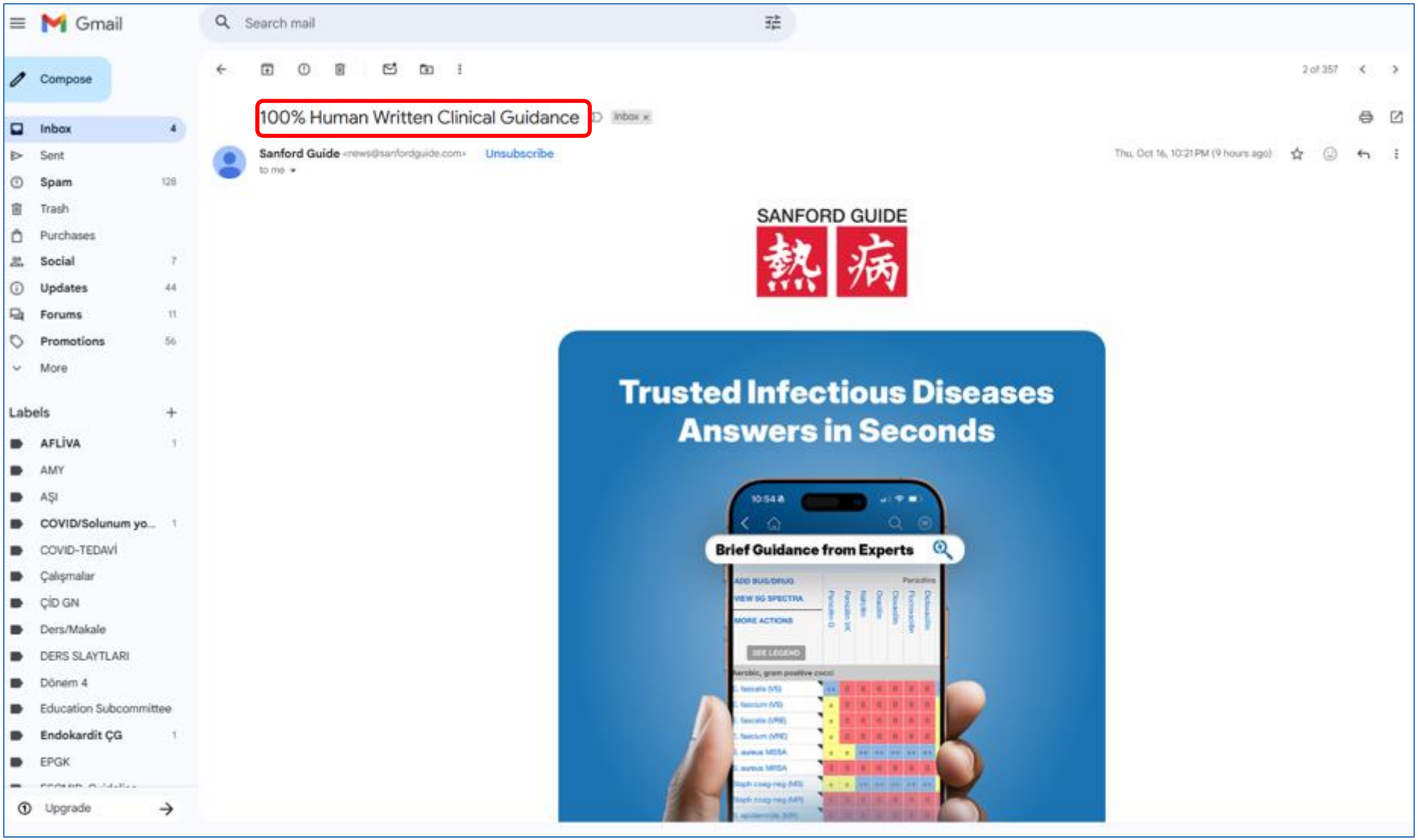
KLİMİK TÜRK KLİNİK MİKROBİYOLOJİ VE İNFEKSİYON HASTALIKLARI DERNEĞİ

39.YIL


# İnfektif Endokarditte Son İki Yılda Ne Oldu?

Dr. Özlem Kurt Azap
Başkent Üniversitesi Tıp Fakültesi
Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji AD

# Yüzde yüz insan tarafından yazılmış klinik rehber!




İNFEKTİF ENDOKARDİTTE YENİ KANITLAR, YENİ YAKLAŞIMLAR
ULUSAL KILAVUZ GÜNCELLEMESİNE DOĞRU
HİBRİT
18 EKİM 2025
Ankara Üniversitesi İbn-i Sina Hastanesi
Hasan Ali Yücel Salonu, Ankara
İEÇG
KLİMİK DERNEĞİ İNFEKTİF ENDOKARDİT VE DİĞER KARDİYOVASKÜLER İNFEKSİYONLAR ÇALIŞMA GRUBU


İNFEKTİF ENDOKARDİT
2023'TE NELER DEĞİŞTİ?
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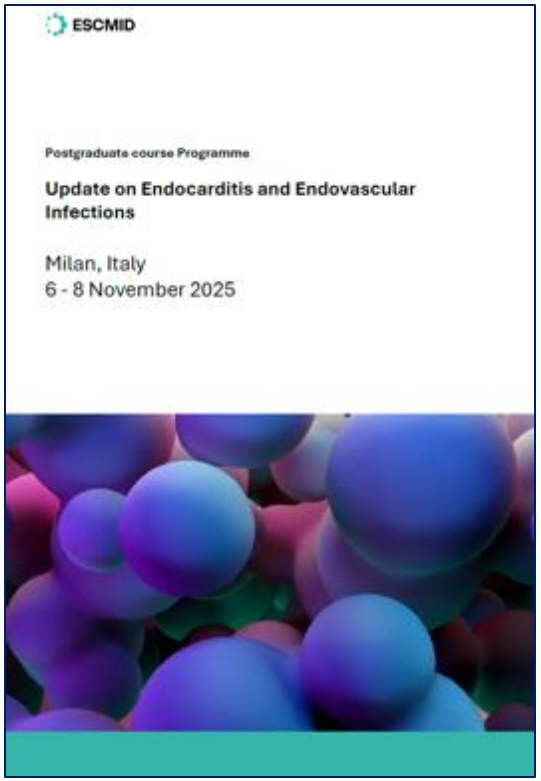
İNFEKTİF ENDOKARDİT:
GÜNCEL BİLGİLER, YEREL VERİLER
21-22 EKİM 2017
Sağlık Bilimleri Üniversitesi
Dr. Siyami Ersek Göğüs, Kalp ve Damar Cerrahisi
Eğitim ve Araştırma Hastanesi
İstanbul


ESCMID
Postgraduate course Programme
Update on Endocarditis and Endovascular Infections
Milan, Italy
6 - 8 November 2025


# Son İki Yılda (2023 Nisan-2025 Ağustos) Yayımlanan Dikkat Çekici İnfektif Endokardit Makaleleri

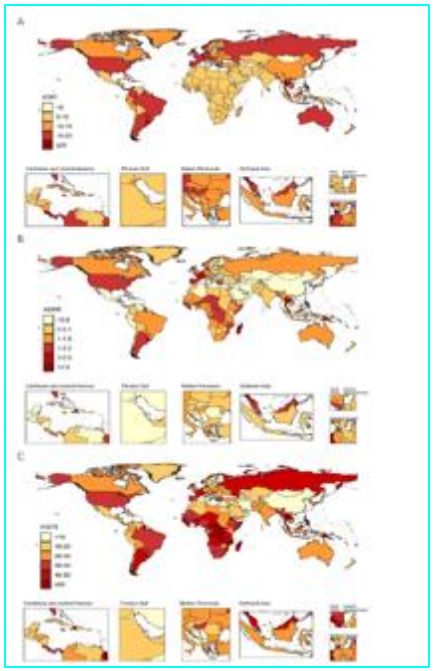
Dr. Özlem Kurt Azap
Başkent Üniversitesi Tıp Fakültesi
Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji AD

