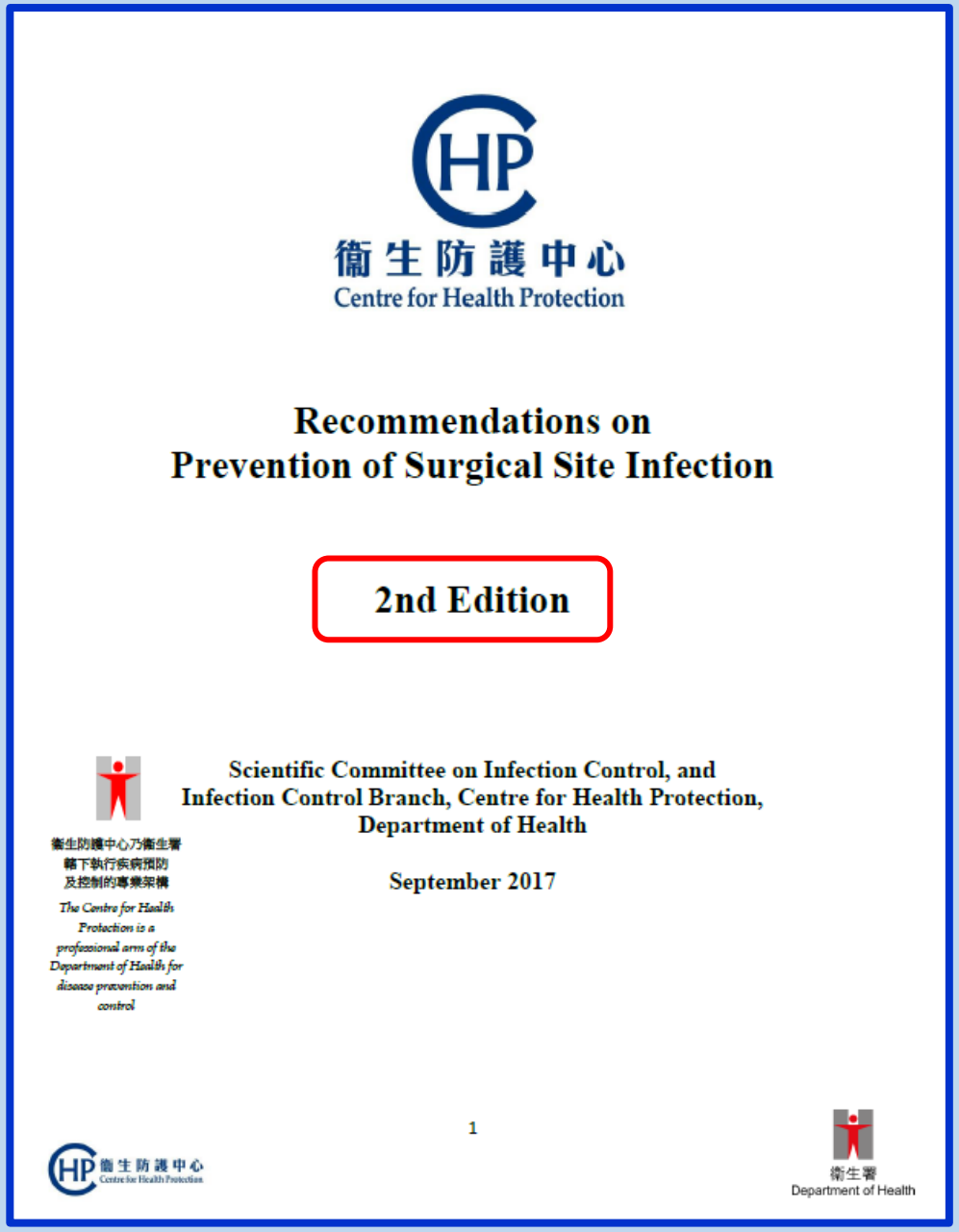
178 pages



First guideline 2009

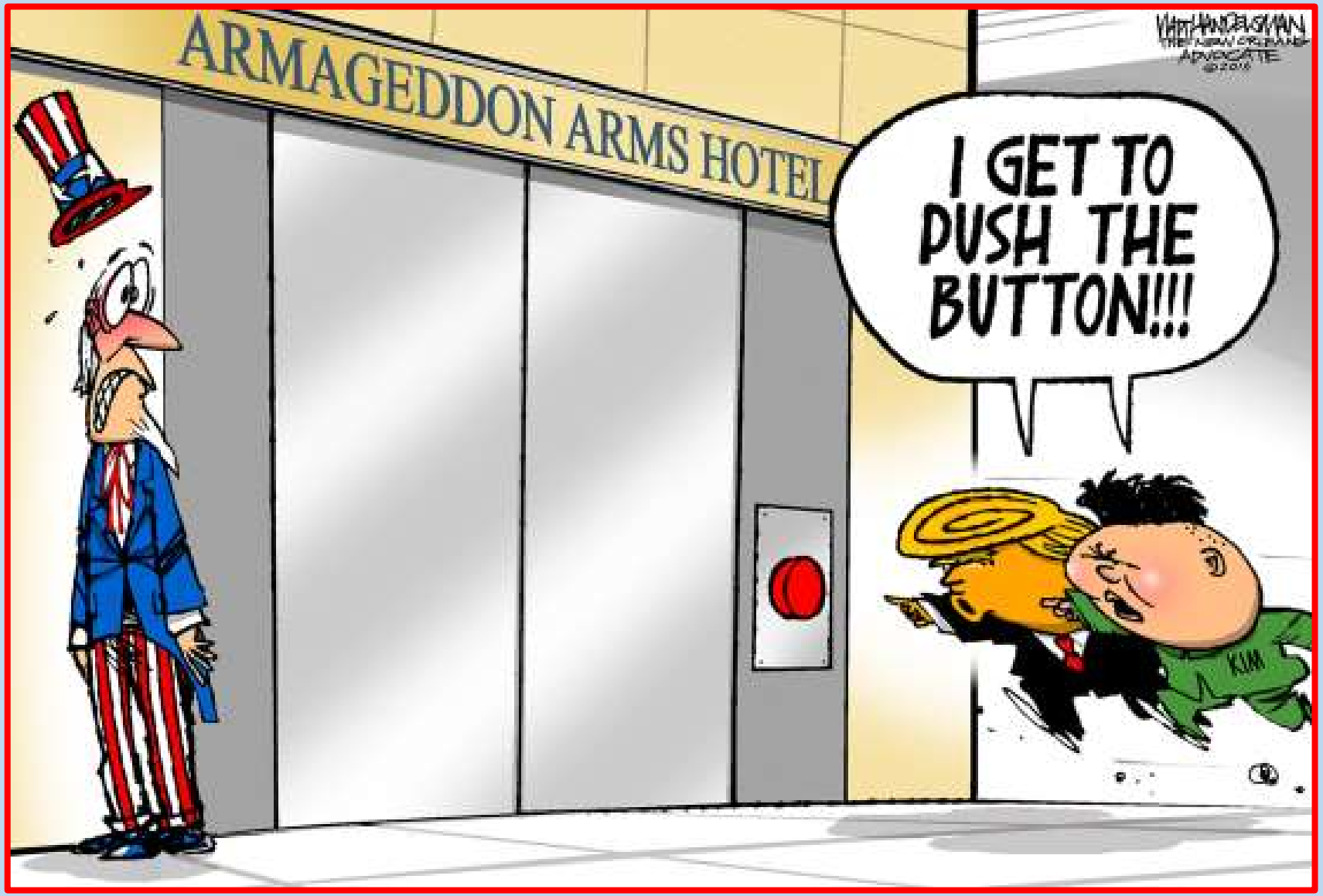
Highlights

on the

revised guideline on prevention of SSI

WH Seto

Guidelines are useless – if people just do whatever they want ……



Donald Trump Cartoon

Kim Jung Un says he already arrived in Singapore,
love Durians, Chicken Rice and is waiting for Trump

World Health Organization

185 pp

GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION:
An introduction

Launched 3 November 2016

http://www.who.int/gpsc/ssi-prevention-guidelines/en/

Why surgical site infection prevention?

It is estimated that hundreds of millions of patients are affected by health care-associated infections (HAI) worldwide, each year. At present, **no country is free from the burden of disease caused by HAI.**

Surgical site infections (SSI) are potential complications associated with any type of procedure and are among the most preventable HAI.

SSI is the most frequent type of HAI in low- and middle-income countries (affecting on average 11% of patients who undergo a surgical procedure) and the second or third most frequent type of HAI in the United States and Europe.

