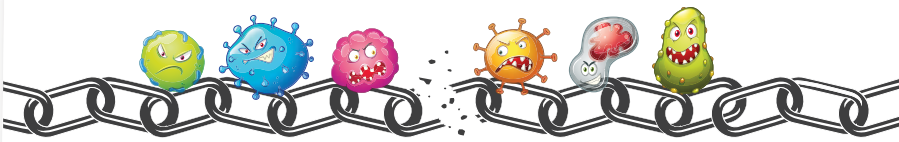
BSN medical

an Essity company

MICROBE OF THE MONTH



Breaking The Chain of Infection

OCTOBER 2018

SYNERGISING MEDICAL MICROBIOLOGY, PATIENT SAFETY AND CLINICAL PRACTICE

Compiled by Helen Loudon RN Independent IPP

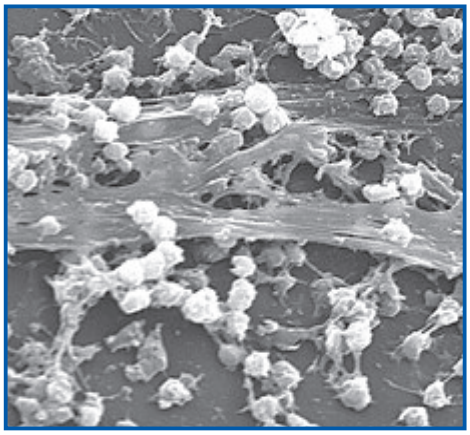
With International Bone and Joint Week in focus from 12th – 20th October, and the devastating effects of infection after the insertion of a joint prosthesis, it is appropriate to feature **Staphylococcus epidermidis** (*'Stafee- lowcoccus – épee – der - meedis'*) this month.

Staphylococcus epidermidis (S. epidermidis) is a very hardy, non-motile, Gram-positive bacterium, and is one of over 40 species belonging to the genus Staphylococcus. It is also a 'facultative anaerobe', meaning it can survive under anaerobic conditions if required to do so.

S. epidermidis is part of the normal human skin flora and, less commonly, the nasal mucosa, and is therefore a frequent contaminant of specimens sent to the diagnostic laboratory.

Previously not considered to be pathogenic, *S. epidermidis* is now commonly implicated in healthcare-associated infections affecting patients with compromised immune systems.

The risk of delayed wound healing and post-operative wound infection following a joint implant may also be increased following non-steroidal anti-inflammatory therapy for arthritis-related pain, due to the patient being unable to mount a normal inflammatory response for wound healing (i.e., stage 2 of the wound healing process).



Electron micrograph of Staphylococcus epidermidis biofilm

KEY TERMS AND CONCEPTS

- Biofilm, facultative anaerobe, virulence, prosthesis, osteomyelitis, MRSE

PATHOGENESIS, VIRULENCE AND ANTIBIOTIC RESISTANCE

The ability to form **biofilms** on plastic devices is a major virulence factor for *S. epidermidis*.

This occurs most commonly on intravascular catheters, defective heart valves (endocarditis) and on medical prostheses or implants.

A biofilm comprises any group of microorganisms which stick to each other and often also to a surface. These adherent bacterial cells become embedded within a three-dimensional slimy matrix of polysaccharides, proteins, lipids and DNA.

Thus, the polysaccharide intercellular adhesin (PIA) produced by *S. epidermidis* allows other bacteria to bind to its existing biofilm, creating a **multilayer** biofilm.

The decreased metabolic activity of the microorganisms inside biofilm, combined with impaired diffusion of antibiotics, therefore makes it very difficult for antibiotics to effectively clear biofilm-based infections.

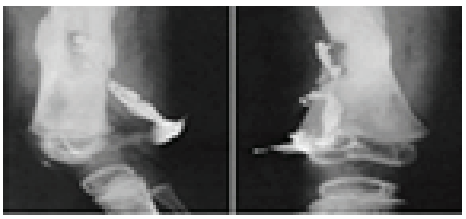
WHAT IS MRSE?

Methicillin resistance (methicillin resistant *Staphylococcus epidermidis*) is now widespread, because organisms living freely on the skin as commensals are routinely exposed to antibiotics secreted in sweat. Resistance to other antibiotics may also include rifamycin, fluoroquinolones, gentamycin, tetracycline, clindamycin and sulphonamides.

