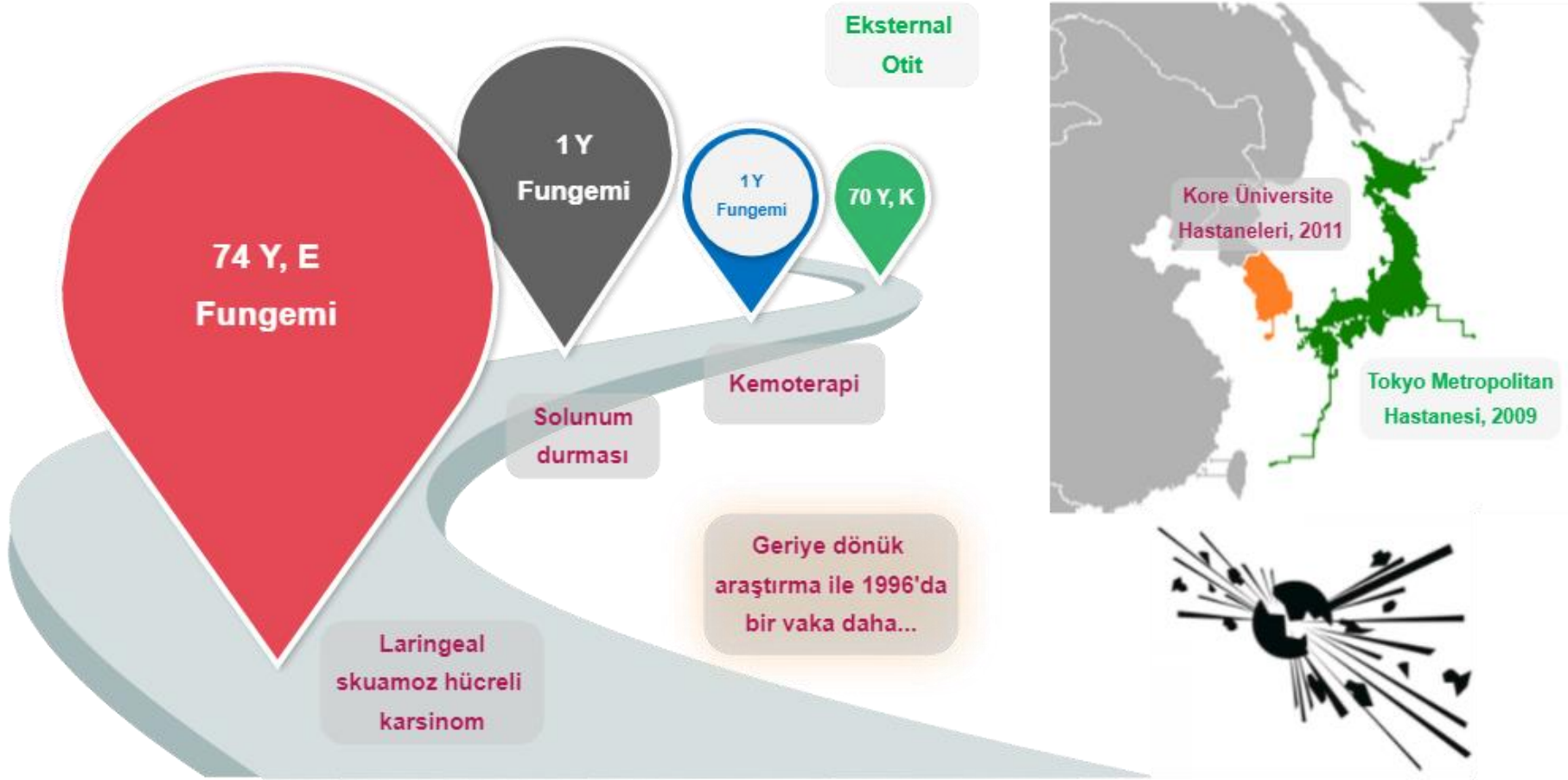


Candida auris
Ülkemiz İçin Sorun mu?



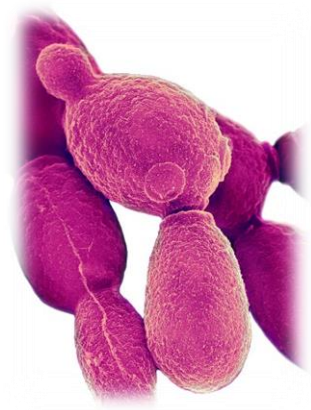
Prof. Dr. Hakan Erdem
SBU, Gülhane TF
Enf. Hast. ve Kl. Mik AD

Hikayenin Başlangıcı



Satoh, K.; et al. *Candida auris* sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital. *Microbiol. Immunol.* 2009; 53: 41–44.

Lee WG, et al. First three reported cases of nosocomial fungemia caused by *C. auris*. *J Clin Microbiol* 2011; 49, 3139-42



Yaşamsal Önemde

- ✓ **Candida auris**
- ✓ **Candida albicans**
- ✓ *Cryptococcus neoformans*
- ✓ *Aspergillus fumigatus*

Yüksek Öncelikli

- ✓ **Candida glabrata**
- ✓ **Candida tropicalis**
- ✓ **Candida parapsilosis**
- ✓ *Histoplasma spp.*
- ✓ *Mucorales*
- ✓ *Fusarium spp.*

Orta Öncelikli

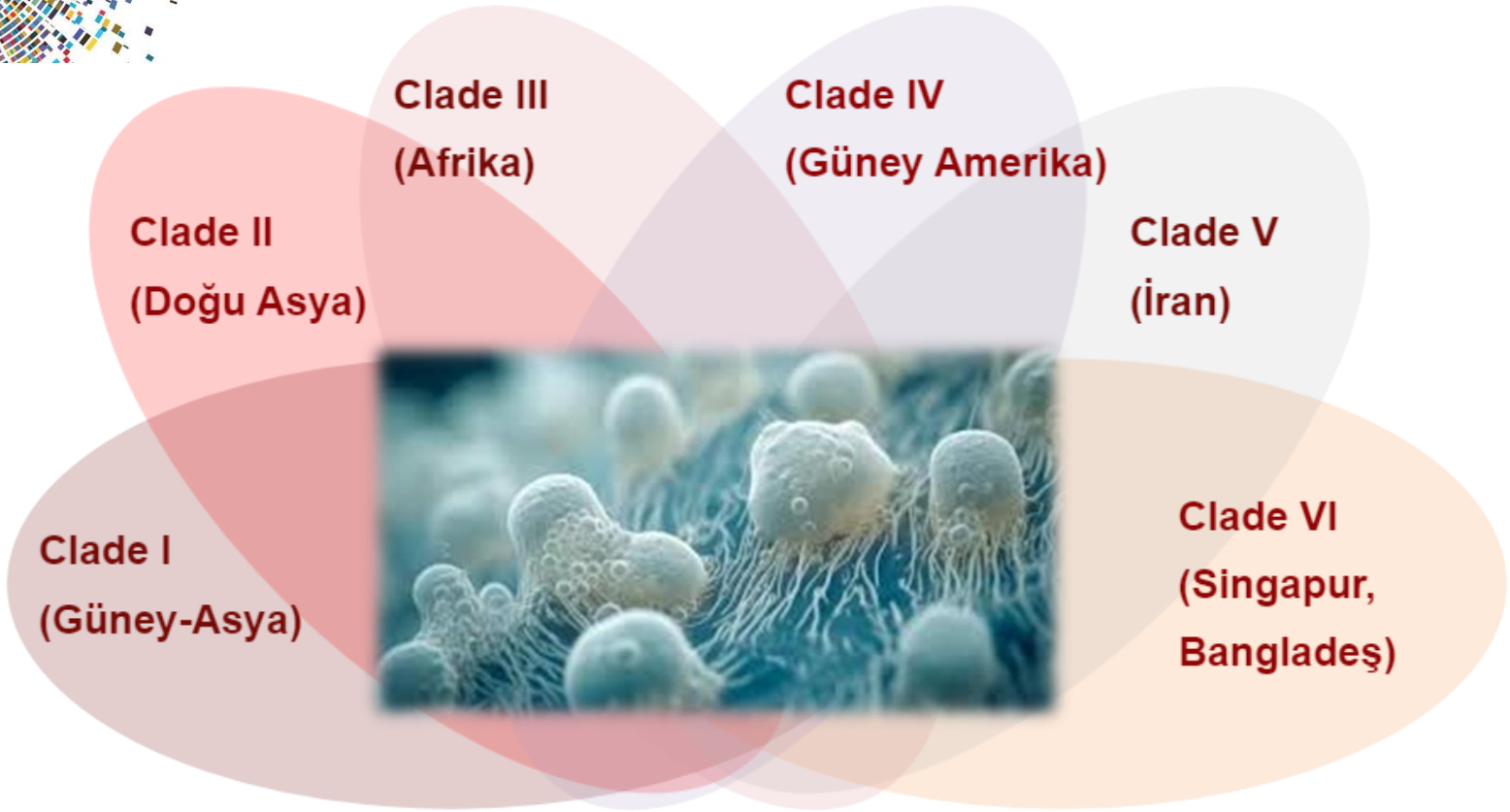
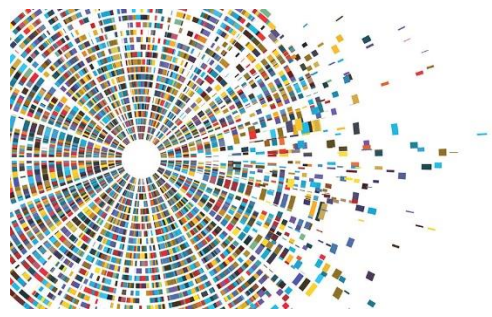
- ✓ **Candida krusei**
- ✓ *Pneumocystis jirovecii*
- ✓ *Cryptococcus gattii*
- ✓ *Scedosporium spp.*
- ✓ *Lomentospora prolificans*
- ✓ *Coccidioides spp.*
- ✓ *Talaromyces marneffeii*
- ✓ *Paracoccidioides spp.*



