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Microbe of the month

Breaking The Chain of Infection

NOVEMBER 2024
NEWSLETTER

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FEATURED THIS MONTH:

WORLD AMR AWARENESS WEEK 18th – 24th November

AMR is invisible, but its victims are not WHO

10-minute read + QUIZ

Hello readers!

The Microbe of the Month ('MOM') newsletter aims to create awareness about current international programmes and pathogens of clinical importance, as well as recommendations to promote sound infection prevention and control and antimicrobial stewardship practices.

Every issue is laid out in an easy to read and understand format, complete with a detailed references section to assist you with risk management and Quality Assurance in your area of patient care.

There is a quick quiz at the end of the newsletter to test your grasp of the content – please use this newsletter as a teaching tool in your workplace, share it widely and start an 'infectious dialogue' about topical issues in infection control!

You are also encouraged to visit www.woundwarriors.co.za to view the large repository of clinical material which can be downloaded to assist you in your daily practice.

World Antimicrobial Resistance (AMR) Awareness Week is commemorated annually from 18th - 24th November.

AMR occurs when bacteria, viruses, fungi and parasites no longer respond to antimicrobial agents.

This phenomenon threatens the core of patient care. It means losing the effectiveness of essential drugs – antibiotics and other antimicrobials – that are crucial for treating infections. This translates into fewer therapeutic options, increased healthcare costs, recurring infections, a heightened risk of treatment failures, and the potential to reverse decades of medical advancement.

Antimicrobial Resistance (AMR) is a pressing global health and socioeconomic crisis. It has significant impacts on human and animal health, food production and the environment. **Drug-resistant pathogens pose a threat to *everyone, everywhere*!**

Stronger political leadership, advocacy and accountability are needed at all levels and the time to act is now. [1]

Over and above the ongoing problem of antibiotic resistant bacteria in South Africa, specific fungal species are posing frightening treatment dilemmas; amongst them, the deadly pathogen Candida auris. ***Candida auris* is a fungal (yeast-like) pathogen within the Candida genus,** which can live on the skin, in the gut, or in the environment; and which has been implicated in serious outbreaks of healthcare-associated infections (HAIs) on several continents.

***Candida auris (C. auris)* causes life-threatening infections such as bloodstream infections, meningitis, bone infections, burns / wound infections and urinary tract infections.** This fungus is difficult to identify in the routine laboratory setting, is associated with a high mortality among patients with invasive infection, and may be difficult to "eradicate" from the hospital environment.

Of most concern, *C. auris* is usually multi-drug resistant – almost all *C. auris* isolates are resistant to fluconazole (an important first-line antifungal agent) and, in a recent global study [2,9], more than 40% of isolates were resistant to two or more major classes of antifungals.[2-4]

Key words: *antimicrobial resistance (AMR), selective pressure, multidrug-resistant (MDR), multidrug-resistant organism (MDRO), mechanisms of resistance, Candida auris, antimicrobial stewardship (AMS)*

