IP&ABR ZORGNETWERK Zuidwest-Nederland

Van ABR naar AMR

Inge Huijskens
arts-microbioloog RLM

AntiBioticaResistentie

Kamerbrief Voortgang aanpak antibioticaresistentie
9 februari 2021

- Het voorkómen van resistente micro-organismen vraagt om een aanpak over diverse domeinen heen.
- Resistente micro-organismen komen voor bij mensen, bij dieren, in ons voedsel en in het milieu.

Van ABR naar AMR

- We richten ons niet alleen meer op ABR, maar ook op het inzicht en vóórkomen van resistentie bij andere microben, zoals schimmels en virussen

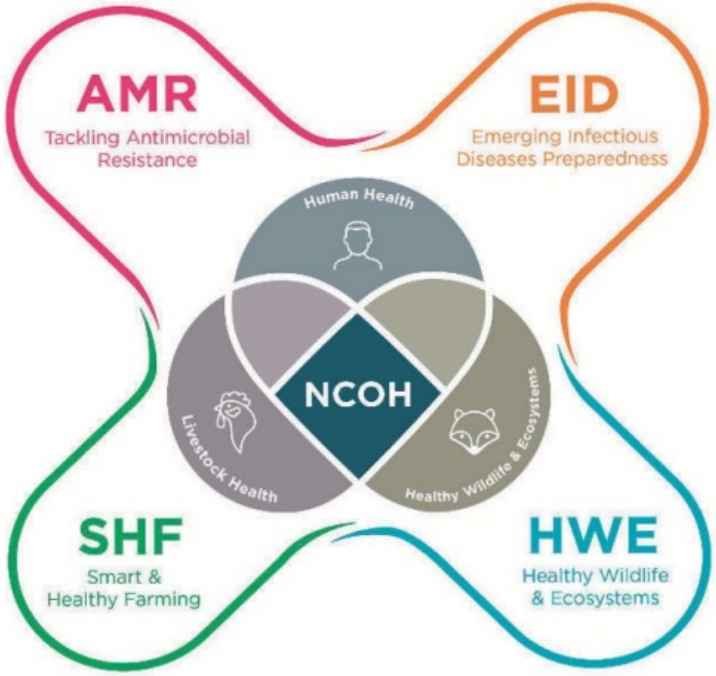
- Regionale netwerken gaan de hoeksteen vormen van de aanpak van resistentie in de zorg.

- One health

One Health

Netherlands Centre for One Health (NCOH)
9 partners in Nederlandse universiteiten en umcs + 1 associate partner (RIVM)

> 400 actieve deelnemers
> € 50 miljoen investering
> 30 samenwerkingsprojecten
> 100 hoofdonderzoekers
> 65 PhD-studenten



One Health

Figuur 1. Het aantal geschatte dieren in Nederland

102 | Ned Tijdschr Med Microbiol 2021; 29: nr 3

Various global changes affect the human, animal, and environment ecosystem making new outbreaks of existing and new virus diseases possible.

Doelen

- Bevorderen van het juist gebruik van antibiotica waarmee een stabilisering en waar mogelijk een daling van het gebruik in de zorg en de dierhouderij wordt bewerkstelligd;
- Afremmen van het ontstaan van resistentie voor de meeste micro-organismen. Door te investeren in onderzoek naar en ontwikkeling van nieuwe antibiotica, anti schimmelmiddelen of alternatieven wordt bijgedragen aan het verminderen van het ontstaan van resistentie en het behandelbaar houden van infecties met resistente micro-organismen;
- Voorkomen van verspreiding van BRMO (tussen patiënten in en buiten zorginstellingen, met de omgeving, en dierhouderij;
- Daling van het aantal door BRMO veroorzaakte zorginfecties en afname van uitbraken in zorginstellingen, door middel van adequate surveillance en goede infectiepreventie;
- Intensiveren van internationale samenwerking.

A One Health response to AMR

A sustained Global/National One Health Response is essential to tackle antimicrobial resistance and achieve the Sustainable Development Goals

Humans

Food & feed

Plants & crops

Environment

Terrestrial & aquatic animals

AntiMicrobial Resistance

WHO

- “AMR occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. As a result, the medicines become ineffective and infections persist in the body, increasing the risk of spread to others.”

Preventing Antimicrobial Resistance Together
World AMR Awareness Week, 18 - 24 November

WHO Priority pathogens

- Bacteriën
  - *Acinetobacter baumannii*, carbapenem-resistent
  - *Pseudomonas aeruginosa*, carbapenem-resistent
  - *Enterobacteriaceae*, carbapenem-resistent, ESBL-producerend
- Virussen
  - COVID-19, Crimean-Cong haemorrhagic fever, Ebola virus disease, Marburg virus disease, Lassa fever, Middle East respiratory syndrome (MERS), Severe Acute Respiratory Syndrome (SARS), Nipah and henipaviral diseases, Rift Valley fever, Zika
- Schimmels
  - *Cryptococcus neoformans*, *Candida auris*, *Aspergillus fumigatus*, *Candida albicans*
- Disease X

‘Superbugs’ Could Kill Up to Ten Million Additional People Each Year by 2050

A new U.N. report warns that climate change, pollution and biodiversity loss are helping create pathogens that can evade our medications

NEWS

Deadly fungal infection spreading at an alarming rate, CDC says

SMART NEWS

These Flesh-Eating Bacteria Are Thriving [illegible] of Climate Change

New research finds that infections caused by Vibrio vulnificus have increased over the last 30 years and expanded to new geographic areas

CDC Sounds the Alarm: A Diarrhea Superbug Is Resisting Drugs and Spreading Fast

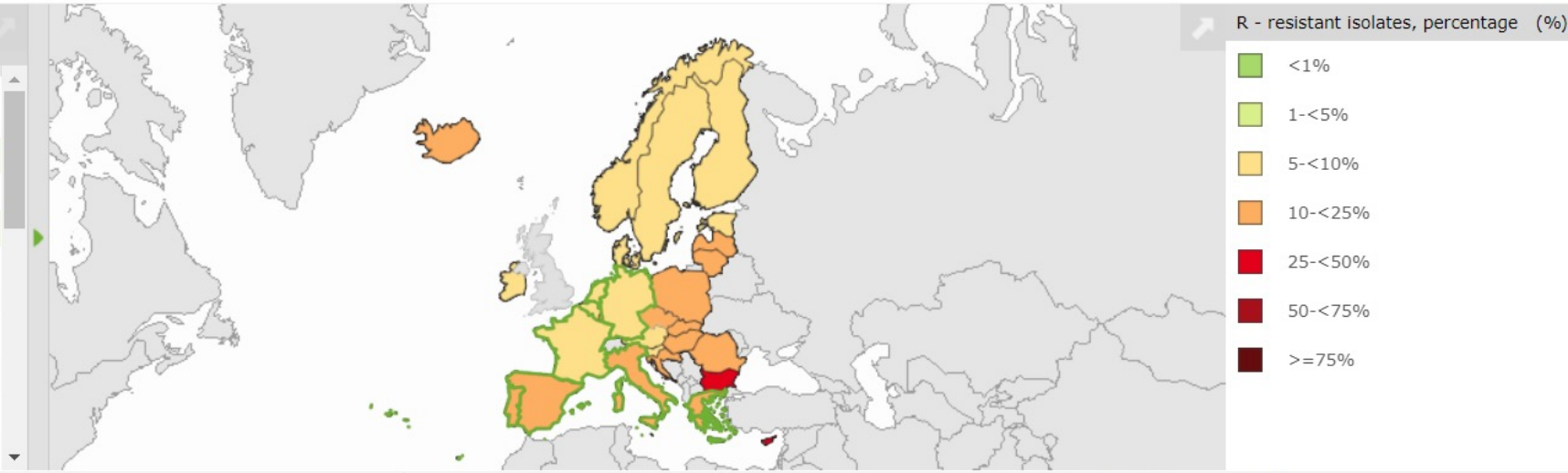
Cases of extensively drug-resistant *Shigella* are becoming more common in the U.S., while an outbreak in Cape Verde has sickened hundreds of tourists.

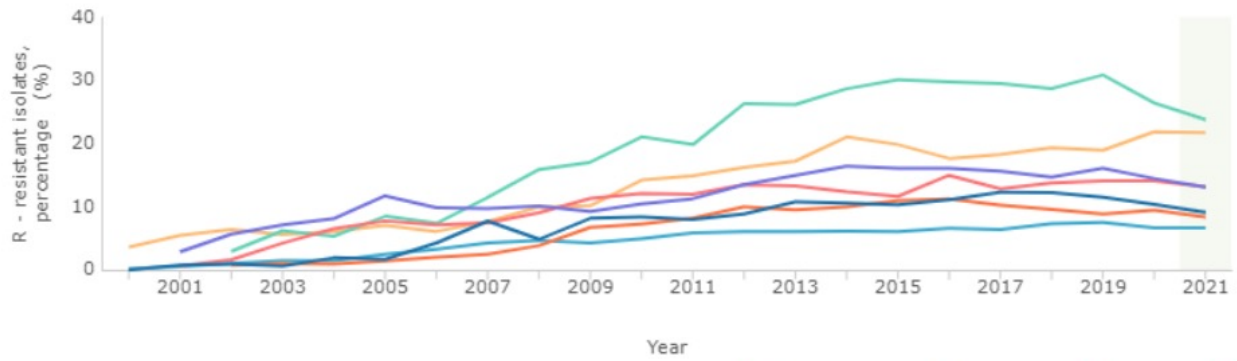
By **Ed Cara** Published February 27, 2023 | Comments (38) | Alerts

Surveillance Atlas of Infectious Diseases

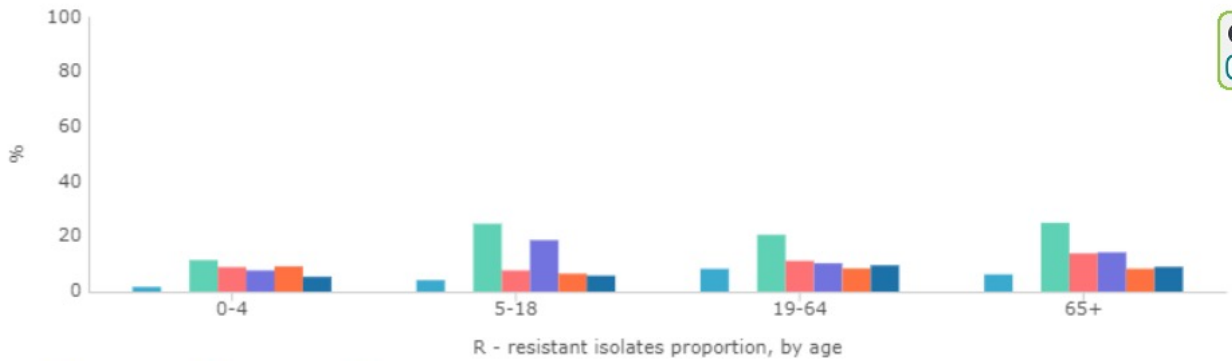
Antimicrobial resistance | Escherichia coli | Third-generation cephalosporins | R - resistant isolates, percentage | 2021