**FUNGAL ARAŞTIRMALAR
ÖNCELİĞİ**

WHO fungal priority pathogens list to guide research, development and public health action, 25 Ekim 2022

<https://www.who.int/publications/i/item/9789240060241>

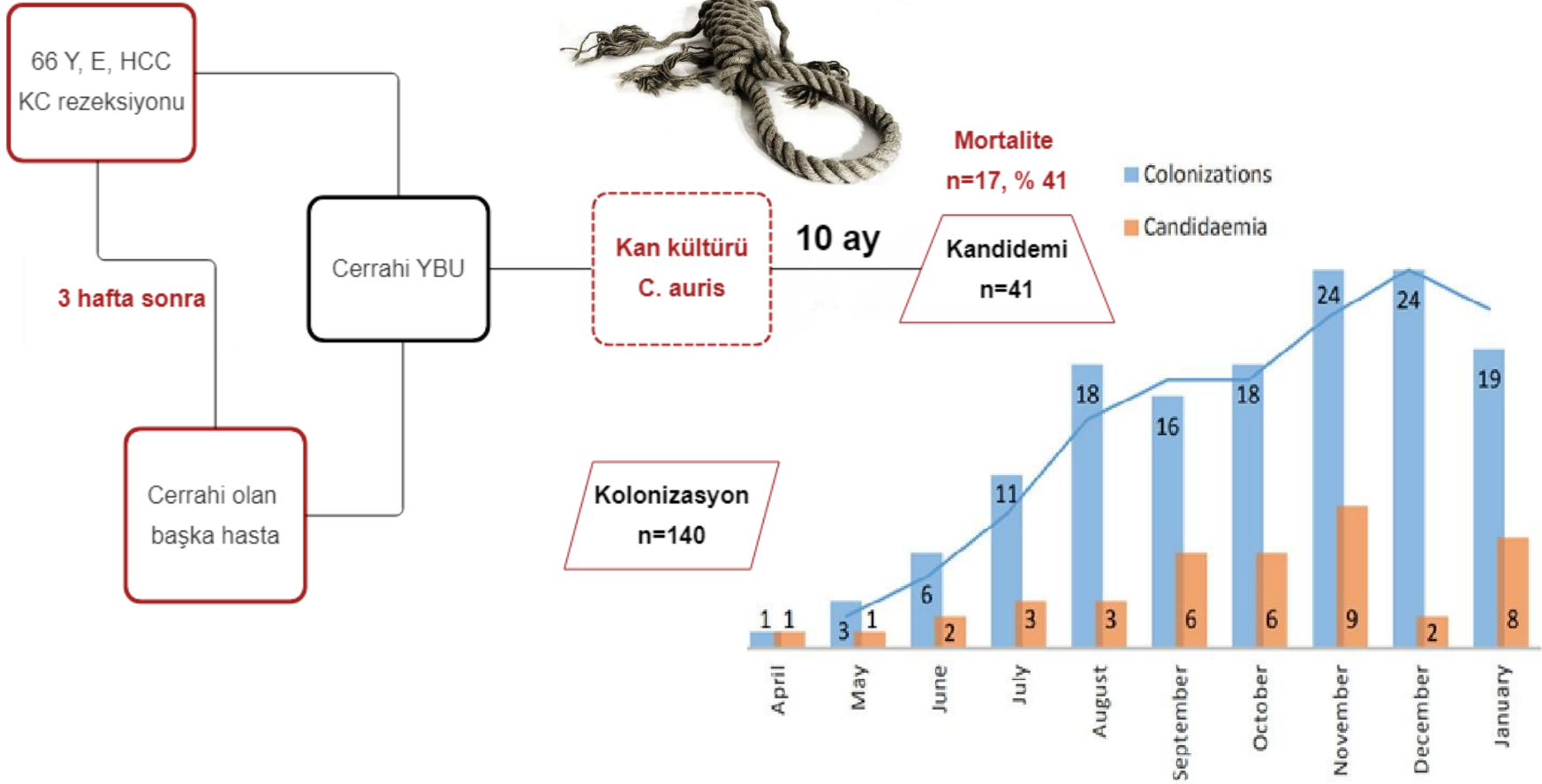


Suphavilai C., et al. Discovery of the sixth *Candida auris* clade in Singapore. Medrxiv, doi: <https://doi.org/10.1101/2023.08.01.23293435>

Spruijtenburg B, et al. Confirmation of fifth *Candida auris* clade by whole genome sequencing. Emerg Microbes Infect. 2022; 11(1): 2405–2411.

Hospital La Fe, Valencia İspanya

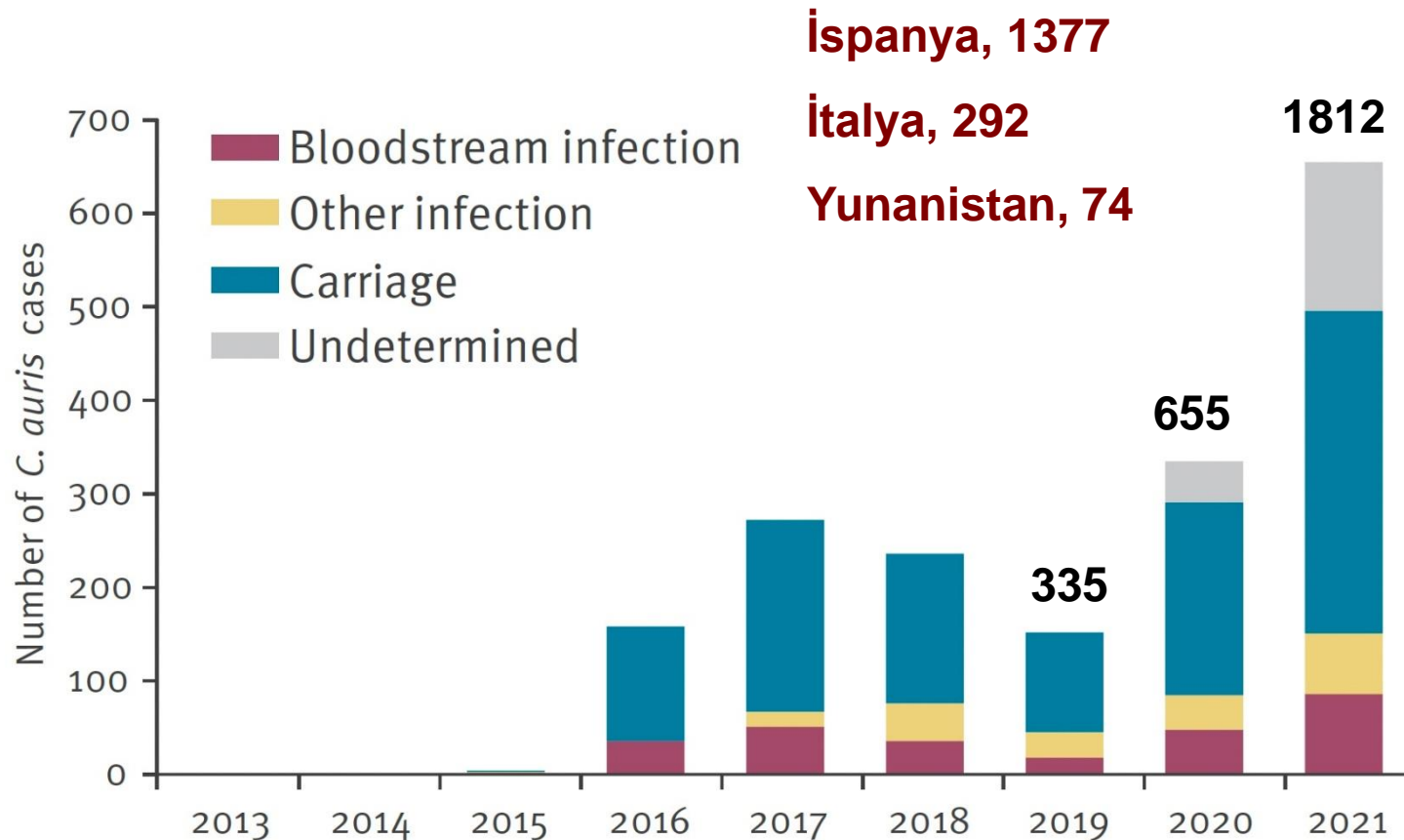
992 Yataklı, 3. basamak hastane
Nisan 2016



Ruiz-Gaitán A, et al. An outbreak due to *Candida auris* with prolonged colonisation and candidaemia in a tertiary care European hospital. *Mycoses* 2018;61(7):498-505.



