Prevenzione delle SSI in chirurgia d'urgenza

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REVIEW ARTICLE

Surgical site infections – review of current knowledge, methods of prevention

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According to the CDC definition, SSIs can be divided as follows:

1. Superficial – develop within 30 days since surgery and involve skin and subcutaneous tissue;

2. Deep – develop after 30 days or within one year if a foreign body was implanted and involve fascia and muscles;

3. Organ or body cavity infection in close proximity to the surgical site – developing within 30 days or one year if a foreign body was implanted.

Surgical wounds are traditionally classified into four classes based on how clean or contaminated they are according to the CDC definition [7]:

- Class I: clean wound: infection risk <2%, e.g. laparotomy, breast resection, vascular interventions;
- Class II: clean/contaminated wound: infection risk <10%, e.g. elective cholecystectomy, small bowel resection, laryngectomy;
- Class III: contaminated wound: risk infection of about 20%, e.g. appendiceal phlegmon, gangrenous cholecystitis;
- Class IV: dirty/infected wound: risk infection >40%, e.g. infected traumatic wounds, pus collections such as testicular abscess. The appropriate evaluation for surgical site infection risk is not based solely on wound classification. There is a number of other risk factors (Tab. I.) contributing to SSI.

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Tab. I. Risk factors of surgical site infections.

PATIENT-DEPENDENT	SURGERY-DEPENDENT
Age	Skin disinfection
Nutritional status	Hair shaving
Diabetes	Perioperative antibiotics
Smoking	Duration of surgery
Obesity	Operating room air conditioning
Concomitant infections	Improper instrument sterilization
Colonization with drug-resistant pathogens	Foreign body within wound
Impaired immunity	Surgical site drainage
Duration of hospital stay before surgery	Insufficient hemostasis
	„Dead space"
	Significant surgical trauma

Tab. II. Skin pathogens.

MICROORGANISM	INCIDENCE / VIRULENCE
Staphylococcus epidermidis	Common, sometimes pathogenic
Staphylococcus aureus	Rare, pathogenic
Staphylococcus warneri	Rare, sometimes pathogenic
Streptococcus pyogenes	Rare, pathogenic
Streptococcus mitis	Common, sometimes pathogenic
Propionibacterium acnes	Common, sometimes pathogenic
Corynebacterium spp.	Common, sometimes pathogenic
Acinetobacter johnsonii	Common, sometimes pathogenic
Pseudomonas aeruginosa	Rare, sometimes pathogenic

Source: Cogen A.L., Nizet V., Gallo R.L. (2008). Skin microbiota: a source of disease or defense?. Br J Dermatol 158 (3): 442–55.

PREVENTING SURGICAL SITE INFECTIONS

Preoperative phase

- Surgical site shaving
- Nutrition
- Immunosuppressive therapy
- Antibiotic prophylaxis

PREVENTING SURGICAL SITE INFECTIONS

INTRAOPERATIVE PHASE

- Operating room architecture
- Surgical field asepsis
- Hand disinfection
- Blood transfusion
- Maintaining patient’s homeostasis

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REVIEW Open Access

Intraoperative surgical site infection control and prevention: a position paper and future addendum to WSES intra-abdominal infections guidelines

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1) How to close a surgical incision?

There is no significant difference in terms of SSI incidence and length of hospital stay between patients in which the skin is sutured by continuous versus interrupted stitches (GoR 1B)
Superficial wound dehiscence is lower in subcuticular continuous suture versus interrupted stitches. (GoR 1B)
The use of steri-strips doesn't reduce the incidence of SSI

2) Coated sutures: are they useful?

Triclosan-coated sutures significantly reduce SSI prevalence compared with the non-coated sutures (GoR1B)

3) What is the role of intraoperative intraperitoneal irrigation vs topic wound lavage with antibiotic solutions to prevent surgical site infections?

There are insufficient data to to support the role of intraperitoneal the role of intraperitoneal or topic wound irrigation with antibiotics in preventing SSI

4) Could wound irrigation with saline and/or povidone iodine solution be useful to prevent surgical site infections?

There are insufficient data to determine the role of saline or povidone solution irrigation of incisional wounds before closure to prevent SSI (GoR 2B).