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Bind:
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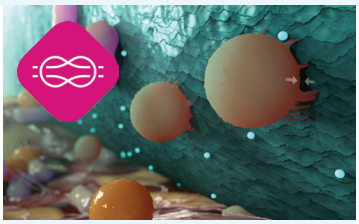
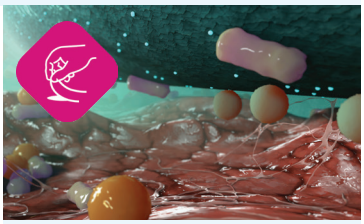
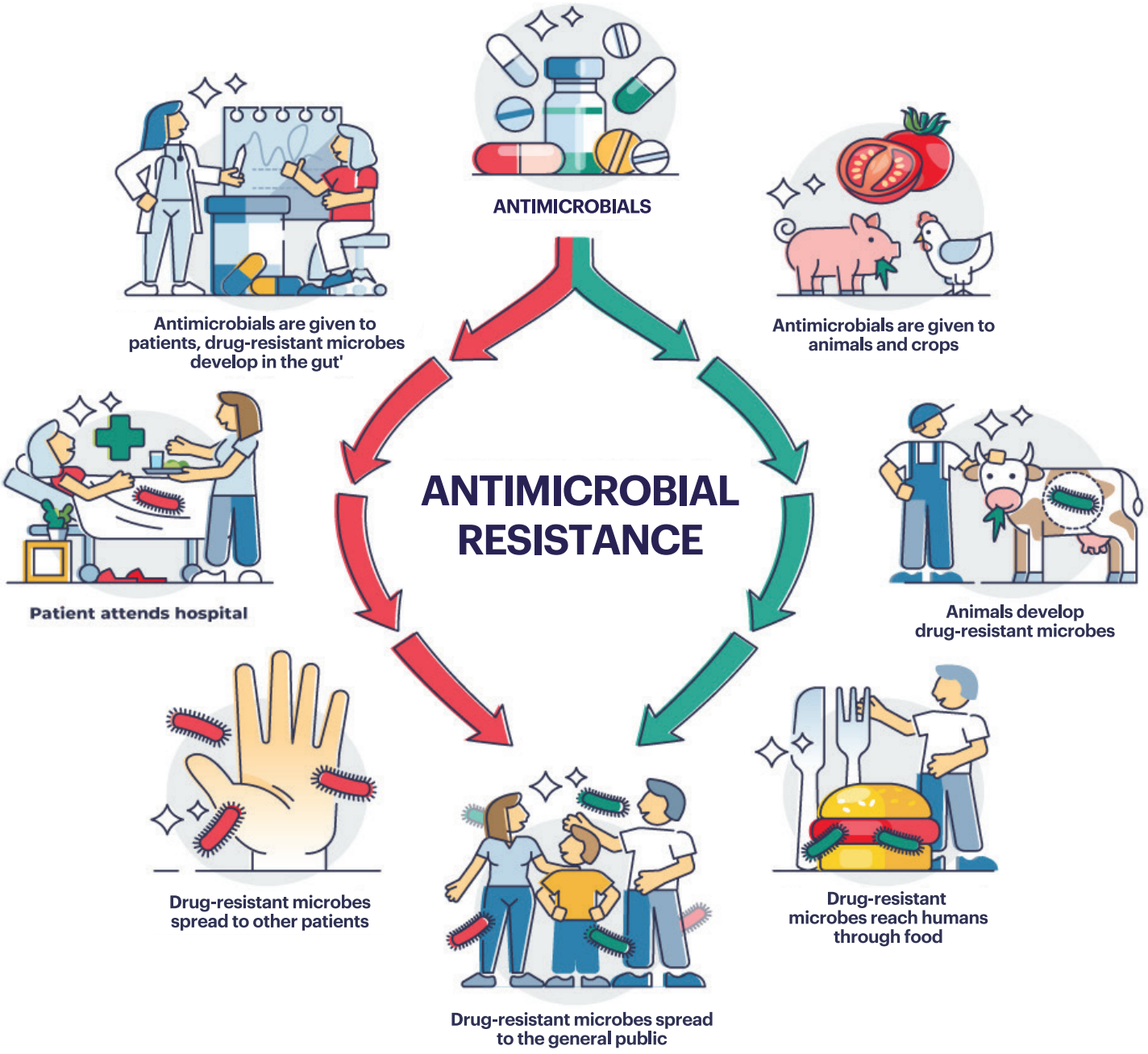


Inhibit:
Bacteria are irreversibly bound, and growth is inhibited. Development of bacterial or fungal resistance is not expected.