# Başlıklar

- Epidemiyolojik veriler: Sıklık, mortalite, hastalık yükü
- Tanı kriterleri/Tanı Yöntemleri: Duke/ISCVID tanı kriterleri
  Mikrobiyolojik, Görüntüleme
- Antibiyotik tedavisi: Direnç Sorunu, Oral tedaviye geçiş
- Cerrahi tedavi
- Profilaksi
- Endokardit ekibi

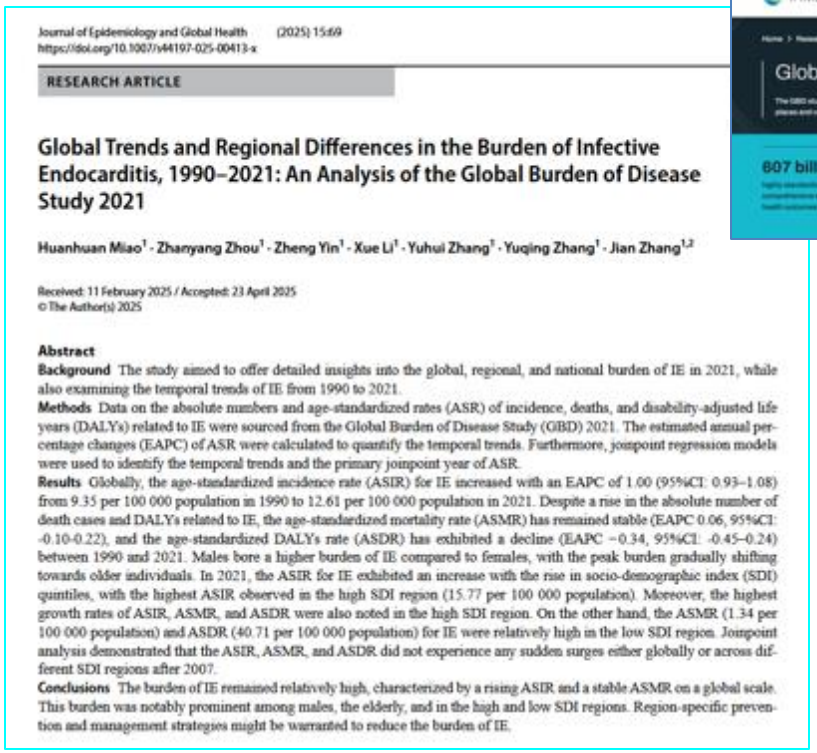
# Endokardit tanı kriterleri büyük bir değişim içinde ☺

- Epidemiyolojik verilerin değişmesi tanı kriterlerini etkiliyor
- Tanı kriterlerinin değişmesi epidemiyolojik verileri etkiliyor



# Epidemiyolojik Veriler

# İE Yükü: 30 yıllık veri



Journal of Epidemiology and Global Health (2025) 15:69
https://doi.org/10.1007/s44197-025-00413-x

RESEARCH ARTICLE

## Global Trends and Regional Differences in the Burden of Infective Endocarditis, 1990–2021: An Analysis of the Global Burden of Disease Study 2021

Huanhuan Miao[1] · Zhanyang Zhou[1] · Zheng Yin[1] · Xue Li[1] · Yuhui Zhang[1] · Yuqing Zhang[1] · Jian Zhang[1,2]

Received: 11 February 2025 / Accepted: 23 April 2025

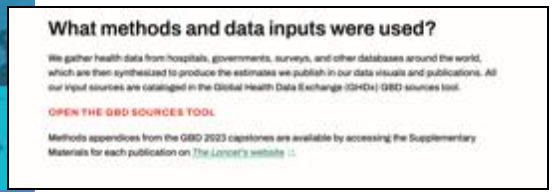

**Abstract**

**Background** The study aimed to offer detailed insights into the global, regional, and national burden of IE in 2021, while also examining the temporal trends of IE from 1990 to 2021.

**Methods** Data on the absolute numbers and age-standardized rates (ASR) of incidence, deaths, and disability-adjusted life years (DALYs) related to IE were sourced from the Global Burden of Disease Study (GBD) 2021. The estimated annual percentage changes (EAPC) of ASR were calculated to quantify the temporal trends. Furthermore, joinpoint regression models were used to identify the temporal trends and the primary joinpoint year of ASR.

**Results** Globally, the age-standardized incidence rate (ASIR) for IE increased with an EAPC of 1.00 (95%CI: 0.93–1.08) from 9.35 per 100 000 population in 1990 to 12.61 per 100 000 population in 2021. Despite a rise in the absolute number of death cases and DALYs related to IE, the age-standardized mortality rate (ASMR) has remained stable (EAPC 0.06, 95%CI: -0.10-0.22), and the age-standardized DALYs rate (ASDR) has exhibited a decline (EAPC −0.34, 95%CI: -0.45–0.24) between 1990 and 2021. Males bore a higher burden of IE compared to females, with the peak burden gradually shifting towards older individuals. In 2021, the ASIR for IE exhibited an increase with the rise in socio-demographic index (SDI) quintiles, with the highest ASIR observed in the high SDI region (15.77 per 100 000 population). Moreover, the highest growth rates of ASIR, ASMR, and ASDR were also noted in the high SDI region. On the other hand, the ASMR (1.34 per 100 000 population) and ASDR (40.71 per 100 000 population) for IE were relatively high in the low SDI region. Joinpoint analysis demonstrated that the ASIR, ASMR, and ASDR did not experience any sudden surges either globally or across different SDI regions after 2007.

**Conclusions** The burden of IE remained relatively high, characterized by a rising ASIR and a stable ASMR on a global scale. This burden was notably prominent among males, the elderly, and in the high and low SDI regions. Region-specific prevention and management strategies might be warranted to reduce the burden of IE.


IHME = Institute for Health Metrics and Evaluation (Sağlık Ölçümleri ve Değerlendirme Enstitüsü)

- 1990–2021 yılları arasında İE yükündeki değişimleri cinsiyet, yaş grubu, SDI bölgesi, coğrafi bölge ve ülke bazında incelemiştir
- Erkeklerde İE yükü, kadınlara göre daha yüksek bulunmuştur
- Zamanla, en yüksek hastalık yükü ileri yaş gruplarına kaymıştır

RESEARCH ARTICLE

Global Trends and Regional Differences in the Burden of Infective Endocarditis, 1990–2021: An Analysis of the Global Burden of Disease Study 2021

# Terimler önemli!

**Abbreviations**

| | |
|---|---|
| APC | Annual percent change |
| AAPC | Average annual percentage change |
| ASDR | Age-standardized disability-adjusted life years rate |
| ASIR | Age-standardized incidence rate |
| ASMR | Age-standardized mortality rate |
| ASR | Age-standardized rates |
| CDRIE | Intracardiac device-related infective endocarditis |
| CI | Confidence interval |
| CODEm | Cause of Death Ensemble model |
| DALYs | Disability-adjusted life years |
| DisMod-MR | Disease Modelling Meta-Regression |
| EAPC | Estimated annual percentage change |
| GATHER | Guidelines for Accurate and Transparent Health Estimates Reporting |
| GBD | Global Burden of Diseases, Injuries, and Risk Factors Study |
| ICD | International Classification of Disease |
| IE | Infective endocarditis |
| NVE | Native valve endocarditis |
| PVE | Prosthetic valve endocarditis |
| SDI | Socio-demographic index |
| ST-GPR | Spatiotemporal Gaussian process regression |
| UI | Uncertainty interval |