World Health Organization

Main reasons for developing surgical site infection prevention guidelines

- High global epidemiological burden
- **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

Guideline for Prevention of Surgical Site Infection, 1999

Alicia J. Mangram, MD; Teresa C. Horan, MPH, CIC; Michele L. Pearson, MD; Leah Christine Silver, BS; William R. Jarvis, MD;
The Hospital Infection Control Practices Advisory Committee

Hospital Infections Program
National Center for Infectious Diseases
Centers for Disease Control and Prevention
Public Health Service
US Department of Health and Human Services

Hospital Infection Control Practices Advisory Committee Membership List, January 1999

CHAIRMAN
Elaine L. Larson, RN, PhD, FAAN, CIC
Columbia University School of Nursing
New York, New York

EXECUTIVE SECRETARY
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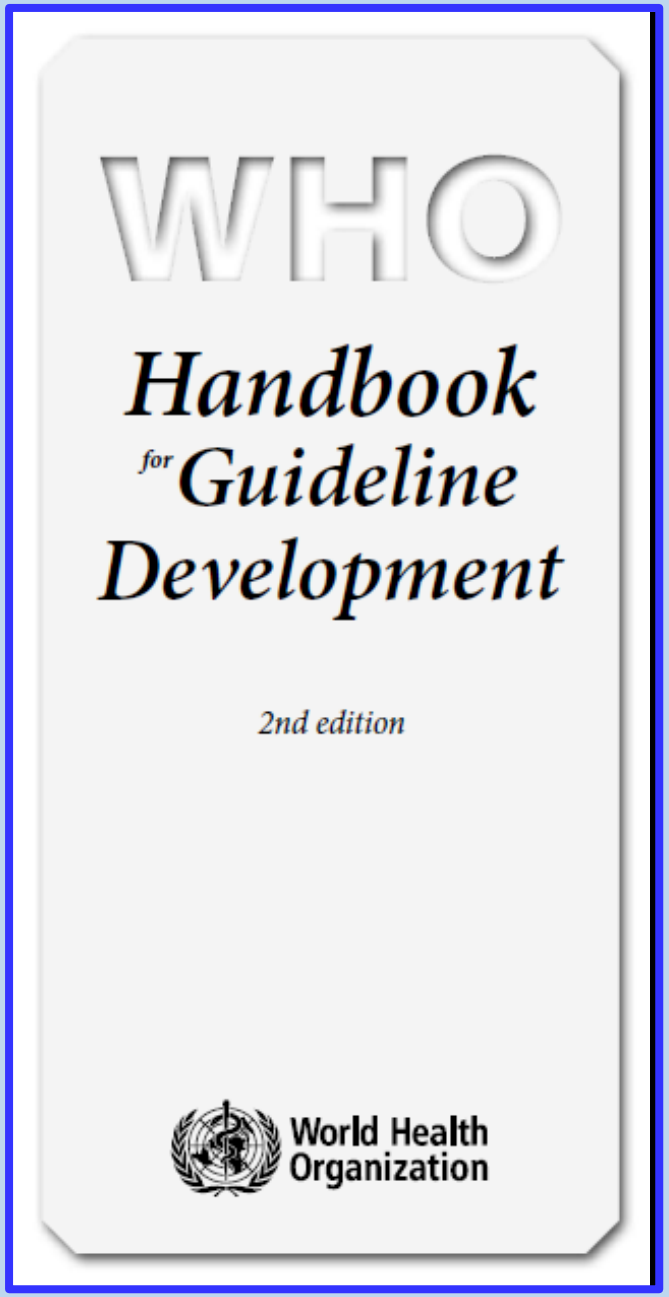
University of Minnesota
Minneapolis, Minnesota