Region	R - resistant isolates, percentage (%)
Bulgaria	37.3
Cyprus	32.8
Italy	23.8
Slovakia	23.1
Greece	21.7
Hungary	20.4
Romania	18.8
Poland	18.7
Croatia	18.6
Latvia	18.3
Czechia	14.4





R - resistant isolates proportion, by age | Bar

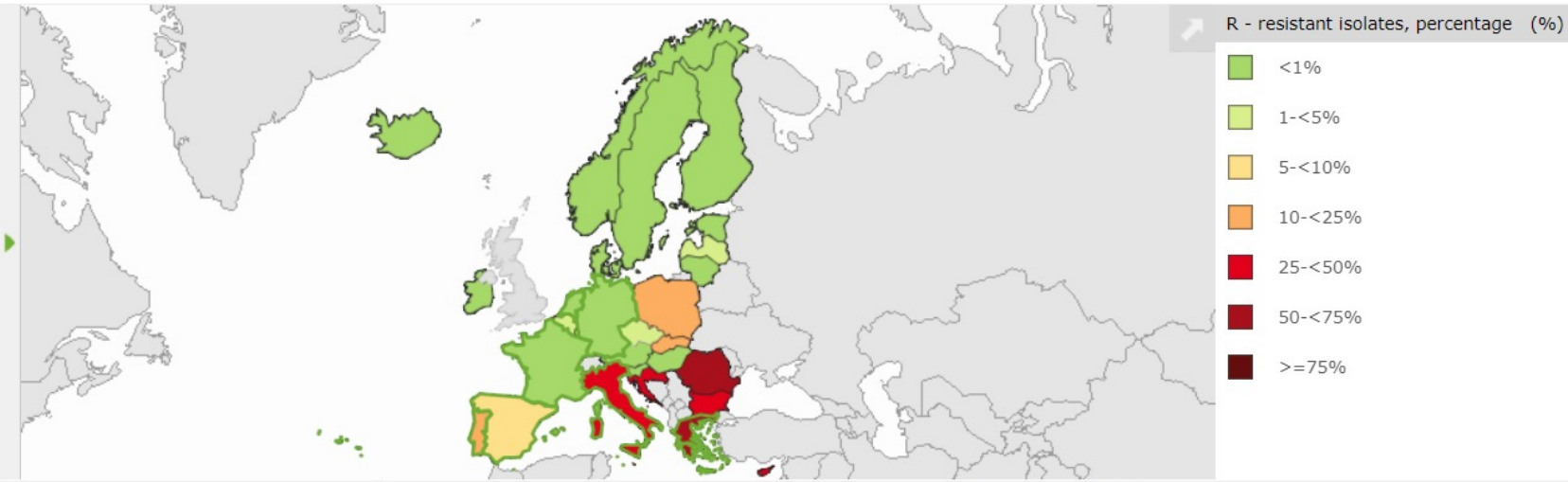


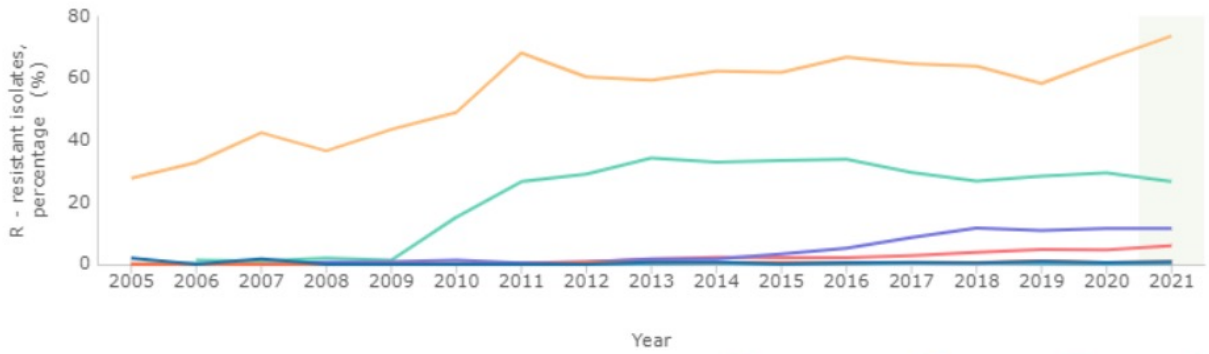
Netherlands | Greece | Italy | Spain | Portugal | France | Germany

Surveillance Atlas of Infectious Diseases

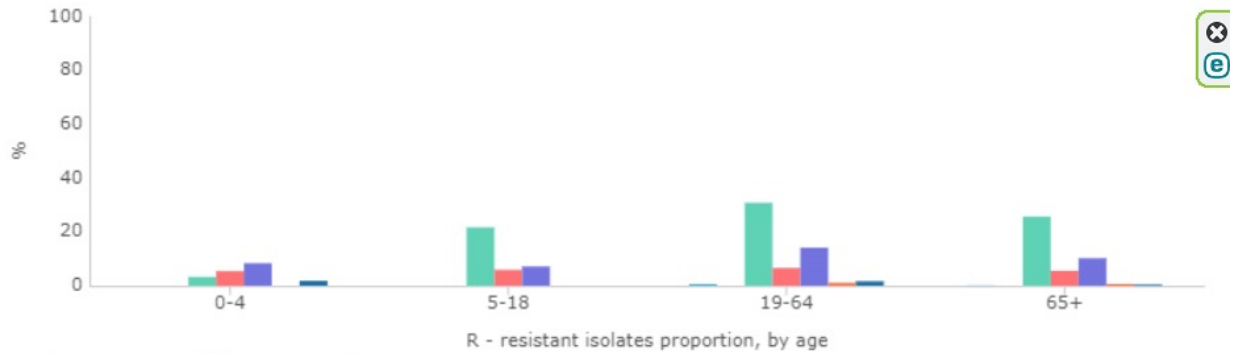
Antimicrobial resistance | Klebsiella pneumoniae | Carbapenems | R - resistant isolates, percentage | 2021

Region	R - resistant isolates, percentage (%)
Greece	73.7
Romania	54.5
Bulgaria	46.3
Croatia	32.9
Italy	26.7
Cyprus	26.2
Poland	19.5
Slovakia	11.7
Portugal	11.6
Malta	6.7
Spain	5.9





R - resistant isolates proportion, by age | Bar

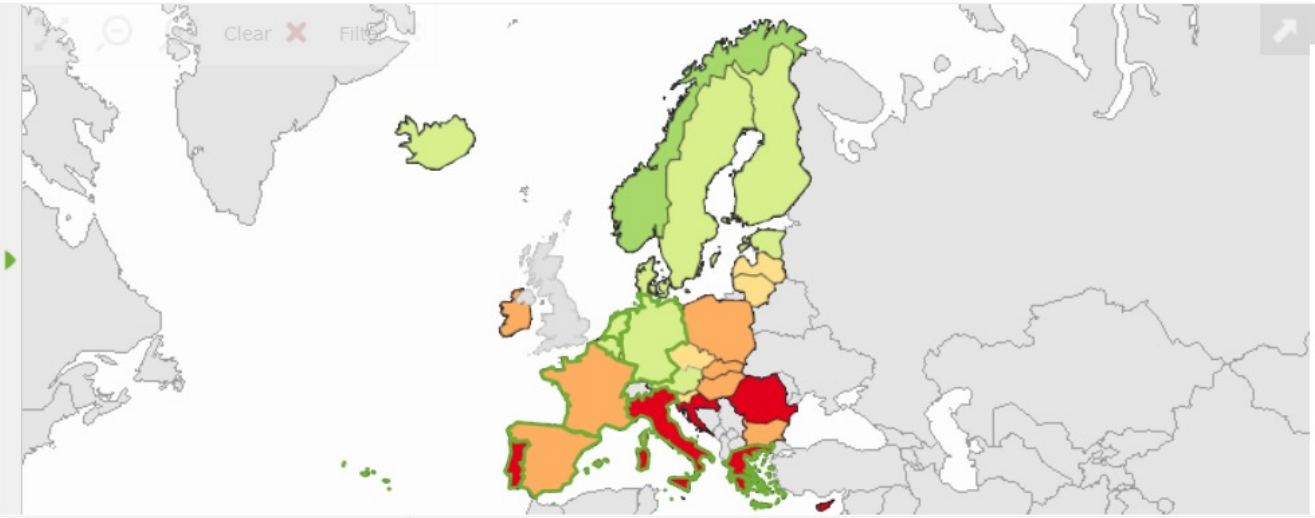


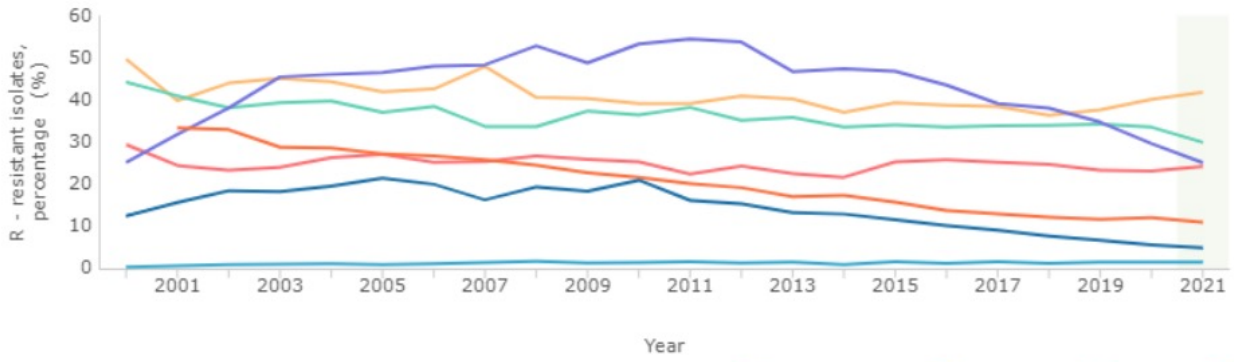
Netherlands Greece Italy Spain Portugal France Germany

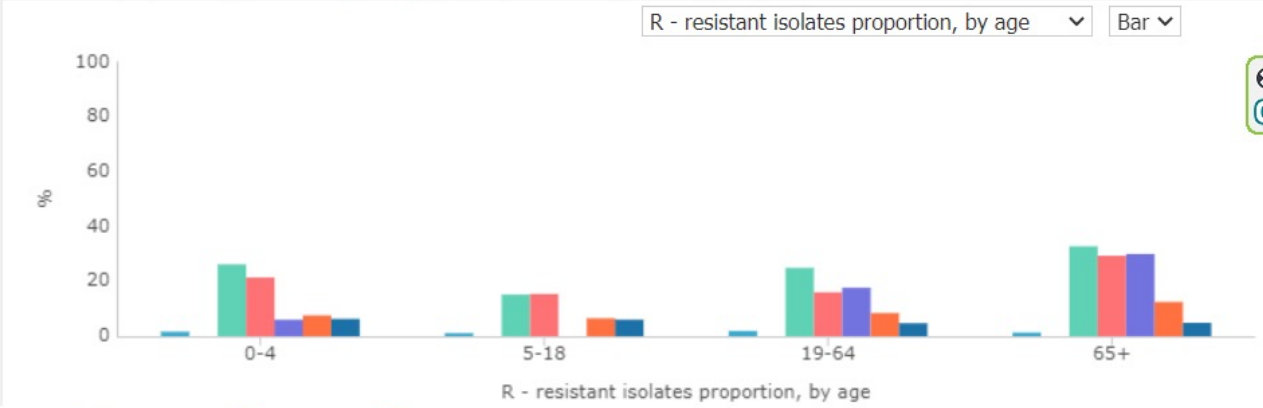
Surveillance Atlas of Infectious Diseases