ASDR: yaşa göre standardize edilmiş engellilik yükü oranı

ASIR: yaşa göre standardize edilmiş insidans hızı

ASMR: yaşa göre standardize edilmiş mortalite hızı

DALY: engellilikle kaybedilen yaşam yılı

# Dünyada İE- 2021

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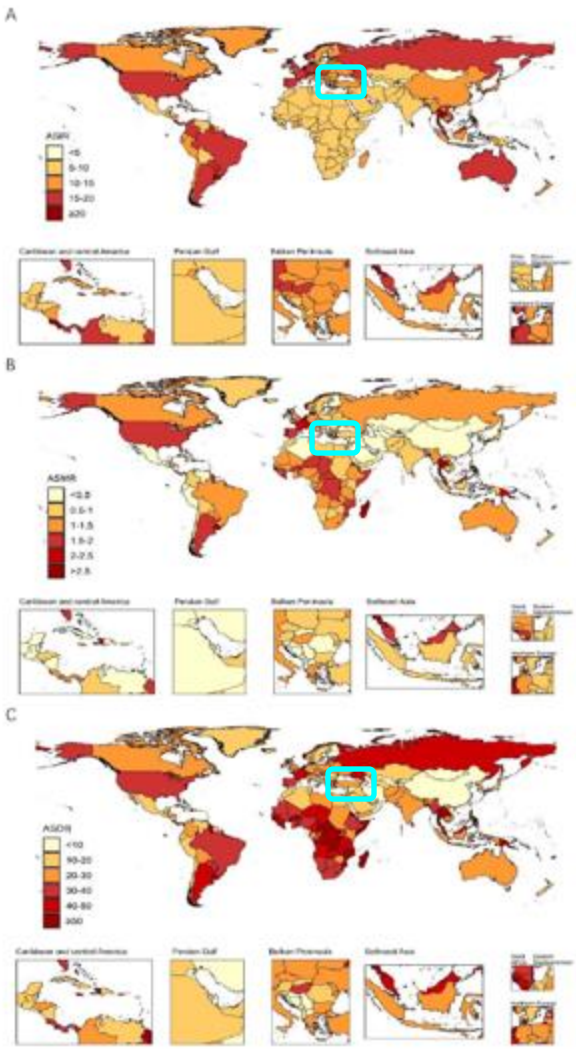
**Conclusions** The burden of IE remained relatively high, characterized by a rising ASIR and a stable ASMR on a global scale. This burden was notably prominent among males, the elderly, and in the high and low SDI regions. Region-specific prevention and management strategies might be warranted to reduce the burden of IE.

**Fig. 3** Age-standardized incidence (**A**), mortality (**B**), and DALYs (**C**) rates for IE in 204 countries and territories, for both sexes, 2021. ASDR, age-standardized disability-adjusted life year rate; ASIR, age-standardized incidence rate; ASMR, age-standardized mortality rate; DALYs, disability-adjusted life years



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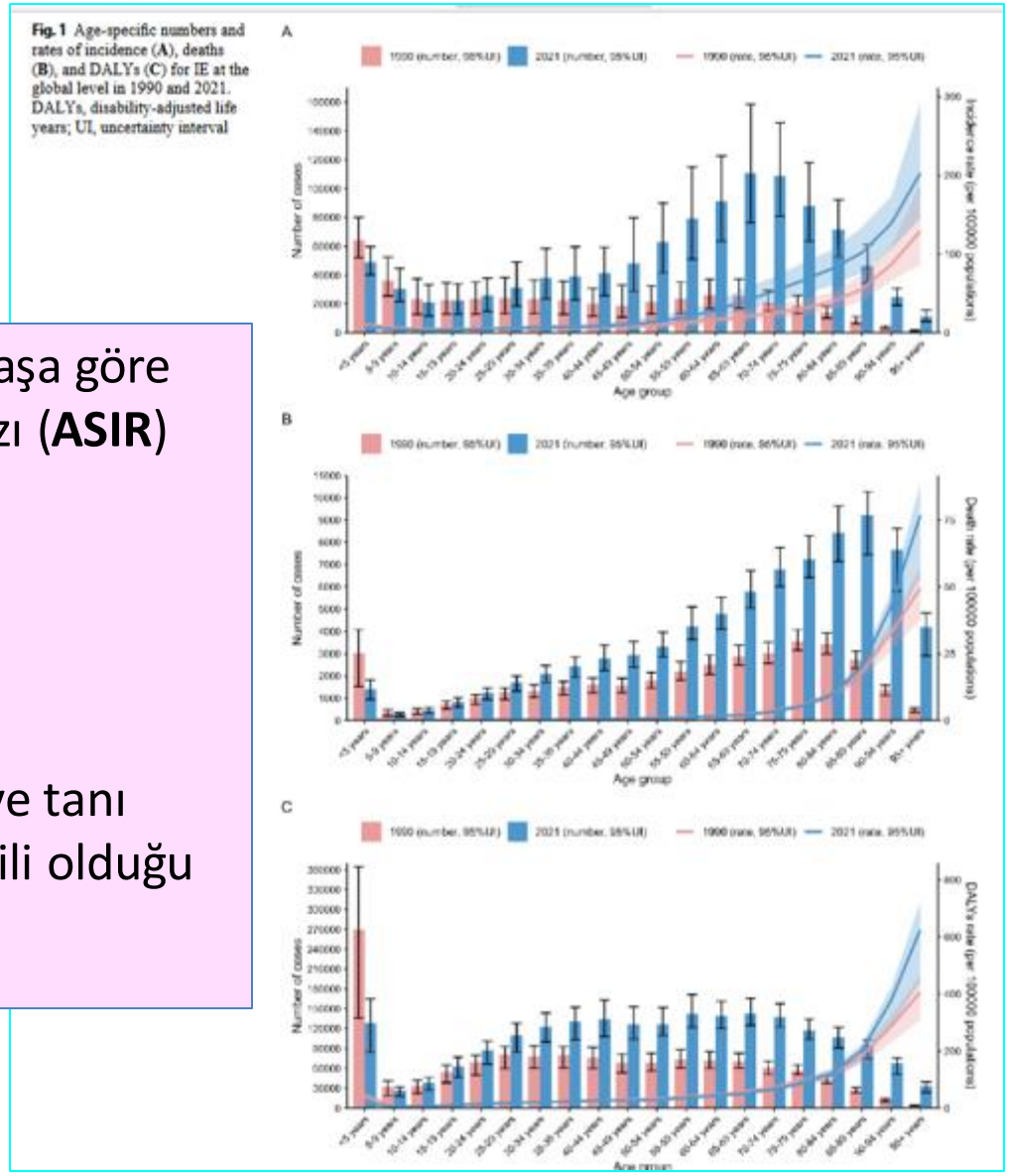



**Fig. 1** Age-specific numbers and rates of incidence (A), deaths (B), and DALYs (C) for IE at the global level in 1990 and 2021. DALYs, disability-adjusted life years; UI, uncertainty interval

- Hem **yeni olgu sayısı** hem de yaşa göre standardize edilmiş insidans hızı (**ASIR**) **artış** göstermiştir

  Bu **artışın**;

  nüfus artışı

  yaşlanan toplum yapısı

  invaziv girişimlerin artması ve tanı yöntemlerindeki ilerlemelerle ilişkili olduğu düşünülmektedir