Clinical Review & Education

JAMA Surgery | Special Communication

Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017

Sandra I. Berríos-Torres, MD; Craig A. Umscheid, MD, MSCE; Dale W. Bratzler, DO, MPH; Brian Leas, MA, MS; Erin C. Stone, MA; Rachel R. Kelz, MD, MSCE; Caroline E. Reinke, MD, MSHP; Sherry Morgan, RN, MLS, PhD; Joseph S. Solomkin, MD; John E. Mazuski, MD, PhD; E. Patchen Dellinger, MD; Kamal M. F. Itani, MD; Elie F. Berbari, MD; John Segreti, MD; Javad Parvizi, MD; Joan Blanchard, MSS, BSN, RN, CNOR, CIC; George Allen, PhD, CIC, CNOR; Jan A. J. W. Kluytmans, MD; Rodney Donlan, PhD; William P. Schecter, MD; for the Healthcare Infection Control Practices Advisory Committee



Level of Evidence

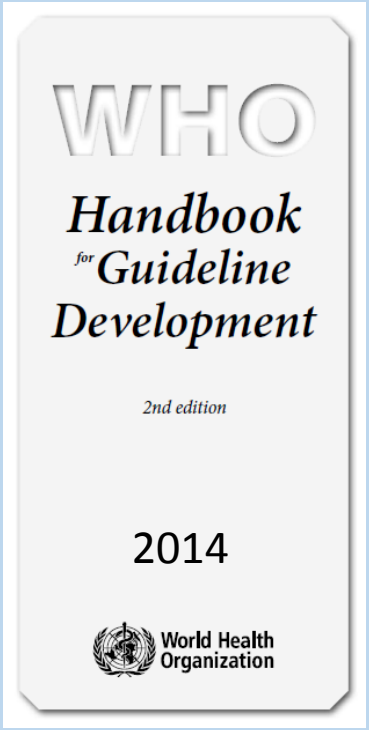
The WHO GRADE APPROACH

GRADE: Grading of Recommendations Assessment, Development and Evaluation.

Guideline development

- WHO guidelines are developed following a standard methodology described in the *WHO Handbook for Guideline Development* and in accordance with the WHO Guidelines Review Committee (GRC)

- **The process included:**
  - Identification of primary critical topics/outcomes and the development of related PICO (Population, Intervention, Comparator, Outcomes) questions
  - Retrieval of evidence through systematic reviews of each topic
    - Systematic reviews were conducted between December 2013 and October 2015 in order to provide supporting evidence for the development of each recommendation
  - Assessment and synthesis of the evidence
  - Formulation of recommendations with leading experts from around the world – 29 recommendations on 26 topics have been outlined, nine of which are "strong recommendations"
  - Writing of guidelines content and planning for dissemination and implementation



WHO uses the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to assess the quality of a body of evidence,

Fig. 9.1. The GRADE approach to rating quality of evidence for each outcome

1 Establish initial level of quality or confidence		2 Consider lowering or raising level of quality or confidence		3 Final level of quality (confidence rating)
Study design	*Initial confidence in an estimate of effect*	*Reasons for considering lowering or raising confidence*		*Confidence in an estimate of effect across all considerations*
		↓ Lower if	↑ Higher if [a]	
Randomized controlled trials →	High confidence	Risk of bias Inconsistency Indirectness Imprecision Publication bias	Large effect Dose response All plausible confounding and bias • would reduce a demonstrated effect or • would suggest a spurious effect if no effect was observed	High ⊕⊕⊕⊕
				Moderate ⊕⊕⊕◯
Observational studies →	Low confidence			Low ⊕⊕◯◯
				Very low ⊕◯◯◯

GRADE: Grading of Recommendations Assessment, Development and Evaluation.

[a] Criteria for upgrading the quality are only applicable to observational studies without any reason for downgrading.

Table 9.2. Quality of evidence in GRADE

Quality level	Definition
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low	We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

GRADE: Grading of Recommendations Assessment, Development and Evaluation.

Guideline development

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  - Assessment and synthesis of the evidence
  - Formulation of recommendations with leading experts from around the world – 29 recommendations on 26 topics have been outlined, nine of which are "strong recommendations"
  - Writing of guidelines content and planning for dissemination and implementation

A **strong recommendation** is one for which the panel is confident that the desirable effects of adherence to a recommendation outweigh the undesirable effects. This can be both in favor of an intervention or against an intervention.