5) Are wound protector devices useful?

The use of wound protectors has protective effects in reducing incisional SSI (GoR 1A);

The use of dual-ring constructed wound protectors appears to be superior to single-ring devices in preventing SSI (GoR1B).

6) Are sterile surgical drapes useful?

There is no evidence that plastic adhesive incise drapes with or without antimicrobial properties are useful to decrease SSI (GoR 2C).

7) To drain or not to drain in closing surgical incision?

There are insufficient data to determine the role of the use of subcutaneous drainage of incisional wounds before closure to prevent SSI in high-risk patients (GoR 2B)

8) When is double gloving recommended? When is changing gloves recommended during an operation?

There are insufficient data to determine the role of double gloving to prevent SSI (GoR 2C).
The mechanical resistance of latex gloves depends on the duration of wear. It may be beneficial for surgical team members and their protection to change
gloves at certain intervals during surgery (GoR 2C).

9) Is negative-pressure wound dressing useful to prevent surgical site infections?

The application of negative-pressure wound therapy in preventing SSI may be effective in reducing postoperative wound complications and it may be an option especially in patients with a high risk of SSI (GoR 2C)

10) Is intraoperative normothermia useful to prevent surgical site infections?

Intraoperative normothermia decreases the rate of SSI (GoR 1A).

The use of active warming devices in operating room is useful to keep normothermia and reduce SSI (GoR 1B)

11) Is perioperative supplemental oxygen effective to reduce surgical site infections?

Perioperative hyperoxygenation does not reduce SSI (GoR 2B)

12) Leaving the skin open for delayed primary closure can reduce SSI?

Delayed primary skin closure may reduce the incidence of SSI (GoR 2C)

Delayed primary closure of a surgical incision is an option to take into consideration in contaminated abdominal surgeries, in patients with high risk of SSI (GoR 2C)

13) When should additional antibiotic dose be administered intraoperatively?

Optimal knowledge and use of the pharmacokinetic/pharmacodynamic characteristics of antibiotics are important to evaluate when additional antibiotic doses should be administered intraoperatively in patients with intra-abdominal infections undergoing emergency surgery (GoR 1C)

