

Surgical Site Infections

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Outline

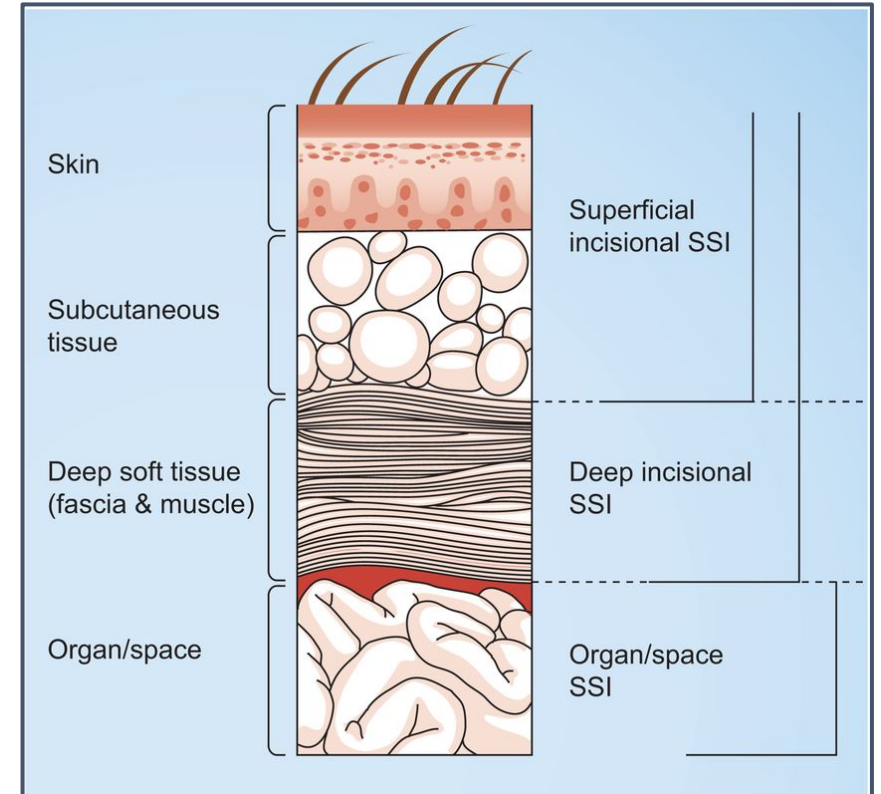
- Definitions
- Human medicine guidelines
- Veterinary medicine guidelines
- Prevention measures
- Monitoring/surveillance
- Confirmation and management
- Treatment

Surgical site infection (SSI)

- CDC: one that occurs after surgery in the part of the body where the surgery took place.
- Up to 18% reported SSI in vet med
- Incisional SSI vs organ space SSI