A **weak recommendation** is one for which the panel concludes that the desirable effects of adherence to a recommendation probably outweigh the undesirable effects, but the panel is not confident about these trade-offs. Reasons for not being confident can include:

Decide by:
GDG: Guidelines Development Group

Table 10.1. Factors that determine the direction and strength of a recommendation

Factor	How the factor influences the direction and strength of a recommendation
Quality of the evidence	The quality of the evidence across outcomes critical to decision-making will inform the strength of the recommendation. The higher the quality of the evidence, the greater the likelihood of a strong recommendation.
Values and preferences	This describes the relative importance assigned to health outcomes by those affected by them; how such importance varies within and across populations; and whether this importance or variability is surrounded by uncertainty. The less uncertainty or variability there is about the values and preferences of people experiencing the critical or important outcomes, the greater the likelihood of a strong recommendation.
Balance of benefits and harms	This requires an evaluation of the absolute effects of both benefits and harms (or downsides) of the intervention and their importance. The greater the net benefit or net harm associated with an intervention or exposure, the greater the likelihood of a strong recommendation in favour or against the intervention.
Resource implications	This pertains to how resource-intense an intervention is, whether it is cost–effective and whether it offers any incremental benefit. The more advantageous or clearly disadvantageous the resource implications are, the greater the likelihood of a strong recommendation either for or against the intervention.
Priority of the problem	The problem's priority is determined by its importance and frequency (i.e. burden of disease, disease prevalence or baseline risk). The greater the importance of the problem, the greater the likelihood of a strong recommendation.
Equity and human rights	The greater the likelihood that the intervention will reduce inequities, improve equity or contribute to the realization of one or several human rights as defined under the international legal framework, the greater the likelihood of a strong recommendation.
Acceptability	The greater the acceptability of an option to all or most stakeholders, the greater the likelihood of a strong recommendation.
Feasibility	The greater the feasibility of an option from the standpoint of all or most stakeholders, the greater the likelihood of a strong recommendation. Feasibility overlaps with values and preferences, resource considerations, existing infrastructures, equity, cultural norms, legal frameworks, and many other considerations.

Table 10.2. Interpretation of strong and conditional recommendations for an intervention

Audience	Strong recommendation	Conditional recommendation
Patients	Most individuals in this situation would want the recommended course of action; only a small proportion would not. Formal decision aides are not likely to be needed to help individuals make decisions consistent with their values and preferences.	Most individuals in this situation would want the suggested course of action, but many would not.
Clinicians	Most individuals should receive the intervention. Adherence to the recommendation could be used as a quality criterion or performance indicator.	Different choices will be appropriate for individual patients, who will require assistance in arriving at a management decision consistent with his or her values and preferences. Decision aides may be useful in helping individuals make decisions consistent with their values and preferences.
Policy-makers	The recommendation can be adopted as policy in most situations.	Policy-making will require substantial debate and involvement of various stakeholders.

Guideline development

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- **The process included:**
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WHO nine strong recommendations – preoperative measures (1)

	CHP Guideline Number
4.2 Patients 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. (M) [for cardiothracic & orthopaedic surgery*]	**4.6**
4.5 MBP# alone (without the administration of oral antibiotics@) should NOT be used in adult patients undergoing elective colorectal surgery. (M) @Impact – Neomycin + Erythromycin	**2.5**
4.6 In patients undergoing any surgical procedure, hair should either NOT be removed or, if absolutely necessary, should only be removed with a clipper. Shaving is strongly discouraged at all times, whether preoperatively or in the operating room. (M)	**2.1**
4.4 Surgical antibiotic prophylaxis (SAP) should be administered before the surgical incision, when indicated. (L)	**4.8**

#MBP = mechanical bowl preparation *conditional for other operations

World Health Organization

WHO nine strong recommendations – preoperative measures (2)

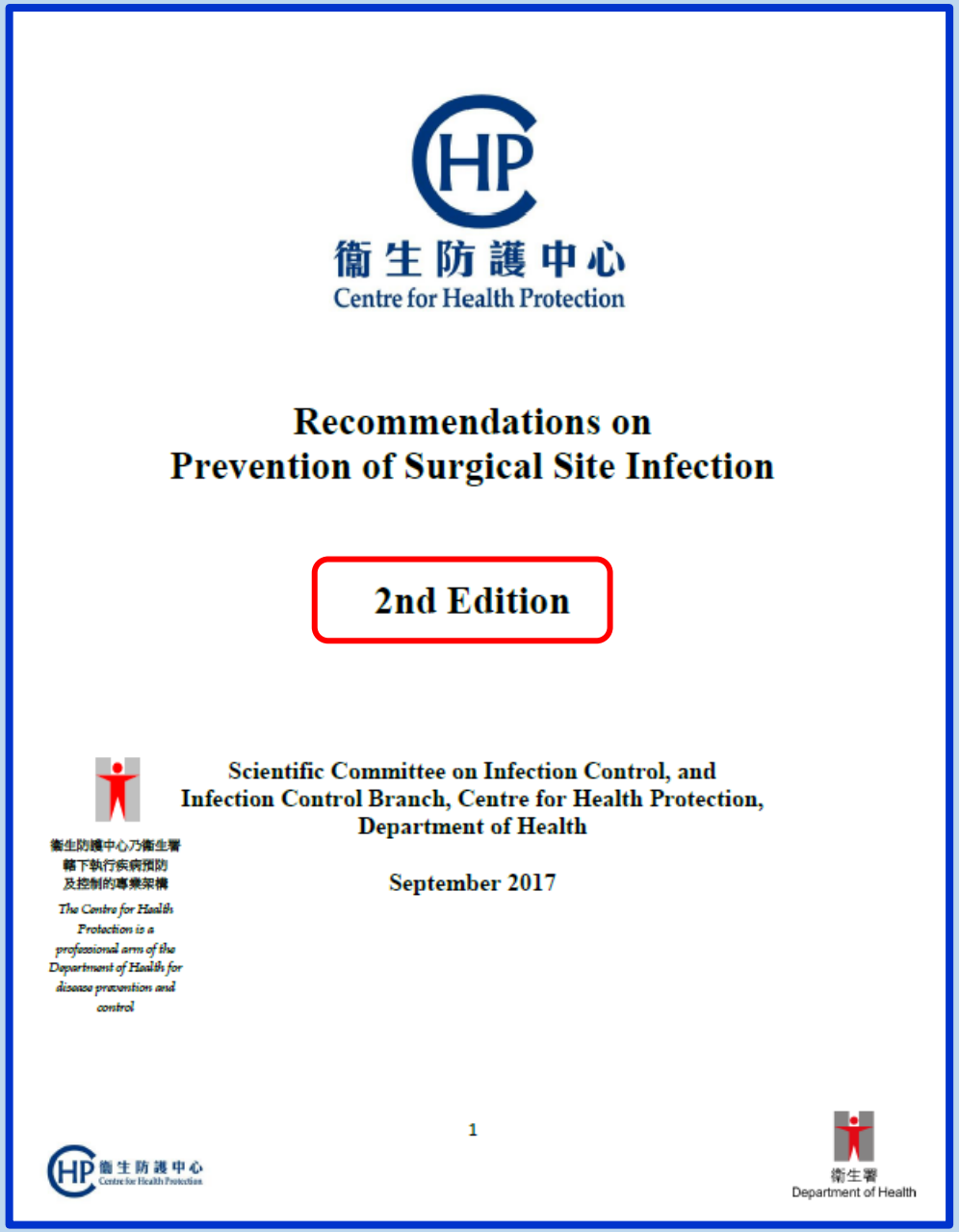
	CHP Guideline Number
4.4 SAP should be administered within 120 min* before incision, while considering the half-life of the antibiotic. (M)	**4.8**
4.9 Surgical hand preparation should be performed either by scrubbing with a suitable **antimicrobial soap** and water **or** using a suitable **alcohol-based handrub** before donning sterile gloves. (M)	**3.3**
4.7 Alcohol-based antiseptic solutions based on CHG for surgical site skin preparation **should be used** in patients undergoing surgical procedures. (M - cf aqueos to L - cf PVP)	**2.4**