RESEARCH ARTICLE

Global Trends and Regional Differences in the Burden of Infective Endocarditis, 1990–2021: An Analysis of the Global Burden of Disease Study 2021

# Dünyada İE- 30 yıl

- Mutlak ölüm sayısı ve engellilikle kaybedilen yaşam yılı (DALY) artsa da

  yaşa göre standardize edilmiş mortalite hızı (ASMR) büyük ölçüde sabit kalmış,

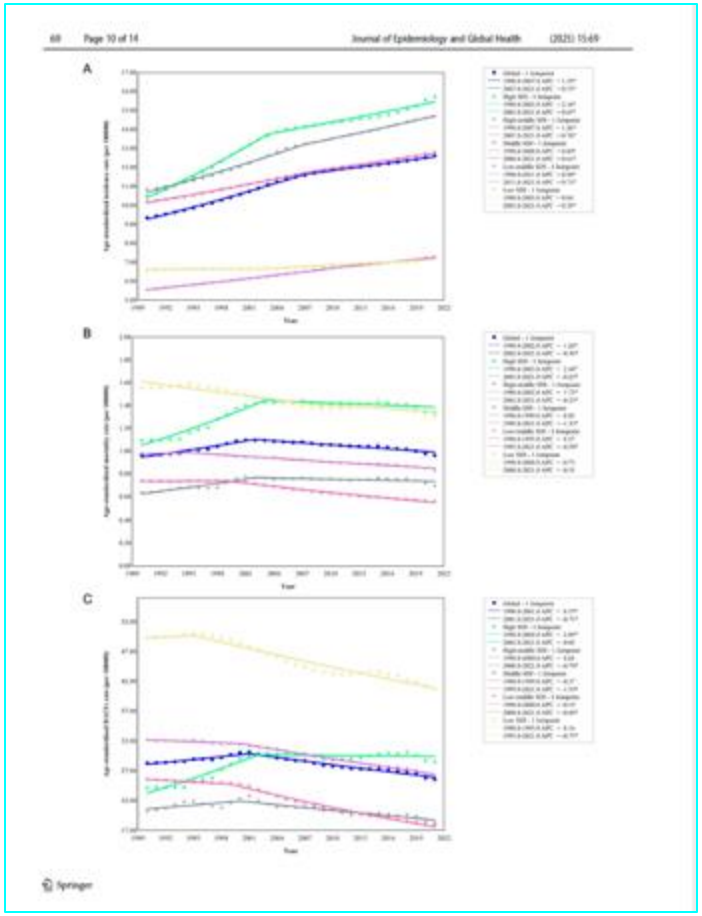
  yaşa göre standardize edilmiş engellilik yükü oranı (ASDR) ise azalma göstermiştir

- Bu **olumlu eğilim**;

  yeni nesil antibiyotiklerin kullanıma girmesi,

  cerrahi tedavi endikasyonu olan olgularda cerrahiye yönelimin artması

  multidisipliner "**Endokardit Ekipleri**"nin kurulmasıyla açıklanabilir



RESEARCH ARTICLE

Global Trends and Regional Differences in the Burden of Infective Endocarditis, 1990–2021: An Analysis of the Global Burden of Disease Study 2021

# Son 30 yılda İE…

- ASIR (Yaşa göre standardize edilmiş insidans oranı) SDI düzeyi arttıkça yükselmiştir

  Yüksek SDI bölgelerinde daha yüksek İE insidansı

- ASMR (Yaşa göre standardize edilmiş mortalite oranı) ve ASDR (Yaşa göre standardize edilmiş özürlülüğe göre ayarlanmış yaşam yılı kaybı)

  **düşük SDI** bölgelerinde görece daha **yüksek** bulunmuştur

RESEARCH ARTICLE

Global Trends and Regional Differences in the Burden of Infective Endocarditis, 1990–2021: An Analysis of the Global Burden of Disease Study 2021

# Son 30 yılda İE…

Bu veriler, küresel sağlık eşitsizliklerini ve bakım kalitesindeki farklılıkları göstermektedir

Politika yapıcılar:

- Bölgesel farklılıkları tanımlamalı
- Yerel epidemiyolojik özellikleri ve risk faktörlerini incelemeli
- Bölgeye özgü önleme ve yönetim stratejileri geliştirmelidir

# Japonya: 2016–2021 Ulusal Kohort Verileri

Journal of the American Heart Association

ORIGINAL RESEARCH

## Trends in the Clinical Characteristics and Outcome of Infective Endocarditis: A Nationwide Study From 2016 to 2021

Hiroshi Okamoto, MD, PhD; Takashi Nishi, MD, PhD; Kyo Kamisaka, MD; Yoshitaka Sasahira, MD; Koshiro Kanaoka, MD, PhD; Yoko Sumita; Yoshitaka Iwanaga, MD, PhD; Chisato Izumi, MD, PhD; Shiro Uemura, MD, PhD

**BACKGROUND:** Infective endocarditis (IE) is still a fatal disease, and given its rarity, ongoing updates to patient characteristics and outcomes of IE are essential for providing precision diagnoses and effective treatments. This study sought to examine temporal trends in the clinical characteristics and in-hospital occurrence of adverse outcomes of IE.

**METHODS AND RESULTS:** Using the Japan nationwide administrative database, we identified patients with IE in Japan from 2016 to 2021. A total of 17 407 patients with IE (37.8% women; median age, 72 [interquartile range, 59–81] years) were identified. The incidence of IE increased from 2.02 per 100 000 population in 2016 to 2.59 per 100 000 population in 2021. The median age of the patients increased from 70 years in 2016 to 73 years in 2021, and patient backgrounds were becoming more complex. The in-hospital mortality rate was 14.5%, which significantly increased from 14.1% in 2016 to 15.4% in 2021. Higher age (odds ratio [OR], 1.34 [95% CI, 1.29–1.40]), heart failure (OR, 1.37 [95% CI, 1.18–1.59]), cerebrovascular complications (OR, 1.78 [95% CI, 1.59–1.99]), renal failure (OR, 2.36 [95% CI, 2.06–2.70]), and sepsis (OR, 2.79 [95% CI, 2.48–3.13]), were independently associated with an increased in-hospital mortality rate. In contrast, cardiac surgery (OR, 0.47 [95% CI, 0.41–0.55]), and a higher number of total cardiac surgeries (OR, 0.77 [95% CI, 0.65–0.92]) independently predicted a lower in-hospital mortality rate.

- **17 bin 407 İE** olgusu
- **İnsidans:**
  2016'da 100.000'de **2,02** → 2021'de **2,59**
- **Ortanca yaş:** 70'ten **73**'e yükseldi; hastalar giderek **yaşlı ve daha kompleks** hale geldi
- **Hastane içi mortalite:** %14,1 → **%15,4**'e arttı

