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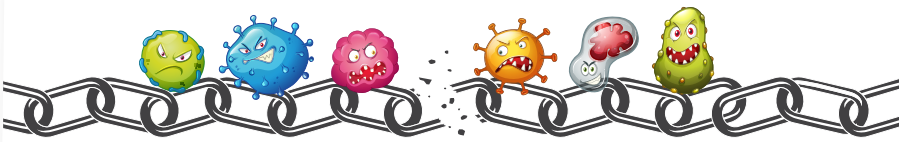
MICROBE OF THE MONTH



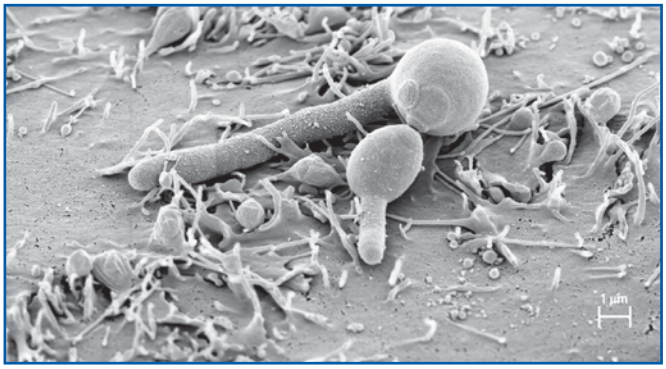
Breaking The Chain of Infection

APRIL 2018

SYNERGISING MEDICAL MICROBIOLOGY, PATIENT SAFETY AND CLINICAL PRACTICE

Compiled by Helen Loudon RN Independent IPP

WELCOME! to another in a series of microbial factsheets which we hope will heighten awareness of commonly encountered pathogens in the healthcare environment and support best practice in infection control. Continuing with the focus on high risk immunocompromised groups, this edition will review important **multidrug resistant fungi** and the prevention of **catheter associated blood stream infection.**



WHAT ARE YEASTS AND FUNGI?

Fungi are a diverse group of microorganisms with over 80,000 identifiable species! Typically, they grow as long 'budding' filaments which are known as hyphae; whereas yeasts are single cells which may reproduce by 'budding' as well as fusion with other yeast cells. Of clinical significance, both form thousands of **spores** in the reproductive process, each of which are capable of germinating into new yeast cells and fungal hyphae.

There are over 20 species of Candida yeasts which can cause infection in humans, the most common of which is **Candida** albicans (Candee 'dah' albee 'cans'). Historically, **Candida species** were considered non–pathogenic and part of the normal flora of healthy individuals, rarely causing serious infection. However, with the widespread use (and misuse) of broad spectrum antibiotics and antifungal agents in different regimens of prophylaxis, empirical, and targeted therapy of fungal infections, this reality has changed dramatically.

PATHOGENESIS: Most fungi grow best at about 25°C which is close to room temperature, however pathogenic (disease causing) fungi thrive at body temperature 37°C, and under acidic conditions at a pH of 5-6. Although usually aerobic, facultative yeasts can multiply in anaerobic conditions, especially in the presence of high concentrations of sugar (hence the diabetic predisposition to fungal infections).

C. albicans has several known **virulence factors** contributing to its pathogenicity which include biofilm production, adherence to epithelial and endothelial cells, and the production of multiple toxic enzymes.

Asexual reproduction occurs through 'budding' or the fragmentation of hyphae (filaments), resulting in the liberation of **thousands of spores** into the environment. These spores are then **inhaled** with the potential for invasion of all major organs and systems (termed candidiasis) in critically ill patients and those with serious comorbid conditions.

FAST FACT: Yeasts can survive and multiply inside macrophages and neutrophils!

The main mode of transmission of Candida species is via dissemination of fungal spores by air currents and dust. However, the eco-epidemiology is still not completely understood - surveys conducted on outbreaks suggest that this pathogen is able to survive for long periods in the hospital environment (e.g., floors, trolleys, windowsills, medical equipment, key pads etc.), to colonize healthcare workers, and to cause persistent colonization of previously infected patients, despite exposure to antifungal therapy.

Therefore, scrupulous hand and environmental hygiene, the use of aseptic technique and fastidious urinary and vascular catheter care are fundamental precautions.