* CHP – within 30 min.

World Health Organization

WHO nine strong recommendations – intra & postoperative measures

	CHP Guideline Number
4.12 Adult patients undergoing **general anaesthesia with endotracheal intubation** for surgical procedures should receive **80% fraction of inspired oxygen intraoperatively** and, if feasible, in the **immediate postoperative period for 2–6 h.** (M)	**1.6**
4.24 Surgical **antibiotic prophylaxis** administration should **not be prolonged after completion of the operation** (M)	**4.9**



First guideline 2009

Key changes in the 2017 second edition

1. Key-changes recommendation
Blood glucose control

2009

- 1.2 Screen patients for presence of hyperglycaemia and implement protocol to adequately control the serum blood glucose level (less than 11.1mmol/L = *200mg/dL)* perioperatively and during the first 48 hours postoperatively (10-12). There is evidence for such measures to be applied in patients undergoing cardiothoracic operations, most notably coronary artery bypass graft (CABG).

2017

- 1.2 Screen patients for presence of hyperglycaemia and implement protocol to adequately control the serum blood glucose level ~~(less than 11.1mmol/L = 200mg/dL)~~ perioperatively and during the first 48 hours postoperatively for both diabetic and non-diabetic patients undergoing cardiac and other major operations.

Strong for CDC 2017

Conditional guideline recommendations

Immunosupresssive medication	Immunosuppressive medication should **not** be discontinued prior to surgery for the purpose of preventing SSI.
Nutritional formulas	Consider the administration of oral or enteral multiple nutrient-enhanced nutritional formulas for the purpose of preventing SSI in underweight patients who undergo major surgical operations.
Bathing before surgery	It is good clinical practice for patients to bathe or shower before surgery. Either a plain soap or an antiseptic soap could be used for this purpose.
Intranasal mupirocin	Consider 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.
Antibiotics & MBP	Preoperative oral antibiotics combined with MBP should be used to reduce the risk of SSI in adult patients undergoing elective colorectal surgery.
Antimicrobial sealants	Antimicrobial sealants should **not** be used after surgical site skin preparation for the purpose of reducing SSI.
Warming devices	Warming devices should be used in the operating room and during the surgical procedure for patient body warming with the purpose of reducing SSI.
Blood glucose control	Protocols for intensive perioperative blood glucose control should be used for both diabetic and non-diabetic adult patients undergoing surgical procedures.
Fluid therapy	Goal-directed fluid therapy should be used intraoperatively for the purpose of reducing SSI.
Drapes and gowns	Either sterile disposable non-woven or sterile reusable woven drapes and surgical gowns can be used during surgical operations for the purpose of preventing SSI.

2. Key-changes recommendation Maintaining normothermia

2009

Point 1.5

- Maintain normothermia (core temperature of 36-38oC) perioperatively in colorectal surgery patients. The supportive measures include a combination of warmed blankets, warming devices, warmed intravenous fluids, increase ambient temperature in the operating room, and a consistent method and equipment for monitoring patients' temperature. They may prove valuable for other surgical patients as well.

2017

Point 1.5

- Maintain normothermia (above 36oC) perioperatively ~~in colorectal surgery patients~~. The supportive measures include a combination of warmed blankets, warming devices, warmed intravenous fluids, increase ambient temperature in the operating room, and a consistent method and equipment for monitoring patients' temperature. ~~They may prove valuable for other surgical patients as well~~ .

Strong for CDC 2017

Conditional guideline recommendations

Immunosupresssive medication	Immunosuppressive medication should **not** be discontinued prior to surgery for the purpose of preventing SSI.
Nutritional formulas	Consider the administration of oral or enteral multiple nutrient-enhanced nutritional formulas for the purpose of preventing SSI in underweight patients who undergo major surgical operations.
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Blood glucose control	Protocols for intensive perioperative blood glucose control should be used for both diabetic and non-diabetic adult patients undergoing surgical procedures.
Fluid therapy	Goal-directed fluid therapy should be used intraoperatively for the purpose of reducing SSI.
Drapes and gowns	Either sterile disposable non-woven or sterile reusable woven drapes and surgical gowns can be used during surgical operations for the purpose of preventing SSI.