Antimicrobial resistance | Staphylococcus aureus | Meticillin (MRSA) | R - resistant isolates, percentage | 2021

Region	R - resistant isolates, percentage (%)
Cyprus	42.9
Greece	41.9
Romania	41.0
Croatia	34.8
Italy	30.0
Portugal	25.1
Spain	24.2
Slovakia	22.3
Malta	20.4
Hungary	19.3
Poland	16.5







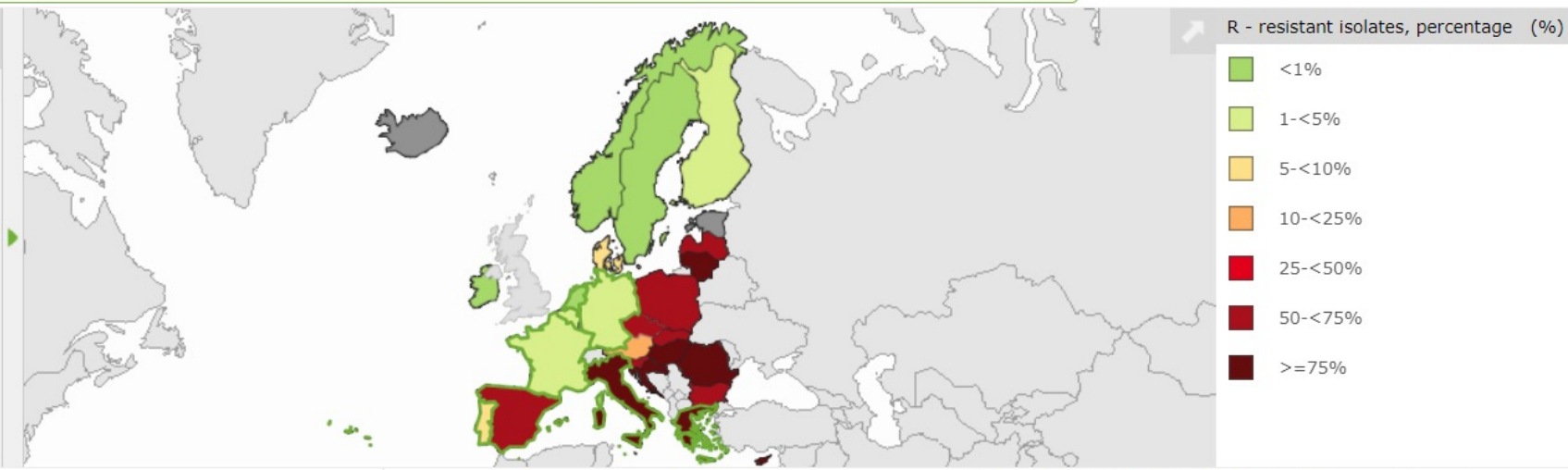
Netherlands | Greece | Italy | Spain | Portugal | France | Germany

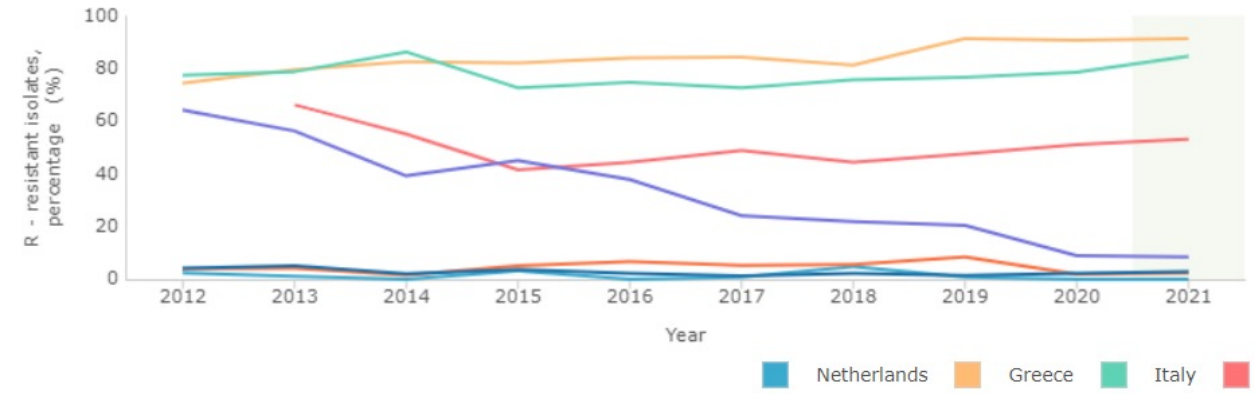
Surveillance Atlas of Infectious Diseases

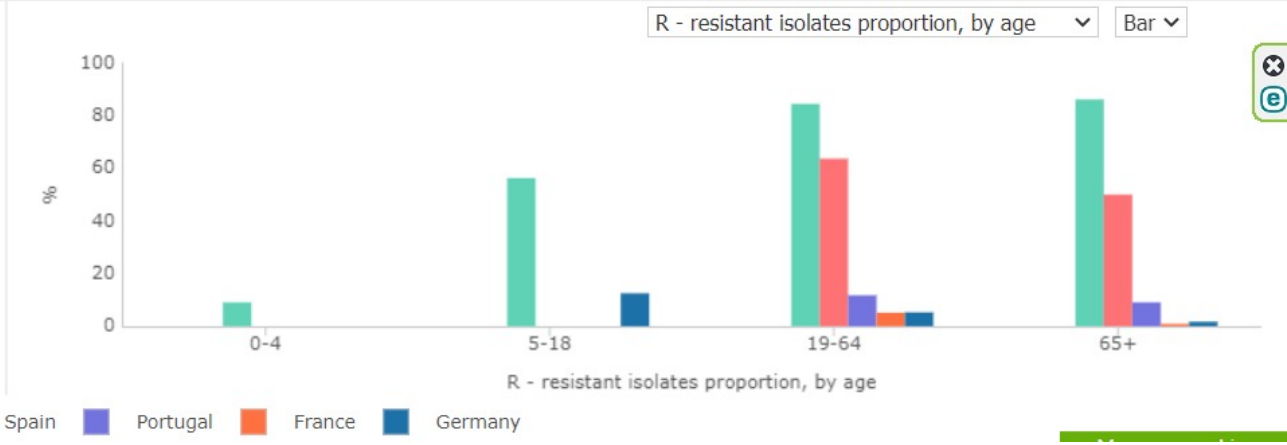
Antimicrobial resistance | Acinetobacter spp. | Combined resistance (fluoroquinolones, aminoglycosides and carbapenems)

R - resistant isolates, percentage | 2021

Region	R - resistant isolates, percentage (%)
Croatia	98.5
Lithuania	92.9
Greece	91.4
Romania	89.9
Cyprus	88.8
Italy	84.7
Hungary	80.1
Bulgaria	71.9
Latvia	70.0
Poland	67.0
Slovenia	66.9







Netherlands Greece Italy Spain Portugal France Germany

Virussen

AMERICAN SOCIETY FOR MICROBIOLOGY | Clinical Microbiology Reviews

REVIEW
April 2021 Volume 34 Issue 2 10.1128/cmr.00224-20
https://doi.org/10.1128/cmr.00224-20

Understanding the Impact of Resistance to Influenza Antivirals

Edward C. Holmes [a,b], Aeron C. Hurt[c], Zuzana Dobbie[c], Barry Clinch[d], John S. Oxford[e], Pedro A. Piedra[f]

Schimmels

ELSEVIER

Fungal Biology Reviews

Volume 34, Issue 4, December 2020, Pages 202-214

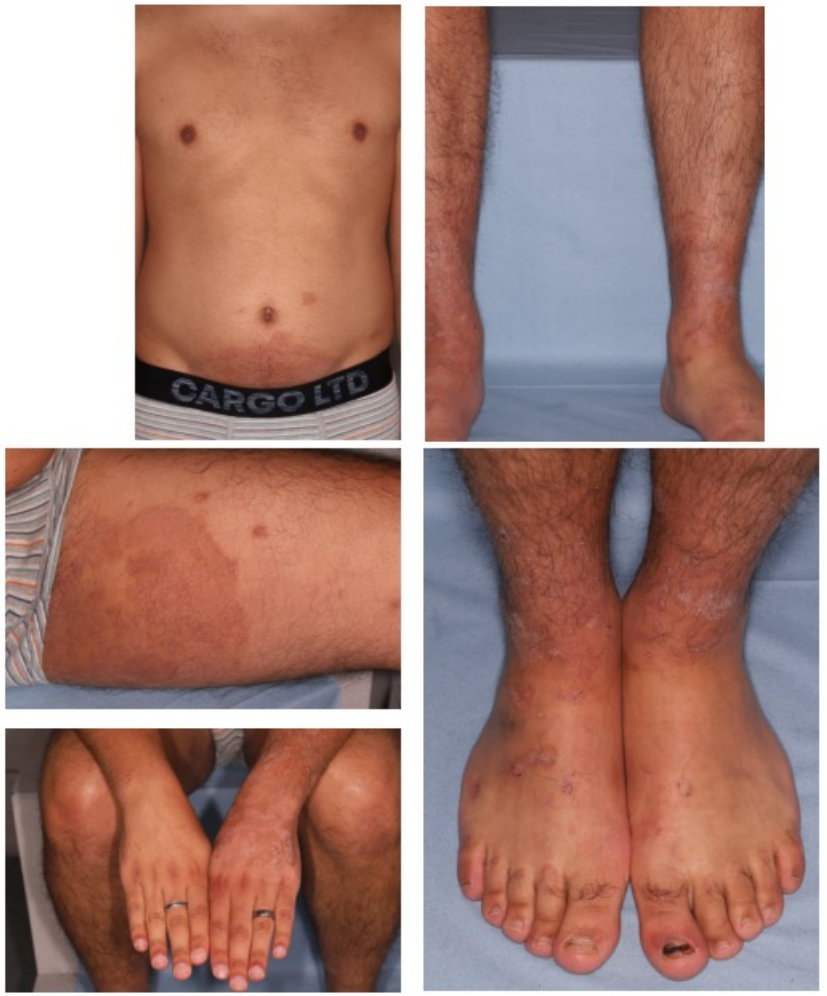
Review

The one health problem of azole resistance in *Aspergillus fumigatus*: current insights and future research agenda

Paul E. Verweij [a b], John A. Lucas [c], Maiken C. Arendrup [d e f], Paul Bowyer [g], Arjen J.F. Brinkmann [h], David W. Denning [i j], Paul S. Dyer [k], Matthew C. Fisher [l], Petra L. Geenen [m], Ulrich Gisi [n], Dietrich Hermann [o p], Andre Hoogendijk [q †], Eric Kiers [r], Katrien Lagrou [s t], Willem J.G. Melchers [a b], Johanna Rhodes [l], Anton G. Rietveld [u], Sijmen E. Schoustra [v], Klaus Stenzel [p w], Bas J. Zwaan [v]...Bart A. Fraaije [c]

Trichophyton indotineae

- Ringworm (tinea corporis)
- Resistent voor terbinafine
- India
  - USA, Frankrijk, Duitsland



Candida auris

▲ Foto als voorbeeld. © Getty Image

Het overleeft op fruit en in de gordijnen: moeten we vrezen voor de dodelijke schimmel ‘candida auris’?