AB; 2013-2021



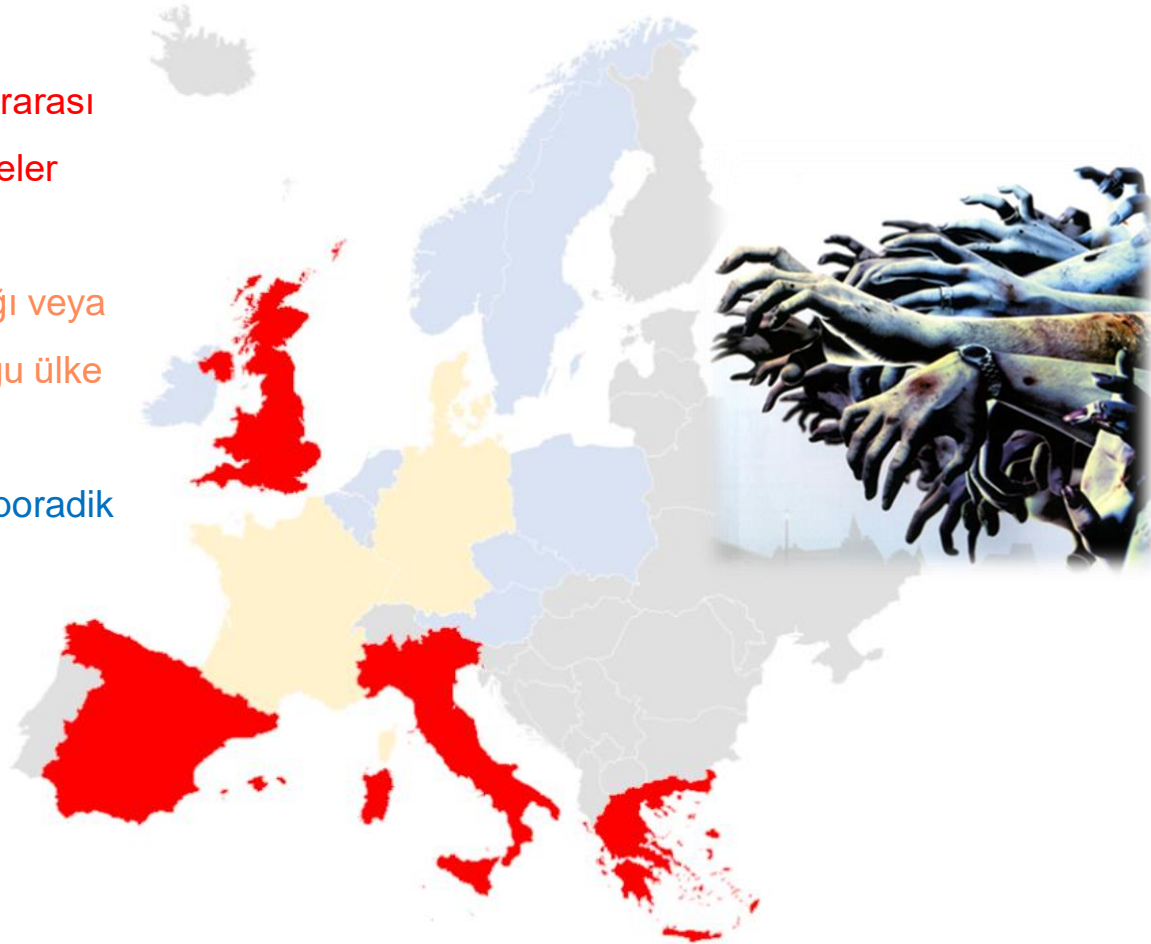
Kohlenberg A, et al. Increasing number of cases and outbreaks caused by *Candida auris* in the EU/EEA, 2020 to 2021, Euro Surveill 2022 Nov;27(46):2200846.

Avrupa'da *C. auris* Salgınları

Kırmızı: Hem endemik hem de kurumlararası yayılan, *C. auris* salgınları saptanan ülkeler

Sarı: Kurumlar arası salgınların olmadığı veya sınırlı olduğu, sporadik salgınların olduğu ülke

Mavi: Yerel olarak edinilen ya da ithal sporadik *C. auris* vakaları



Ülkemizdeki Sorun ve Boyutu





81 Y, K, aort stenozu

- Aort grefi
- Koroner arter stenti
- Kapak değişimi sonrası

KVS YBU



Kan, *C. parapsilosis* (+)
SVK çıkarılmış
Amfo-B başlanmış



7 gün sonra

- Klinik düzelme yok
- Kan kültürleri hala (+)
- Rady, TTE, göz dibi (-)
- Amfo-B + kaspo



Kan kültürleri (-)
Toplam 36 gün sonra
tedavi kesilmiş



3 hafta sonra

- Ateş
 - Genel durumda bozulma
 - Kanda candida sp (+)
- SK kateter çıkarılmış
Amfo-B + kaspo yeniden



TTE ve göz dibi (-)
Katater ucunda Candida
sp (+)
KVS kliniğine nakil

MALDI-TOF

- *C. auris*
- Burun, koltuk altı,
kasık (+)



ENFEKSİYON KONTROLÜ



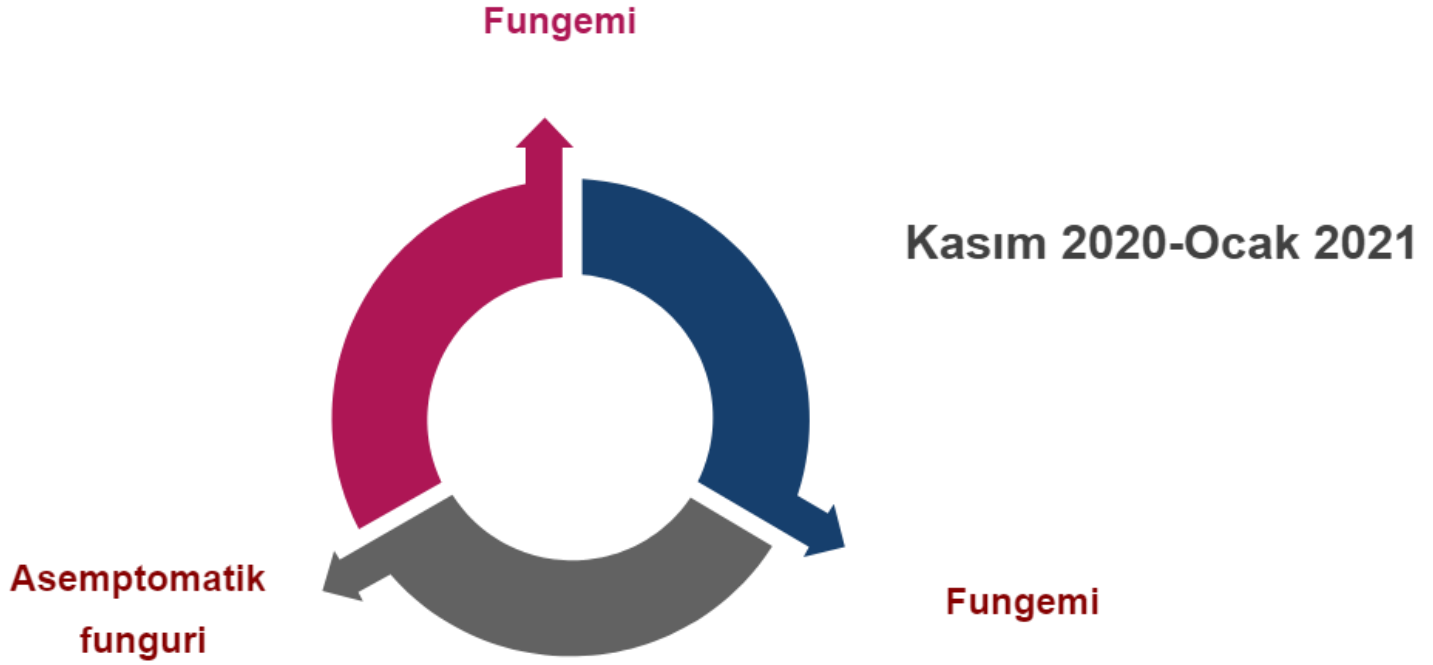
✓ Tek kişilik oda
✓ Temas izolasyonu
✓ KVS de 3, YBU da 6 hastadan
burun, koltuk altı, kasık tarama
✓ Çevresel yüzey kültürü

Bir hastanın koltuk-altı
kültürü (+)
✓ Tek kişilik oda
✓ Temas izolasyon
✓ Enfeksiyon (-)

✓ 3 ay boyunca HAFTALIK
burun, koltuk altı, kasık
tarama kültürleri (+)

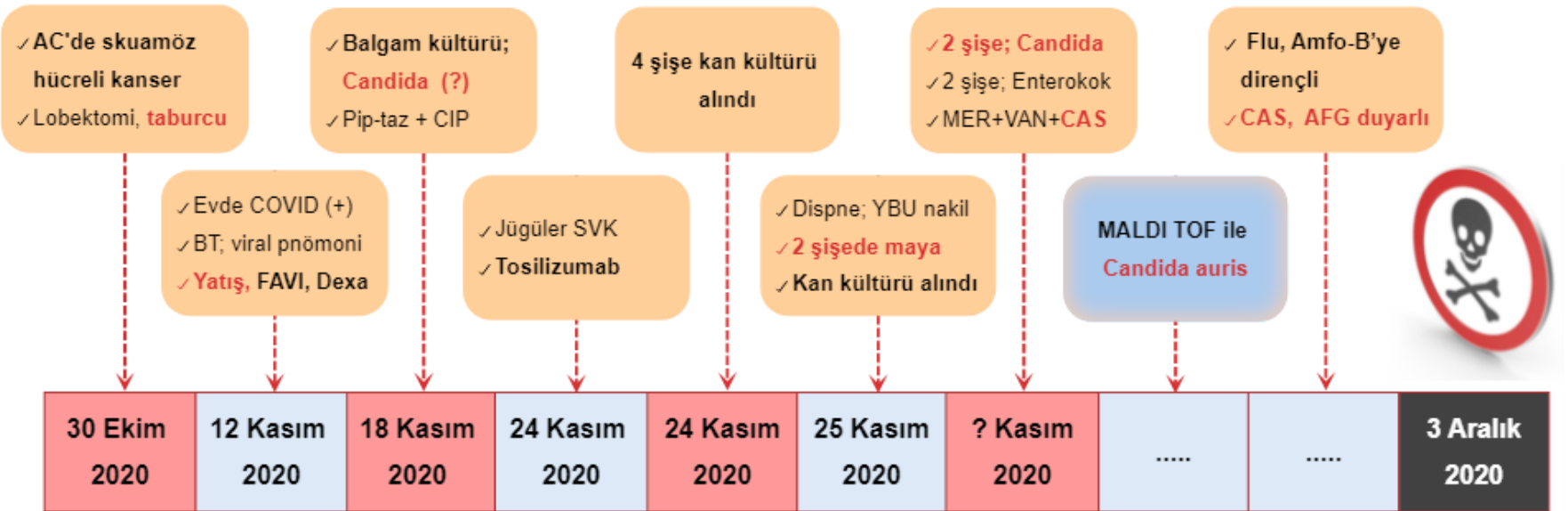
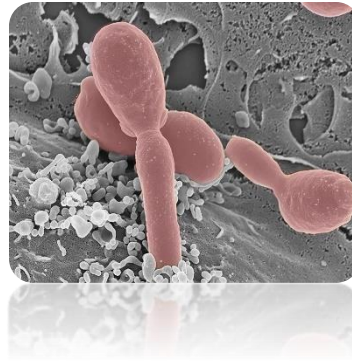
✓ 1000 ppm klor ile çevre
dezenfeksiyonu
✓ Alkol bazlı el hijyeni