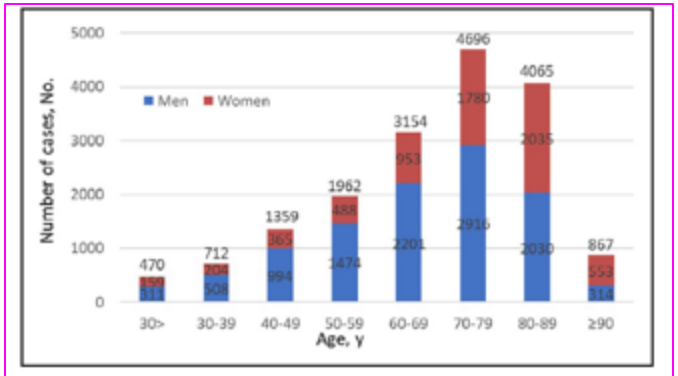



**Figure 3. Age distribution of patients with IE.**
IE indicates infective endocarditis.

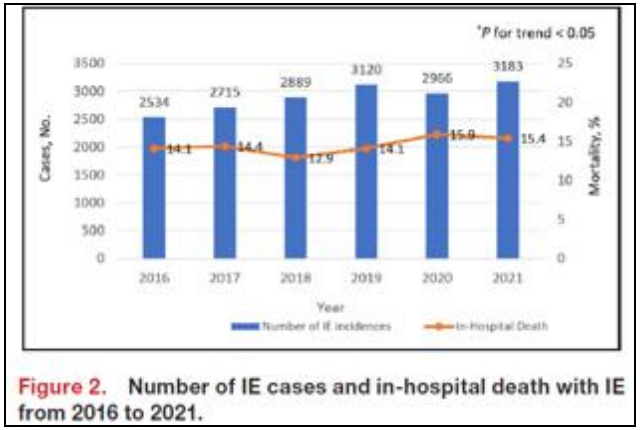
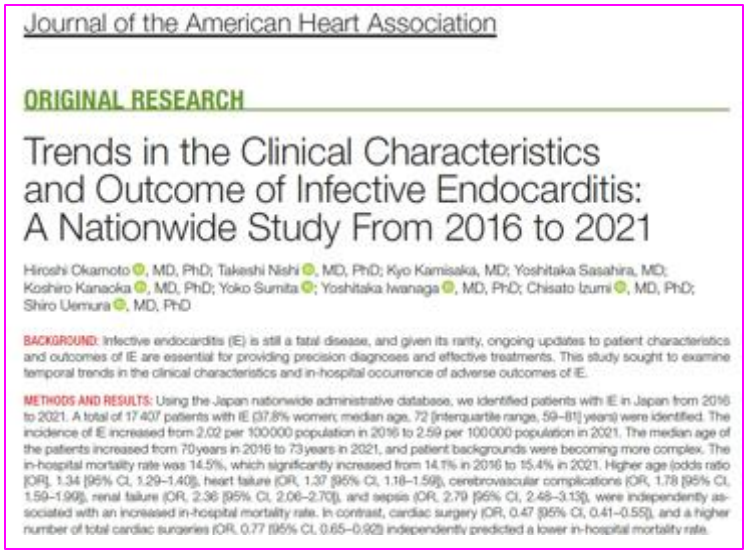



**Figure 2. Number of IE cases and in-hospital death with IE from 2016 to 2021.**

# Japonya: 2016–2021 Ulusal Kohort Verileri



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**Mortaliteyi Artıran Faktörler**

- İleri yaş
- Kalp yetmezliği
- Serebrovasküler komplikasyonlar
- Böbrek yetmezliği
- Sepsis

**Mortaliteyi Azaltan Faktörler**

- Kardiyak cerrahi uygulanması
- Cerrahi hacmi yüksek merkezlerde tedavi

# Türkiye'de neler değişti?

**Tablo 1. Türkiye'de 1974-2017 Yılları Arasında İzlenmiş İnfektif Endokardit Olgularını İçeren Çalışmaların Özellikleri**

| Araştırmacılar | Dönem | Şehir | Olgu Sayısı | Yaş* | Erkek (%) | ARA (%) | Yapay Kapak (%) | IVDU (%) | CIED (%) | Diyaliz (%) | Stafilokok (%) | *Staphylococcus aureus* (%) | MRSA (%) | Streptokok (%) | Enterokok (%) | *Brucella* spp. (%) | Kan Kültürü Negatif (%) | Ameliyat (%) | Nozokomiyal (%) | Kesin İE† (%) | Mortalite (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Toplam** | 1974-2017 | Türkiye | 2712 | 47 | 61 | 37 | 27 | 2 | 7 | 9 | 31 | 21 | 5 | 19 | 9 | 7 | 37 | 50 | 25 | 90 | 24 |
| Kaya *et al.* (47) | 2005-2012 | Şanlıurfa | 24 | 41 | 50 | | 13 | | 4 | 8.3 | 21 | | | 17 | 4 | 33 | 21 | 37 | | | 8 |
| İnanç *et al.* (49) | 2006-2007 | Kayseri | 27 | 47 | 63 | 67 | 41 | | | | 33 | 11 | | 4 | 11 | 4 | 45 | 19 | | | 15 |
| Çaylan *et al.* (48) | 1997-2001 | Trabzon | 32 | 47 | 73 | | 22 | | | | 37 | 22 | | 19 | 9 | | 78 | 25 | | | 41 |
| Zencir *et al.* (33) | 2000-2015 | Aydın | 59 | 59 | 43 | | 32 | | | | | 39 | | | | | | 27 | | 100 | 27 |
| Tuğcu *et al.* (34) | 2000-2007 | İstanbul | 68 | 51 | 59 | 40 | 56 | | 3 | 12 | 41 | 28 | 4 | 25 | 1.5 | 0 | 21 | 59 | 28 | 84 | 25 |
| Sucu *et al.* (35) | 1997-2007 | Gaziantep | 72 | 45 | 57 | 36 | 29 | | | 3 | 27 | 10 | | 23 | 4 | 4 | 36 | 28 | | 100 | 15 |
| Heper ve Yorukoglu (36) | 1995-1999 | Ankara | 74 | 25 | 66 | 66 | 14 | | | | 44 | 21 | | 29 | 15 | 7 | 11 | | | | 18 |
| Cancan-Gursul *et al.* (32) | 2006-2013 | İzmir | 80 | 51 | 70 | | 12 | 0 | 22.5 | 7.5 | 49 | 27 | 2.5 | 20 | 17 | 12 | 51 | 56 | | | 15 |
| Agca *et al.* (37) | 2009-2014 | Bursa | 85 | 52 | 56 | 22 | 40 | | 13 | | 27 | 8 | 2 | 11 | 5 | 6 | 32 | 27 | | 100 | 36 |
| Taşbakan *et al.* (38) | 2007-2017 | İzmir | 100 | 52 | 65 | | 13 | 3 | 42.5 | | | 18 | | 32 | 11 | | 26 | | | | 14 |
| Erbay *et al.* (39) | 2002-2008 | Ankara | 107 | 45 | 71 | | 44 | | | | | | | | | | 34 | | | | 27 |
| Akıl *et al.* (40) | 2005-2012 | Çok Merkezli | 112 | 45 | 50 | 18 | 17 | 8 | | 5.4 | 50 | 35 | | 29 | 16 | | 16 | 13 | | 90 | 29 |
| Şimşek-Yavuz *et al.* (50) | 2015-2016 | Çok Merkezli | 112 | 55 | 70 | 12 | 33 | 4 | 8 | 13 | 31 | 15 | 3.5 | 22 | 8 | 1 | 29.5 | 56 | 35 | 77 | 28 |
| Ademir *et al.* (41) | 1997-2004 | İstanbul | 119 | 39 | 69 | 39 | 20 | | 2 | | 24 | 22 | 11 | 9 | 3 | 3 | 57 | 76 | | 100 | |
| Çay *et al.* (42) | 2008-2011 | Ankara | 121 | 55 | 53 | 14 | 42 | | 10 | 18 | 33 | 16 | | 21 | 7 | 6 | 29 | 38 | | 100 | 24 |
| Turak *et al.* (43) | 1997-2012 | Ankara | 157 | 59 | 55 | 15 | 42 | | 9 | | 30 | 13 | | 22 | 7 | 6 | 29 | 39 | | 100 | 26 |
| Leblebicioğlu *et al.* (30) | 2002-2012 | Çok Merkezli | 158 | 47 | 51 | 39 | 0 | | | | 28 | | 6 | 11 | 11 | 6 | 34 | 51 | | | 31 |
| Özveren *et al.* (44) | 1985-2011 | İstanbul | 174 | 39 | 79 | | 15 | | | | 15 | | 2 | 29 | | 6 | 47 | 100 | | | 16 |
| Kocabaş *et al.* (45) | 2009-2012 | İzmir | 194 | 48 | 66 | 22 | 12 | | 3.1 | 6 | 30 | | | 16 | 6 | | 43 | 52 | | 100 | 20 |
| Cetinkaya *et al.* (29) | 1974-1999 | Ankara | 228 | 36 | 55 | 64 | 20 | 0 | 0.4 | | 27 | 24 | | 14 | 6 | 5.7 | 50 | 37 | 12 | 53 | 23 |
| Elbey *et al.* (31) | 2005-2012 | Çok Merkezli | 248 | 47 | 55 | 28 | 30 | | 6 | | 29 | 21 | 6 | 11 | 11 | 5 | 37.5 | 54 | | 100 | 33 |
| Şimşek-Yavuz *et al.* (4) | 2004-2015 | İstanbul | 325 | 47 | 58 | 34 | 44 | 1 | 5.6 | 3 | 36 | 20 | 2 | 19 | 7 | 5 | 22 | 52 | 23 | 86 | 27 |
| **Toplam** | 1974-2017 | Türkiye | 2712 | 47 | 61 | 37 | 27 | 2 | 7 | 9 | 31 | 21 | 5 | 19 | 9 | 7 | 37 | 50 | 25 | 90 | 24 |