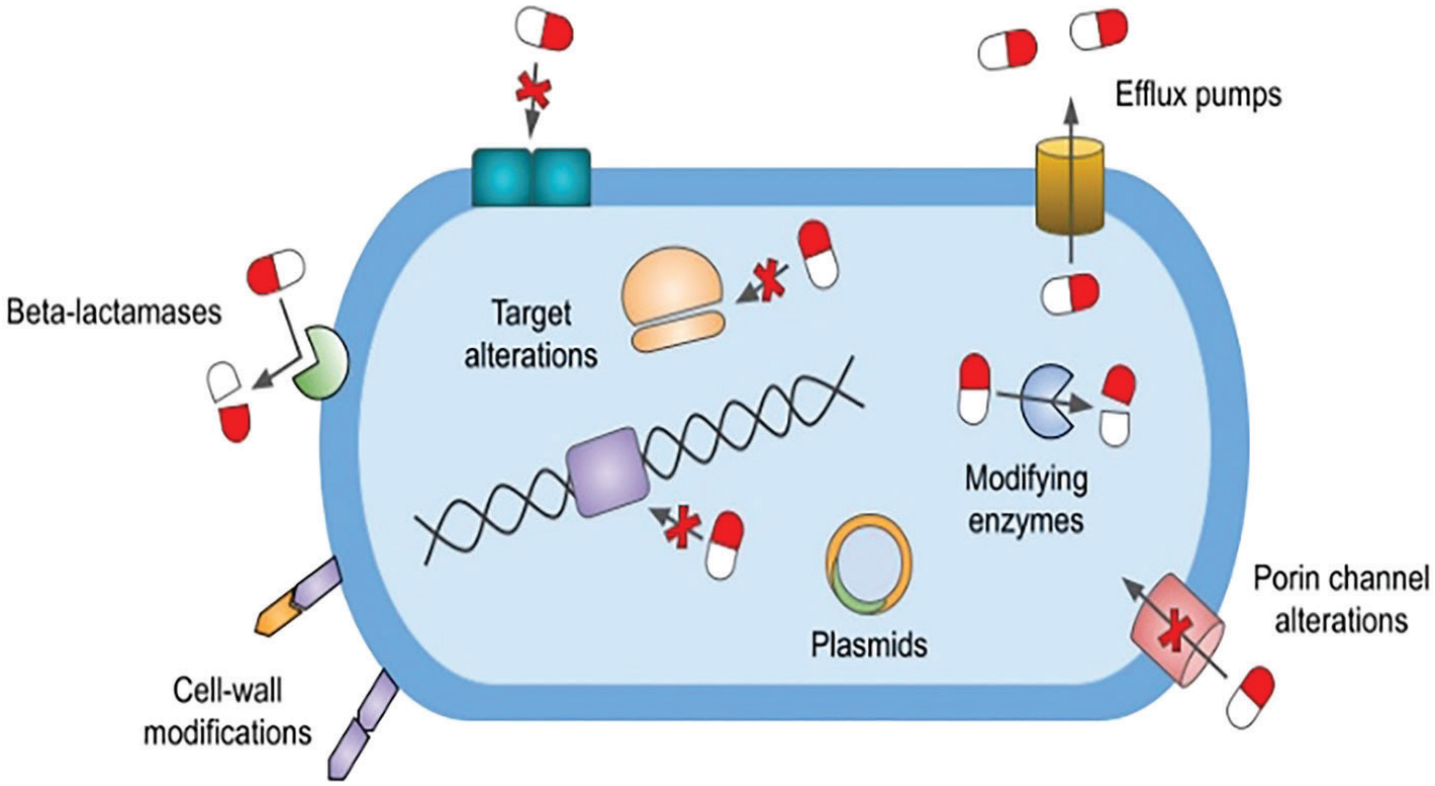


Remove:
Bound bacteria, fundi and endotoxins are removed.

How does antimicrobial resistance (AMR) spread?



How bacteria and fungi fight back against antimicrobial agents



EMERGENT DRUG RESISTANT CANDIDA SPECIES [2,4-9]

Invasive fungal infections pose an important threat to public health and are an under-recognised component of antimicrobial resistance (AMR). Environmental factors probably play a role in outbreaks in healthcare settings, including their prolonged survival in healthcare environments, probably due to colonised and asymptomatic **carriers**.

Candidiasis, which includes both superficial infections and invasive disease, is the most common cause of fungal infection worldwide. Candida bloodstream infections (BSI) cause significant mortality and pose a major threat to immunocompromised and intensive care unit (ICU) patients.

