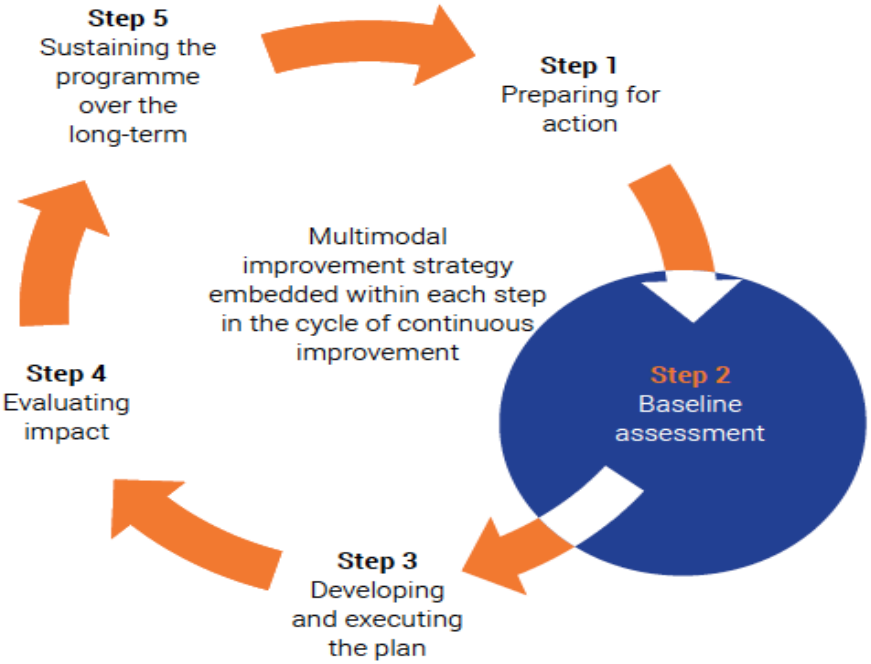
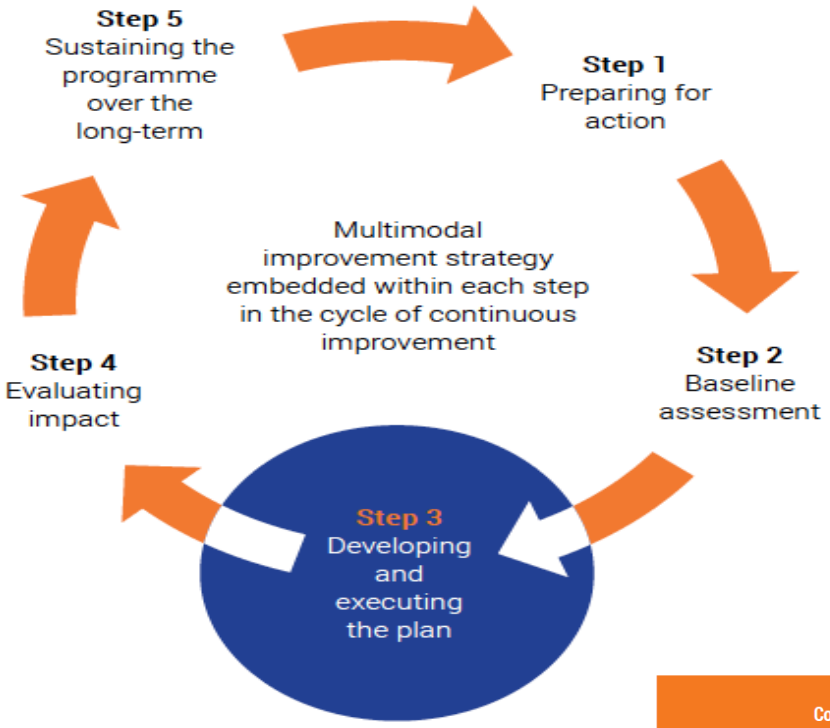


STEP 2
BASELINE ASSESSMENT



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STEP 3
DEVELOPING AND EXECUTING THE PLAN

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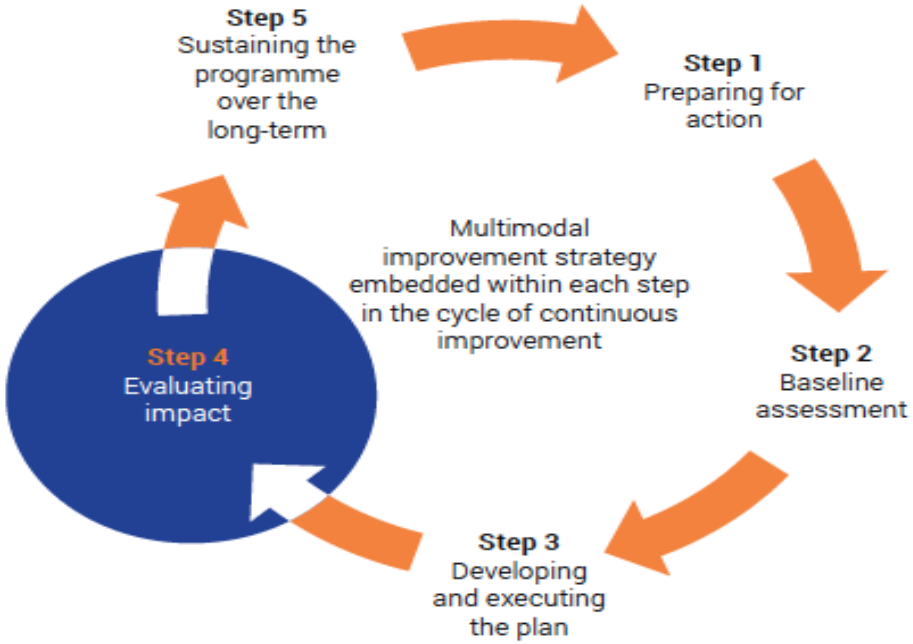