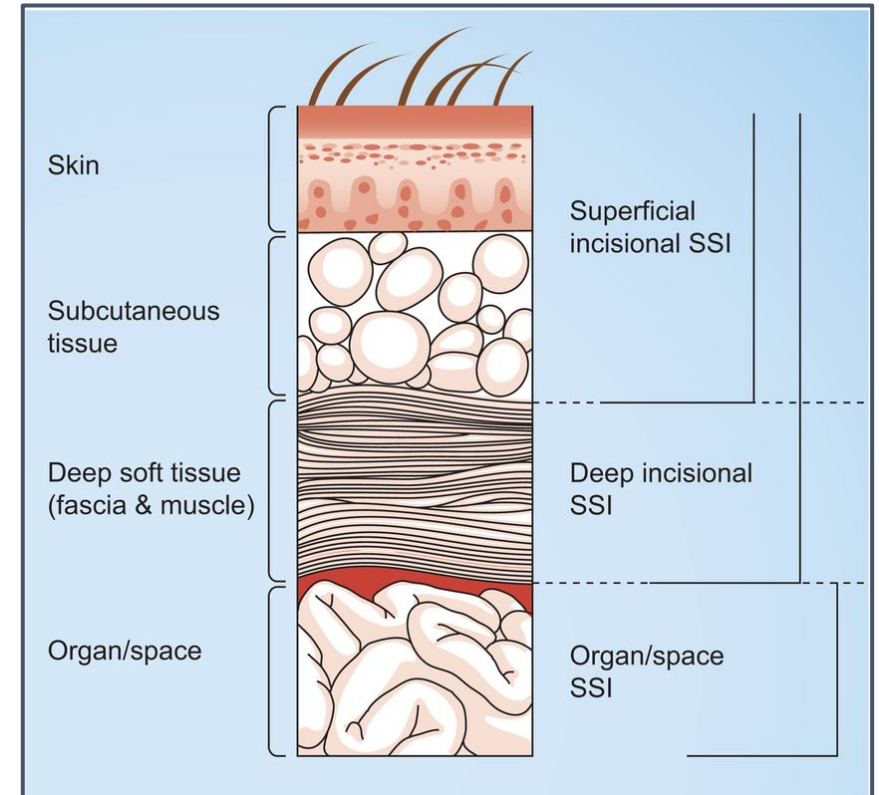
Incisional SSIs

- Superficial
 - Within 30 days
 - Only skin and subcutaneous tissue
 - Superficial purulent discharge
 - Pain
 - Localized swelling
 - Erythema
 - Heat



Incisional SSIs

- Deep
 - No implant: within 30 days
 - Implant: within 1 year
 - Deep soft tissues of the incision
 - Purulent discharge
 - Deep incision spontaneously dehisces
 - Fever or localized pain



Organ/space SSIs

- Any part of the body minus skin, fascia, and muscle
- No implant: within 30 days
- Implant: within 1 year
- Purulent discharge from drain
- Abscess in deep tissues

SSI and wound classification

- Clean
 - nontraumatic, infected
- Clean-contaminated
 - controlled entrance of a hollow viscus
- Contaminated
 - open traumatic wound
- Dirty
 - perforated viscus, pus

Epidemiologic triad

- Agent
 - Endogenous
 - Exogenous
- Host
 - Comorbidities
 - Immune status
- Environment
 - OR
 - IVC

$$\text{Infection Risk} = \frac{\text{Contamination} \times \text{Virulence}}{\text{Host Resistance}}$$

Human Medicine Guidelines

- Razor hair removal
- Decolonization of intranasal staph
- Use of chlorhexidine and alcohol based skin preps
- Maintaining normothermia
- Perioperative glycemic control
- NPWT

Risk factors

- Degree of bacterial contamination
- Timing of clipping
- Duration of surgery
- Duration of anesthesia
- Comorbidities
- Number of people in the OR
- Body condition
- Sex
- Hypothermia
- Self mutilation
- Implants

Veterinary Evidence Based Medicine

- Duration of surgery
- Number of people in OR
- Timing of clipping
- Glove perforation
- Self mutilation

Prevention Strategies

- Identify high risk populations
- Adherence to aseptic principles
- Judicious use of antimicrobial drugs (AMD)
- SSI surveillance

Prevention Strategies

- Physical exam
- Blood work and urinalysis pre-op
- Treat endocrinopathies
- Correct comorbidities
- Treat pyoderma
- Clean, well maintained clippers



Prevention Strategies

- Chlorhexidine and alcohol based solutions for scrub
- Peri-op antimicrobials
- Identify at risk population



Prevention Strategies-Surgical Team

- Short, tidy nails
- Remove jewelry
- Wash hands/nail pick
- Aseptic scrub technique
 - Chlorhexidine vs iodine vs alcohol based
- Use of brushes is discouraged