Ziekenhuizen vrezen voor de dodelijke schimmel candida auris en rekenen erop dat er ook in Nederland een uitbraak komt. Hoe loopt iemand die schimmel op? En hoe bang moeten we zijn? Dé experts, wereldwijd, zitten in Nijmegen. ,,De schimmel overleeft in de gordijnen.”

IP & ABR ZORGNETWERK Zuidwest-Nederland

AMR

IP&ABR ZORGNETWERK
Zuidwest-Nederland

CANDIDA AURIS

Laura Dix – AIOS
Juliette Severin – arts-microbioloog
Erasmus MC

WHO fungal priority pathogens list to guide research, development and public health action

WHO 2022

Fig. 1. WHO fungal priority pathogens list (WHO FPPL)

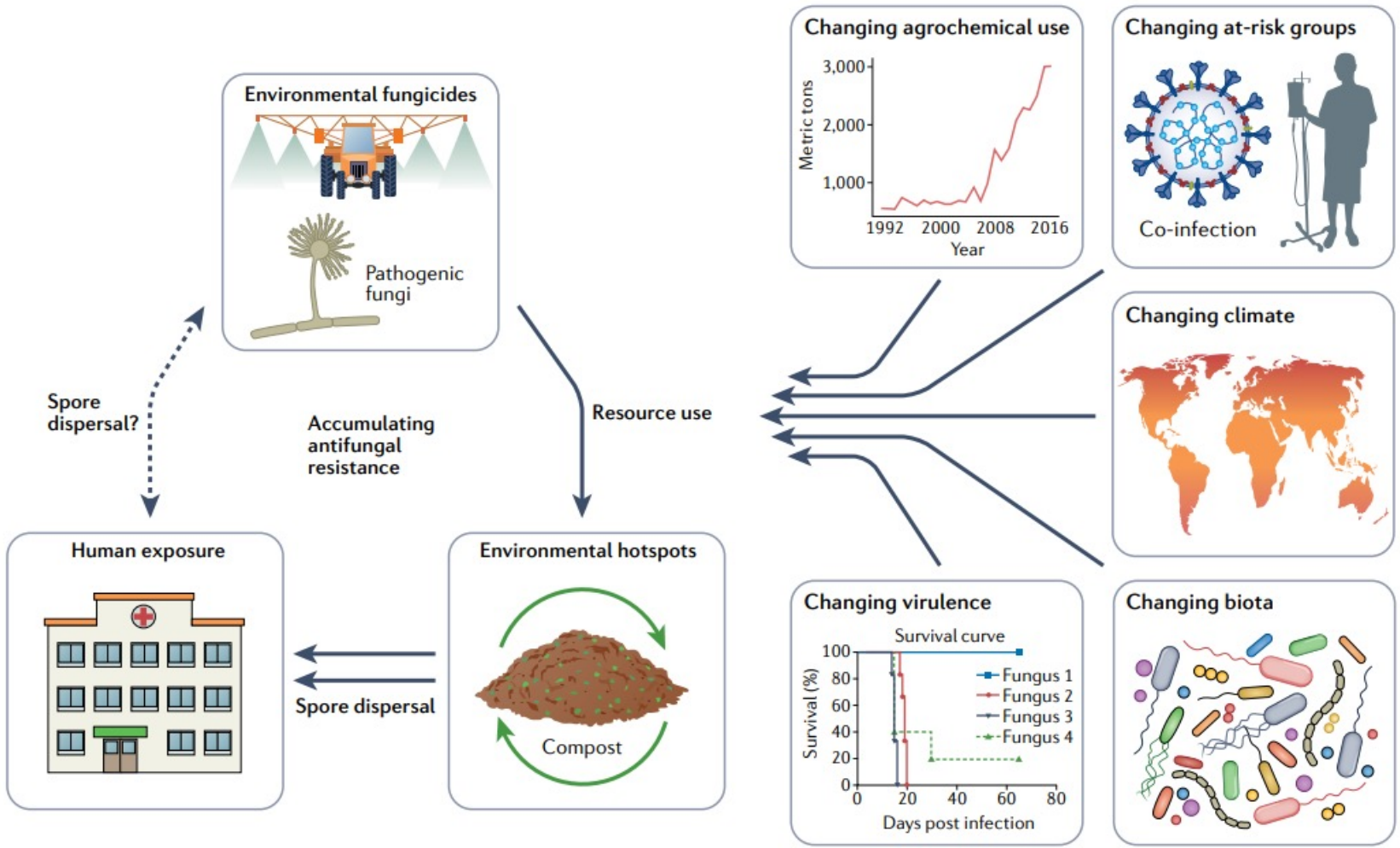
IP&ABR ZORGNETWERK Zuidwest-Nederland

Fig. 2. Proposed priority areas for action

AMR: antimicrobial resistance; R&D: research and development; WHO FPPL: World Health Organization fungal priority pathogens list.

WHO 2022

Antifungale resistentie



Fsiher Nat Rev 2022

Candida auris – take home

- Gist
  - Invasieve infectie
  - Dragerschap / kolonisatie
  - Uitbraken
- **Moeizaam** te beheersen
  - Uitbraak potentie
  - Resistent tegen commerciële desinfectantia
- **Moeizaam** te behandelen
  - Intrinsiek resistent tegen meeste antifungale middelen
- **Moeizaam** aan te tonen

NEWS

Deadly fungal infection spreading at an alarming rate, CDC says

SHARE & SAVE –

Deadly fungal infection spreading at an alarming rate, CDC says

The fungus, a type of yeast called Candida auris, or C. auris, can cause severe illness in people with weakened immune systems.

IP&ABR ZORGNETWERK Zuidwest-Nederland

Candida auris fungal infections sprea 'alarming' rate,

22 March

NOS Nieuws • Woensdag 22 maart, 21:45

RIVM treft voorbereidingen voor mogelijke schimmeluitbraak bij mensen

Candida auris: deadly fungal infections US at 'worrisome' rate

Candida auris doubled, with esistant high fever with chills

The Guardian – maart 2023

CNN health | Life, But Better | Fitness | Food | Sleep | Mindfulness | Relationships | Audio | Live TV | Log In

An emerging fungal threat spread at an alarming rate in US health care facilities, study says

By Janelle Chavez, CNN
Published 5:01 PM EDT, Mon March 20, 2023

CDC warns emerging fungus can cause severe, deadly infections in hospitals, nursing homes

By Beth Galvin | Published April 4, 2023 | FOX Medical Team | FOX 5 Atlanta |

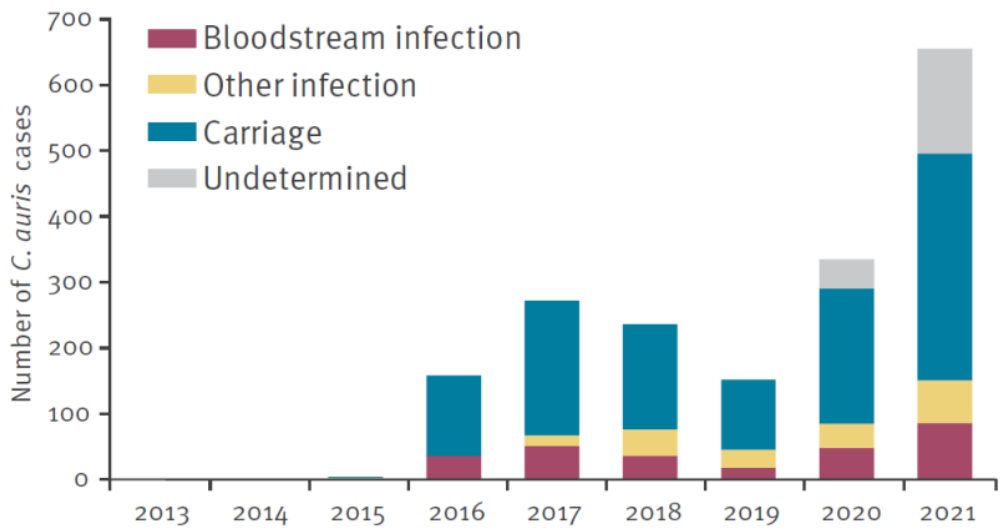
RAPID COMMUNICATION

Increasing number of cases and outbreaks caused by *Candida auris* in the EU/EEA, 2020 to 2021

Anke Kohlenberg[1] , Dominique L Monnet[1] , Diamantis Plachouras[1] , *Candida auris* survey collaborative group[2]
1. European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden
2. The members of the *Candida auris* survey collaborative group are listed under Collaborators and at the end of the article