STEP 4
ASSESSING IMPACT

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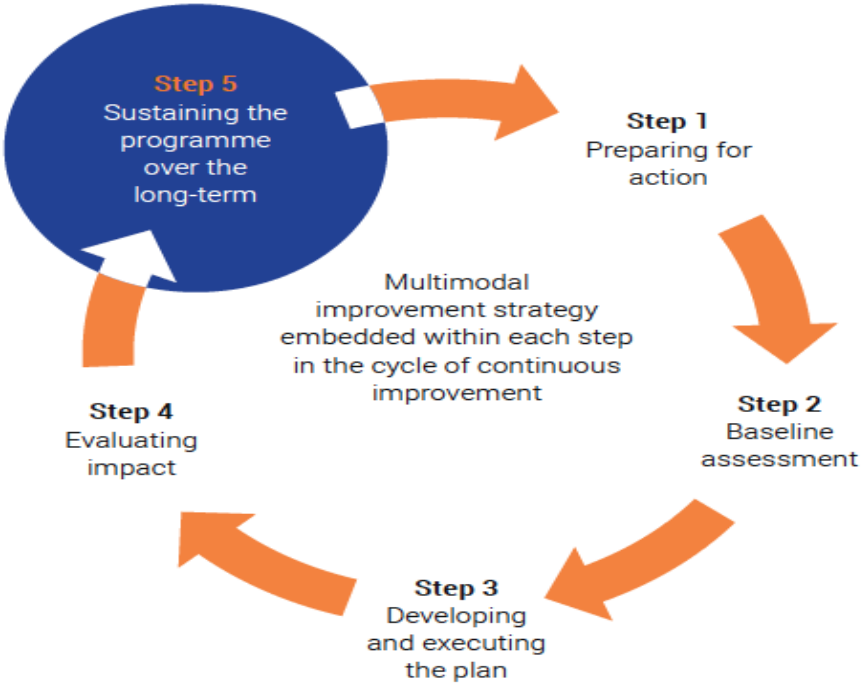


STEP 5
SUSTAINING THE PROGRAMME OVER THE LONG TERM

What help you can find

World Health Organization

PRACTICAL TIPS, KEY CONSIDERATIONS AND ACTIONS

IMPLEMENTATION BARRIERS AND SOLUTIONS

TOOLS AND RESOURCES

CASE STUDY EXAMPLES

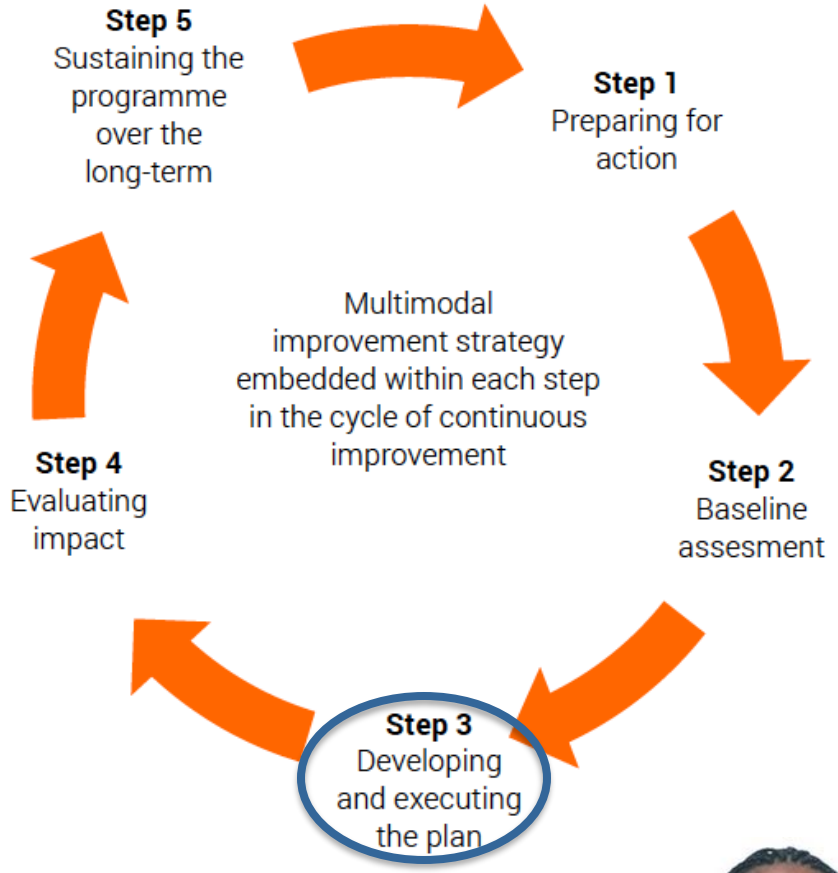
STEP 1 CHECKLIST

At the end of step 1 you should have: ✓

1.	Familiarized yourself with the core component guideline recommendations	
2.	Prepared a "script" or key points to guide discussions with management and leadership (using Figures 2 and 3)	
3.	Made a list of the exact key stakeholders that will be engaged, based on the local context	
4.	Collected any previous assessments/reports and data that address IPC	
5.	Investigated any IPC integration possibilities with current activities at the health care facility, for example, with AMR, etc.	
6.	Listed any patient or civil society groups that exist and could support IPC advocacy	
7.	Held a series of advocacy meetings with leaders, key stakeholders and champions/opinion leaders using the sample script (Figure 3)	
8.	Secured verbal and written management and leadership support for IPC	
9.	Identified an IPC lead/focal person and team, supported by health care facility managers	
10.	Identified possible human and financial resources to support and sustain the work (where necessary)	

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

Liberia: core components prioritization



Core components prioritization

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

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NATIONAL QUALITY MANAGEMENT ORGANIZATION

Minister of Health

Chief Medical Officer

Quality Advisory Board

National Quality Director

County Quality Manager

Hospital Med Director

QM Team Leader

QM Team

District Health Officer

District Data Clerk (QM Focal Person)

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

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.