Kurt AF, et al. *Candida auris* Fungemia and a local spread taken under control with infection control measures: First report from Turkey. *Indian J Med Microbiol* 2021 Apr;39(2):228-230. Makale gönderim tarihi: **16 Temmuz 2020**



Tablo 1. Olgulardaki *C. auris* İzolatlarının Antifungal MİK Değerleri (mg/ml)

	Flukanazol	İtrakonazol	Posakanazol	Vorikonazol	Anidulafungin	Kaspofungin	Amfoterisin B
Olgu 1	>256	0.25	0.03	0.5	0.25	0.25	2
Olgu 2	>256	0.25	0.03	0.25	0.25	0.25	2
Olgu 3	>256	0.25	0.015	1	0.25	0.25	2



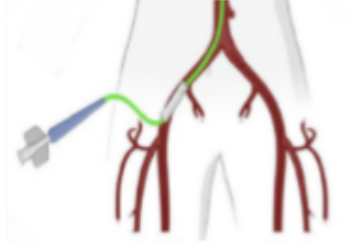
Bölükbaşı Y, et al. Türkiye'de İlk COVID-19 pozitif Candida auris fungemi olgusu. Mikrobiyol Bul 2021;55(4):648-655



T.C. SAĞLIK BAKANLIĞI

İSTANBUL İL SAĞLIK MÜDÜRLÜĞÜ

GAZİOSMANPAŞA EĞİTİM VE ARAŞTIRMA HASTANESİ



Kasım 2020

Beyin kanseri?
2 kez opere
Pnömoni
SKİ-KDİ

Kızamık
bölge

Kanda
maya (+)

VITEK-2
Cryptococcus
laurentii

MALDI Bruker
VITEK MS
C. auris

Mikafungin
Duyarlı

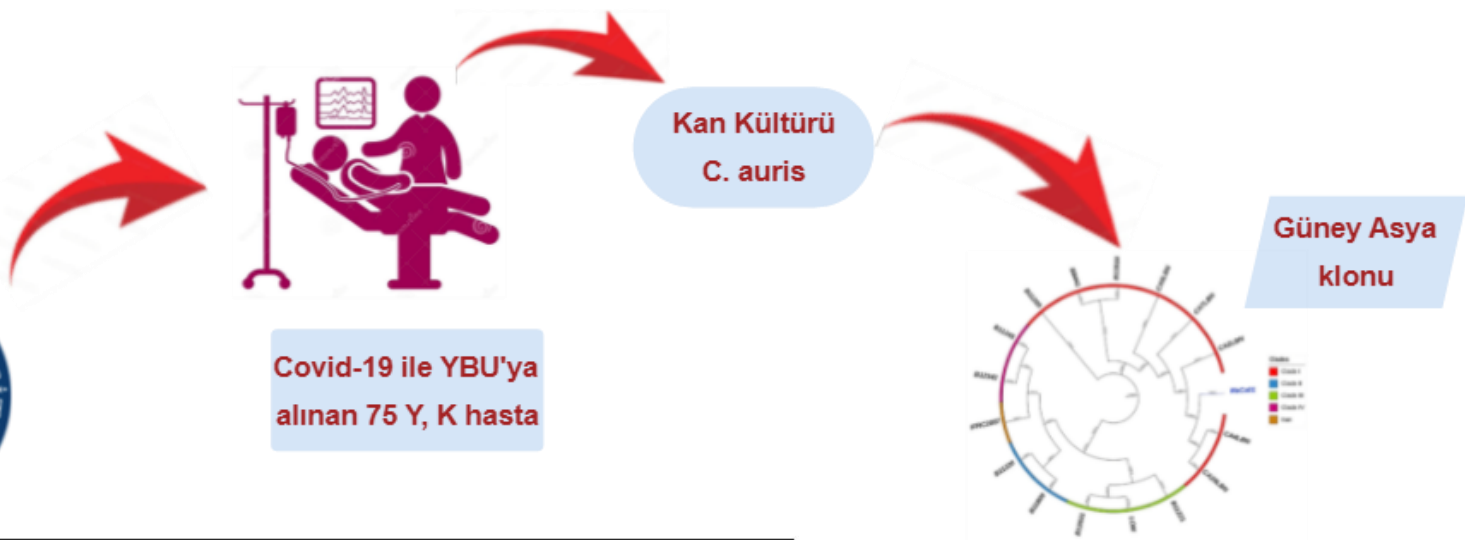


Antibiotik
kullanımı

YBU yatış
öyküsü



Teke L, et al. Türkiye'den ikinci Candida auris sepsisi olgu sunumu: Küresel sağlık için yaklaşan bir tehdit. Mediterr J Infect Microb Antimicrob 2021;10:48



Gene Name	Mutations in our clinical <i>C. auris</i> isolate, (<i>MaCa01</i>)	Reference mutations previously identified for <i>C. auris</i> *	Relation	Antifungal	<i>MaCa01</i>	CDC tentative
<i>CDR1</i>	E709D ^a	Not specific, increase of expression	Resistance against azoles [8]	Anidulafungin	0.12	≥ 4
<i>ERG2</i>	No mutations found	Not known	Resistance against amphotericin B [8, 18]	Micafungin	0.12	≥ 4
<i>ERG6</i>	No mutations found	Not known	Resistance against amphotericin B [9, 18]	Caspofungin	> 8	≥ 2
<i>ERG11</i>	Y132F ^a	Y132F, K143R, F126T	Resistance against azoles [8, 14]	5-Flucytosine	0.12	U
<i>FKSI</i>	No mutations found	S639P, S639F, S639Y	Resistance against echinocandins [8, 14]	Posaconazole	> 8	N/A
<i>FURI</i>	No mutations found	F211I	Resistance against flucytosine [10, 14]	Voriconazole	> 8	N/A
<i>TAC1b</i>	L36S, R215K, R226Q, V278D, Q328L, S331C, F334C, A339S, H608Y, N754S, I809M ^a	F214S, R495G, F862del, F191del	Resistance against azoles [19, 20]	Itraconazole	> 16	N/A
				Fluconazole	≥ 256	≥ 32
				Amphotericin B	4	≥ 2



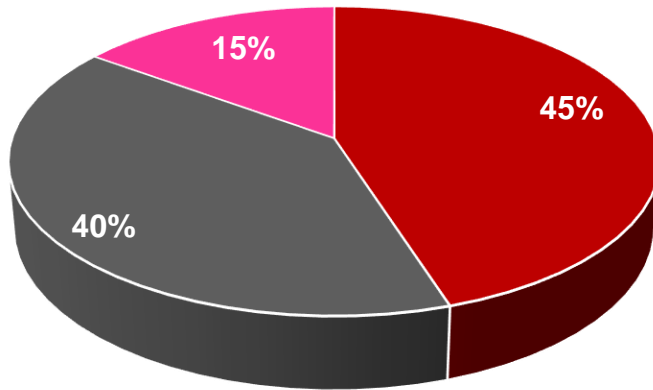
T.C. SAĞLIK BAKANLIĞI
HALK SAĞLIĞI
GENEL MÜDÜRLÜĞÜ



Haziran 2020-Ağustos 2022

%97, YBU'da takip

%24, COVID (+)



■ Kan ■ İdrar ■ Diğer

Antifungal Drugs	MIC Range	MIC ₅₀	MIC ₉₀
Amphotericin B	0,25-1	0,5	1
Fluconazole	32-256	256	256
Itraconazole	0,06-4	0,5	1
Voriconazole	0,125-1	0,25	1
Posaconazole	0,015-1	0,25	0,25
Caspofungin	0,06-0,5	0,25	0,25
Anidulafungin	0,125-2	0,25	1
Micafungin	0,06-0,5	0,125	0,125

Quality control strains (n=5) *Candida krusei* ATCC 6258, *Candida parapsilosis* ATCC 22019

Candida albicans ATCC 90028, (fluconazole sensitive, MIC, ≤ 2)

Candida albicans ATCC 64124 (Darlington), *Candida albicans* ATCC 76615, (fluconazole resistance MIC, ≥ 8

Karabıçak N, et al. Increased cases of *Candida auris* infection from various hospitals in Turkey during the COVID-19 pandemic, ECCMID, 23-26 April 2022, P1529, Lisbon, Portugal

