



**World Health
Organization**

**WHO global guidelines for the
prevention of surgical site infections
(and their implementation...)**

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STOP INFECTIONS AFTER SURGERY

WHAT'S THE PROBLEM?

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

LOW- AND MIDDLE-INCOME COUNTRIES



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

People's risk of SSI in LMICs is **3 TO 5 TIMES HIGHER** than in high-income countries



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



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



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

HIGH-INCOME COUNTRIES



In Europe, SSIs affect more than **500 000 PEOPLE** per year costing up to **€ 19 BILLION**

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



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



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Surgical Site Infection (SSI)

- In Europe, SSI are the second most frequent type of HAI (19.6%) – 543 149 (298 167-1 062 673) SSI episodes/year (HAI prevalence survey 2011)
- SSI are the most frequent type of HAI on admission (67% in US, 33% in Europe)
- **Surgical sepsis accounts for approximately 30% of all septic patients**
- **SSI are the most frequent type of HAIs in LMICs and rates are significantly higher than in HICs**



Main reasons for developing global guidelines for SSI prevention

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

WHO Global Guidelines for the Prevention of SSI

□ Aim:

- To provide a comprehensive range of evidence- and consensus-based recommendations for interventions related to the prevention of SSI during pre-, intra-, and post-operative periods
- Further ensure high quality care for every patient irrespective of resource availability

□ **Population:** patients of any age undergoing any type of surgical procedure

□ **Target audience: the surgical team** (surgeons, nurses, technical support staff, anesthesiologists, and any professionals directly providing surgical care), **infection prevention and control (IPC) professionals, policy-makers, senior managers, hospital administrators**, as well as those responsible for staff education and training.

WHO Guidelines for SSI Prevention: Methods (2)

□ Evidence quality assessment:

- Cochrane Collaboration tools (RCTs)
- Newcastle-Ottawa Quality Assessment Scale (cohort studies)
- Overall quality of the body of the retrieved evidence: graded as “high”, “medium”, “low”, or “very low” according to Grading of Recommendations Assessment, Development, and Evaluation (GRADE)

□ Meta-analyses:

- Meta-analyses performed using Review Manager version 5.3
- Random effects model; crude estimates pooled as odds ratios (OR) with 95% confidence intervals (CI)

□ Development of recommendations:

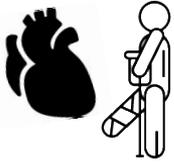
- According to the standard GRADE decision making process

□ Strength of recommendations:

- **“Strong”** – the expert panel was confident that benefits outweighed risks / considered to be adaptable for implementation in most (if not all) situations and patients should receive the intervention as the course of action.
- **“Conditional”** – the panel considered that benefits of the intervention probably outweighed the risks / a more structured decision-making process should be undertaken, based on stakeholder consultation and the involvement of patients and health care professionals.

A SUMMARY

WHO Recommendations for SSI Prevention for the Preoperative Period



Carriers' decolonisation
with mupirocin



MBP & use of oral
antibiotics



Hair removal



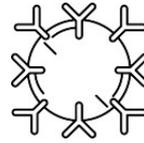
SAP optimal timing



Surgical hand
preparation



Surgical site skin
preparation



Perioperative
immunosuppressive agents



Enhanced nutritional support



Preoperative bathing



Antimicrobial skin sealants

SAP: surgical antibiotic prophylaxis

<http://who.int/infection-prevention/publications/ssi-guidelines/en/>

Launched on 3 November 2016



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WHO Recommendations for SSI Prevention for the Perioperative Period



Perioperative oxygenation



Incisional wound irrigation



Normothermia



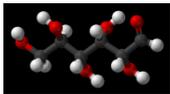
Prophylactic negative pressure wound therapy



Normovolemia



Antimicrobial-coated sutures



Glucose control



Laminar flow



Drapes and gowns



Wound protection devices

WHO Recommendations for SSI Prevention for the Postoperative Period



Surgical antibiotic
prophylaxis prolongation



Advanced
dressing



Antimicrobial prophylaxis
in presence of a drain

STRONG RECOMMENDATIONS

WHO Recommendations for SSI Prevention for the Preoperative Period (1)