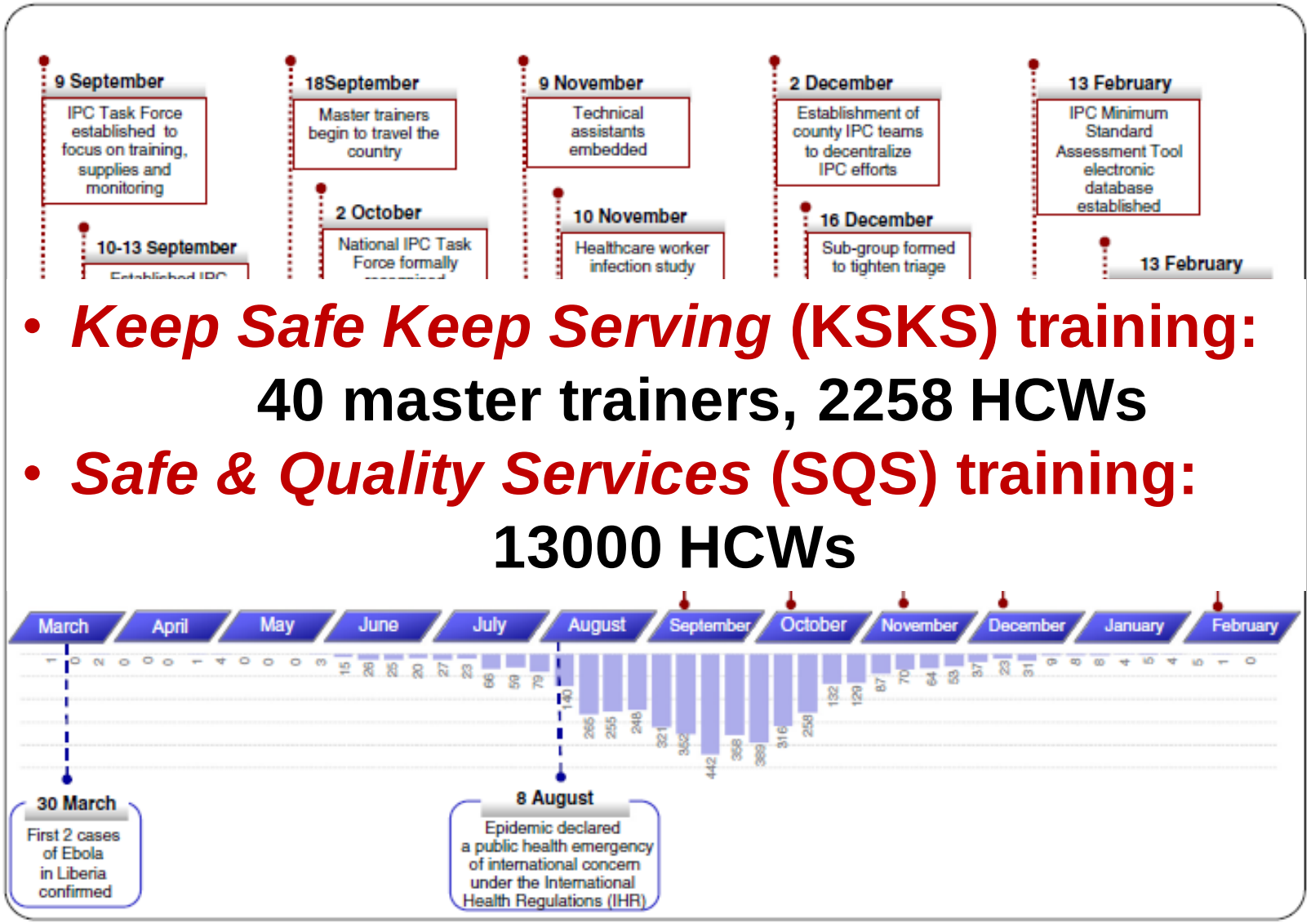
Hospital QM Team

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

District QM Team

- District Health Team
- Community Health Development Committee Rep.

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

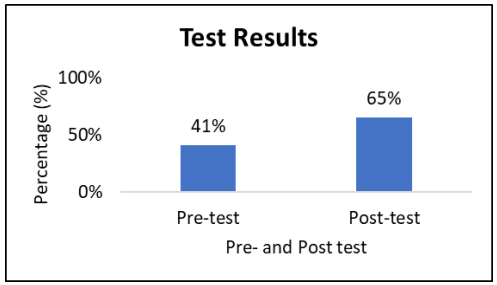
Cooper et al. BMC Med 2016; 14:2

WHO IPC Advanced Training (2017-18)

- Leadership and IPC program management
- Prevention of urinary tract infections
- Prevention of catheter-as[illegible]d bloodstream infections
- Prevention of respira[illegible]ions
- Prevention of i[illegible]
- Reproces[illegible]es
- Outbr[illegible]healthcare settings
- IPC to control antibiotic resistance
- HAI surveillance
- Injection safety

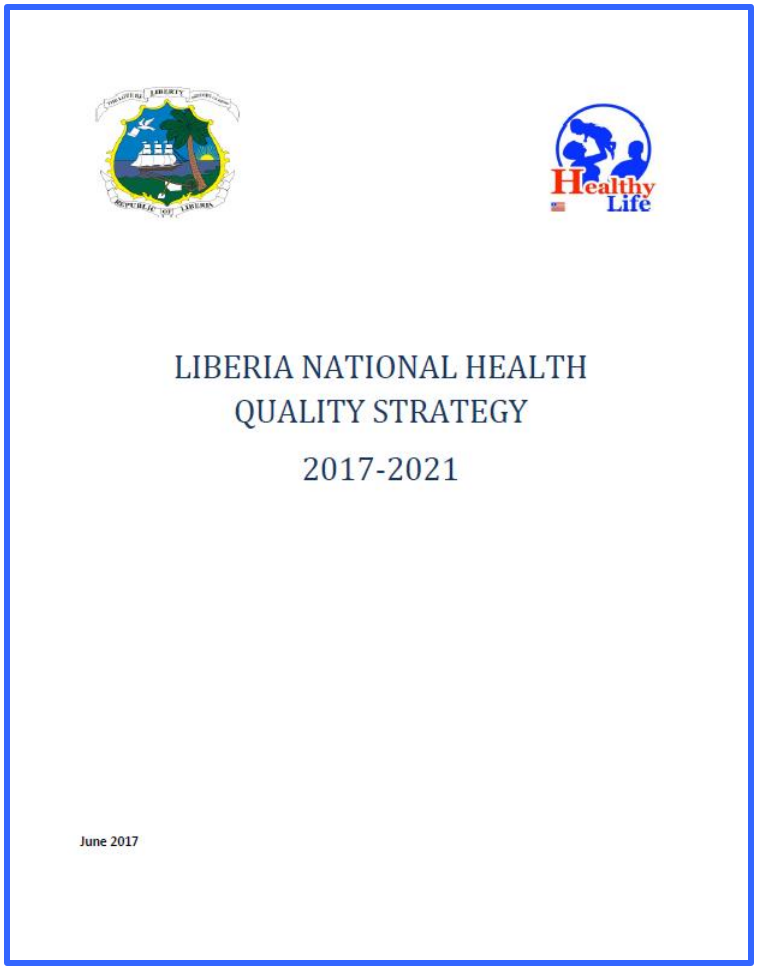
Liberia: 37 facility, county & national IPC focal persons