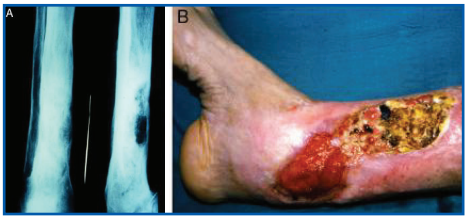
THE SPECTRUM OF *Staphylococcus epidermidis* INFECTION

Osteomyelitis: refers to a bone infection which is usually bacterial in origin. Microorganisms can be introduced into the bone in three ways -

- **Acute haematogenous osteomyelitis** is primarily a disease of children, with 85% of cases occurring in children less than 17 years of age. Most adult cases are seen in patients over 50 years of age, and usually involve the vertebral, sternoclavicular and sacroiliac joints. Predisposing risk factors in adults which contribute to bacteraemia include recent gastrointestinal or urinary tract surgery and intravenous drug abuse.
- **Post traumatic osteomyelitis** develops as a result of contaminated open fractures or surgical treatment of closed fractures (pins, plates etc). The microorganisms are introduced into the bone in the trauma setting or from injured tissue nearby.
- **Local invasion** – osteomyelitis resulting from infection from periodontal disease or a nearby decubitus ulcer. Treatment includes bone, periosteal, bone marrow space, synovial fluid and/or blood culture; and intravenous antibiotics followed by oral therapy for at least 4-6 weeks. Surgical treatment may include drainage of the abscess and removal of devitalised bone.



Sinogram clearly depicting the sinus tract to the focus of osteomyelitis



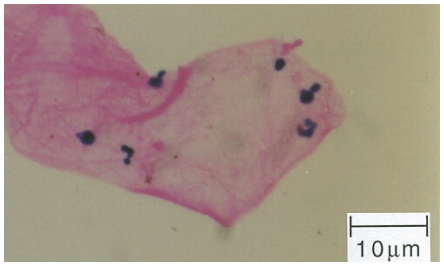
(A) X-ray depicting chronic osteomyelitis from a chronic leg ulcer
(B) The patient's leg ulcer has also undergone a malignant transformation to squamous cell carcinoma

Septic arthritis – bacterial arthritis is potentially the most dangerous and destructive form of acute arthritis. In most cases, it results from haematogenous spread to the joint, but can also result from direct inoculation into the joint from bites, trauma and joint surgery. Predisposing risk factors include prior joint pathology such as rheumatoid arthritis, gout, osteoarthritis, recent joint surgery, etc. The knees, hips, ankles and wrists are the joints most commonly involved.

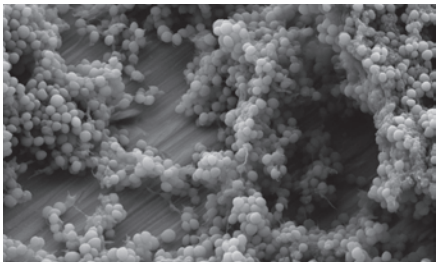
Prosthetic joint infection

S. epidermidis is transferred from the skin adjoining the surgical site and contaminates the prosthesis. Colonisation and biofilm formation ensue with subsequent attachment to the device. Bacterial biofilm is such a complex and impervious structure, that it resists the protective action of leukocytes and antibodies, and infection develops.

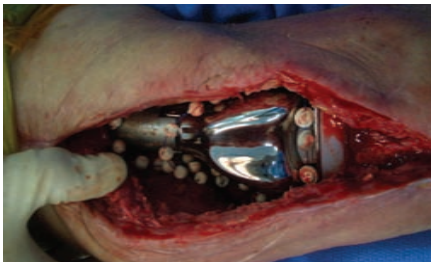
Treatment involves long-term antibiotic therapy and surgical measures – however, it is important to note that antibiotics are largely ineffective in clearing biofilms unless the biofilm is physically disrupted or removed by surgical debridement. Unfortunately, removal and/or replacement of the infected implant is usually necessary.



Staphylococci attached to a skin cell ('skin squame')



Electron micrograph depicting the typical clusters of *Staphylococcus epidermidis* and biofilm formation on a titanium surface



Resorbable antibiotic beads inserted around a septic knee prosthesis

PRACTICE POINTS FOR PRE-OPERATIVE PATIENTS [1,2,3,4]

Staphylococci and their biofilms are a great threat to patients undergoing a joint replacement.

Perioperative care should include the following:

1. Timeous work-up, preferably via a hospital pre-admission clinic
2. Screen for *Staphylococcal* carriage (nose / oropharynx or groin swabs)
   - 2.1 If colonisation with *Staphylococci* is detected, implement decolonisation treatment with intranasal mupirocin (Bactroban®) twice daily for 5-7 days
3. Adherence to the SSI (surgical site infection) prevention bundle which includes:
   - 3.1 Removal of hair at the surgical site with clippers (NO shaving)
   - 3.2 The patient should bathe / shower with 4% chlorhexidine gluconate (CHG) antiseptic soap the night before, and the morning of surgery
   - 3.3 Disinfection of the surgical site with CHG in 70% alcohol
   - 3.4 Administer appropriate intra-operative antibiotic prophylaxis (intravenously within 60 minutes of the surgical incision) to ensure high blood / tissue levels
     - 3.4.1 SSIs increase 6-fold if antibiotics are administered longer than 2 hours pre-operatively or > 3 hours post-surgery[1]
     - 3.4.2 A single pre-operative dose of antibiotic has the same efficacy as multiple doses and the current recommendation is to administer a second dose (in the case of cephalosporins) only if the operation lasts for more than three (3) hours[1,3]
   - 3.5 Keep the patient's core temperature > 36.5°C during the peri-operative period
   - 3.6 Control blood sugar levels between 8 and 11mmol/L
4. Meticulous operative techniques, sterile attire, drapes and supplies, and limit traffic in the operating theatre