FIGURE 1

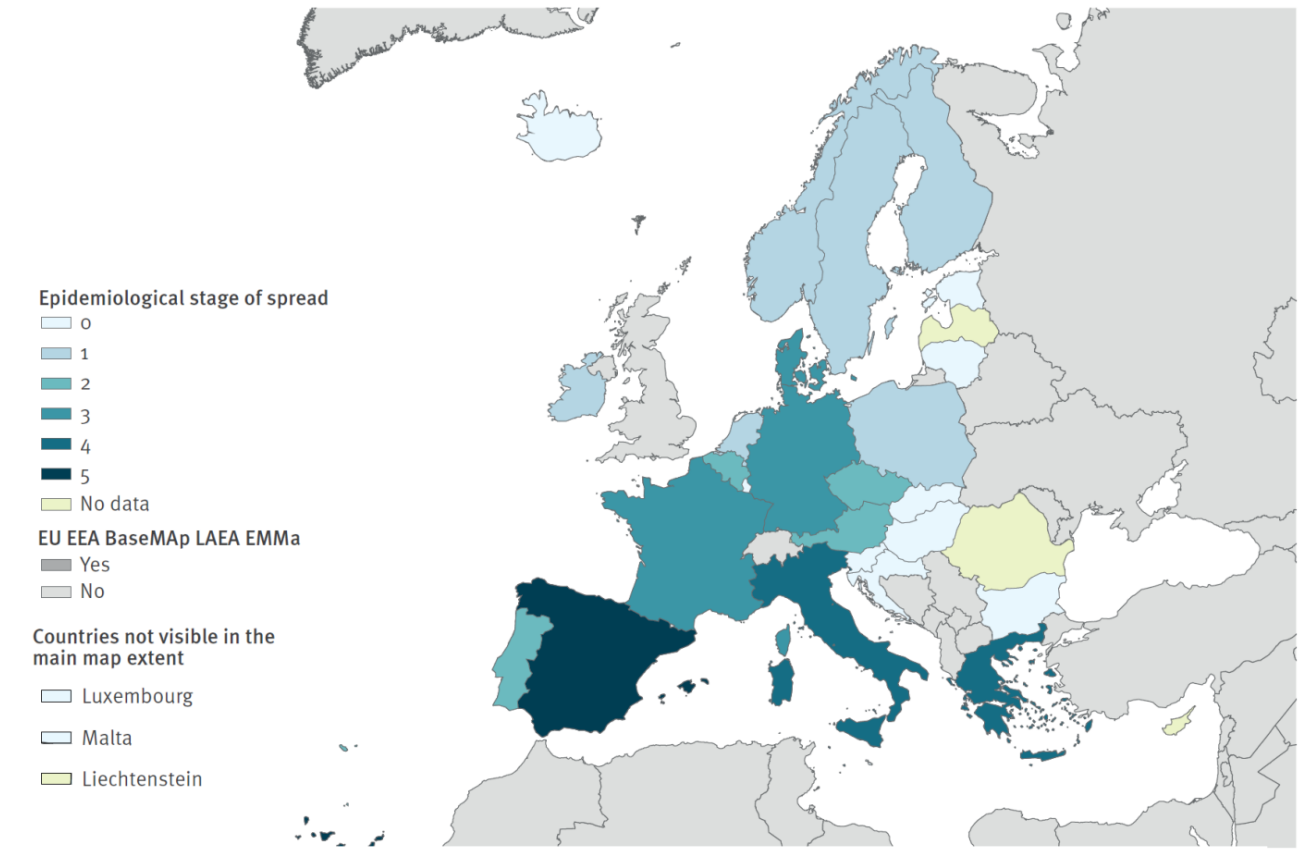
Reported cases of *Candida auris* infection or carriage, EU/EEA, 2013–2021 (n = 1,812)[a]



EEA: European Economic Area; EU: European Union.

FIGURE 2

Epidemiological stage of *Candida auris* spread[a], assessment by survey respondents in EU/EEA countries, 2022 (n = 30 countries)



Morbidity and Mortality Weekly Report

Candida auris Outbreak in a COVID-19 Specialty Care Unit — Florida, July–August 2020

Christopher Prestel, MD[1,2]; Erica Anderson, MPH[2]; Kaitlin Forsberg, MPH[3]; Meghan Lyman, MD[3]; Marie A. de Perio, MD[4,5]; David Kuhar, MD[1]; Kendra Edwards[6]; Maria Rivera, MPH[2]; Alicia Shugart, MA[1]; Maroya Walters, PhD[1]; Nychie Q. Dotson, PhD[2]

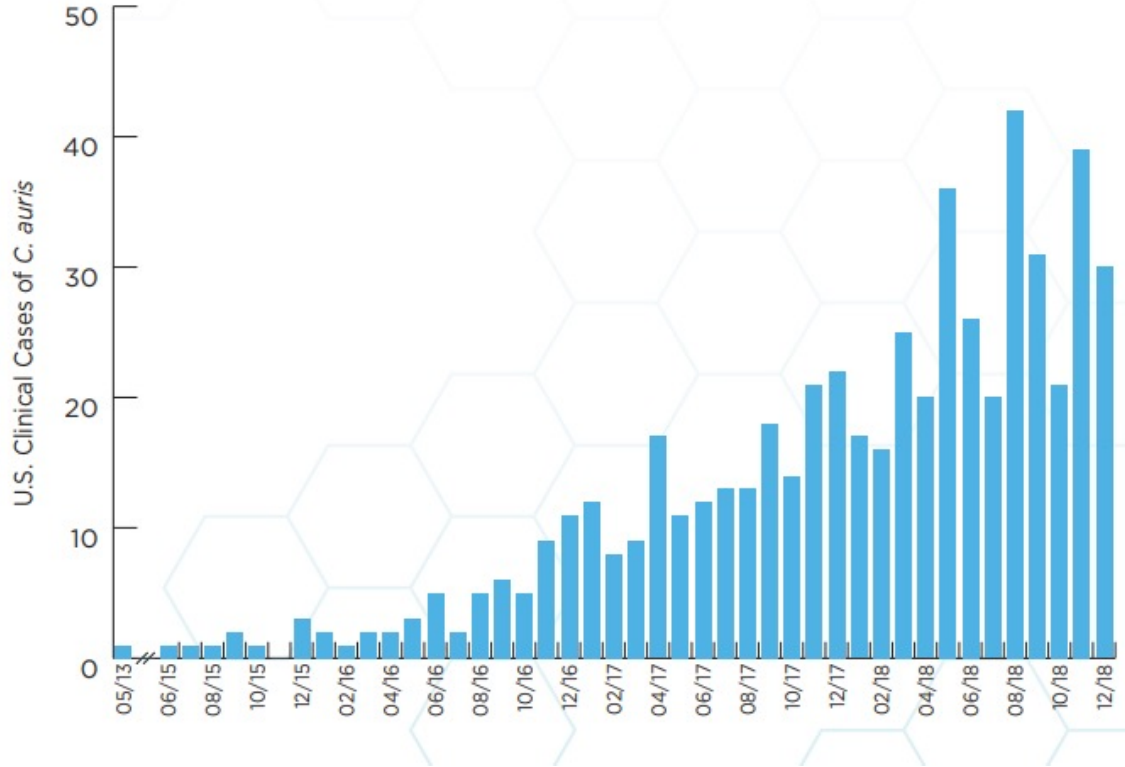
VS: Meldingsplichtige ziekte

A combination of factors that included HCP using multiple gown and glove layers in the COVID-19 unit, extended use of the underlayer of PPE, lapses in cleaning and disinfection of shared medical equipment, and lapses in adherence to hand hygiene likely contributed to widespread *C. auris* transmission.

WHO:

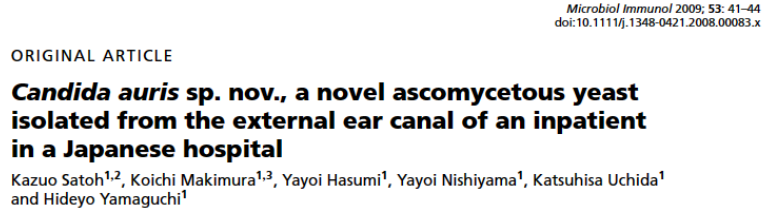
CASES OVER TIME

C. auris began spreading in the United States in 2015. Reported cases increased 318% in 2018 when compared to the average number of cases reported in 2015 to 2017.



Candida auris – geschiedenis

- 1e beschrijving: 2009 (Japan, oorinfectie)


Microbiol Immunol 2009; 53: 41–44
doi:10.1111/j.1348-0421.2008.00083.x

ORIGINAL ARTICLE

Candida auris sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital

Kazuo Satoh[1,2], Koichi Makimura[1,3], Yayoi Hasumi[1], Yayoi Nishiyama[1], Katsuhisa Uchida[1] and Hideyo Yamaguchi[1]

- 1e isolaat: 1996 Zuid-Korea


Research Article | September 2011

First Three Reported Cases of Nosocomial Fungemia Caused by *Candida auris*

Authors: Wee Gyo Lee, Jong Hee Shin, Young Uh, Min Gu Kang, Soo Hyun Kim, Kyung Hwa Park, Hee-Chang Jang | AUTHORS INFO &

- 1e candidemia: 2009 (Zuid-Korea) → persisterende candidemia onder fluconazole en Amphotericine B

- 5 jaar daarna: invasieve infecties gerapporteerd vanuit ziekenhuizen in India, Zuid-Afrika, Kuwait, Brazilië, Venezuela, USA, UK en Pakistan

Table 1. Laboratory Testing and Misidentification of *Candida auris*

Diagnostic System	Comments
Antifungal Susceptibility Testing Method	
API-20C	May misidentify *Candida auris* as *Rhodotorula glutinis, Candida sake, Saccharomyces cerevisiae*
Vitek-2	May misidentify *C. auris* as *Candida haemulonii, Candida famata*
Matrix-assisted laser desorption/ionization-time of flight mass spectrometry	Will identify *C. auris* if appropriate sequences are in the database. The Bruker Biotyper library has 3 isolates from Japan and South Korea in its database. If sequences are not in the database (eg, US Food and Drug Administration database), isolates will be identified as yeast that gives no score.
DNA sequencing	Sequencing of the internal transcribed spacer and D1-D2 domain of the large subunit rRNA gene has been performed most commonly.
Clinical and Laboratories Standards Institute broth microdilution method	May give falsely elevated caspofungin MICs
Vitek-2	May give falsely elevated amphotericin B MICs
Etest	May give most consistent results

The table is based on data from [12].

Abbreviation: MIC, minimum inhibitory concentration.

Clancy 2017 CID

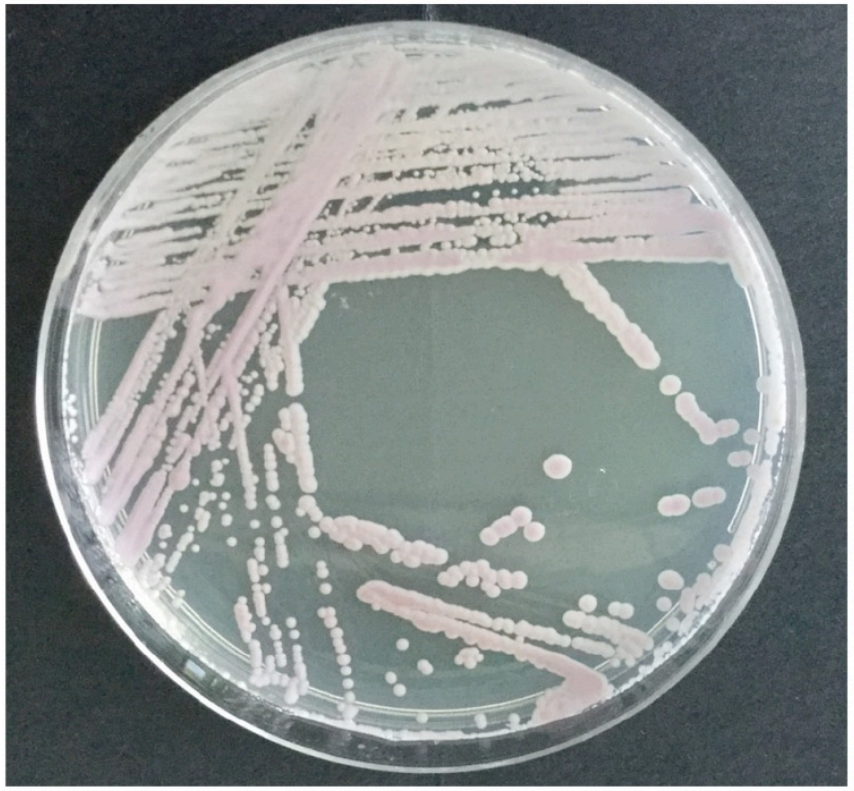
Table 2 Common misidentifications of *Candida auris* by commercial phenotypic identification systems[18,35,37]