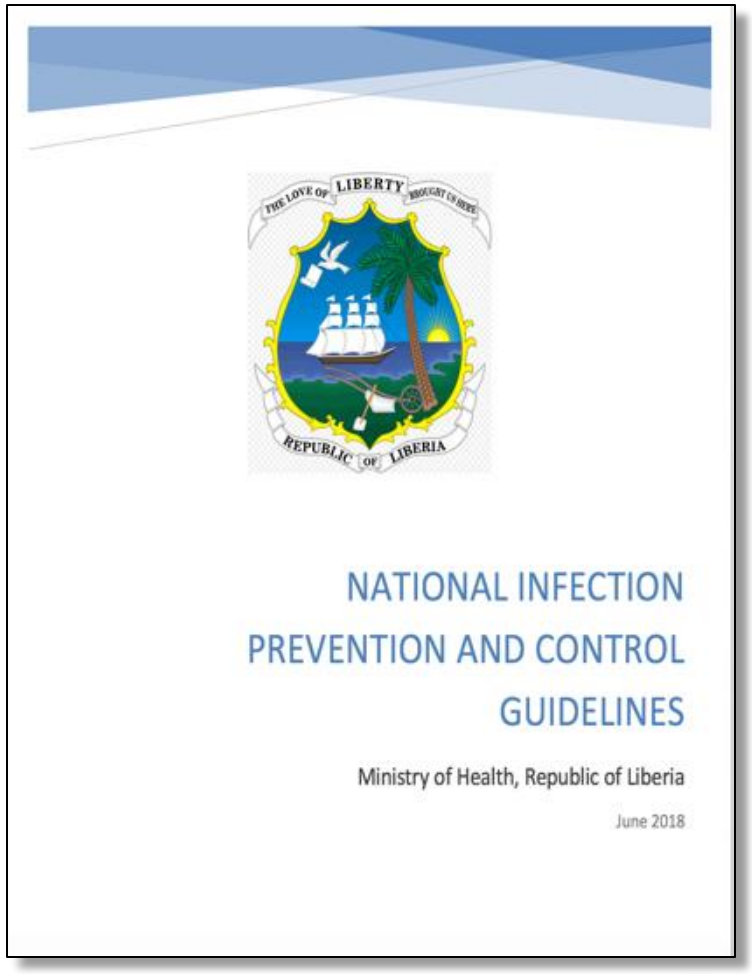
- Slides deck
- Trainer's manual
- Student's handbook
- E-learning module



World Health Organization

National quality policy and IPC guidelines (2018)





Liberia national IPC guidelines TOT

World Health Organization

Implementation example

Articles

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, Nejla Zeynep Kubilay, Peter Nthumba, Jack Barasa, Gabriel Okumu, Robert Mugarura, Alexander Etoku, Josephat Jombwe, Mayaba Maimbo, Joseph Musowoya, Angèle Gayet-Ageron, Sean M Berenholtz

Summary

Background Surgical site infections (SSIs) are the most frequent health-care-associated infections in developing countries. Specific 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 July 1, 2013, and Dec 31, 2015, at five African hospitals. The multimodal intervention consisted of the implementation or strengthening of multiple SSI prevention measures, combined with an adaptive approach aimed at the improvement of teamwork and the safety climate. The primary outcome was the first 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 k
quality) data for the sustainability period
891 in the sustainability period). SSI
8·0% (95% CI 6·8–9·5; n=129) to 3·8%
period (3·9%, 2·8–5·4; n=35). A substan
observed in the follow-up and sustainab
than pre-intervention (odds ratio [OR]
significantly reduced (0·72, 0·42–1·24;

Interpretation Implementation of our i
across all perioperative prevention practi
heterogeneity between sites. Further la
improve the sustainability and long-term

Funding US Agency for Healthcare Rese

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Lancet Infect Dis 2018; 18: 507–15
Published Online March 5, 2018
http://dx.doi.org/10.1016/S1473-3099(18)30101-6
See Comment page 474

Infection Prevention and Control Global Unit, World Health Organization, Geneva, Switzerland (B Allegranzi MD, N Z Kubilay MD); Division of Clinical Epidemiology

Introduction

Health-care-associated infections are o
common adverse events during care
evidence exists on the morbidity, mortali
health-care-associated infections in lo
middle-income countries, but WHO est
that the overall prevalence in these cou
the average reported in high-incom
According to WHO, surgical site infecti
most surveyed and most frequent health
infection in countries of low and middle i
affect up to one-third of surgical
significantly increased risk of SSI in cour
middle income affects all types of proce
clean surgery.[3] SSI is also the second
health-care-associated infection in Europe
Given the increasing recognition of the

Supplementary appendix

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

Contents

5 Hospitals

Key resource

Allegranzi B, et al. Lancet Infect Dis. 2018 Mar 5

World Health Organization

The surgical unit-based safety programme (SUSP)

World Health Organization

Patient safety culture improvement (CUSP):

- science of safety education
- staff safety assessment
- leadership
- learning from defects
- team work and communication

