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

HIGH-INCOME COUNTRIES

- In Europe, SSIs affect more than 500,000 people per year costing up to €19 BILLION
- Around 1% of people who have surgery in the USA get an SSI
- In the USA, SSIs contribute to patients spending more than 400,000 extra days in hospital, costing US$10 BILLION per year

- SSIs 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

World Health Organization
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

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

**SAP:** surgical antibiotic prophylaxis


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WHO Recommendations for SSI Prevention for the Perioperative Period

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


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

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

Launched on 3 November 2016

STRONG RECOMMENDATIONS
<table>
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<th>Topic</th>
<th>Research Question</th>
<th>Recommendation</th>
<th>Strength Quality</th>
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| Decolonisation with mupirocin ointment with or without CHG body wash for the prevention of *Staphylococcus aureus* 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 *S. aureus* infections in nasal carriers undergoing surgery? | *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.*<br><br>Consider also treating patients with known nasal carriage of *S. aureus* undergoing other types of surgery with perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash. | Strong recommendation  
--------------------------  
Moderate quality of evidence  
Conditional recommendation  
--------------------------  
Moderate quality of evidence |
| 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? | Preoperative oral antibiotics combined with MBP should be used to reduce the risk of SSI in adult patients undergoing elective colorectal surgery.<br><br>*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.* | Conditional recommendation  
--------------------------  
Moderate quality of evidence  
Strong recommendation  
--------------------------  
Moderate quality of evidence |
## WHO Recommendations for SSI Prevention for the Preoperative Period (2)

<table>
<thead>
<tr>
<th>Topic</th>
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<th>Recommendation</th>
<th>Strength Quality</th>
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</table>
| Hair removal                               | 1. Does hair removal affect the incidence of SSI?                                  | *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.* | Strong recommendation  
Moderate quality of evidence                          |
|                                            | 1. What method and timing of hair removal is associated with the reduction of SSI? | *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.* | Strong recommendation  
Moderate quality of evidence                          |
| Optimal timing for administration of surgical antibiotic prophylaxis | How does the timing of surgical antibiotic prophylaxis administration impact on the risk of SSI and what is the precise optimal timing? | *When indicated (depending on the type of operation), surgical antibiotic prophylaxis should be administered prior to the surgical incision.*  
*Surgical antibiotic prophylaxis should be administered within 120 minutes before incision, while considering the half-life of the antibiotic.* | Strong recommendation  
Low quality of evidence                                    | Strong recommendation  
Moderate quality of evidence                                    |
## WHO Recommendations for SSI Prevention for the Preoperative Period (3)

<table>
<thead>
<tr>
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<th>Recommendation</th>
<th>Strength</th>
<th>Quality</th>
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| Surgical hand preparation    | 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? | 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. | 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? | Alcohol-based antiseptic solutions, particularly based on chlorhexidine gluconate (CHG), are recommended for surgical site skin preparation in patients undergoing surgical procedures. | Strong recommendation | Low to moderate quality of evidence |
## WHO Recommendations for SSI Prevention for the Intra- & Postoperative Period

<table>
<thead>
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<th>Topic</th>
<th>Research Question</th>
<th>Recommendation</th>
<th>Strength Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perioperative oxygenation</td>
<td>How safe and effective is the perioperative use of increased FiO2 in reducing the risk of SSI?</td>
<td><em>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.</em></td>
<td>Strong recommendation -- Moderate quality of evidence</td>
</tr>
<tr>
<td>Surgical antibiotic prophylaxis prolongation</td>
<td>Does continued postoperative surgical antibiotic prophylaxis reduce the risk of SSI compared with preoperative and (if necessary) intraoperative prophylaxis only?</td>
<td><em>Surgical antibiotic prophylaxis administration should not be prolonged after completion of the operation for the purpose of preventing SSI.</em></td>
<td>Strong recommendation -- Moderate quality of evidence</td>
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</table>
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
WHO global guidelines for SSI prevention

Launched on 3 November 2016

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

<table>
<thead>
<tr>
<th>TECHNICAL WORK</th>
<th>ADAPTIVE WORK</th>
</tr>
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<tbody>
<tr>
<td>Work that we know we should do: implementation of evidence-based recommendations (e.g. appropriate antibiotic dosing and skin preparation)</td>
<td>The intangible components of work, like ensuring team members speak up with concerns and hold each other accountable</td>
</tr>
<tr>
<td>Work that lends itself to standardization (e.g., checklists and protocols)</td>
<td>Work that shapes the <strong>attitudes, beliefs, and values</strong> of clinicians, so they consistently perform tasks the way they know they should</td>
</tr>
<tr>
<td>Evidence-based interventions</td>
<td>Safety culture, including improved communications and teamwork</td>
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</tbody>
</table>
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:

1. **Build it** (system change)
   - What infrastructure, 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 hand rubs at the point of care and the availability of WASH infrastructures (including water and soap) are important considerations. Are those 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 nurses and community workers, is important considerations, as well as adequate dispensing 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/reminding 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.

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/