Phenotypic identification method	*Candida auris* misidentified as
Vitek 2 YST (bioMerieux, Marcy L'etoile, France)	*Candida haemulonii* *Candida duobushaemulonii* *Candida famata*
API 20C AUX; ID32C (bioMerieux)	*Rhodotorula glutinis* *Candida sake*
BD Phoenix (BD Diagnostics, Sparks, MD, USA)	*Candida haemulonii* *Candida catenulata*
Microscan (Beckman Coulter, Pasadena, CA, USA)	*Candida albicans* *Candida catenulata* *Candida famata* *Candida guilliermondii* *Candida lusitaniae* *Candida parapsilosis* *Candida tropicalis*
RapID Yeast Plus (ThermoFisher Scientific, Waltham, MA, USA)	*Candida parapsilosis*

Ong 2019 Int Med J

Laboratorium

- Thermo-tolerant
  - Groei bij 40°C
- Zout-tolerant
  - 10% NaCl
- Bouillon met 10% NaCl (+ genta en Cl-amf)
  - 72 uur incubatie bij 40°C
- Sab agar
  - Groei kan 10 dagen duren!
  - Niet te onderscheiden van C. glabrata



Ong 2019. Welsh 2017 JCM

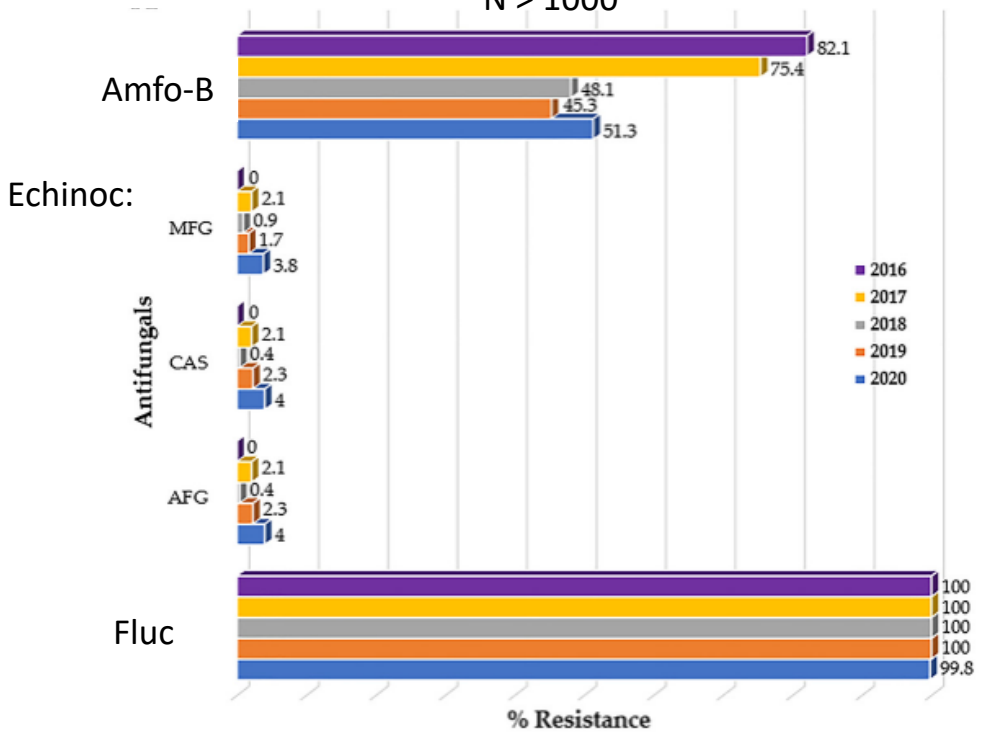
Resistentie

- - 90% van de isolaten is resistant tegen fluconazole

- Vaak multi-drug resistant
  - Azolen
  - Echinocandines
  - Varieert geografisch

- - 5% is panresistent

C. auris clinical isolates New York, 2016 to 2020
N > 1000



Kilburn 2022 AAC

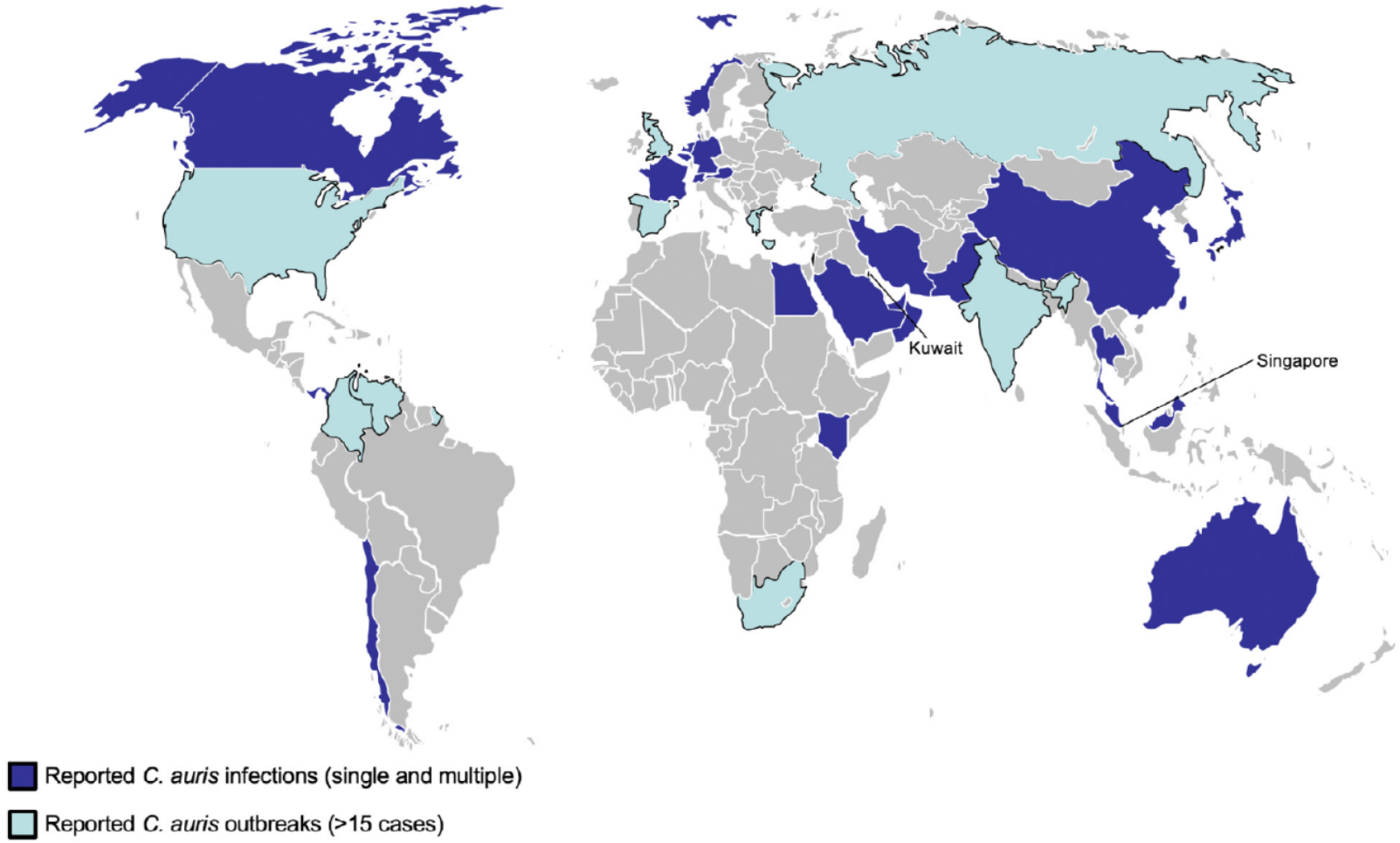
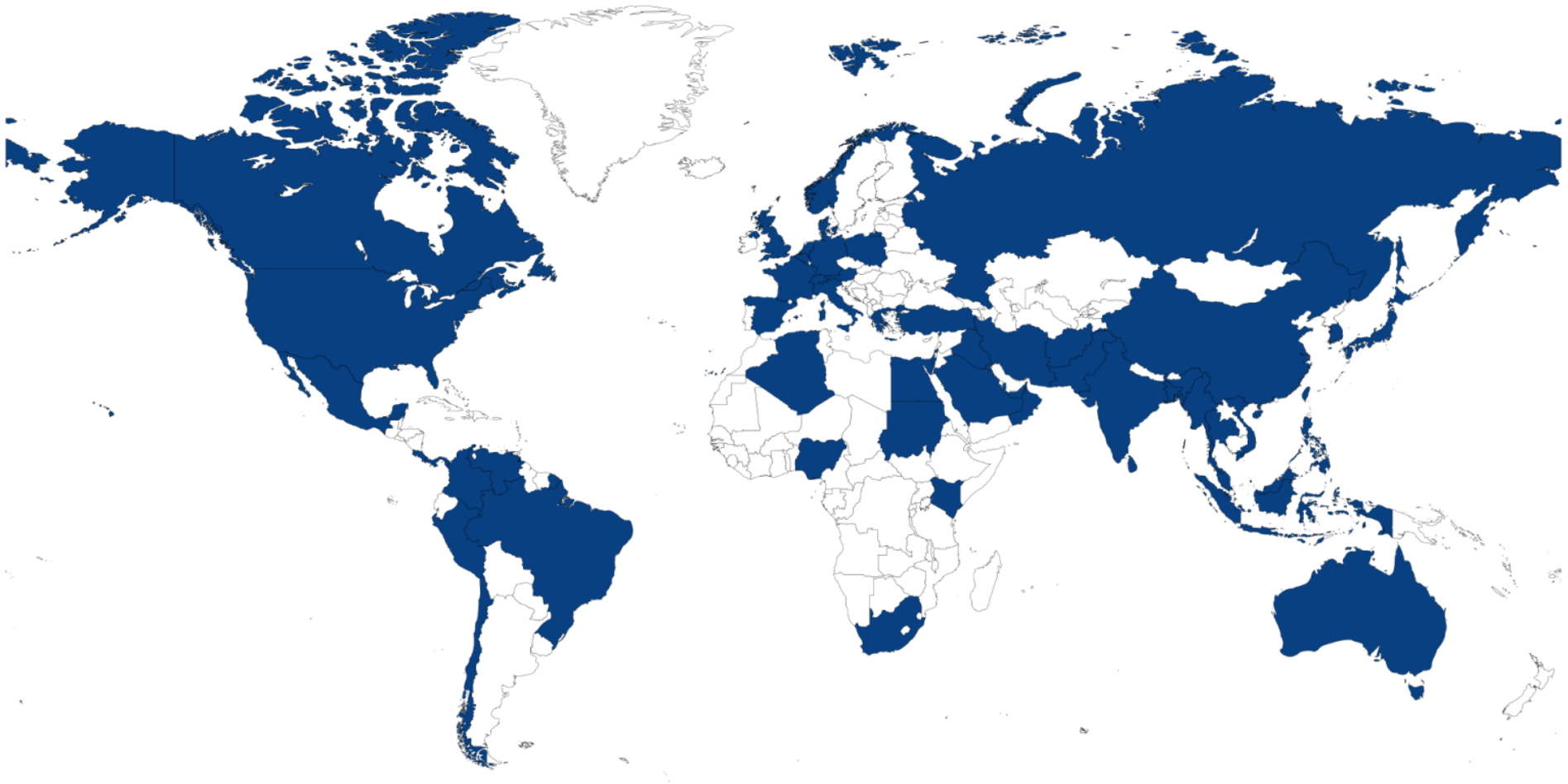
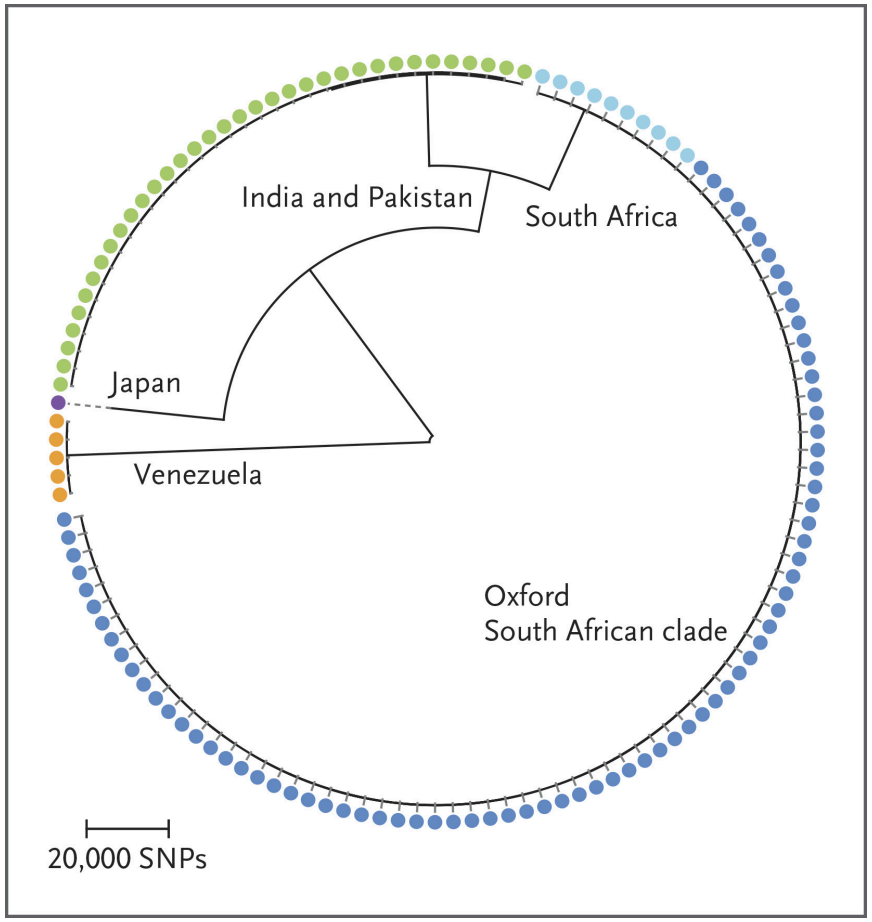