+

Infection prevention best practices

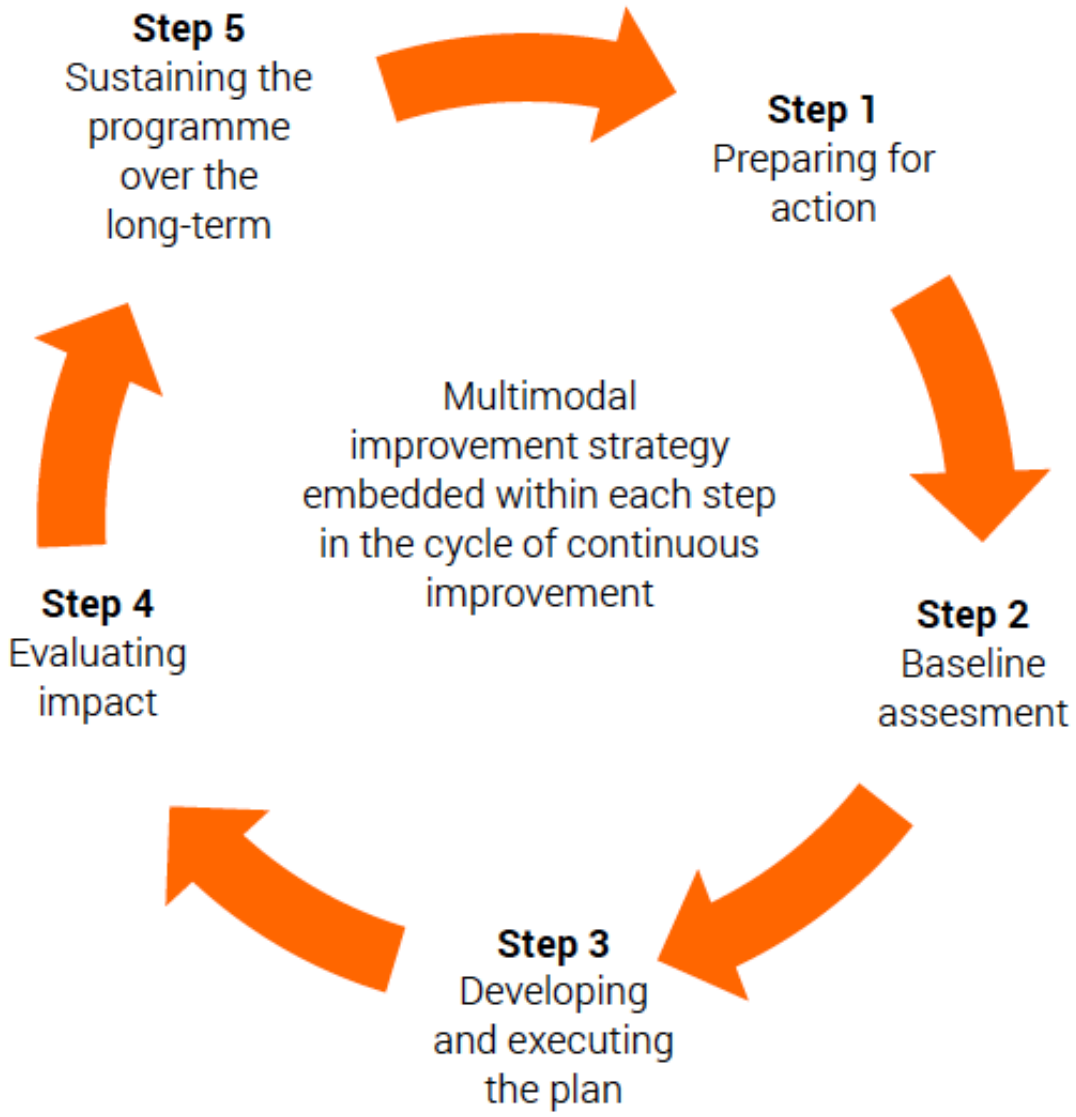
- *evidence-based and identified according to local staff assessment*

Improvement of the patient safety climate

Reduction of:

- SSIs
- surgical complications

Stepwise approach



Understand 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***

Source: https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/surgery/guide-appcusp.html


Organizational culture change
Modified WHO checklist
Pre-op Bath
No Hair removal
Surgical hand preparation
Surgical site skin preparation
OR discipline
Antibiotic prophylaxis

Multidisciplinary local teams

LAUNCHING THE SUSP PROJECT

Kijabe SUSP Team with Benedeta

Benedeta Speech

The SUSP Team with the infection control committee held a launch ceremony of WHO Surgical Unit Safety Program (SUSP) Project on Tuesday April 8TH in the KH chapel
The ceremony was officiated by DR.Benedetta ALLEGRANZI WHO Technical Lead.

She made some presentations on patient safety and importance of the study.

Kijabe SUSP Team with Senior Management Team

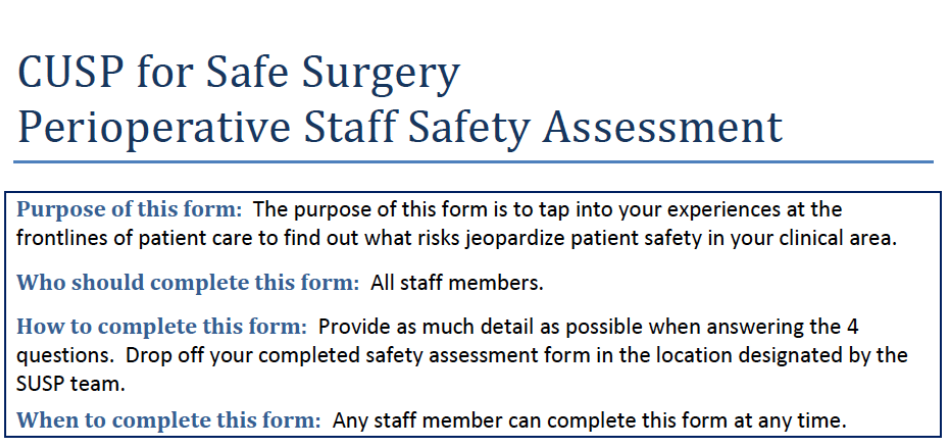
World Health Organization

Tools to address the culture

World Health Organization

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.



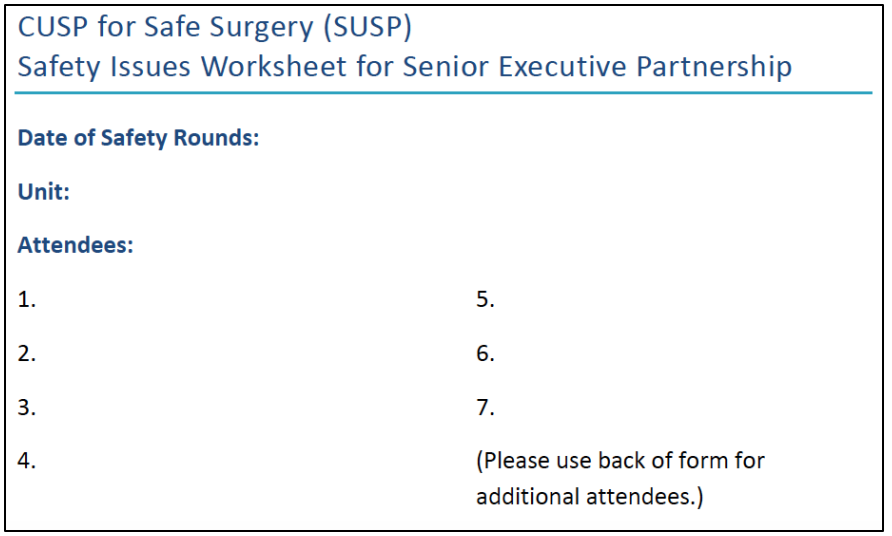
CUSP for Safe Surgery
Perioperative Staff Safety Assessment

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

Date of Safety Rounds:

Unit:

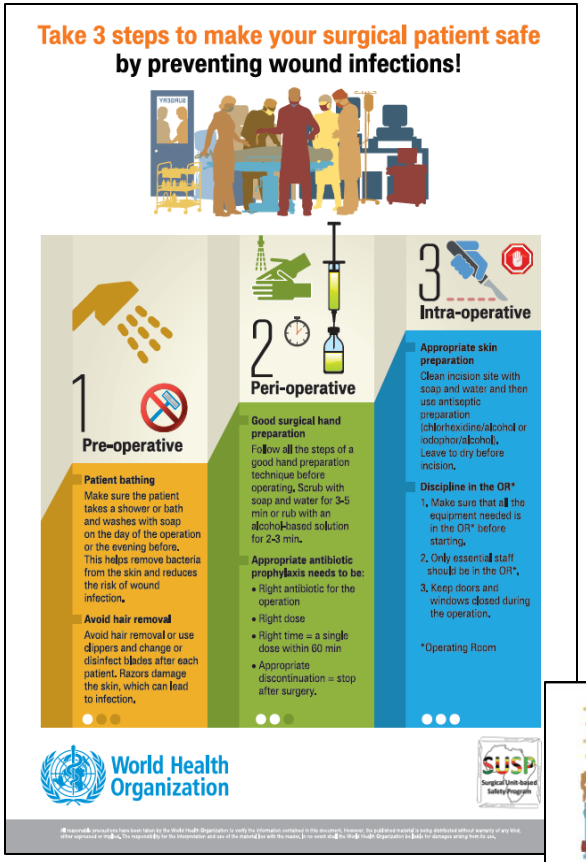
Attendees:

1. 5.
2. 6.
3. 7.
4. (Please use back of form for additional attendees.)

https://www.ahrq.gov/professionals/education/curriculum-tools/cusptoolkit/modules/index.html
https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/surgery/guide-appcusp.html

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

World Health Organization



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

System change - modified WHO formulations for surgical hand preparation

World Health Organization

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. H_2O_2 (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. H_2O_2 (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:

Suchomel M KM, Kundi M, Pittet D, Rotter ML. Modified World Health Organization hand rub formulations comply with European efficacy requirements for preoperative surgical hand preparations. Infect Control Hosp Epidemiol. 2013; 34(3):245–250.

Allegranzi B, Aiken AM, Zeynep Kubilay N, Nthumba P, Barasa J, Okumu G et al. A multimodal infection control and patient safety intervention to reduce surgical site infections in Africa: a multicentre, before–after, cohort study. Lancet Infect Dis. 2018; 18(5):507–515.

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%

Source: Allegranzi B, Aiken AM, Zeynep Kubilay N, Nthumba P, Barasa J, Okumu G et al. A multimodal infection control and patient safety intervention to reduce surgical site infections in Africa: a multicentre, before–after, cohort study. Lancet Infect Dis. 2018; 18(5):507–515.

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

Video

Tools for monitoring impact

Surgical Unit-based Safety Program
Protocol for SSI Surveillance in African sites

SUSP Surgical Unit-based Safety Program

Purpose of this document

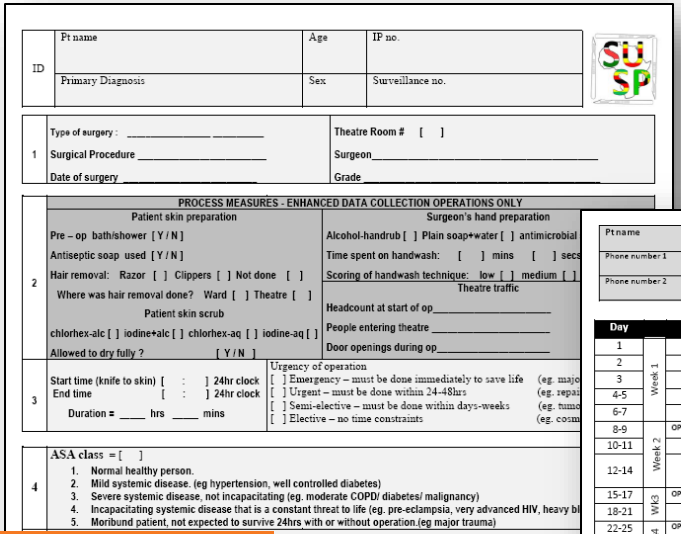
Conducting high-quality Surgical Site Infection (SSI) surveillance is challenging in any setting, but it is especially difficult to perform in routine practice in settings where resources are limited and hence, is rarely undertaken. Methods described for SSI surveillance in high-income countries (such as those of the Centers for Disease Control [CDC]) are not entirely appropriate in low/income countries (LICs) due to financial and other constraints, and hence there is a need for a practical, reproducible and low-cost SSI surveillance methodology for health professionals in these settings.

This protocol describes the intended format for SSI surveillance in the SUSP project being undertaken across five African Hospitals in 2013/14 under the coordination of the WHO Patient Safety Programme and in collaboration with Johns Hopkins University. This protocol is strongly based on the CDC method and definitions for SSI surveillance and is accompanied by data collection forms, training materials, information sheets and Epi-Info database that are meant to practically facilitate surveillance in the context of a LIC. These methods may need further adaptation according to local circumstances.

Principles of SSI surveillance

Surveillance can be described as *"The systematic collection, analysis and interpretation of health data, closely integrated with the timely dissemination of these data to those who need to know."* In surgical care, the collection of SSI surveillance information can serve to motivate and guide surgical teams on how to improve their services to minimize the risk of SSI in their patients. Most surgeons are very interested to know the results of SSI surveillance on their own patients, as long as they have confidence in the methods being used – so it is important that surgeons understand the key principles of the surveillance process.

Peri-operative form



ID | Pt name | Age | IP no.
Primary Diagnosis | Sex | Surveillance no.