Topic	Research Question	Recommendation	<u>Strength</u> Quality
Decolonisation with mupirocin ointment with or without CHG body wash for the prevention of <i>Staphylococcus aureus</i> infection in nasal carriers undergoing surgery	Is mupirocin nasal ointment in combination with or without a CHG body wash effective in reducing the number of <i>S. aureus</i> infections in nasal carriers undergoing surgery?	<p><i>Patients undergoing cardiothoracic and orthopaedic surgery with known nasal carriage of S. aureus should receive perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash.</i></p> <p>Consider also treating patients with known nasal carriage of <i>S. aureus</i> undergoing other types of surgery with perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash.</p>	<p>Strong recommendation</p> <p>-----</p> <p>Moderate quality of evidence</p> <p>-----</p> <p>Conditional recommendation</p> <p>-----</p> <p>Moderate quality of evidence</p>
Mechanical bowel prep (MBP) and the use of oral antibiotics	Is MBP combined with or without oral antibiotics effective for the prevention of SSI in colorectal surgery?	<p>Preoperative oral antibiotics combined with MBP should be used to reduce the risk of SSI in adult patients undergoing elective colorectal surgery.</p> <p><i>MBP alone (without the administration of oral antibiotics) should not be used for the purpose of reducing SSI in adult patients undergoing elective colorectal surgery.</i></p>	<p>Conditional recommendation</p> <p>-----</p> <p>moderate quality of evidence</p> <p>Strong recommendation</p> <p>-----</p> <p>Moderate quality of evidence</p>

WHO Recommendations for SSI Prevention for the Preoperative Period (2)

Topic	Research Question	Recommendation	Strength Quality
Hair removal	<p>1. Does hair removal affect the incidence of SSI?</p> <p>1. What method and timing of hair removal is associated with the reduction of SSI?</p>	<p><i>In patients undergoing any surgical procedure, either hair should not be removed or, if absolutely necessary, it should be removed only with a clipper. Shaving is strongly discouraged at all times, whether preoperatively or in the operating room.</i></p>	<p>Strong recommendation</p> <p>-----</p> <p>Moderate quality of evidence</p>
Optimal timing for administration of surgical antibiotic prophylaxis	<p>How does the timing of surgical antibiotic prophylaxis administration impact on the risk of SSI and what is the precise optimal timing?</p>	<p><i>When indicated (depending on the type of operation), surgical antibiotic prophylaxis should be administered prior to the surgical incision.</i></p> <p><i>Surgical antibiotic prophylaxis should be administered within 120 minutes before incision, while considering the half-life of the antibiotic.</i></p>	<p>Strong recommendation</p> <p>-----</p> <p>low quality of evidence</p> <p>Strong recommendation</p> <p>-----</p> <p>Moderate quality of evidence</p>

WHO Recommendations for SSI Prevention for the Preoperative Period (3)

Topic	Research Question	Recommendation	<u>Strength</u> Quality
Surgical hand preparation	<ol style="list-style-type: none"> 1. What is the most effective type of product for surgical hand preparation to prevent SSI? 2. What is the most effective technique and the ideal duration of surgical hand preparation? 	<i>Surgical hand preparation should be performed using either a suitable antimicrobial soap and water or a suitable alcohol-based hand rub before donning sterile gloves.</i>	Strong recommendation ----- Moderate quality of evidence
Surgical site preparation	In surgical patients, should alcohol-based antiseptic or aqueous solutions be used for skin preparation and, more specifically, should CHG or PVP-I solutions be used?	<i>Alcohol-based antiseptic solutions, particularly based on chlorhexidine gluconate (CHG), are recommended for surgical site skin preparation in patients undergoing surgical procedures.</i>	Strong recommendation ----- Low to moderate quality of evidence

WHO Recommendations for SSI Prevention for the Intra- & Postoperative Period

Topic	Research Question	Recommendation	Strength Quality
Perioperative oxygenation	How safe and effective is the perioperative use of increased FiO ₂ in reducing the risk of SSI?	<i>Adult patients undergoing general anaesthesia with endotracheal intubation for surgical procedures should receive FiO₂ 80% intra-operatively and, if feasible, in the immediate postoperative period for 2-6 hours.</i>	Strong recommendation ----- Moderate quality of evidence
Surgical antibiotic prophylaxis prolongation	Does continued postoperative surgical antibiotic prophylaxis reduce the risk of SSI compared with preoperative and (if necessary) intraoperative prophylaxis only?	<i>Surgical antibiotic prophylaxis administration should not be prolonged after completion of the operation for the purpose of preventing SSI.</i>	Strong recommendation ----- --Moderate quality of evidence

Priority – 4 recommendations specifically focus on improving antibiotic use in surgery

1. Optimal timing for surgical antibiotic prophylaxis (SAP)

- EV SAP should be administered prior to the surgical incision when indicated (depending on the type of operation)
- The administration of SAP should be within 120 minutes of the incision, while considering the half-life of the antibiotic (microbiology and pharmacy advice will support this decision)

Recommendations against:

- ~~2. antibiotic wound irrigation~~
- ~~3. antibiotic prophylaxis in presence of a drain~~
- ~~4. SAP prolongation in the post operative period~~