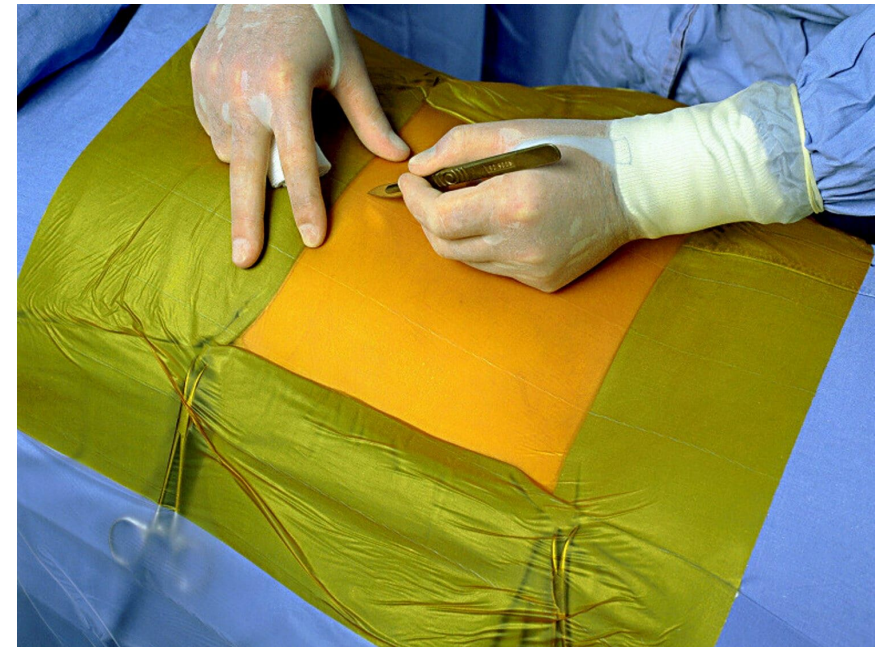


Prevention-Antimicrobials

- Administration of antimicrobials should not replace appropriate sterile technique.
- Surgical antimicrobial prophylaxis is the use of a very brief course of an antimicrobial agent initiated 30–60 minutes before the first incision. Surgical antimicrobial prophylaxis is not usually needed for clean procedures.
- Sterile technique and proper tissue handling should eliminate the need for prophylactic antibiotics in ovariohysterectomies, orchiectomies, and most other sterile procedures.
- Ongoing postoperative antimicrobial therapy is rarely required.

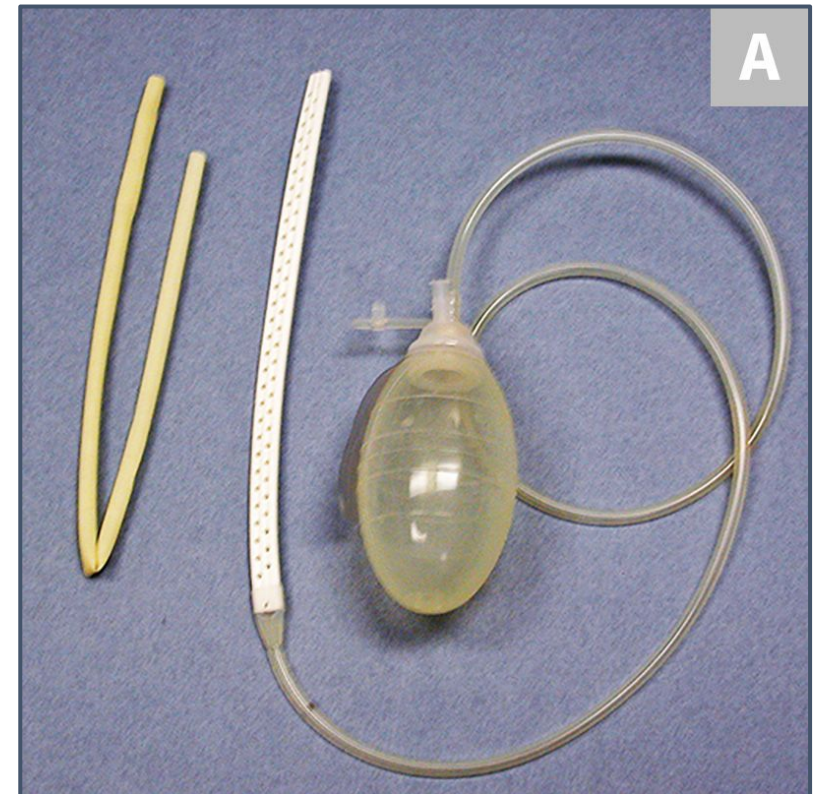
Prevention Strategies-In the OR

- Proper surgical attire
 - Cap, mask gown
 - No need for shoe cover
 - Consider changing gloves
- Reusable cloth vs single use gowns/drapes
- Adhesive, impregnated drapes
- Risk of SSI 1.3x with each person
- Halsted's principles