Although *Candida albicans* remains the most frequently isolated Candida species in the clinical setting, **Candida auris *(C. auris)* has rapidly emerged as a major cause of candidemia in South Africa**, surpassing the number of cases caused by *C. albicans, C. parapsilosis, C. glabrata, C. tropicalis* and *C. krusei*. [7]

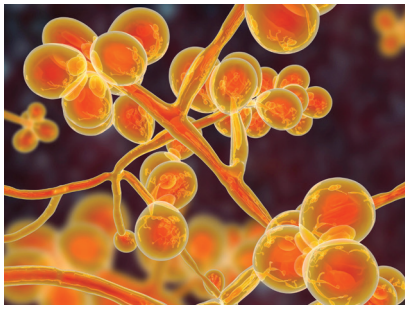
There has also been a marked shift towards species of Candida that have increased resistance to -azoles such as fluconazole (the standard antifungal drug of choice in many countries), and to the most recently introduced antifungals known as echinocandins. [9]

Could there be a link to climate change?

- The reasons for the dramatic emergence of *C. auris* as a pathogen in healthcare settings are not clear. Most fungi and yeasts prefer the cooler temperatures in soil, but *C. auris* can grow at relatively high temperatures (42°C). To our knowledge, it has never been isolated from the natural environment, and it does not seem to have been a common coloniser of humans before 2009. [4,6,9]
- However, it is believed that changes in environmental temperatures may have led to its emergence. For example, East Asia, South Asia, Africa and South America have unique *C. auris* **clades** (a group of organisms believed to comprise all the evolutionary descendants of a common ancestor), consistent with the theory that *C. auris* emerged independently on several continents. [4-6,9]

WHO IS AT RISK FOR AN INVASIVE *C. AURIS* INFECTION? [4,6]

- The elderly and debilitated residents of long-term care facilities.
- Critically ill patients and premature neonates.
- Those with immune systems compromised by diabetes mellitus, HIV, cancer chemotherapy or transplant-necessitated immunosuppression therapy.
- Prior or prolonged exposure to broad-spectrum antimicrobial agents.
- Invasive devices (especially central lines), major surgical procedures.
- Those with severe viral infections, such as influenza virus and COVID-19.



CANDIDA AURIS
(C. auris)

The spread of *C. auris* is most likely through the hands of healthcare workers and contaminated surfaces and materials such as shared patient equipment, linen and hospital furniture. Due to its ability to form **biofilms and spores**, and its **intrinsic resistance to some commonly used disinfectants, *C. auris* can survive for prolonged periods** (e.g., up to 28 days on plastic surfaces in a controlled environment). [5,12]

Inadequate infection control practices, combined with poor environmental cleaning and disinfection, or the use of surface disinfectants which are not sporicidal, create ideal opportunities for contact transmission.

LABORATORY IDENTIFICATION OF *C. AURIS*

Like other Candida species, invasive *C. auris* infection should be confirmed by the culture of blood or other body fluids. However, *C. auris* is frequently misidentified by clinical laboratories, and may be confused with other yeasts such as *Candida haemulonii* and *Rhodotorula glutinis*. [1]

- **For this reason, the laboratory should suspect *C. auris* when specimens are submitted from facilities known to be endemic for this pathogen, or when the culture is fluconazole resistant.** [5]
- **Case definition/s:**
  - Colonisation: "Detection of *C. auris* in a specimen from a swab obtained from any non-sterile body site" (e.g., skin, nasal, rectal swabs).
  - Infection: "Detection of *C. auris* in a specimen obtained from a sterile body site" (e.g., blood culture, cerebrospinal fluid, tissue, catheter specimen of urine). [2-5]
  - An outbreak is defined as a sudden temporal increase in the number of cases of *C. auris* colonisation or infection within a unit or facility compared to a baseline, with epidemiological links which suggest clustering. [5]
- **All suspected clusters / outbreaks should be reported by the facility IPC Practitioner or laboratory to the relevant district CDC authority, as well as the SA National Institute for Communicable Diseases (NICD).**