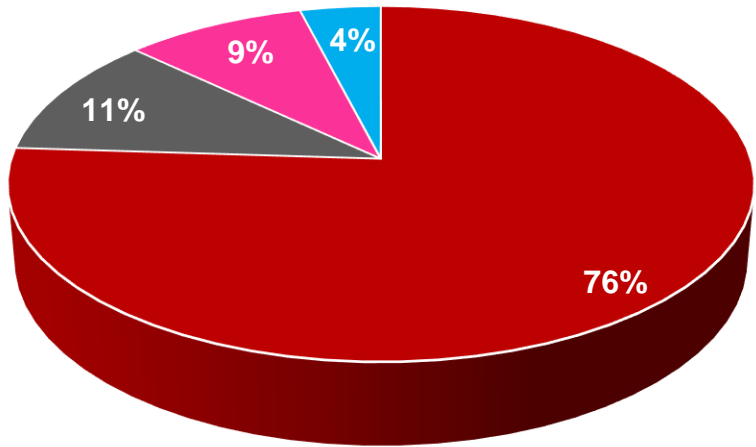
ABD
Hindistan
Türkiye
Umman
Pakistan

10 Merkez

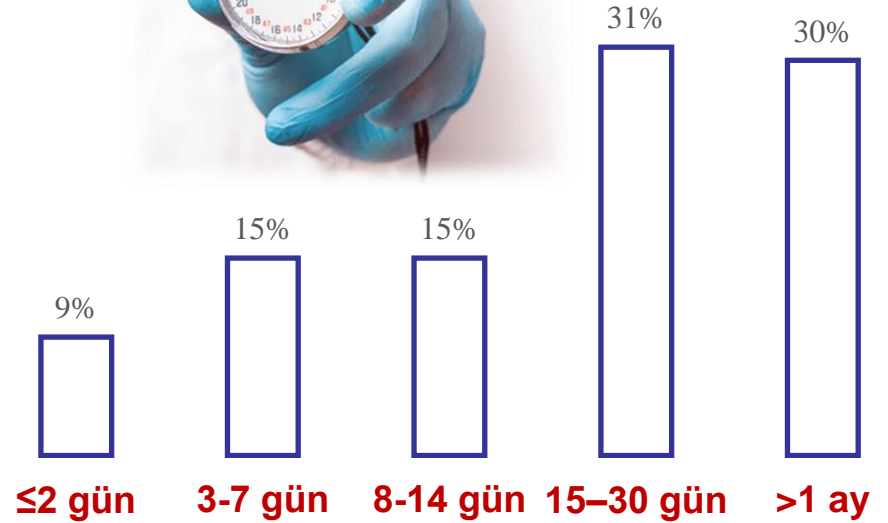
ID-IRI

54 Vaka

YBU, Kaynaklar



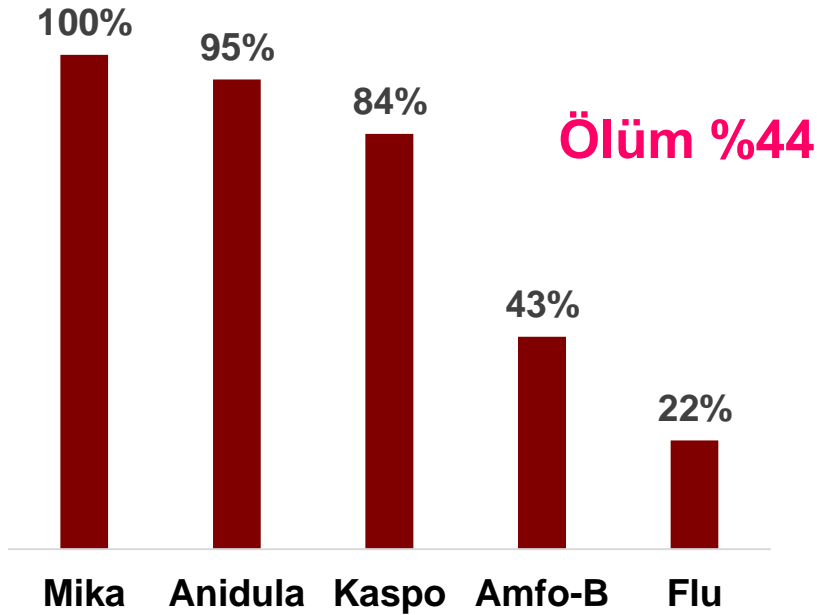
■ Kan ■ Cilt, yumuşak doku ■ Solunum ■ İdrar





ID-IRI

Antifungal Direnç

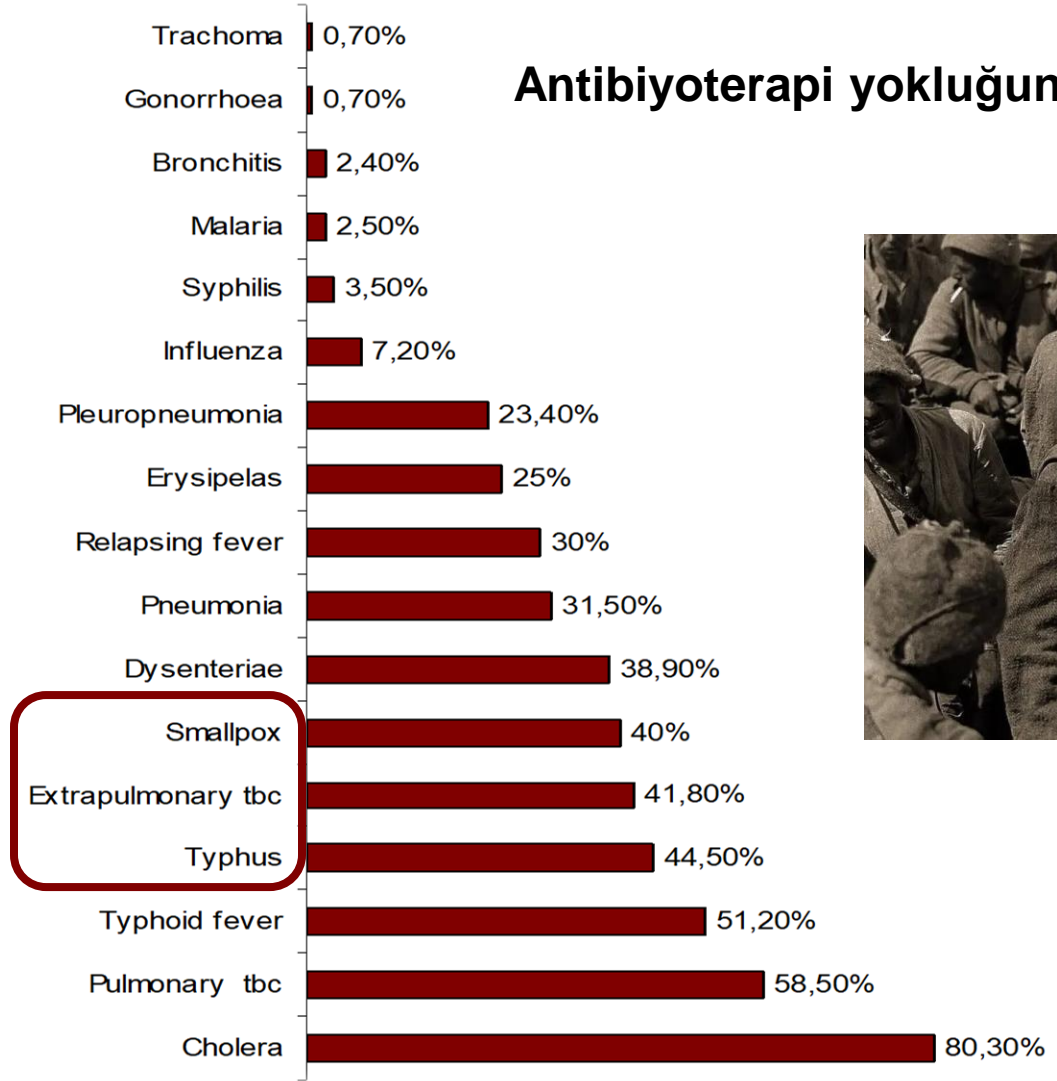


	R	MIC50	MIC90
Flu	≥ 32	31	≥ 256
Vori	?	1	≥ 8
Amfo-B	≥ 2	1	≥ 16
Kaspo	≥ 2	0.25	4
Mika	≥ 4	0.12	2
Anidula	≥ 4	0.5	4
Pos	?	4	4
5-Flcyt	?	31	≥ 64

Pandya N, et al. International multicentre study of Candida auris infections. Journal of Fungi 2021;9;7(10):878

CDC, C. auris, Antifungal Susceptibility Testing and Interpretation <https://www.cdc.gov/fungal/candida-auris/c-auris-antifungal.html>

Antibiyoterapi yokluğunda ölüm



Erdem H, et al. War and infection in the pre-antibiotic era. *Scandinavian Journal of Infectious Diseases*. 2011;43(9): 690–695.