Prevention Strategies-In the OR

- Halsted's principles
- Minimize foreign material
- Close suction drain vs penrose
- Clean and clean-contaminated wounds can be closed primarily



Prevention Strategies-Patient Care

- Maintain normothermia
 - Warming blankets and forced warm air
- Minimize anesthesia time
- Appropriate volume replacement*
- Supplemental oxygen*
- Appropriate analgesia*
- Protect incision post-op
 - Adhesive bandage
 - E. collar

Confirmation of SSI

- Pain or tenderness
- Localized swelling
- Redness
- Warm to the touch
- Purulent discharge
- Identification of bacteria through culture
 - Infected vs inflamed
- Culture based antibiotics
- Appropriate wound management

Management of SSI

- Cellulitis w/out abscess amenable to oral AMP
- Open incision and debride
- Address source of contamination
- Obtain samples for culture
- Wound management
- Guided AMP therapy
- Implant removal
- Close wound/second intention healing

Common bugs

- Staphylococcus
- Enterococcus
- Pseudomonas
- Escherichia coli



All of which can exhibit multidrug resistance and can persist in the hospital environment.

Monitoring/surveillance

Goals:

- Establish policies regarding AMD use
- Monitor incidence rates
- Evaluate drug resistance patterns
- Promote prevent practices
- Establish protocols for isolation of patients with nosocomial infections

Surgical checklist and SSIs

- World Health Organization developed a surgical safety checklist in 2008
- 3-10% reduction in SSIs overall
- Decrease SSI in cats/dogs from 5% to 1.4% (Bergstrom, 2016)
- 8% decrease in SSIs in cat/dogs undergoing GI surgery (Launcelott, 2019)
 - Gastrotomy/enterotomy
 - Linear FB
 - Solitary FB
 - Enterotomy
 - Self trauma

Client ID _____
Patient Name _____
Technician _____

- Antibiotics were given prior to the first incision
- Incision was scrubbed routinely and then with a scrub brush
- A second drape was placed over the patient prior to incising into the gastrointestinal tract and then removed once GI incision(s) were closed
- All surgeons scrubbed in changed gloves once GI tract was closed
- A new pack and table were used to close the abdominal incision

Minimally Invasive Surgery and SSI

- Shorter surgery duration
- Limited iatrogenic soft tissue trauma
- Lower potential for intra-op contamination
- Overall SSI rate in MIS group was 1.7% and in the open surgery group was 5.5% (Mayhew, 2012)



Negative Pressure Wound Therapy

- Vacuum dressing used to promote healing in acute and chronic wounds
- Controlled application of subatmospheric pressure to local wound environment
- Increased perfusion
- Enhanced granulation tissue
- Removal of exudate
- Decreased proinflammatory cytokines
- Decreased proteases
- Leads to reduced bacterial load*

Liposomal Bupivacaine and SSI

Andrews et al (2023):

- SSI developed in 5.6% dogs that received LB and 10.2% that did not
- SSI developed in 3.6% cats that received LB and 4% that did not

Rahn et al (2023):

- Postoperative wound complications were seen in 10.8% with LB and 2.9%*

Power et al (2022):

- Incidence of short-term incisional complications did not differ between surgical wound classifications ($P = 0.55$)

Baxter et al (2013)

- No clinically evident impact on wound or bone healing

Summary

- SSI's represent significant morbidity, mortality, and cost
- Most well established and effective strategies to reduce SSI are prevention
- Culture based therapy is ideal
- Debridement and open wound management for deep infections
- Culture based therapy can help reduce MDR pathogens

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QUESTIONS?



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