IMPLEMENTATION

Science of implementation

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

Implementation

- technical and adaptive work

TECHNICAL WORK

Work that we know we should do: implementation of evidence-based recommendations (e.g. appropriate antibiotic dosing and skin preparation)

Work that lends itself to standardization (e.g., **checklists and protocols**)

Evidence-based interventions

ADAPTIVE WORK

The intangible components of work, like ensuring team members speak up with concerns and hold each other accountable

Work that shapes the **attitudes, beliefs, and values** of clinicians, so they consistently perform tasks the way they know they should

Safety culture, including improved communications and teamwork

Critical engagement of the multidisciplinary team

- Surgical team: OR, ward, and outpatient services
- Infection prevention & control
- Anaesthesiologists
- Sterilization services
- Pharmacists
- Senior managers
- Trainers

A key lesson - summary of a multimodal strategy

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

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.

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.

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.

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).

5. Live it (culture change)



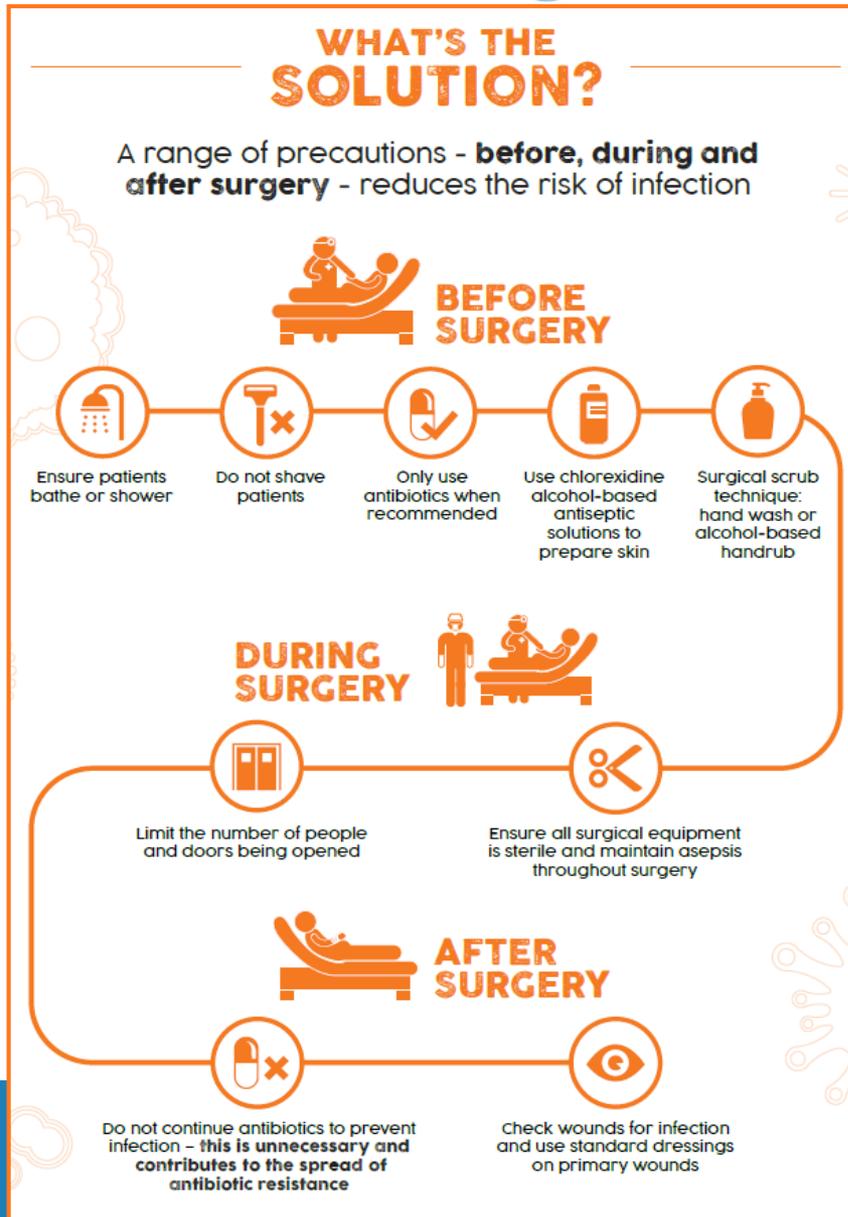
Is there demonstrable support for the intervention at every level of the health system? For example, do senior managers provide funding for equipment and other resources? Are they willing to be champions and role models for IPC improvement?

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.

These 5 components have been embodied in practice in some form to achieve success in SSI prevention

SSI prevention throughout the patient journey is our goal



THANK YOU

WHO Infection Prevention and Control Global Unit



More at:

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



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