3. Key-changes recommendation
Choice of skin disinfectant

2009

Point 2.3

- Chlorhexidine is a more effective skin disinfectant (19,20) and repeated applications with this agent may be indicated for cardiac thoracic and orthopaedic surgical patients with known MRSA in hospitals and units where there is a high incidence of postoperative wound infections by MRSA or MRSE (27,62-63).

2017

Point 2.3

- Add 2.4

  "use alcohol-based antiseptic solutions containing CHG for surgical site skin preparation in patients undergoing surgical procedures

WHO nine strong recommendations – preoperative measures (2)

	CHP Guideline Number
4.4 SAP should be administered within 120 min before incision, while considering the half-life of the antibiotic. (M)	**4.8**
4.9 Surgical hand preparation should be performed either by scrubbing with a suitable **antimicrobial soap** and water **or** using a suitable **alcohol-based handrub** before donning sterile gloves. (M)	**3.3**
4.7 Alcohol-based antiseptic solutions based on CHG for surgical site skin preparation **should be used** in patients undergoing surgical procedures. (M - cf aqueos to L - cf PVP)	**2.4**

4. Key-changes recommendation
Surgical hand preparation

2009

Point 3.6

- Alcohol-based surgical handrub product – follow manufacturer's instructions

2017

Point 3.5

- Alcohol-based surgical handrub product – follow manufacturer's instructions

- 3.5.5 – Proper sequence with an alcohol-based technique is included in Appendix 2

Appendix 2:

Table I.13.2
Protocol for surgical scrub with a medicated soap

Procedural steps
• Start timing. Scrub each side of each finger, between the fingers, and the back and front of the hand for 2 minutes.
• Proceed to scrub the arms, keeping the hand higher than the arm at all times. This helps to avoid recontamination of the hands by water from the elbows and prevents bacteria-laden soap and water from contaminating the hands.
• Wash each side of the arm from wrist to the elbow for 1 minute.
• Repeat the process on the other hand and arm, keeping hands above elbows at all times. If the hand touches anything at any time, the scrub must be lengthened by 1 minute for the area that has been contaminated.
• Rinse hands and arms by passing them through the water in one direction only, from fingertips to elbow. Do not move the arm back and forth through the water.
• Proceed to the operating theatre holding hands above elbows.
• At all times during the scrub procedure, care should be taken not to splash water onto surgical attire.
• Once in the operating theatre, hands and arms should be dried using a sterile towel and aseptic technique before donning gown and gloves.

Figure I.13.1
Surgical hand preparation technique with an alcohol-based handrub formulation

The handrubbing technique for surgical hand preparation must be performed on perfectly clean, dry hands.
On arrival in the operating theatre and after having donned theatre clothing (cap/hat/bonnet and mask), hands must be washed with soap and water.
After the operation when removing gloves, hands must be rubbed with an alcohol-based formulation or washed with soap and water if any residual talc or biological fluids are present (e.g. the glove is punctured).

Surgical procedures may be carried out one after the other without the need for handwashing, provided that the handrubbing technique for surgical hand preparation is followed (images 1 to 17).

1
Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the dispenser

2
Dip the fingertips of your right hand in the handrub to decontaminate under the nails (5 seconds)

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

4
See legend for Image 3

5
See legend for Image 3

6
See legend for Image 3

7
See legend for Image 3

8
Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your right hand, using the elbow of your other arm to operate the dispenser

9
Dip the fingertips of your left hand in the handrub to decontaminate under the nails (5 seconds)

Figure I.13.1
Surgical hand preparation technique with an alcohol-based handrub formulation (Cont.)

10
Smear the handrub on the left forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

11
Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the distributor. Rub both hands at the same time up to the wrists, and ensure that all the steps represented in Images 12-17 are followed (20-30 seconds)

12
Cover the whole surface of the hands up to the wrist with alcohol-based handrub, rubbing palm against palm with a rotating movement

13
Rub the back of the left hand, including the wrist, moving the right palm back and forth, and vice-versa

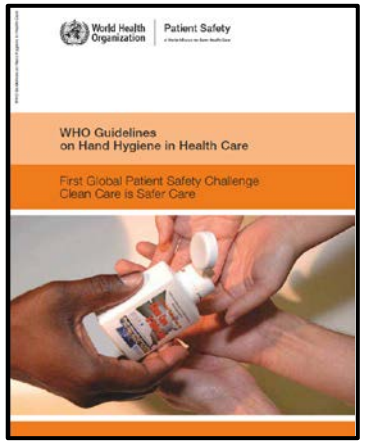
14
Rub palm against palm back and forth with fingers interlinked

15
Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement

16
Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa

17
When the hands are dry, sterile surgical clothing and gloves can be donned

Repeat the above-illustrated sequence (average duration, 60 sec) according to the number of times corresponding to the total duration recommended by the manufacturer for surgical hand preparation with an alcohol-based handrub.



Surgical Handrubbing Technique

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

Put approximately 5ml (3 doses) of ABHR in the palm of your left hand, using the elbow of your other arm to operate the dispenser.

Dip the fingertips of your right hand in the handrub to decontaminate under the nails (5 seconds).

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

Images 8-10: Now repeat steps 1-7 for the left hand and forearm.

Put approximately 5ml (3 doses) of ABHR in the palm of your left hand as illustrated, to rub both hands at the same time up to the wrists, following all steps in images 12-17 (20-30 seconds).

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

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

Rub palm against palm back and forth with fingers interlinked.

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

Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa.