THE NEW KILLERS ON THE BLOCK…

Candida auris, Candida glabrata and **Candida parapsilosis** are emerging fungi which present a serious global health threat affecting patients who commonly have an underlying malignancy or neutropenia, have received immunosuppressive therapy and antifungals, and long-term central venous catheters for chemotherapy or parenteral nutrition.

These fungi are **multidrug-resistant** i.e. resistant to the few antifungal drugs currently available to treat infections caused by Candida species. Laboratory identification and differentiation may also be difficult, leading to inappropriate clinical management and high mortality rates.

WHO IS AT RISK FOR INVASIVE CANDIDIASIS?

- Patients with central venous catheters (CVP)
- ICU patients
- Those with weakened immune systems (e.g. organ transplantation, corticosteroid therapy, HIV/AIDS)
- People who have taken broad-spectrum antibiotics
- Diabetics
- Patients who have a very low neutrophil count (neutropenia) from cytotoxic chemotherapy
- People with kidney failure or are on haemodialysis
- Patients undergoing major gastrointestinal surgery

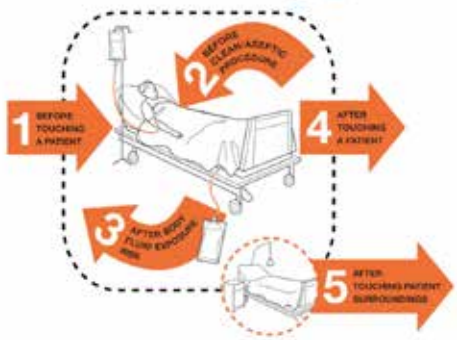
HAND HYGIENE IS NON-NEGOTIABLE…

Use an alcohol-based hand rub

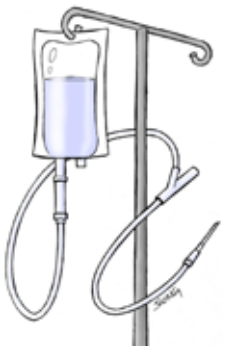
- Before and after direct patient contact, and after touching the patient's surroundings
- After blood or body fluid risk exposure

Use soap and water

- When caring for patients with vomiting and diarrhoeal illness, regardless of whether gloves have been worn



VASCULAR FOCUS



Health-care-associated infection is the most frequent result of unsafe patient care worldwide; with intravascular access devices commonplace in the management of patients in acute and chronic care settings. Catheter-related bloodstream infections (CR-BSI) associated with the insertion and maintenance of these devices are potentially the most dangerous complications associated with health care. 70% of healthcare acquired blood stream infections are catheter related and one in five patients will die.

DEFINITION: Catheter related blood stream infection (bacteraemia) Local and/or systemic infections related to a vascular access device (including peripheral IV therapy, A-lines, central venous and haemodialysis catheters)

THE PATHOGENESIS OF CATHETER RELATED COMPLICATIONS

Skin cannot be sterilized! Vascular catheters disrupt the integrity of the skin, making infection with bacteria and/or fungi possible. The catheter may become colonized by microorganisms within a biofilm, which are protected from host defense mechanisms and the effect of antimicrobial agents. Local and systemic infections may result from contamination or colonization of intravascular devices - cellulitis, abscess formation, septic thrombophlebitis, bacteraemia, or endocarditis may occur as complications of intravenous therapy.

The most common route for contamination of vascular access devices is

- Migration of skin organisms at the insertion site into the cutaneous catheter tract and along the surface of the catheter with subsequent colonization of the catheter tip and formation of biofilm.
- Direct contamination of the catheter hub by contact with hands
- Haematogenous seeding of the intravascular device from contaminated infusate, multi-dose vials or a focus of infection from a distal body site (e.g. wound, lung or urinary system).

Your comments or suggestions for future topics?
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EFFECTIVE HAND DECONTAMINATION IS DEPENDENT ON

- The removal of all wrist and hand jewellery
- Wearing short sleeved clothing for patient care
- Ensuring fingernails are short, clean and free from nail polish and false nails (incl. gel overlays)
- Covering cuts and abrasions with waterproof dressings

SAFE INJECTION PRACTICE

- Needles and syringes are single-use devices
- Disinfect catheter hubs, needleless connectors, and injection ports before accessing vascular catheters
- Do not administer medication form a single dose vial or bag to multiple patients

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