  https://www.nicd.ac.za/our-services/outbreak-response/

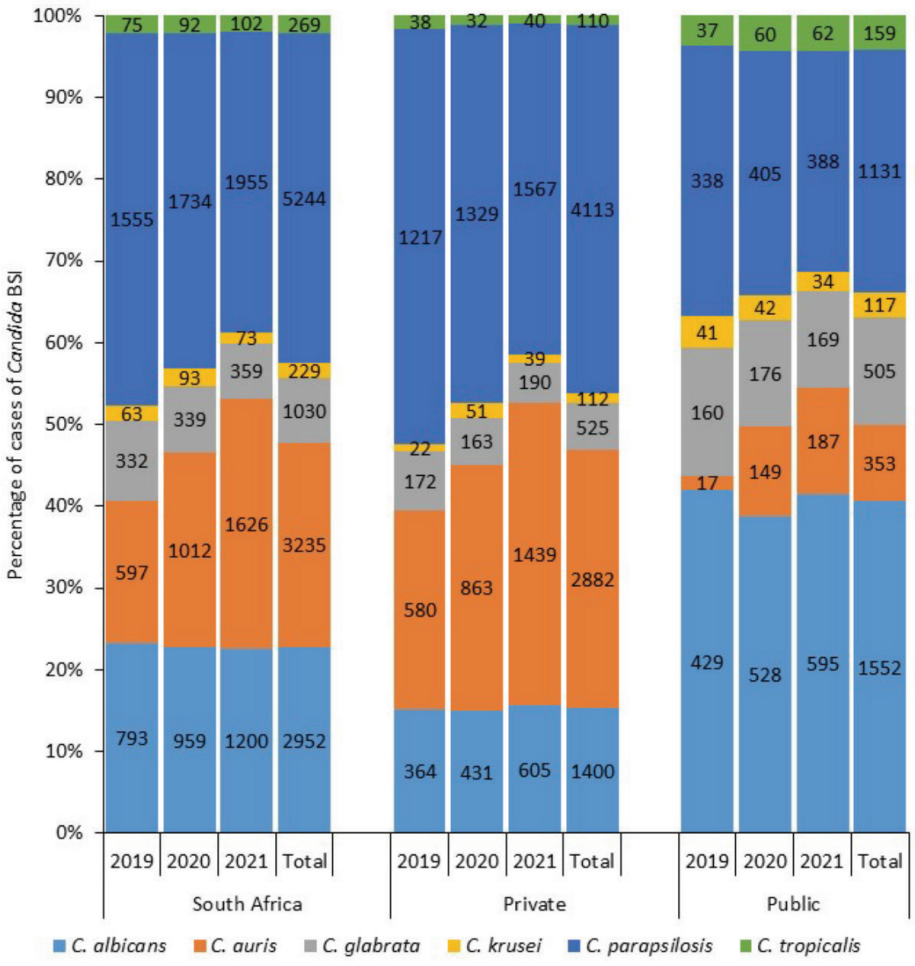
ANTIMICROBIAL STEWARDSHIP (AMS) AND *CANDIDA AURIS* [5,6]

- More than 90% of isolates are resistant to fluconazole.
- 35% of isolates are resistant to amphotericin B.
- 7% are resistant to echinocandins.
- 41% are multi-drug resistant (MDR - i.e., resistance to at least 2 classes of antifungals).
- **NB!** All MDR *C. auris* isolates, and those found to be resistant to an **echinocandin** or **amphotericin B**, should be promptly referred to the NICD.

  https://www.nicd.ac.za/our-services/outbreak-response/

An echinocandin (e.g., caspofungin, micafungin or anidulafungin) or amphotericin B deoxycholate should be used as first-line therapy, depending on availability (Note: patients with fungaemia may have renal dysfunction, so amphotericin B should be avoided). Blood cultures and laboratory / biochemical markers (including white cell count (WCC), platelet count and C-reactive protein (CRP)) should be repeated at least three times a week to monitor clearance after the candidaemia is confirmed by blood culture. Where possible, invasive devices such as CVCs and urinary catheters should be removed. The duration of antifungal treatment duration is standard as for infections caused by other *Candida* species – treatment should be continued for 14 days after the documented clearance of *C. auris* from the bloodstream (i.e., one blood culture per day until negative) and the resolution of symptoms.