1 | Type of surgery : _____ _____ | Theatre Room # [ ]
Surgical Procedure _____ | Surgeon_____
Date of surgery _____ | Grade _____

2 | PROCESS MEASURES - ENHANCED DATA COLLECTION OPERATIONS ONLY
Patient skin preparation | Surgeon's hand preparation
Pre – op bath/shower [Y / N] | Alcohol-handrub [ ] Plain soap+water [ ] antimicrobial
Antiseptic soap used [Y / N] | Time spent on handwash: [ ] mins [ ] secs
Hair removal: Razor [ ] Clippers [ ] Not done [ ] | Scoring of handwash technique: low [ ] medium [ ]
Where was hair removal done? Ward [ ] Theatre [ ] | Theatre traffic
Patient skin scrub | Headcount at start of op_____
chlorhex-alc [ ] iodine+alc [ ] chlorhex-aq [ ] iodine-aq [ ] | People entering theatre _____
Allowed to dry fully ? [Y / N] | Door openings during op_____

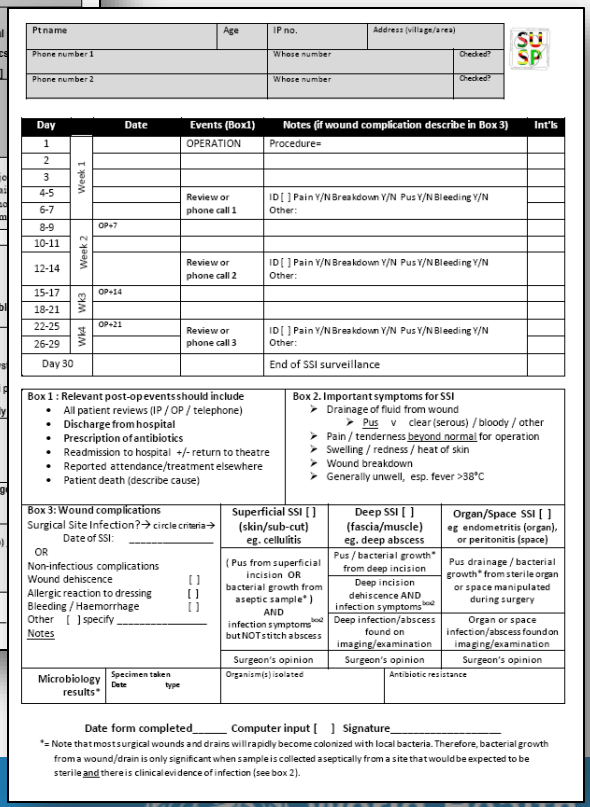
3 | Start time (knife to skin) [:] 24hr clock | Urgency of operation
End time [:] 24hr clock | [ ] Emergency – must be done immediately to save life (eg. majo
Duration = ____ hrs ____ mins | [ ] Urgent – must be done within 24-48hrs (eg. repai
[ ] Semi-elective – must be done within days-weeks (eg. tumo
[ ] Elective – no time constraints (eg. cosm

4 | ASA class = [ ]
1. Normal healthy person.
2. Mild systemic disease. (eg hypertension, well controlled diabetes)
3. Severe systemic disease, not incapacitating (eg. moderate COPD/ diabetes/ malignancy)
4. Incapacitating systemic disease that is a constant threat to life (eg. pre-eclampsia, very advanced HIV, heavy bl
5. Moribund patient, not expected to survive 24hrs with or without operation.(eg major trauma)

[ ] = Sterile tissue with no resident bacteria eg. Neurosurgery
[ ] = CONTROLLED entry to tissue with resident bacteria eg. hys
[ ] = UNCONTROLLED entry to tissue with bacteria eg. acute g-i p
[ ] = Heavy contamination (eg soil in wound) or infection already

[ ] patch [ ] shunt [ ]
phylaxie required [ ] Ceftriaxone [ ]
dose _____(mg/g)
Any antibiotics written up to start after surg
Drug_____ Dose ___
Doses/day _____ Duration (days)
mputer input [ ] Signature_____

Post-operative form



Pt name | Age | IP no. | Address (village/area)
Phone number 1 | Whose number | Checked?
Phone number 2 | Whose number | Checked?

Day		Date	Events (Box1)	Notes (if wound complication describe in Box 3)	Int'ls
1	Week 1		OPERATION	Procedure=	
2					
3					
4-5			Review or phone call 1	ID [ ] Pain Y/N Breakdown Y/N Pus Y/N Bleeding Y/N Other:	
6-7					
8-9	Week 2	OP+7			
10-11					
12-14			Review or phone call 2	ID [ ] Pain Y/N Breakdown Y/N Pus Y/N Bleeding Y/N Other:	
15-17	Wk3	OP+14			
18-21					
22-25	Wk4	OP+21	Review or phone call 3	ID [ ] Pain Y/N Breakdown Y/N Pus Y/N Bleeding Y/N Other:	
26-29					
Day 30				End of SSI surveillance	

Box 1 : Relevant post-op events should include
- All patient reviews (IP / OP / telephone)
- **Discharge from hospital**
- **Prescription of antibiotics**
- Readmission to hospital +/- return to theatre
- Reported attendance/treatment elsewhere
- Patient death (describe cause)

Box 2. Important symptoms for SSI
- Drainage of fluid from wound
  - Pus v clear (serous) / bloody / other
- Pain / tenderness beyond normal for operation
- Swelling / redness / heat of skin
- Wound breakdown
- Generally unwell, esp. fever >38°C

Box 3: Wound complications	Superficial SSI [ ] (skin/sub-cut) eg. cellulitis	Deep SSI [ ] (fascia/muscle) eg. deep abscess	Organ/Space SSI [ ] eg endometritis (organ), or peritonitis (space)
Surgical Site Infection? → circle criteria → Date of SSI: _____ OR	(Pus from superficial incision OR bacterial growth from aseptic sample*) AND infection symptoms[local] but NOT stitch abscess	Pus / bacterial growth* from deep incision	Pus drainage / bacterial growth* from sterile organ or space manipulated during surgery
Non-infectious complications: Wound dehiscence [ ] Allergic reaction to dressing [ ] Bleeding / Haemorrhage [ ] Other [ ] specify _____ Notes		Deep incision dehiscence AND infection symptoms[local]	
		Deep infection/abscess found on imaging/examination	Organ or space infection/abscess found on imaging/examination
	Surgeon's opinion	Surgeon's opinion	Surgeon's opinion

Microbiology results* | Specimen taken Date type | Organism(s) isolated | Antibiotic resistance

Date form completed_____ Computer input [ ] Signature_____

*= Note that most surgical wounds and drains will rapidly become colonized with local bacteria. Therefore, bacterial growth from a wound/drain is only significant when sample is collected aseptically from a site that would be expected to be sterile and there is clinical evidence of infection (see box 2).