Fig. 1. World map highlighting reported *C. auris* infections including single and multiple case reports, and outbreaks (published and unpublished).

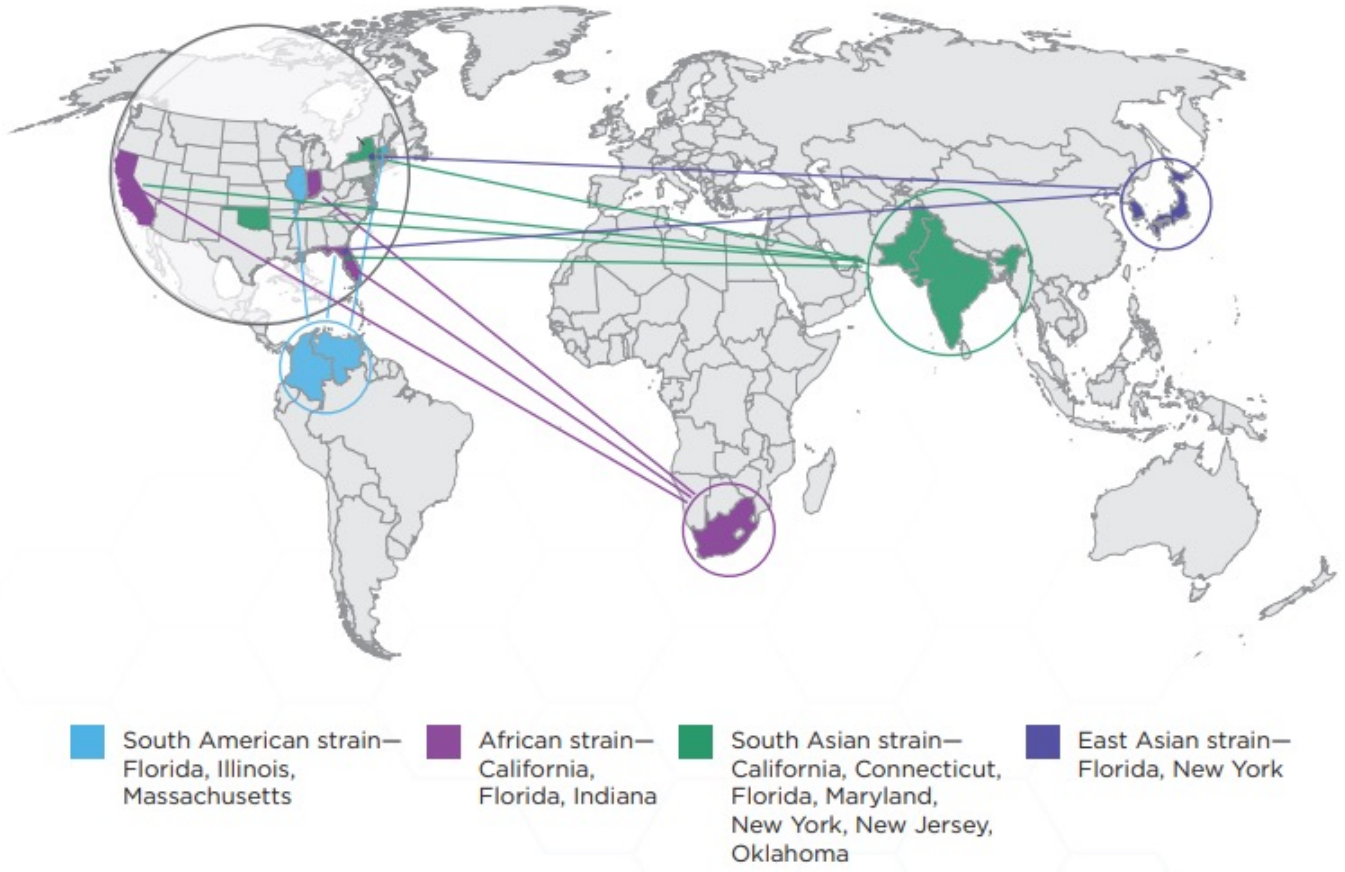
Figuur 1. *Landen waar Candida auris inmiddels gerapporteerd is (blauw). Bron: mapchart.net*



Clades



N Engl J Med 2018



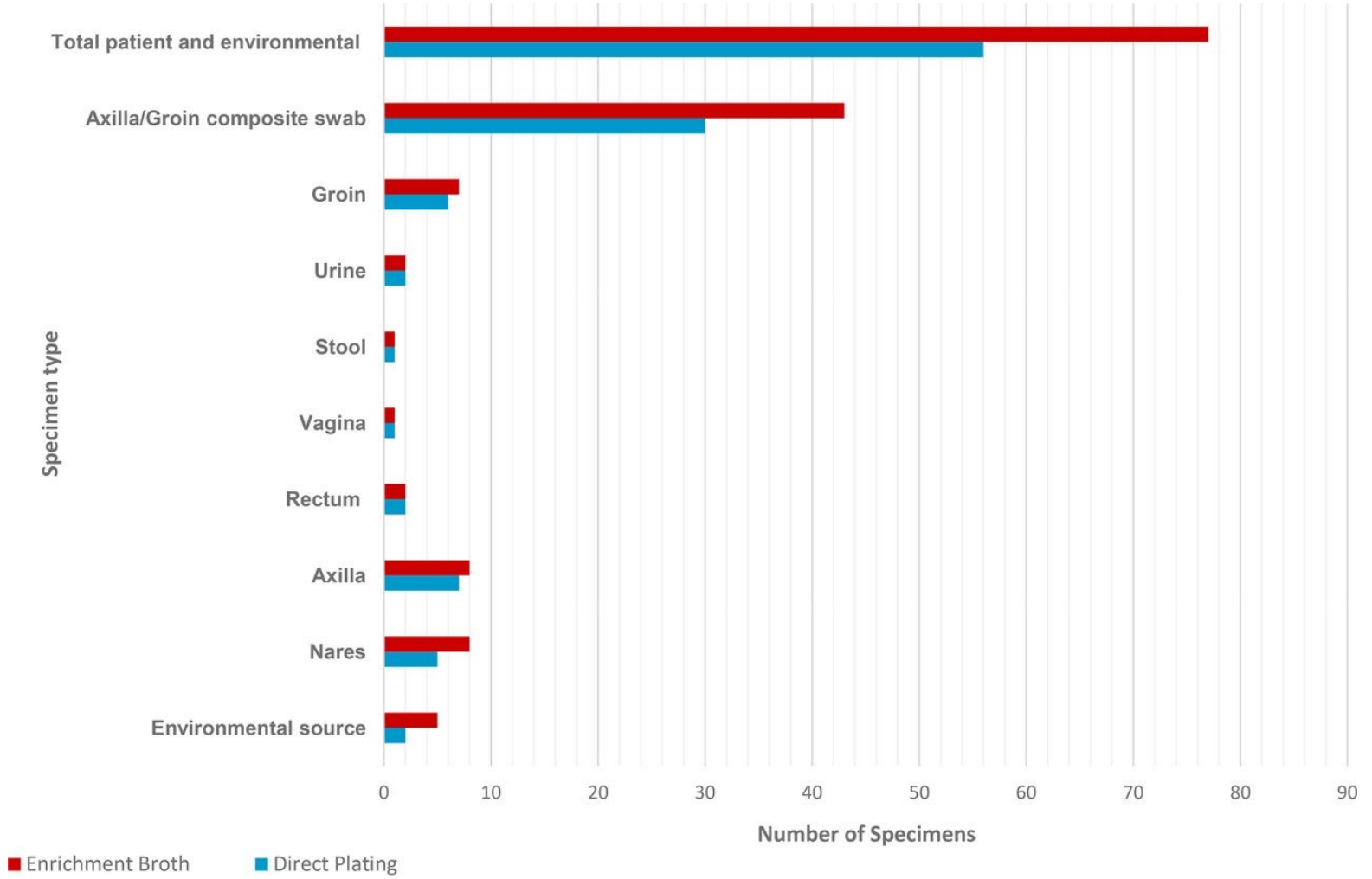
WHO

Control of *Candida auris* in healthcare institutions: Outcome of an International Society for Antimicrobial Chemotherapy expert meeting

Nikki Kenters[a,*], Martin Kiernan[b], Anuradha Chowdhary[c], David W. Denning[d], Javier Pemán[e], Katja Saris[a,f], Silke Schelenz[g], Ermira Tartari[h], Andreas Widmer[i], Jacques F. Meis[a,j], Andreas Voss[a,c,k]

- Screening
- Standard precautions
- Cleaning and disinfection
- Inpatient transfer
- Outbreak management
- Decolonization
- Treatment

Screening: wat?