Treatment of deep-seated or complicated infections is usually prolonged and should be in consultation with a Medical Microbiologist or an Infectious Diseases specialist.[5,6]



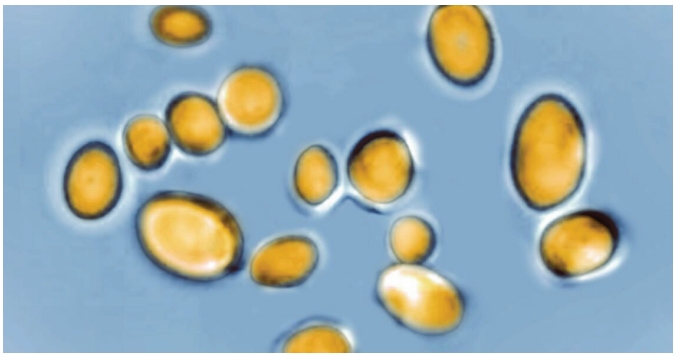
Distribution of six *Candida* species by Private and Public health sectors in South Africa, 2019-2021.[7]

Electronic blood culture data was obtained from the NICD surveillance data warehouse and the South African Society of Clinical Microbiology from 1 January 2019 through 31 December 2021.

A case of *Candida* BSI was defined as a person who had a blood culture from which one of the six common *Candida* species (*C. albicans, C. auris, C. glabrata, C. krusei, C. parapsilosis or C. tropicalis*) was isolated either at a NHLS or private pathology laboratory (Ie. Ampath, Lancet Laboratories, PathCare/ Vermaak and Partners).

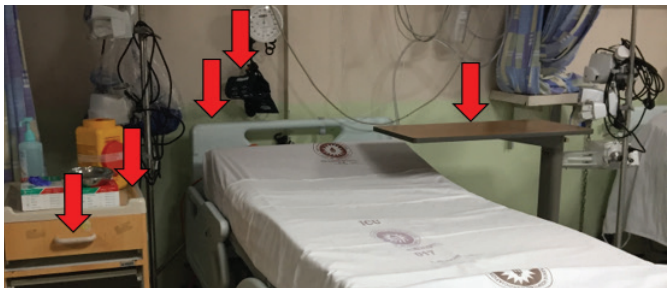
Fewer than 30% of cases of *Candida* BSI were reported from the public sector, suggesting differential specimen-taking practices or a relatively smaller population at risk. ***Candida auris*, was the second most common cause of candidaemia**. This represents a further shift in epidemiology since a national survey in 2016-2017 found that *C. parapsilosis* was the most common species (44%), followed by *C. albicans* (23%) and *C. auris* (14%). [7]

ENVIRONMENTAL CLEANING AND DISINFECTION



Fungal spores are resistant to many surface disinfectants! [10-12]
(e.g., Quaternary ammonium compounds - also known as 'Quats' or 'QACs')