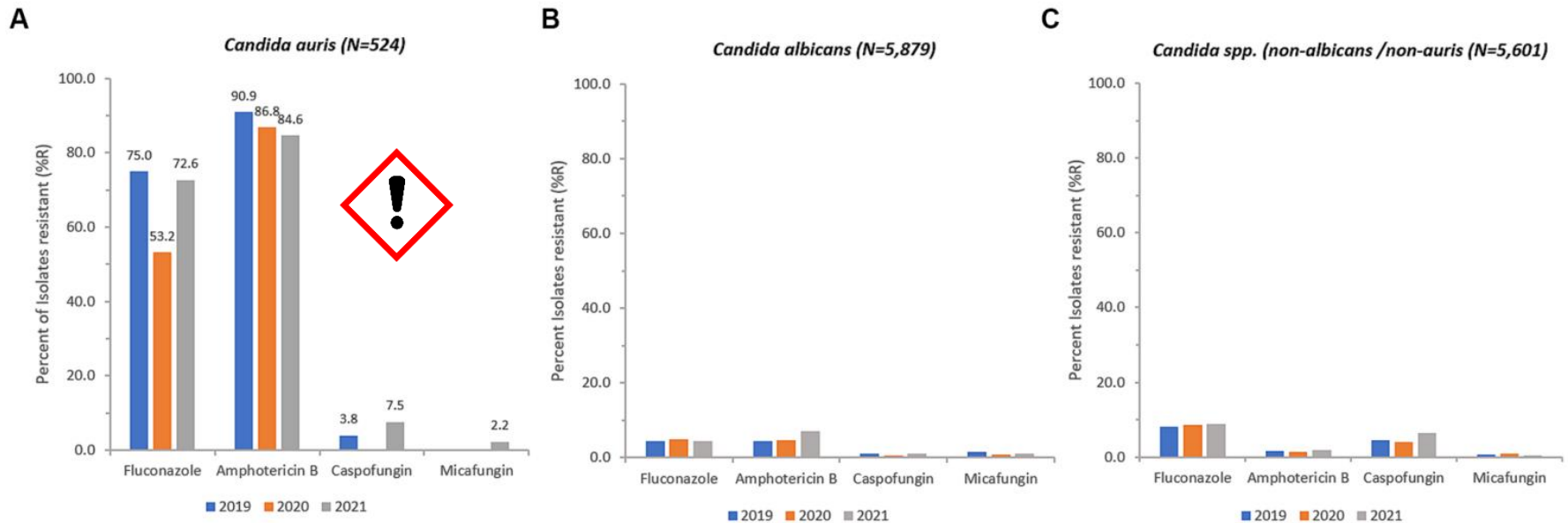


FIGURE 8 Annual trends for percentage of isolates resistant (%R) for *C. auris* (A), *C. albicans* (B), and *Candida* spp. (non-albicans/non-auris) (C), 2018–2021.

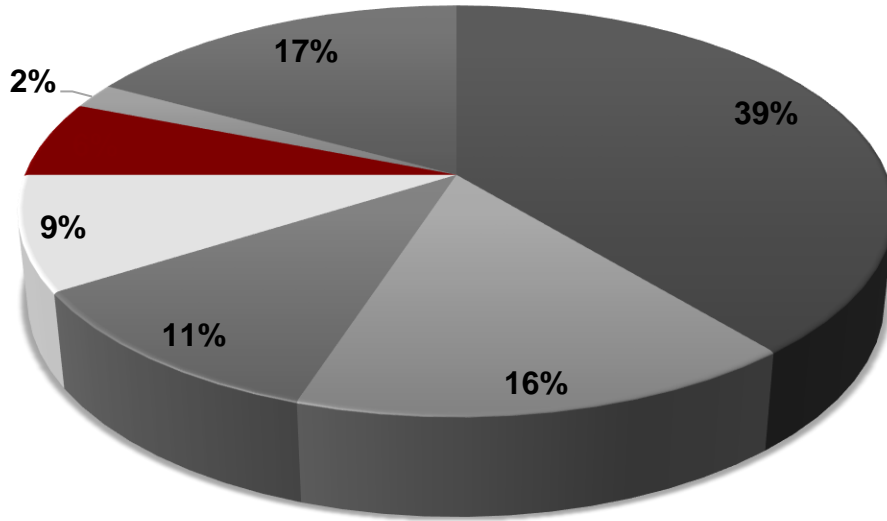
Thomsen J, et al. Emergence of highly resistant *Candida auris* in the United Arab Emirates: a retrospective analysis of evolving national trends. *Front Public Health*. 2024 Jan 12;11:1244358.

34 Merkez

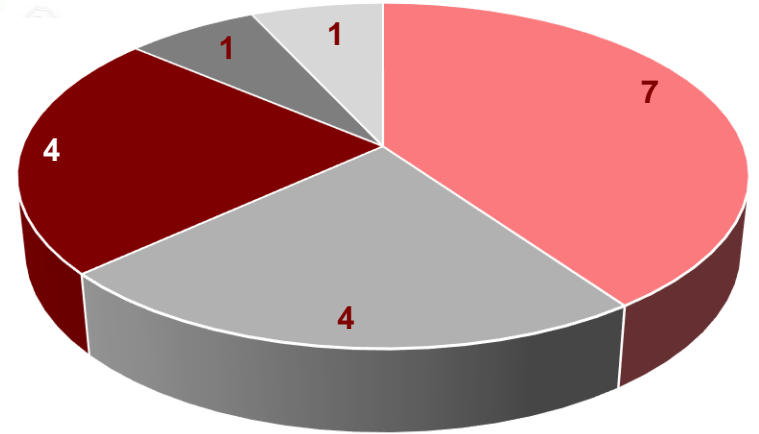
18 Ülke

ID-IRI

293 Vaka



C. auris Dağılımı



■ ABD ■ Hindistan ■ İstanbul, Türkiye ■ Mısır ■ Katar

- C. albicans
- C. parapsilosis
- C. glabrata
- C. tropicalis
- **C. auris**
- C. krusei
- Tiplendirilmeyen

Aydın S, et al. Understanding clinical outcomes and factors influencing mortality in ICU patients with COVID-19 associated candidemia. Mycoses. 2024; 67(1): e13687

YBU'da *C. auris* Kandidemi Risk Faktörleri

Tümü Güney Asya klonu

108 kandidemi vakası

	<i>C. auris</i> candidemia No. (%)	Non- <i>auris</i> candidaemia No. (%)
Number of cases	42 (38.9%)	66 (61.1%)
Median age years (IQR)	56.5 (43.3–70.5)	58 (42.8–71.3)
APACHE II (mean ± SD)	20.4 ± 5.21	21.4 ± 4.93
Central venous line	41 (97.6%)	56 (84.8%)
Central line days, median days, (IQR)	13 (4–21)	7 (2–13)
Mechanical ventilation	38 (90.4%)	47 (71.2%)
Urinary catheter	39 (92.8%)	59 (89.8%)
Length of stay prior to candidaemia, median days, (IQR)	18 (9–34.8)	9 (3–18)
Prior antifungal exposure	27 (64.2%)	41 (62.1%)
Prior antibiotic median days, (IQR)	15 (7–30)	9 (4–17)
Underlying neurological illness	10 (23.8%)	6 (9.1%)
Underlying respiratory illness	11 (26.1%)	5 (7.6%)
Underlying cardiac illness	13 (30.9%)	21 (31.8%)
Underlying renal disease	13 (30.9%)	17 (25.7%)
Underlying gastrointestinal diseases	10 (23.8%)	25 (37.8%)
Prior surgery	21 (50%)	29 (43.9%)
Gastrointestinal surgery	7 (16.7%)	17 (25.8%)



Variables	Odds ratio	P value
<i>C. auris</i> and non- <i>auris</i> candidaemia (model = AUC 75.3%, accuracy: 73.0%, $R^2 = 0.271$, $p < 0.001$)		
Underlying respiratory illness	5.34 (1.43–19.85)	0.012
Underlying neurological illness	5.30 (1.18–23.81)	0.029

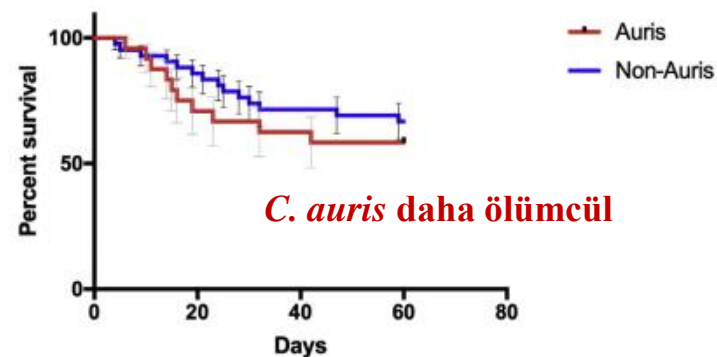
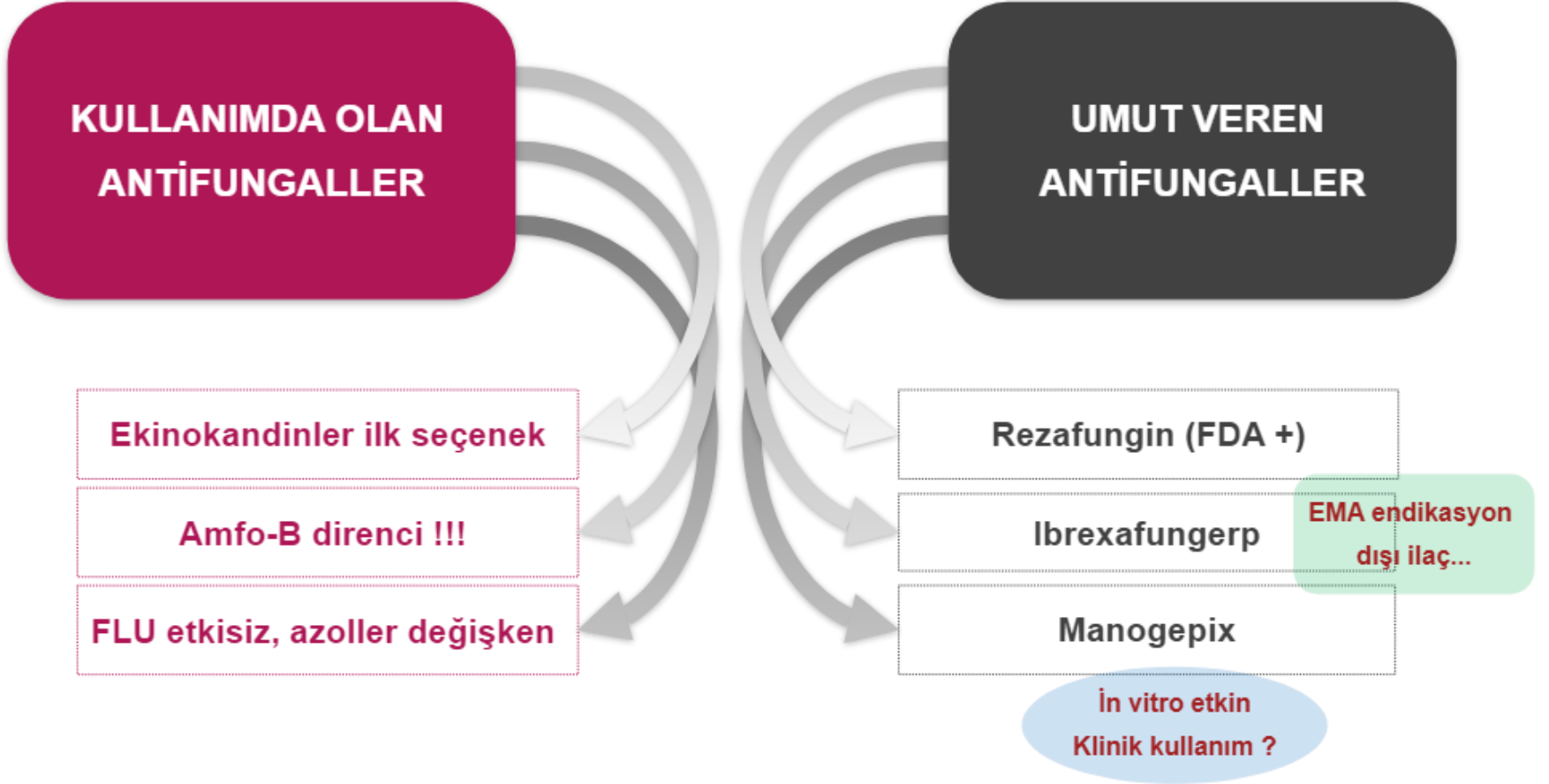