---

WIN ENTRANCE TO THE WOUND HEALING ASSOCIATION OF SOUTH AFRICA (WHASA) CONGRESS IN CAPE TOWN ON 25-27 OCTOBER 2018

We are giving away delegate registration to 2 lucky readers! To stand a chance to win in our lucky draw simply give us feedback on your perceptions of the Microbe of the Month and The Link newsletters at askcutimed@bsnmedical.com before **15 October 2018.**

REFERENCES

1. AMPATH Guidelines to Antimicrobial Therapy and the Laboratory Approach to the Diagnosis of Infectious Diseases. (2010) Antibiotic Prophylaxis in Surgery. (2011) Bone and Joint Infections.

2. Anderson, DJ., Sexton, DJ., Harris, A., Baron, E. (2010) An Overview of Control Measures to Prevent Surgical Site Infection. JAMA; 303:2479.

3. Wasserman S, Boyles T, Mendelson M. 2015. A Pocket Guide to Antibiotic Prescribing for Adults in South Africa: for the SA Antibiotic Stewardship Programme (SAASP)

4. World Health Organisation. (2016) Global Guidelines for the Prevention of Surgical Site Infection

Cutimed® Sorbion® Sorbact®

A unique combination

One dressing for infected and highly exuding wounds

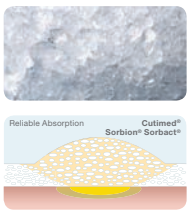
Each layer of Cutimed® Sorbion® Sorbact® is designed to provide an optimal treatment outcome:

ANTI-STRIKETHROUGH BACKING LAYER

- Low risk of strikethrough bedding
  - To protect patients clothes and
  - To improve patient comfort
- Printed surface
  - Enables easy dressing application

SUPER-ABSORBENT CORE

- Absorbs and retains large volumes of exudate into the dressing even under pressure
  - Reduces the risk of skin maceration and assists with the management of different wounds, e.g., leg ulcers and pressure ulcers



The **Cutimed® Sorbion® Sorbact®** internal core expands and gels to effectively retain high to very high levels of exudate

ROUNDED EDGES

- Remain flat
  - To provide additional patient comfort

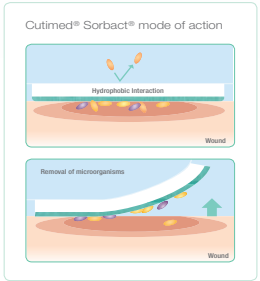
CUTIMED® SORBACT® WOUND CONTACT LAYER

Due to its coating of DACC, **Cutimed® Sorbact®** enables safe[1], irreversible, physical binding of bacteria and fungi to the dressing and rendering them inert[2].

- Low risk of allergies
  - Can be used safely on all patients including those with sensitivities or previously sensitised to antimicrobial dressings
- No release of chemically active agents
  - No known risk of bacterial or fungal resistance
- In contrast to antimicrobial wound dressings, it does not increase cell debris in the wound
  - Helping to support wound healing
- No contraindications
  - Can be used on all patient groups

NON-WOVEN DISTRIBUTION LAYER

- Allows for optimal distribution of fluid throughout the dressing and prevents exudate returning to the wound bed
  - Reduces the risk of skin maceration



Ordering Information Cutimed® Sorbion® Sorbact®

Ref-No.	Size	Wound Pad Size	Items per Unit	NAPPI Code
72698-00	10 x 10 cm	8 x 9 cm	10	274714-001
72698-01	10 x 20 cm	7.7 x 17.8 cm	10	274715-001
72698-02	20 x 20 cm	17.8 x 17.8 cm	10	274716-001
72698-03	20 x 30 cm	17.5 x 27.5 cm	10	274717-001

Wound depth Superficial + deep **Wound phase** Infected Sloughy **Exudate level** Moderate to high

[1] Haycocks S, Chadwick P (2011). Use of a DACC coated antimicrobial dressing in people with diabetes and a history of foot ulceration. Wounds UK Vol 6 No 4
[2] Ljungh et al (2006) Using the principle of hydrophobic interaction to bind and remove wound bacteria. Journal of Wound Care, 15 (4): 175 80

Win the race against wound infection

Cutimed® Sorbact®

Antibacterial and Antifungal Wound Dressings

S **SAFE**
Suitable for **at risk** patient groups

T **TOOLBOX**
Full assortment for a **wide variety** of wound types

A **ADVANCED**
Unique microbial binding technology

R **RESISTANCE**
No bacterial or fungal resistance

T **TIME**
Suitable for **prolonged** treatment

Management and prevention of wound infection is possible when choosing **Cutimed® Sorbact®** as your **1st line** option

BSN medical
an Essity company

Cutimed®
Closing wounds. Together.

essity

Tel: +27 (0)31 710 8111 | Fax: +27 (0)31 710 8225 | 30 Gillitts Road, Pinetown, 3610 | PO Box 526, Pinetown, 3600 | Web: www.bsnmedical.co.za | www.essity.com