SPORICIDAL (spore-killing) DISINFECTANTS	SPECIAL COMMENTS
Sodium hypochlorite (chlorine) applied at 1:1000 dilution **after** cleaning	Recommended for routine environmental disinfection to control *C. auris*. Unstable once diluted, and rapidly inactivated once contaminated with organic matter. Solution should be discarded immediately after use. Inexpensive, but corrosive. PPE is required.
NaDCC (sodium dichloroisocyanurate) detergent-combined granules or tablets mixed with lukewarm water	Strong odour, airway irritant. Less corrosive to steel and galvanised surfaces. Handle with caution; PPE is required.
Glutaraldehyde 2%	The solution only becomes sporicidal once it is "activated" to pH 7.5–8.5. Once activated, these solutions have a limited shelf-life of 14-28 days, and the microbicidal activity of the solution should be tested daily before use. Strong odour, toxic airway irritant. PPE required.
Peracetic acid	Expensive, highly volatile and unstable once activated. Requires special administration cabinets; irritant to eyes and mucous membranes; PPE required.
Hydrogen peroxide 35% gas vapour	Used as micro-condensation after terminal cleaning. Expensive, requires specialised equipment and extended contact time for optimum microbicidal and sporicidal efficacy. Synergistic sporicidal effects have been observed with a combination of hydrogen peroxide and peracetic acid.
Ultraviolet light technology ('UV-C')	Used after terminal cleaning. Light in the ultraviolet 'C wavelength' of 200-320 nanometres demonstrates broad spectrum microbicidal properties; however, studies are conflicting regarding the degree of sporicidal efficacy.



It is imperative that IPC Practitioners liaise with Cleaning Supervisors and provide oversight of cleaning methods to ensure the use of hospital grade sporicidal surface disinfectants, including the application of the product for the correct 'contact time'.

THE BOTTOM LINE... [4-6,10-12]

- Patients with *C. auris* infection or colonisation should be isolated in single rooms with en suite facilities or side rooms, or should be cohorted, wherever possible.
- Standard precautions should be strictly adhered to, including hand hygiene using soap and water (especially with visible soiling).
- In addition, contact precautions are recommended. These include the donning of appropriate personal protective equipment (PPE) (gloves and disposable aprons) before touching the patient or the patient's immediate surroundings (e.g., bed linen, bed rails, personal belongings, invasive devices).
- Between care activities, alcohol hand rub may be used if hands are not visibly soiled.
- PPE should be donned after application of alcohol hand rub and hands should be cleaned with soap and water after removal of PPE.
- Hand hygiene practices among staff members should be evaluated and adherence emphasised.
- Improved adherence to bundles of care for venous and urinary catheters, as well as tracheostomy care, is essential.
- 'High touch' and environmental surfaces should be cleaned and disinfected at least twice daily with detergent-based hospital grade sporicidal chlorine or NaDCC disinfectants.
- Clinicians and ancillary health professionals (including dieticians, radiographers, physiotherapists, phlebotomists, etc.) should also be trained regarding IPC recommendations.
- Affected patients, visitors and family members should be briefed about the importance of hand hygiene and encouraged to use protective aprons.
- If a patient needs care or investigations in another department within a facility (including radiology, theatre, outpatient clinic, etc.), the receiving department should be notified of the patient's *C. auris* status and advised on what precautionary measures to take prior to and during the transfer / procedure. These patients should also be scheduled last on the list for the day, if feasible.
- If a patient needs to be transferred to another healthcare facility, including a long-term care facility, the referring facility should ensure that the receiving facility is appropriately notified of the patient's *C. auris* infection or colonisation status.
- Note: Even after treatment for invasive infections, **patients generally remain colonised with *C. auris* for long periods, and perhaps indefinitely.** Therefore, all recommended infection prevention and control measures should be followed during and after treatment for *C. auris* infection. [2,4,5,10-12]
- Use hydrogen peroxide vapour for terminal disinfection of the isolation room (after the terminal clean) if facilities are available.

Supply the correct answer!

Question 1. *Candida auris* is a bacterial pathogen. TRUE / FALSE.

Question 2. The spread of *Candida auris* is most likely through the _____ of healthcare workers and contaminated surfaces.

Question 3. Due to its ability to form biofilms and _____, *C. auris* is intrinsically resistant to commonly used disinfectants and can survive for long periods in the environment.

Question 4. Almost all isolates of *C. auris* are resistant to the antifungal agent _____.

Question 5. Patients may remain colonised with *C. auris* for long periods. Therefore, contact precautions should be followed during and after treatment for C. auris infection. TRUE / FALSE.

ANSWERS: 1. FALSE. **2.** Hands. **3.** Spores. **4.** Fluconazole. **5.** TRUE.

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