*Ortalama. †Modifiye Duke ölçütleriyle. ARA: akut romatizmal ateş, IVDU: damar içi ilaç kullanıcısı, CIED: kardiyak implante edilebilen elektronik cihaz, MRSA: metisiline dirençli *Staphylococcus aureus*, İE: infektif endokardit.

*Klimik Derg.* 2019; 32(Suppl. 1): 2-116


P1206

KLİMİK TÜRK KLİNİK MİKROBİYOLOJİ VE İNFEKSİYON HASTALIKLARI DERNEĞİ

**Epidemiology and outcome of infective endocarditis in Turkey: a 10 year multi-centre, retrospective cohort study**

E.M. Saricaoglu [1], S. Simsek-Yavuz [2], O. Arap [3], Y. Uygun-Komuz [4], A. Yesilkaya [5], Y. Tezer-Tekce [6], D. Berzeg [7], S. Basaran [8], S. Ozkan Ozturk [9], N. Sen [10], KLIMIK Infective Endocarditis Study Group

## Results

- ✓ 745 patients (n=600 definite, n=145 possible IE).
- ✓ The median age of cohort was 56 years (18-91)
- ✓ 460 (61.7%) patients were male.
- ✓ The most common predisposing heart conditions were native valve disease (40.8%)
  -Degenerative (20%); congenital heart disease (12.2%), rheumatic valve disease (8.6%),
- ✓ Previous valve surgery (30.9%), previous IE episode (5.1%).
- ✓ The median duration of illness prior to admission was 15(1-365) days.
- ✓ Most of the patients (65.8%) had native valve IE
- ✓ Most episodes were left-sided
  -Mitral 272 (36.5%), aortic 244 (32.8%).
- ✓ The causative microorganisms were identified by blood cultures in 549(73.7%) cases.
- ✓ The most common causative microorganisms;
  -*Staphylococcus aureus* (23.6%),
  -*Streptococcus* spp (13.4%)
  -Coagulase negative *Staphylococcus* spp. (13.3%)
  -*Enterococcus* spp (12.5%).
- ✓ The changing epidemiology of causative agents according to years were shown in Figure 1.
- ✓ During this period, 286(39%) patients underwent valve surgery.
- ✓ The in hospital mortality of IE was 27.4% .

# Türkiye: 2013–2023 Ulusal Kohort Verileri

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https://doi.org/10.1007/s10096-025-05095-8

RESEARCH

## Epidemiological, clinical and microbiological aspects of infective endocarditis in Türkiye

Elif M. Saricaoglu[1] · Senliha Basaran[2] · Derya Seyman[3] · Merve Arslan[4] · Serpil Ozkan-Ozturk[5] · Yasemin Tezer-Takce[6] · Yesim Uygun-Kizmaz[7] · Nuran Sari[8] · Deniel Berzag-Deniz[9] · Alpay Azap[1] · Serap Simsek-Yavuz[2] · Ozlem Kurt-Azap[8] · Türkiye Endocarditis Group (TEG) Investigators

Received: 15 January 2025 / Accepted: 2 March 2025 / Published online: 14 March 2025


**Abstract**

**Purpose** Infective endocarditis (IE) is a evolving disease with a shifting epidemiology and disease burden over time. This study aimed to compare the epidemiological and clinical aspects of IE over three time periods across eleven years.

**Methods** This was a retrospective cohort, multicenter study conducted in Türkiye, comparing three periods: 2013–2016, 2017–2020, and 2021–2023. Epidemiological and microbiological characteristics, as well as patient outcomes, were analyzed and compared across these periods.

**Results** A total of 1,044 patients diagnosed with IE were included. The median (Q1-Q3) age was 57 (44–68) years, with an increasing pattern ($p < 0.001$). Throughout the study period, the prevalence of intracardiac devices increased, whereas the prevalence of degenerative and congenital heart diseases declined. Among all patients, the most frequently identified pathogens were staphylococci (36.4%), followed by streptococci (14.0%) and enterococci (11.9%). Throughout the three periods, there was a significant increase in staphylococci, with *S. aureus* emerging as the predominant pathogen in all type IE. The in-hospital mortality rate among all patients was 22.5%. Independent risk factors for in-hospital mortality included ≥65 age(OR:=1.9), chronic kidney disease (OR:=1.9), nosocomial acquisition (OR:=2.1), *Candida* spp. infection (OR:=2.9), prosthetic valve IE (OR:=1.9), vegetation size > 15 mm (OR:=1.6), and central nervous system emboli (OR:=2).

**Conclusion** The epidemiology of IE is undergoing significant changes, leading to shifts in microbiological profiles and clinical presentations. Effective management of IE should be guided by established clinical guidelines while integrating up-to-date epidemiological data to ensure comprehensive and evidence-based patient care.

**Keywords** Epidemiology · Infective endocarditis · Mortality · Türkiye

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**Table 1** Epidemiological and clinical characteristics for infective endocarditis cohort stratified by three time periods