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

Repeat this sequence (average 60 sec) the number of times that adds up to the total duration recommended by the ABHR manufacturer's instructions. This could be two or even three times.

World Health Organization

World Health Organization

WHO nine strong recommendations – preoperative measures (2)

	CHP Guideline Number
4.4 SAP should be administered within 120 min before incision, while considering the half-life of the antibiotic. (M)	**4.8**
4.9 Surgical hand preparation should be performed either by scrubbing with a suitable **antimicrobial soap** and water **or** using a suitable **alcohol-based handrub** before donning sterile gloves. (M)	**3.3**
4.7 Alcohol-based antiseptic solutions based on CHG for surgical site skin preparation **should be used** in patients undergoing surgical procedures. (M -cf aqueos to L -cf PVP)	**2.4**

5. Key-changes recommendation
Prevent Staph aureus infection in carriers

2009

Point 4.6

- Consider using perioperative intranasal Mupirocin and take shower wash or bath or bath as listed in item 2.2 in known carriers of Methicillin Resistant Staphylococcus aureus (MRSA) undergoing cardiothoracic and orthopaedic surgeries where morbidity and mortality due to surgical infections are significant.

2017

Point 4.6

- Use preoperative intranasal Mupirocin 2% and take shower wash or bath with Chlorhexidine gluconate 4% skin cleanser and shampoo in known carriers of Methicillin Resistant Staphylococcus aureus (MRSA) undergoing cardiothoracic and orthopaedic surgeries where morbidity and mortality due to surgical infections are significant.

WHO nine strong recommendations – preoperative measures (1)

	CHP Guideline Number
4.2 Patients 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. (M) [for cardiothracic & orthopaedic surgery*]	**4.6**
4.5 MBP# alone (without the administration of oral antibiotics) should NOT be used in adult patients undergoing elective colorectal surgery. (M)	**2.5**
4.6 In patients undergoing any surgical procedure, hair should either NOT be removed or, if absolutely necessary, should only be removed with a clipper. Shaving is strongly discouraged at all times, whether preoperatively or in the operating room. (M)	**2.1**
4.4 Surgical antibiotic prophylaxis (SAP) should be administered before the surgical incision, when indicated. (L)	**4.8**

#MBP = mechanical bowl preparation

*conditional for other operations

World Health Organization

6. Key-changes recommendation
Ventilation system in OR

2009

Point 5.4

- Filter all recirculated and fresh air through HEPA filters at 99.97% efficiency. There are documents suggesting that HEPA filters are not generally required in the setting of general operating theatres; however, further studies into this subject are required

2017

Point 5.4

- Filter for all incoming air through MERV 7 & MERV 14 filters (or equivalent) at a minimum

6. Ventilation system in OR

GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION 2016

No research question set and recommendations in this topic

In many countries, the use of high efficiency particulate air filters (at least 99.97% efficient in removing particles ≥0.3 µm in diameter) in the operating room ventilation system is mandatory by law. Of note, the utmost importance must be paid to the maintenance of any kind of ventilation system and its components.

The operating room ventilation system should be regularly checked and filters changed (the need for this is assessed by monitoring the pressure differential across the filters) according to local standard operating procedures, which should be based on the manufacturer's instructions and international guidelines.

Table 4.23.1. **Recommendations on ventilation systems in the operating room according to available guidelines**

Guidelines (year issued)	Recommendations on ventilation systems in the operating room
SHEA/IDSA practice recommendation (2014) *(5)*	Follow the American Institute of Architects' recommendations for proper air handling in the operating room.
CDC/HICPAC Guidelines for environmental infection control in health-care facilities (2003) *(3)*	No recommendation for orthopaedic implant operations in rooms supplied with laminar airflow.

SHEA: Society for Healthcare Epidemiology of America; IDSA: Infectious Diseases Society of America; CDC: Centers for Disease Control and Prevention; HICPAC: Healthcare Infection Control Practices Advisory Committee.

ASHRAE/ASHE STANDARD

Ventilation of Health Care Facilities

TABLE 6-1 Minimum Filter Efficiencies

Space Designation (According to Function)	Filter Bank Number 1 (MERV)[a]	Filter Bank Number 2 (MERV)[a]
Classes B and C surgery; inpatient and ambulatory diagnostic and therapeutic radiology; inpatient delivery and recovery spaces	7	14
Inpatient care, treatment, and diagnosis, and those spaces providing direct service or clean supplies and clean processing (except as noted below); AII (rooms)	7	14
Protective environment rooms (PE)	7	17 (HEPA)[c]
Laboratories; Class A surgery and associated semi-restricted spaces	13[b]	N/R*
Administrative; bulk storage; soiled holding spaces; food preparation spaces; and laundries	7	N/R
All other outpatient spaces	7	N/R
Skilled nursing facilities	7	N/R

7. Key-changes recommendation

2009

Point 5.7

- Maintain relative humidity at 30-60% and temperature at 20-23°C

2016

Point 5.7

- Maintain relative humidity at 20-60% and temperature at 20-24°C

Guidelines for Design and Construction of Hospitals and Outpatients Facilities. The Facility Guidelines Institute 2014 edition; American Society for Healthcare Engineering of AHA [Previous edition 2006]

7. Temperature and humidity

GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION 2016
No research question set and recommendations in this topic

8. Key-changes recommendation Microbiological air sampling

2009

5.9 Allow adequate time for commissioning including microbiological assessments by the hospital infection control team before an operating theatre is first used and after any substantial modifications that may affect airflow patterns in pre-existing theatres (40). As microbiological sampling is time consuming, the use of particle counters may be of value (41); however, high particle counts may not necessarily be associated with increase in air microbiological counts in conventionally ventilated operating theatres. The clinical significance of high particle counts is to be further studied (42).