Welsh 2017 JCM

Screening: wie?

- …??

- Risico patiënten
  - Endemisch gebied?
  - Ziekenhuisopname buitenland?
  - Eerder positief?

- Healthcare workers?

Screening: hoe?

- Moeizaam te kweken
- Moleculaire diagnostiek
  - oksel, liezen
  - keel, neus, rectum (BRMO)
  - Indien positief -> afenten
- SAB agar
  - 40 graden
  - 14 dagen
- Kolonisatie?
  - 3 keer kweken
  - Wekelijks screenen

Omgeving

- C. auris kan overleven in healthcare omgeving
- C. auris is geïsoleerd vanaf o.a matras, nachtkastje, bed rails, stoel, raamkozijn, vloer, muur, radiatoren, monitoren, toetsenborden, ventilatoren, ECG leads, etc….
- Multi-use patienten apparatuur
  - Pulse oximeter
  - Thermometer

Reiniging & desinfectie

IP&ABR ZORGNETWERK Zuidwest-Nederland

Concise Communication

Evaluation of nine surface disinfectants against *Candida auris* using a quantitative disk carrier method: EPA SOP-MB-35

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Table 1. Efficacy of Disinfectants Against *C. auris* AR 0385 According to EPA MLB SOP MB-35: "OECD Quantitative Method for Evaluating the Efficacy of Liquid Antimicrobials against *Candida auris* on Hard, Nonporous Surfaces"

Product	EPA Registration No.	Manufacturer	Active Ingredient	Contact Time[a]	Product Preparation[b]	Fungal claim	*C. albicans* claim	Log_{10} Reduction[c]	SD
Oxivir Tb	70627-56	Diversy	0.5% hydrogen peroxide	10 min	Undiluted	yes	no	≥ 5.32	±0.00
Oxivir 1	70627-74	Diversy	0.5% hydrogen peroxide	1 min	Undiluted	yes	yes	≥ 5.48	±0.00
Hydrogen peroxide disinfectant cleaner	67619-24	Clorox	1.4% hydrogen peroxide	3 min	Undiluted	yes	yes	≥ 5.48	±0.00
Protex	6836-152-82613	Parker	0.084% QAC[d]	10 min	Undiluted	yes	no	1.82	±0.39
Sani-cloth Prime	9480-12	PDI	0.61% QAC[e], 28.7% isopropanol, 27.3% ethanol	1 min	Undiluted[f]	yes	yes	≥ 5.29	±0.00
Super Sani-cloth	9480-4	PDI	0.5% QAC[g], 55% isopropanol	2 min	Undiluted[f]	yes	yes	≥ 5.29	±0.00
Husky 891 Arena disinfectant	1839-166-8155	Canberra	10.9% QAC[h]	10 min	1 oz/gal	yes	yes	0.56	±0.10
A 456 II	6836-78-1677	EcoLab	21.7% QAC[i]	10 min	1/2 oz/gal	yes	no	0.56	±0.21
Mint Kleanse	6836-165	Lonza	2% QAC[j]	10 min	5 oz/gal	yes	yes	0.25	±0.10

Reiniging & desinfectie

- Chloor ≥1000 ppm is effectief, maar toxisch..
  - Effect op droge biofilms van C.auris?

- Effectief: alcohol en waterstofperoxide
  - Kleine oppervlakken
  - Niet in Nederlandse richtlijn

- NIET effectief: quaternary ammonium disinfectants

Advies:

Health organisation	Environmental disinfection
Centers for Disease Control and Prevention	Daily and terminal cleaning with use of an EPA-registered hospital-grade disinfectant effective against *C. difficile* spores
Public Health England	Terminal cleaning with use of a hypochlorite at 1000 ppm. Equipment should be cleaned according to manufacturer's instructions
European Centre for Disease Prevention and Control	Terminal cleaning with disinfectants with certified antifungal activity
Centre for Opportunistic, Tropical and Hospital Infections (South Africa)	Regular and terminal cleaning with chlorine-releasing agent at 1000 ppm. Consider hydrogen peroxide vapour in terminal cleaning, if feasible
Pan American Health Organisation/World Health Organisation	Daily and terminal cleaning with soap and water followed by 0.1% bleach. Clean, disinfect, or sterilise equipment and appliances as per the type of material, after use by the patient. Machine wash linens and clothes

Dekolonisatie

- CDC: Laboratory evidence suggests that high levels of chlorhexidine are active against C. auris. However, the effects of chlorhexidine on reducing C. auris skin burden or infection have not been systematically assessed. C. auris outbreaks and transmission have been observed in facilities routinely using chlorhexidine bathing.

Health organisation	Environmental disinfection	Decolonisation procedure
Centers for Disease Control and Prevention	Daily and terminal cleaning with use of an EPA-registered hospital-grade disinfectant effective against *C. difficile* spores	No recommendations
Public Health England	Terminal cleaning with use of a hypochlorite at 1000 ppm. Equipment should be cleaned according to manufacturer's instructions	No recommendations
European Centre for Disease Prevention and Control	Terminal cleaning with disinfectants with certified antifungal activity	No recommendations
Centre for Opportunistic, Tropical and Hospital Infections (South Africa)	Regular and terminal cleaning with chlorine-releasing agent at 1000 ppm. Consider hydrogen peroxide vapour in terminal cleaning, if feasible	Not recommended due to limited evidence
Pan American Health Organisation/World Health Organisation	Daily and terminal cleaning with soap and water followed by 0.1% bleach. Clean, disinfect, or sterilise equipment and appliances as per the type of material, after use by the patient. Machine wash linens and clothes	No recommendations

Uitbraken

Table 1
An overview of infection prevention and control measures for *Candida auris* single cases and outbreaks.

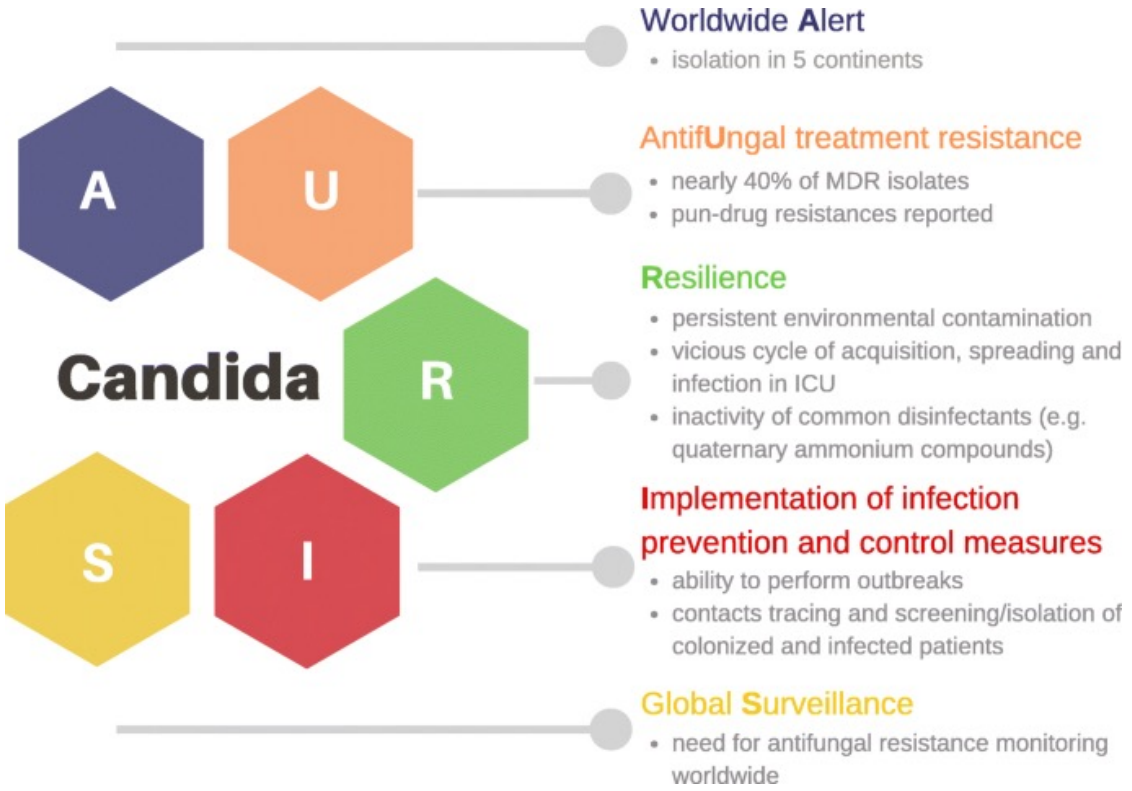
Infection prevention and control measures overview for *Candida auris*			
	Single case		*Outbreak*
	Minimum standard	Best practice	Single room and cohort
Patient room			
Room	Single room	Single isolation room with ante room, private, en-suite bathroom	Single room or cohort
Ventilation	Neutral	Negative	Neutral
Toilet/commode	Commode Validated machine	Single-use commode Single-use bedpan	Single-use commode Single-use bedpan
Washroom	Dedicated washroom	Washing without water	Washing without water/dedicated wash
Bedding	Check pillow and mattresses (when linen is removed) for damage	Check pillow and mattresses (when linen is removed) for damage	Single-use pillows or check pillows and mattresses (when linen is removed) for damage
Personal protective equipment			
Gown	Cuffed long sleeves (water repellent) + apron if needed	Cuffed long sleeves (grade 3)[1]	Cuffed long sleeves per patient in cohort
Gloves	Yes	Yes	Gloves per patient in cohort
Hand hygiene	Alcohol based*	Alcohol based*	Alcohol based*
Shoe covers	Discouraged	Discouraged	Discouraged
Cleaning			
Cleaning material	Single-use cloths	Disposable microfibre cloths	Single-use (microfibre) cloths
Cleaning frequency	Twice daily	Twice daily	Three times a day

* The product needs to meet the EN1500 testing standard[2].

[1] Bartels VT, ed. *Handbook of Medical Textiles*. Sawston, United Kingdom, Cambridge, Woodhead publishers; 2011. [2] Europena Standard. Chemical disinfectants and antiseptics. Hygienic handrub. Test method and requirements. Brussels: European Committee for standardization; 1997.

Candida auris

- Vaak multidrug-resistant
- Moeilijk te kweken
- Kan uitbraken veroorzaken
- Niet alle desinfectantia zijn effectief
- Er is geen effectieve dekolonisatie methode

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