| | Total ($n$=1044) | 2013–2016 ($n$=205) | 2017–2020 ($n$=491) | 2021–2023 ($n$=348) | $p$ value | Post-hoc analysis |
|---|---|---|---|---|---|---|
| **Demographics** | | | | | | |
| Age in years | 57(44,68) | 54 (40,65) | 55(43,66) | 60(47,70) | **<0.001** | **1=2, 2<3** |
| 18–39 y | 202(19.3) | 48(23.4) | 98(20) | 56(16.1) | **<0.001** | **1,2<3** |
| 40–64 y | 517(49.6) | 104(50.7) | 256(52.1) | 157(45.1) | | |
| ≥65 y | 325(31.1) | 53(25.9) | 137(27.9) | 135(38.8) | | |
| Male sex | 666(63.8) | 133(64.9) | 310(63.1) | 223(64.1) | 0.901 | |
| **Comorbidities** | | | | | | |
| Hypertension | 382(36.6) | 66(32.2) | 157(32) | 159(45.7) | **<0.001** | **1=2, 2<3** |
| Diabetes mellitus | 282(27) | 39(19) | 114(23.2) | 129(37.1) | **<0.001** | **1,2<3** |
| Chronic kidney disease | 220(21.1) | 40(19.5) | 97(19.8) | 83(23.9) | 0.297 | |
| Malignancy | 57(5.5) | 9(4.4) | 19(3.9) | 29(8.3) | **0.015** | **1=2, 2<3** |
| Autoimmune disease | 44(4.2) | 3(1.5) | 23(4.7) | 18(5.2) | 0.086 | |
| **Predisposition conditions** | | | | | | |
| Prosthetic valve | 323(30.9) | 59(28.8) | 166(33.8) | 98(28.2) | 0.166 | |
| Degenerative heart disease | 183(17.5) | 48(23.4) | 89(18.1) | 46(13.2) | **0.009** | **1,2>3** |
| Hemodialysis | 169(16.2) | 27(13.2) | 84(17.1) | 58(16.7) | 0.419 | |
| Intracardiac device | 102(9.8) | 15(7.3) | 39(7.9) | 48(13.8) | **<0.001** | **1=2<3** |
| Rheumatic fever | 87(8.3) | 23(11.2) | 39(7.9) | 25(7.2) | 0.060 | |
| Bicuspid aortic valve | 64(6.1) | 16(7.8) | 35(7.1) | 13(3.7) | 0.070 | |
| Congenital heart disease | 60(5.7) | 17(8.3) | 32(6.5) | 11(3.2) | **0.026** | **1,2>3** |
| Previous IE episode | 52(5) | 14(6.8) | 22(4.5) | 16(4.6) | 0.397 | |
| Intravenous drug user | 47(4.5) | 6(2.9) | 28(5.7) | 13(3.7) | 0.192 | |
| **Type of acquisition** | | | | | | |
| Community acquired | 619(59.3) | 133(64.9) | 269(54.8) | 217(62.4) | 0.709 | |
| Nosocomial | 157(15) | 29(14.1) | 72(14.7) | 56(16.1) | **0.010** | **1=2, 2<3** |
| Non-nosocomial healthcare-associated infection | 268(25.7) | 43(21) | 150(30.5) | 75(21.6) | 0.484 | |
| **Endocarditis side** | | | | | | |
| Mitral | 469(44.9) | 90(43.9) | 217(44.2) | 162(46.6) | 0.510 | |
| Aortic | 402(38.5) | 102(49.8) | 203(41.3) | 97(27.9) | **<0.001** | **1,2>3** |
| Tricuspid | 111(10.6) | 15(7.3) | 51(10.4) | 45(12.9) | **0.035** | **1,2<3** |
| Pulmonary | 13(1.3) | 3(1.5) | 7(1.4) | 3(0.1) | 0.561 | |
| Lead | 70(6.7) | 8(3.9) | 28(5.7) | 34(9.8) | **0.011** | **1,2<3** |
| Endocard | 21(2) | 4(2) | 8(1.6) | 9(2.6) | 0.189 | |
| **Type of IE** | | | | | | |
| Native-valve IE | 659(63.1) | 136(66.4) | 303(61.7) | 221(63.2) | 0.482 | |
| Prosthetic-valve IE | 307(29.4) | 59(28.7) | 156(31.8) | 93(26.7) | 0.266 | |
| CIED-IE | 78(7.5) | 10(4.9) | 32(6.5) | 35(10.1) | **0.048** | **1=2, 2<3** |
| **Complications** | | | | | | |
| Cranial embolism | 203(19.4) | 37(18) | 106(21.6) | 60(17.2) | 0.250 | |
| Splenic infarct/abcess | 23(22.2) | 2(1) | 19(3.9) | 2(0.6) | 0.353 | |
| Glomerulonephritis | 29(2.8) | 1(0.5) | 21(4.3) | 7(2) | 0.593 | |
| Pulmonary embolism | 77(7.4) | 2(1) | 32(6.5) | 43(12.4) | **<0.001** | **1,2<3** |
| Spondylodiscitis | 24(2.3) | 1(0.5) | 7(1.4) | 16(4.6) | **0.002** | **1=2, 2<3** |
| Heart failure | 120(11.5) | 10(4.9) | 52(10.6) | 58(16.7) | **<0.001** | **1,2<3** |
| **Cardiac surgery for IE** | 406(38.8) | 102(49.8) | 196(39.9) | 108(31.1) | **<0.001** | **1,2>3** |
| **In-hospital mortality** | 235(22.5) | 58(18.5) | 112(22.8) | 85(24.4) | 0.271 | |

# Türkiye: 2013–2023 Ulusal Kohort Verileri

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RESEARCH

## Epidemiological, clinical and microbiological aspects of infective endocarditis in Türkiye

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Received: 15 January 2025 / Accepted: 2 March 2025 / Published online: 14 March 2025


**Table 3** Microbiological differences between three time periods of overall cohorts

| | Total ($n$=1044) | 2013–2016 ($n$=205) | 2017–2020 ($n$=491) | 2021–2023 ($n$=348) | $p$ value |
|---|---|---|---|---|---|
| Culture negative IE | 281(26.9) | 67(32.7) | 136(27.7) | 78(22.4) | **0.027** |
| *Staphylococcus* spp. | 380(36.4) | 57(27.8) | 180(36.7) | 143(41.1) | **0.007** |
| *S. aureus* | 245(23.5) | 32(15.6) | 116(23.6) | 97(27.9) | **0.004** |
| Methicillin resistance | 72(29.4) | 14(43.8) | 29(25) | 29(29.9) | 0.185 |
| CoNS | 135(12.9) | 25(12.2) | 64(13.1) | 46(13.2) | 0.962 |
| Methicillin resistance | 97(71.9) | 24(96) | 45(70.3) | 28(60.9) | 0.052 |
| *Streptococcus* spp. | 146(14) | 35(17.1) | 60(12.2) | 51(14.7) | 0.220 |
| *Enterococcus* spp. | 124(11.9) | 21(10.2) | 68(13.8) | 35(10) | 0.129 |
| Enterobacterales | 24(2.3) | 8(3.9) | 14(2.9) | 12(3.4) | 0.659 |
| Non-fermentatives | 18(1.7) | 4(2) | 11(2.2) | 3(0.9) | 0.252 |
| *Candida* spp. | 27(2.6) | 5(2.4) | 8(1.6) | 14(4) | 0.134 |
| *Granulicatella* and *Abiotrophia* spp. | 11(1.1) | 2(1) | 6(1.2) | 3(0.9) | 0.574 |
| *Coryneobacterium* spp. | 10(1) | 3(1.5) | 5(1) | 2(0.6) | 0.252 |
| *Coxiella* spp. | 9(0.9) | 5(2.4) | 3(0.6) | 2(0.6) | 0.688 |
| *Brucella* spp. | 7(0.7) | 2(1) | 1(0.2) | 4(1.1) | 0.665 |
| *Bartonella spp.* | 1(0.1) | - | - | 1(0.3) | 0.782 |
| HACEK | 2(0.2) | 1(0.5) | 1(0.2) | 0(0) | 0.594 |


# Tanı Kriterleri / Tanı Yöntemleri

# Tanı kriterlerinin «öyküsü»

| Year | Diagnostic Criteria | Improvement |
|---|---|---|
| 1981 | Von Reyn | 1. Definite, Probable, Possible, Rejected |
| 1994 | Duke Criteria | 1. Major & Minor Criteria<br>2. Clinical Definite Criteria<br>3. Add Echocardiography |
| 2000 | Modified Duke Criteria | 1. Remove "Possible" Echo<br>2. Expand *S. aureus* inclusion |
| 2015 | ESC Criteria | 1. Add PET-CT, Cardiac CT |
| 2023 | Duke ISCVID Criteria | 1. Expand Microbiology<br>- *E. faecalis, most Streptococci*<br>- *Add "Typical" PVE Pathogens*<br>2. Add Molecular Diagnostics<br>- *16S rRNA PCR, FISHseq from valve*<br>- *next generation sequencing from blood*<br>3. Add Surgical Major Criteria<br>4. Remove Blood culture Restrictions<br>- *Timing & Separate Venipunctures* |