5.10 Do not perform microbiological air sampling routinely, provided that engineering parameters such as air distribution, air change rates, pressure differentials and airflow, etc. are satisfactory and regularly monitored. Such sampling should be done as part of an epidemiological investigation, validation of changes in products e.g. HEPA filters, maintenance of operating theatres or as advised by the hospital infection control team (4, 40, 41).

8. Key-changes recommendation Microbiological air sampling

2017

5.11.3 For conventional operation rooms. aerobic cultures on nonselective media should not exceed 10 bacterial and or fungal CFUs per cubic metre (m^3) of air sampled.

Initiate an appropriate course of action e.g. re cleaning of the environment and re testing if results are outside the limits. If repeat testing produces results above acceptable levels the HVAC systems should be reviewed by the appropriate personnel

8. Microbiological air sampling

GLOBAL GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTION 2016

No research question set and recommendations in this topic

Other recommendations

Guidelines (year issued)	Recommendations
DH. Government of Western Australia. Microbiological Air Sampling of Operating Rooms in WA Healthcare Facilities (2015)	The acceptable level of colony forming units (CFUs) for the purpose of this operational directive is the same for all types of ORs Aerobic cultures on non-selective media should not exceed 10 bacterial and or fungal CFUs per cubic metre (m^3) of air sampled.

9. Key-changes recommendation
Flash sterilization

7.5 Immediate-use steam sterilization (IUSS, formerly known as flash sterilization) of surgical instruments should only be used for emergency with no alternatives. IUSS of implant devices, prosthesis and power instruments or simply to save time should be avoided.

7.6 Standard procedures and staff proficiency of carry out IUSS should be monitored.

7.7 IUSS record (i.e. load identification, patient/ hospital's identifier, mechanical, chemical +/- biological result) should be maintained and updated for epidemiological tracking and for an assessment of the reliability of the sterilization process.

Underline sections in 2009 guideline

Comments from WHO guideline, pp53

Immediate use sterilization system or "flash" sterilization

Should never replace the lack of material or instruments.

If an immediate use sterilization system must be used, it should be used only after all of the following conditions have been met:

- Work practices should ensure proper cleaning, inspection and arrangement of instruments before sterilization.
- The physical layout of the area ensures direct delivery of sterilized items to the point of use.
- Procedures are developed, followed and audited to ensure aseptic handling and staff safety during transfer of the sterilized items from the sterilizer to the point of use.

On page 5 of Second Edition

The 1st edition was dedicated to the late

Dr. Rosie Fan

who had contributed enormously to the development of the recommendations.

Beautiful Hong Kong

Thank you!

WHO Infection Prevention and Control

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

Thank you!

Strong for CDC 2017

Conditional guideline recommendations

	Immunosupresssive medication	Immunosuppressive medication should **not** be discontinued prior to surgery for the purpose of preventing SSI.
	Nutritional formulas	Consider the administration of oral or enteral multiple nutrient-enhanced nutritional formulas for the purpose of preventing SSI in underweight patients who undergo major surgical operations.
2.2 →	Bathing before surgery	It is good clinical practice for patients to bathe or shower before surgery. Either a plain soap or an antiseptic soap could be used for this purpose.
	Intranasal mupirocin	Consider 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.
	Antibiotics & MBP	Preoperative oral antibiotics combined with MBP should be used to reduce the risk of SSI in adult patients undergoing elective colorectal surgery.
	Antimicrobial sealants	Antimicrobial sealants should **not** be used after surgical site skin preparation for the purpose of reducing SSI.
1.5 →	Warming devices	Warming devices should be used in the operating room and during the surgical procedure for patient body warming with the purpose of reducing SSI.
1.2 →	Blood glucose control	Protocols for intensive perioperative blood glucose control should be used for both diabetic and non-diabetic adult patients undergoing surgical procedures.
	Fluid therapy	Goal-directed fluid therapy should be used intraoperatively for the purpose of reducing SSI.
	Drapes and gowns	Either sterile disposable non-woven or sterile reusable woven drapes and surgical gowns can be used during surgical operations for the purpose of preventing SSI.

Adhesive drapes	Plastic adhesive incise drapes with or without antimicrobial properties should **not** be used for the purpose of preventing SSI.
Wound protectors	Consider the use of wound protector devices in clean-contaminated, contaminated and dirty abdominal surgical procedures for the purpose of reducing the rate of SSI.
Saline wound irrigation	There is insufficient evidence to recommend for or against saline irrigation of incisional wounds for the purpose of preventing SSI.
Povidone iodine irrigation	Consider the use of irrigation of the incisional wound with an aqueous povidone iodine solution before closure for the purpose of preventing SSI, particularly in clean and clean-contaminated wounds.
Antibiotic irrigation	Antibiotic incisional wound irrigation before closure should **not** be used for the purpose of preventing SSI.
Neg pressure wound therapy	Prophylactic negative pressure wound therapy may be used on primarily closed surgical incisions in high-risk wounds and, taking resources into account, for the purpose of preventing SSI.
Coated sutures	Triclosan-coated sutures may be used for the purpose of reducing the risk of SSI, independent of the type of surgery.
Laminar flow ventilation	Laminar airflow ventilation systems should **not** be used to reduce the risk of SSI for patients undergoing total arthroplasty surgery.
Peri-op antibiotics	Perioperative surgical antibiotic prophylaxis should **not** be continued due to the presence of a wound drain for the purpose of preventing SSI.
Wound drains	The wound drain should be removed when clinically indicated. No evidence was found to allow making a recommendation on the optimal timing of wound drain removal for the purpose of preventing SSI.
Advanced dressings	Advanced dressing of any type should **not** be used over a standard dressing on primarily closed surgical wounds for the purpose of preventing SSI.

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