World Health Organization | Patient Safety — A World Alliance for Safer Health Care | SAVE LIVES Clean Your Hands

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 folders 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

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

World Health Organization

Impact on preventive measures

	Baseline (n=1604)	Follow-up (n=1827)	p value	Sustainability period (n=891)
Preoperative patient bathing (n=4321, 0·02%)	1238 (77·2)	1544 (84·5)	<0·0001	799 (89·7)
Appropriate hair removal (n=4310, 0·3%)	1169 (73·1)	1702 (93·5)	<0·0001	880 (98·8)
Appropriate skin preparation (n=4307, 0·3%)	330 (20·7)	1644 (90·2)	<0·0001	845 (94·8)
Quality of surgical hand preparation (n=4223, 2·3%)	1213 (78·7)	1694 (94·4)	<0·0001	865 (97·4)
Appropriate use of antibiotic prophylaxis (n=4322, 0%)	205 (12·8)	714 (39·1)	<0·0001	635 (71·3)
Theatre discipline				
Theatre door openings per hour of operation time (n=4031, 6·7%)	14·8 (17·8)	14·2 (16·1)	0·3771	19·0 (21·6)
Number of individuals present at the start of the operation (n=4313, 0·2%)	8·3 (3·4)	7·7 (2·5)	<0·0001	7·4 (2·5)
Number of entries during the operation (n=4236, 2·0%)	5·0 (4·1)	4·8 (4·9)	0·1758	4·2 (2·7)

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**

Allegranzi B, et al. Lancet Infect Dis. 2018 Mar 5

World Health Organization

Impact on SSI

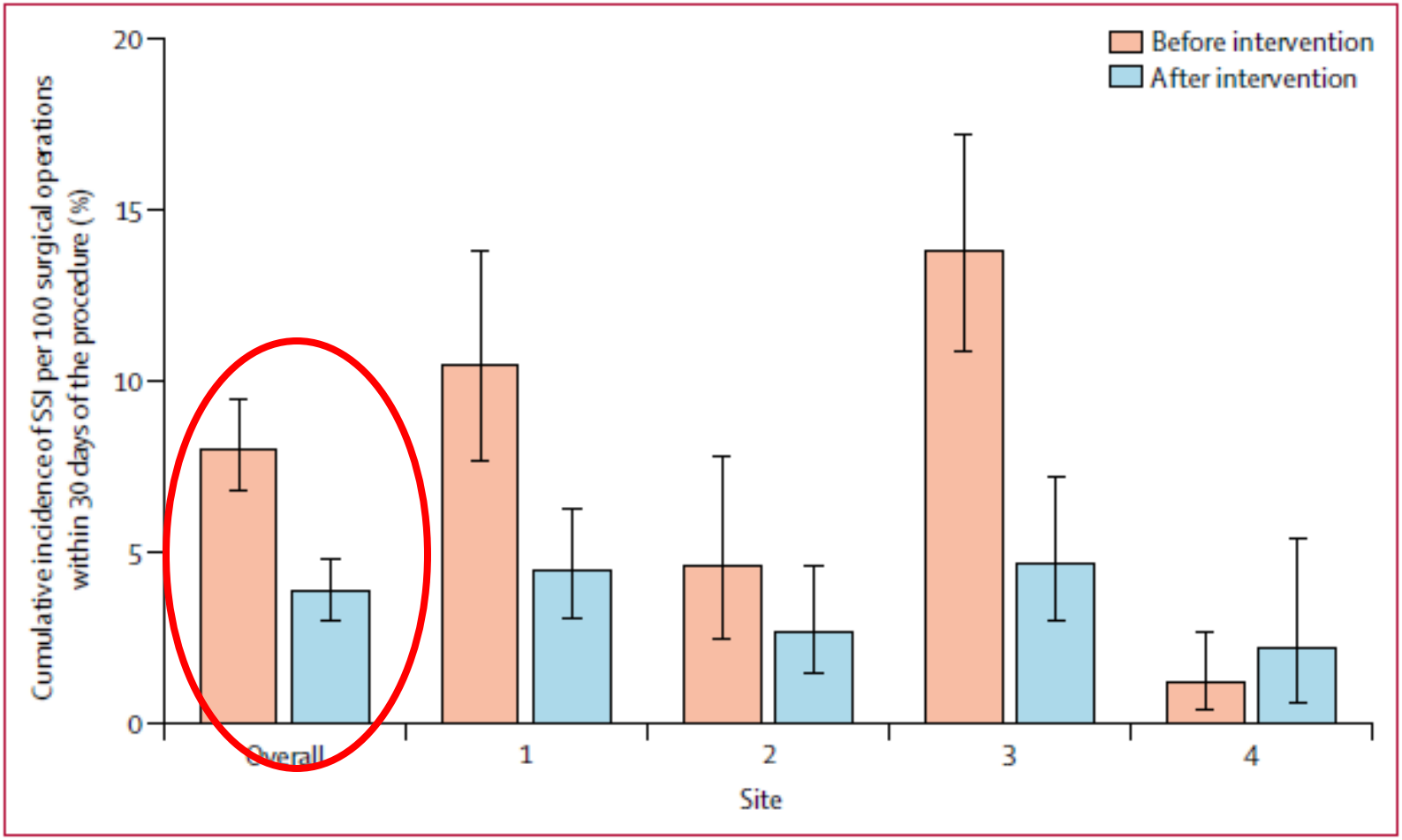


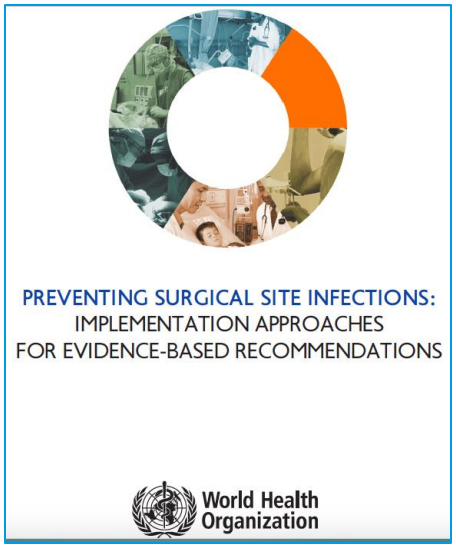
Figure 2: **Unadjusted SSI cumulative incidence overall and by site at baseline and follow-up in four sites**
Error bars show 95% CIs. SSI–surgical site infection.

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

World Health Organization



WHO SSI Prevention Hospital Implementation Guide

WHO Adaptive Tools to Support SSI Prevention Implementation

Fact sheets on SSI recommendations

NEW IMPLEMENTATION PLATFORM
Launching Soon!

SAVE LIVES: Clean Your Hands - 5 May 2019
Monitoring IPC & Hand Hygiene – WHO Global Survey 2019

- **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

World Health Organization

THANK YOU!!!

WHO Infection Prevention and Control Global Unit

Learn more at:

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