Fig. 1. Kaplan Meir survival curve showing mortality among *C. auris* and non-*auris* patients.

Antifungal Tedavi

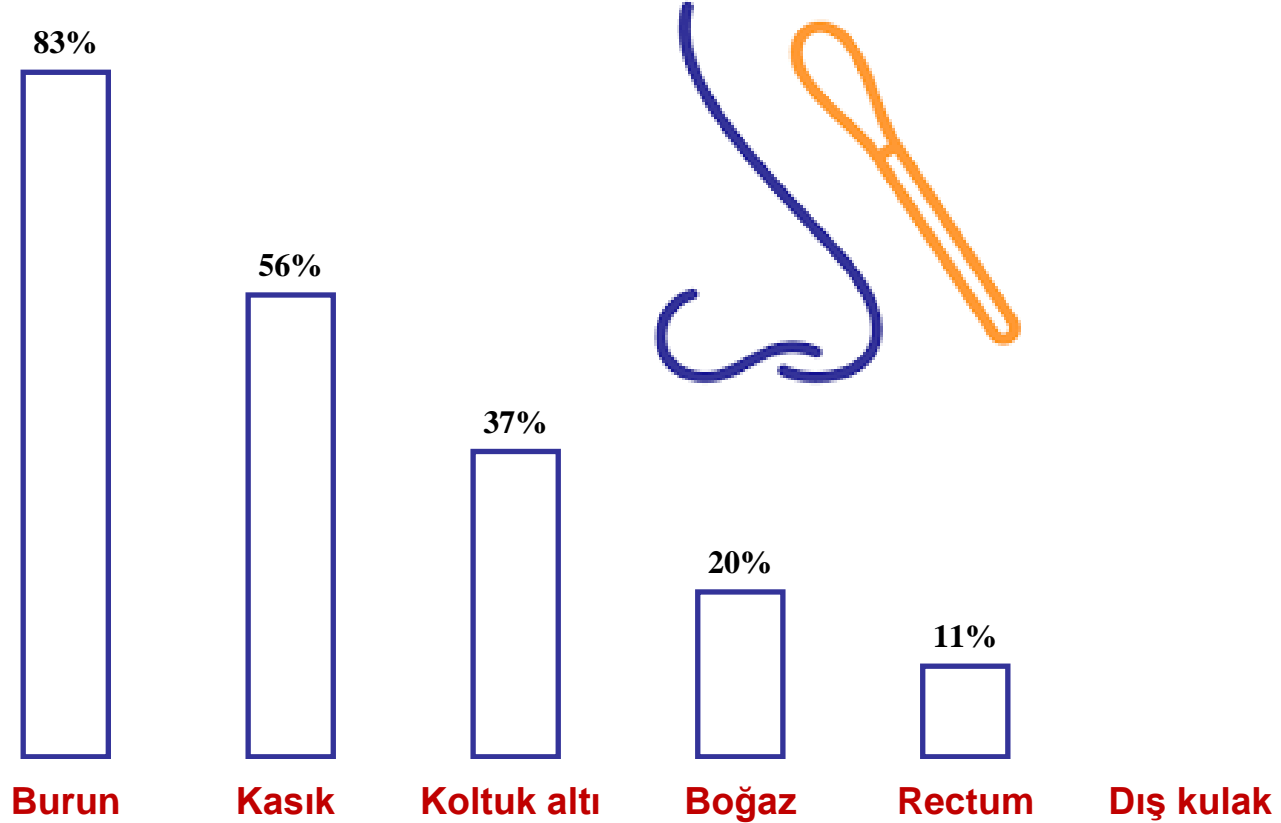


Kiregl L, et al. New treatment options for critically important WHO fungal priority pathogens. Clinical Mikrobiyoloji and Infection. (Yayında) <https://doi.org/10.1016/j.cmi.2024.03.006>