PREVENTING SURGICAL SITE INFECTIONS

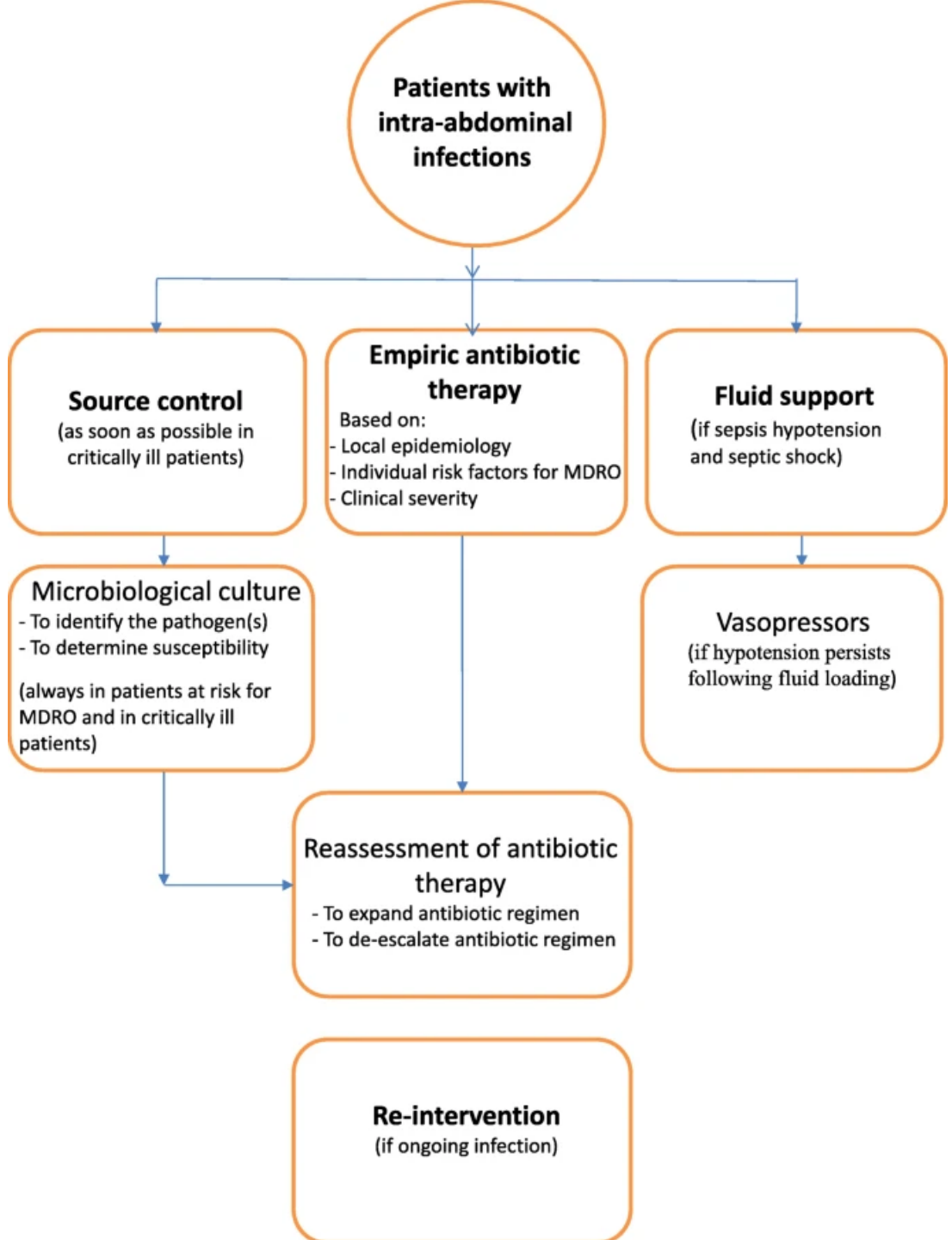
POSTOPERATIVE PHASE

- Clinical signs of infection traditionally include the following: local redness, pain, increased temperature, edema and purulent discharge.
- In SSI treatment, it is necessary to open the infected area and drain the pus.
- Deep tissue infection requires **drainage of the whole area**.
- The remaining fibrin or sutures and staples should be removed or **tissue debridement** may be indicated in the case of necrosis.
- Infected wound should be treated with various antimicrobial products depending on surgeon's preference.
- It is recommended to initiate **antibiotics** when the inflammation reaches beyond 5 cm and the above-listed signs of generalized inflammation are present.
- When choosing the first-line treatment, local epidemiological situation and Gram staining of wound smears should be considered.

PREVENTING SURGICAL SITE INFECTIONS

POSTOPERATIVE PHASE

- For complicated deep and non-healing wounds, **negative pressure therapy should be considered**. Negative pressure facilitates blood supply to the wound by promoting angiogenesis and increases the rate of granulomatous tissue formation.
- Negative pressure therapy in infected wounds is safe. However, it must be preceded by debridement and initiation of **targeted antibiotic therapy**.


Patients with intra-abdominal infections
Source control
(as soon as possible in critically ill patients)
Empiric antibiotic therapy
Based on:
- Local epidemiology
- Individual risk factors for MDRO
- Clinical severity
Fluid support
(if sepsis hypotension and septic shock)
Microbiological culture
- To identify the pathogen(s)
- To determine susceptibility
(always in patients at risk for MDRO and in critically ill patients)
Vasopressors
(if hypotension persists following fluid loading)
Reassessment of antibiotic therapy
- To expand antibiotic regimen
- To de-escalate antibiotic regimen
Re-intervention
(if ongoing infection)

Preventing Surgical Site Infections in Emergency General Surgery: Current Strategies and Recommendations

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Data supporting wound protectors and routine wound irrigation are mixed, however, they are low-cost, low-risk options to help mitigate surgical site infections.

There are several advantages to intra-operative normothermia and glucose control for the prevention of SSI, which have been studied in elective and emergent surgical populations.

The management of contaminated general surgery wounds is controversial, but there is growing evidence to support the use of closed negative pressure wound therapy.


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