ID-IRI

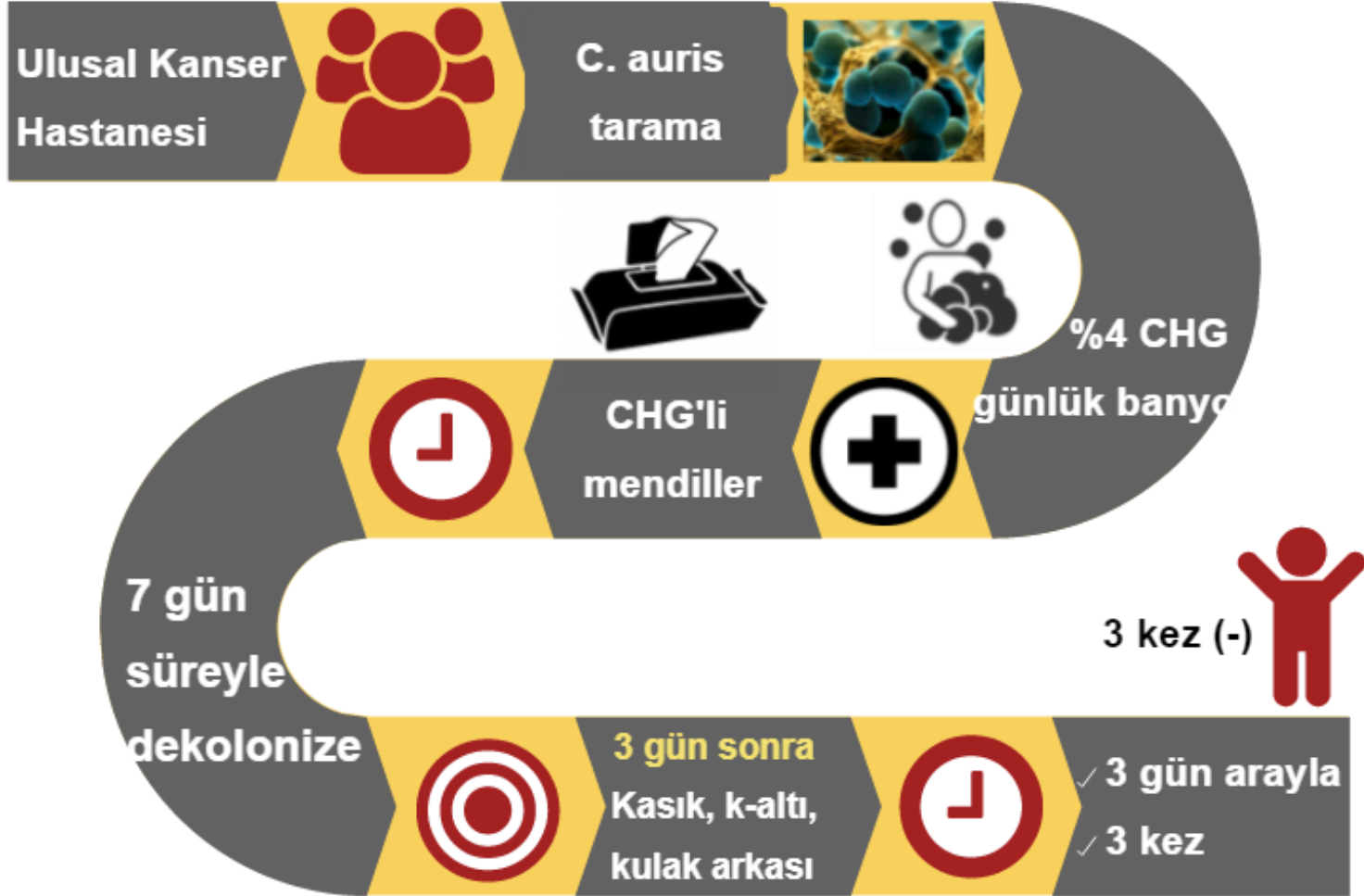
Tarama Kültür Pozitifliği



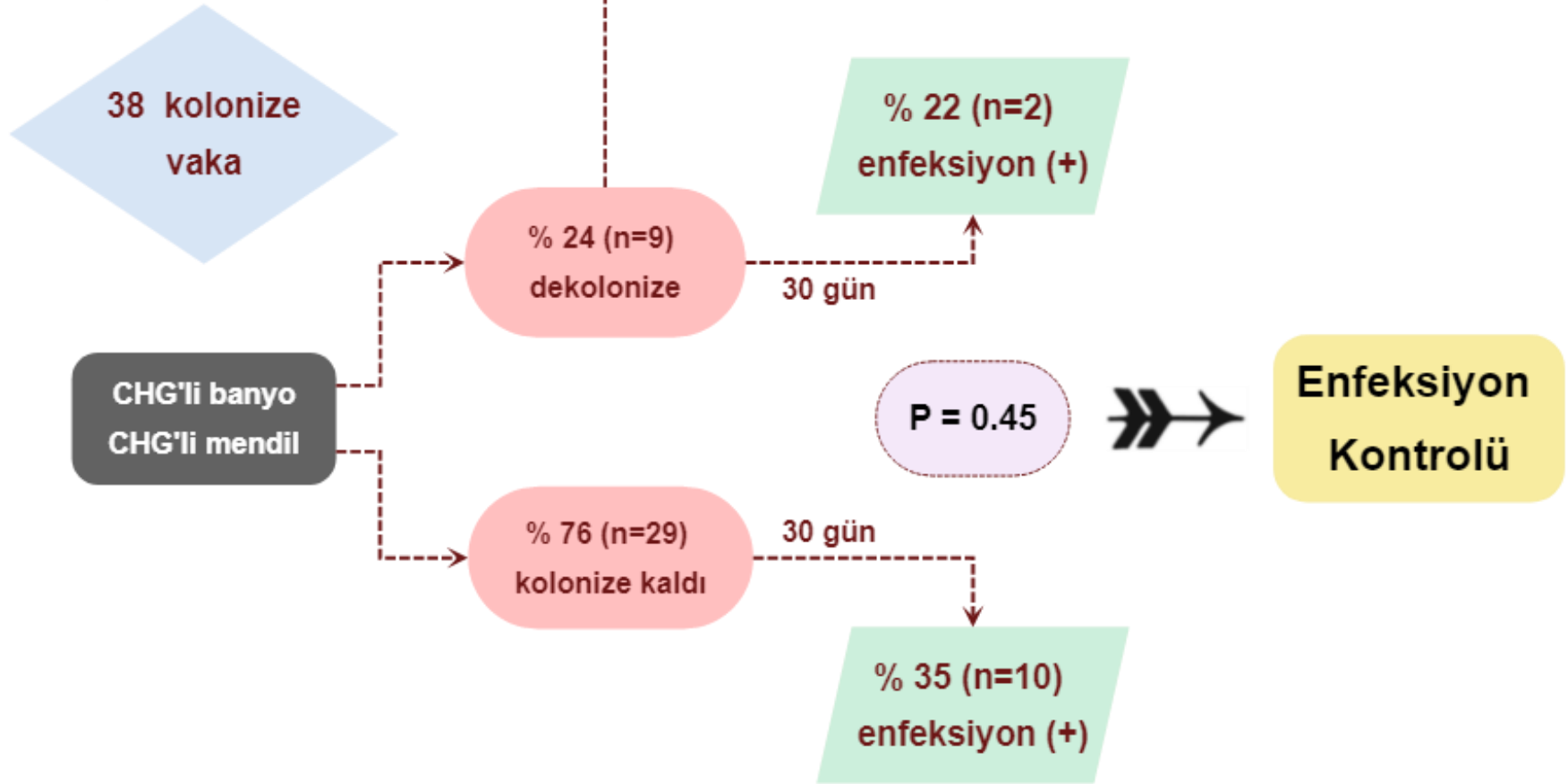
Pandya N, et al. International multicentre study of Candida auris infections. Journal of Fungi 2021;9;7(10):878



Dekolonizasyon



Ümran Elbahr, et al. Can daily bathing with 4% chlorhexidine+daily chlorhexidine wipe for 1 week be effective in decolonizing Candida auris colonization? Eur J Clin Microbiol Infect Dis 2024;43(2):243-247.



Ümran Elbahr, et al. Can daily bathing with 4% chlorhexidine+daily chlorhexidine wipe for 1 week be effective in decolonizing *Candida auris* colonization? Eur J Clin Microbiol Infect Dis 2024;43(2):243-247.

3 aylık tarama

- ✓ Kasık
- ✓ Aksilla
- ✓ Diğer cilt

- ✓ 1 yıl takip
- ✓ ≥ 2 tarama
neg ise

45 hasta
(C. auris +)

28 hasta
(62%)
dekolonize



Madem kolonizasyon kalıcı...

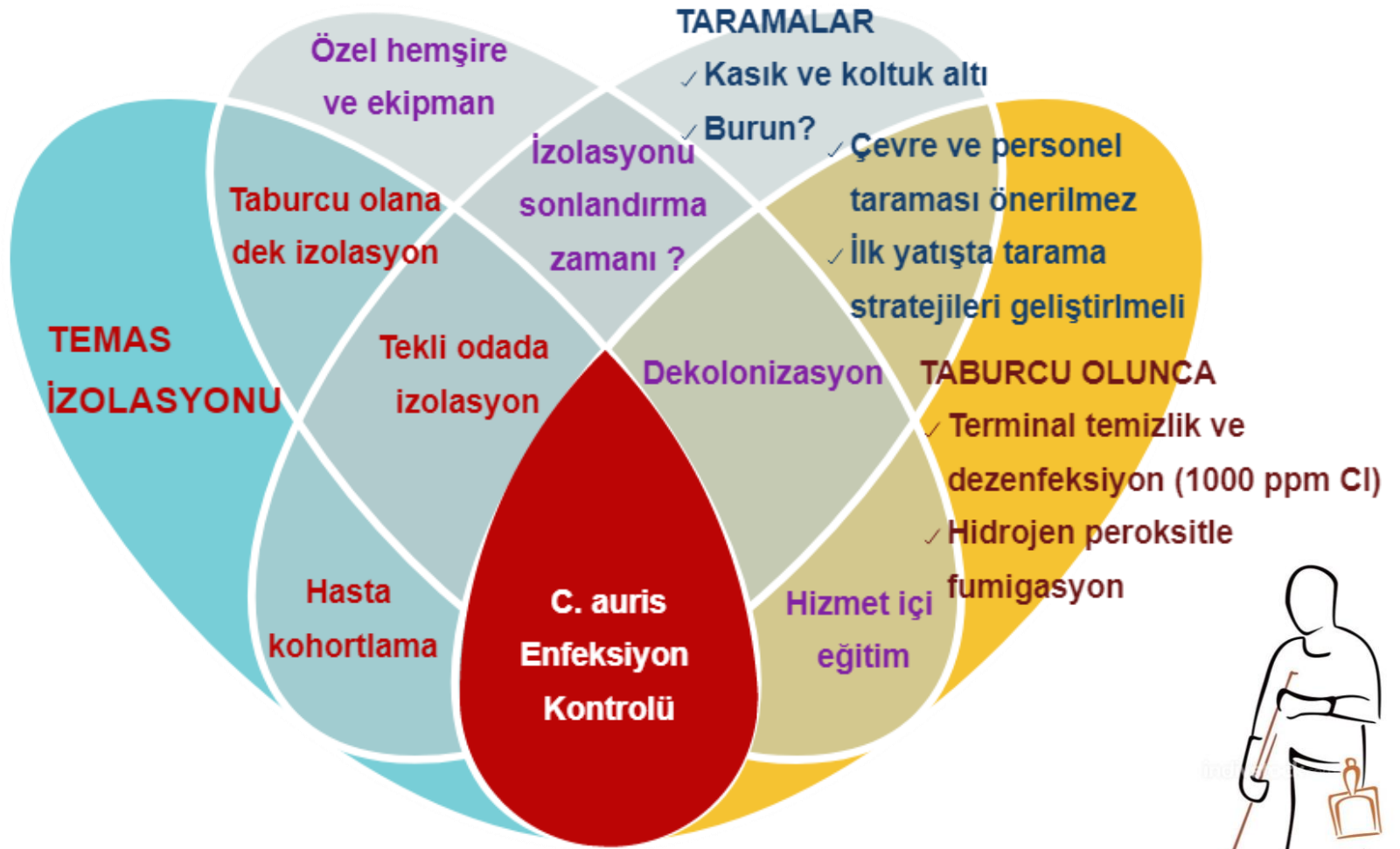


YBU'da
C.auris

- ✓ Santral ve perifer kateter demetleri
- ✓ CAUTI demeti
- ✓ Trakeostomi bakımı



- ✓ Cilt dekolonizasyonu



European CDC, Candida auris in healthcare settings – Europe, 23 April 2018

Public Health of England. Guidance for the laboratory investigation, management and infection prevention and control for cases of Candida auris. August 2017 v2.0

C. auris ülkemiz için sorun mu?



**Çok dikkatli
olmalıyız...**

Candida auris neden sorun ?



Salgınlar yapabilir

Hastanelerimizde
endemik

2



Konvansiyonel
yöntemlerle tanısı
zor

3



Sık kullanılan
dezenfektanlara
kısmen dirençli

5

1

İnvazif Kandidiyaz
etkeni

Ölümcül



2

Antifungal direnç
önemli bir sorun



4

Enfeksiyon
kontrol önlemleri
tam oturmamış



Ulusal sürveyans...

Teşekkürler...