Vance Fowler
United States

# Tanı kriterlerinin «öyküsü»

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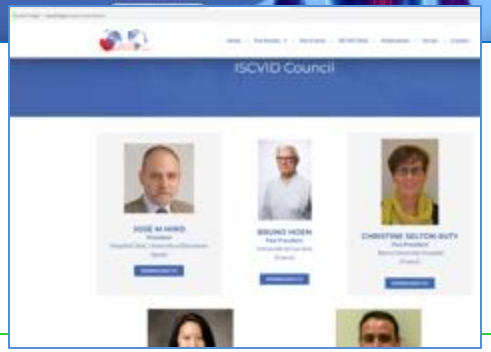
Vance Fowler
United States

25 Ağustos 2023- Avrupa Kardiyoloji Derneği Rehberi

# 2023 Duke-ISCVID Endokardit Kriterleri


| 2023 | Duke ISCVID Criteria | 1. Expand Microbiology<br>- *E. faecalis, most Streptococci*<br>- *Add "Typical" PVE Pathogens*<br>2. Add Molecular Diagnostics<br>- *16S rRNA PCR, FISHseq from valve*<br>- *next generation sequencing from blood*<br>3. Add Surgical Major Criteria<br>4. Remove Blood culture Restrictions<br>- *Timing & Separate Venipunctures* |
|---|---|---|




*Clinical Infectious Diseases*

VIEWPOINTS

IDSA hivma OXFORD

## The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

Vance G. Fowler, Jr.,[1,2,3] David T. Durack,[4] Christine Sexton Sutty,[5] Eugene Athan,[6] Arnold S. Bayer,[7,8] Anna Lisa Chamis,[1] Anders Dahl,[9] Louis DiBernardo,[1] Emanuele Durante-Mangoni,[10] Xavier Duval,[11] Claudio Querido Fortes,[12] Emil Fosbøl,[13] Margaret M. Hannan,[14] Barbara Hasse,[15] Bruno Hoen,[16] Adolf W. Karchmer,[17] Carlos A. Mestres,[18] Cathy A. Petti,[1,19] Maria Nazarena Pizzi,[20] Stephen D. Preston,[21] Albert Roque,[22] Francois Vandenesch,[23,24] Jon T. M. van der Meer,[25] Thomas W. van der Vaart,[25] and Jose M. Miro[26,27]

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The microbiology, epidemiology, diagnostics, and treatment of infective endocarditis (IE) have changed significantly since the Duke Criteria were published in 1994 and modified in 2000. The International Society for Cardiovascular Infectious Diseases (ISCVID) convened a multidisciplinary Working Group to update the diagnostic criteria for IE. The resulting 2023 Duke-ISCVID IE Criteria propose significant changes, including new microbiology diagnostics (enzyme immunoassay for *Bartonella* species, polymerase chain reaction, amplicon/metagenomic sequencing, in situ hybridization), imaging (positron emission computed tomography with 18F-fluorodeoxyglucose, cardiac computed tomography), and inclusion of intraoperative inspection as a new Major Clinical Criterion. The list of "typical" microorganisms causing IE was expanded and includes pathogens to be considered as typical only in the presence of intracardiac prostheses. The requirements for timing and separate venipunctures for blood cultures were removed. Last, additional predisposing conditions (transcatheter valve implants, endovascular cardiac implantable electronic devices, prior IE) were clarified. These diagnostic criteria should be updated periodically by making the Duke-ISCVID Criteria available online as a "Living Document."

**Keywords.** endocarditis; Duke Criteria; PET/CT; echocardiography; ISCVID.

The Duke Criteria for diagnosis of infective endocarditis (IE) were originally published in 1994 [1] and modified in 2000 [2]. Their primary purpose was to serve as a research tool to standardize the definition of a clinically protean condition. Their presence paved the way for a steady stream of multinational investigations [3–7] that transformed our understanding of the disease. However, the microbiology, diagnostics, epidemiology, and treatment of IE have changed significantly since the debut of these criteria. For example, endovascular cardiac implantable electronic devices (CIEDs), including permanent pacemakers and cardioverter-defibrillators, are now present in at least 10% of contemporary IE case series [8], and constitute a significant risk factor for infection [8, 9]. Transcatheter-implanted valves are infected at rates comparable to surgically implanted valves, and are an increasing component of prosthetic valve endocarditis (PVE). In 2015, the European Society of Cardiology [10] proposed changes to the Modified Duke Criteria; however, recent advances require further modifications of the formal diagnostic criteria for IE.

In response to this need, in 2021, the International Society for Cardiovascular Infectious Diseases (ISCVID) convened a Working Group of 25 subject matter experts from 5 continents

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**Table 3. Updates to Modified Duke Criteria Proposed by 2023 Duke-International Society for Cardiovascular Infectious Diseases Infective Endocarditis (IE) Criteria**

| CRITERIA | Change |
|---|---|
| **PATHOLOGIC CRITERIA** | |
| Microorganism identification | Microorganisms identified in appropriate sample by PCR, amplicon or metagenomic sequencing, or in situ hybridization |
| **MAJOR CLINICAL CRITERIA** | |
| **Microbiology** | |
| Blood cultures | Removed requirements for timing and separate venipunctures for blood cultures. |
| Definition of typical organisms | Added typical pathogens:<br>1) *S. lugdunensis*; *E. faecalis*; all streptococci except *S. pneumoniae* and *S. pyogenes*; *Granulicatella* spp.; *Abiotrophia* spp.; and *Gemella* spp.<br>2) Organisms to be considered "typical" IE pathogens in the setting of intracardiac prosthetic material: coagulase negative staphylococci, *Corynebacterium striatum*; *C. jeikeium*, *Serratia marcescens*, *Pseudomonas aeruginosa*, *Cutibacterium acnes*, nontuberculous mycobacteria, and *Candida* spp. |
| Other microbiologic tests | Added new Major Criteria for fastidious pathogens:<br>1) PCR or amplicon/metagenomic sequencing identifies *C. burnetii*, *Bartonella* spp., or *T. whipplei* from blood; or<br>2) IFA ≥1:800 for IgG antibodies identifies *B. henselae* or *B. quintana*. |
| **Imaging** | |
| Echocardiography | Similar to earlier versions. Cornerstone of imaging criterion. |
| Cardiac computed tomography | Added new Major Criterion.<br>Findings equivalent to echocardiography. |
| [18F]FDG PET/CT | Added new Major Criterion.<br>Findings for native valve, cardiac device, or prosthetic valve >3 mo after cardiac surgery are equivalent to echocardiography. |
| **Surgical** | Added new Major Criterion.<br>Intraoperative inspection constitutes Major Criterion in absence of Major Criterion by cardiac imaging or histopathology. |
| **MINOR CLINICAL CRITERIA** | |
| Predisposition | Added transcatheter valve implant/repair, endovascular CIED, and prior diagnosis of IE. |
| Fever | Unchanged. |
| Vascular phenomena | Added splenic and cerebral abscess. |
| Immunologic phenomena | Added definition for immune complex mediated glomerulonephritis. |
| Microbiological | Added PCR or amplicon/metagenomic sequencing evidence of typical pathogen. |
| Imaging | Added PET/CT evidence <3 mo of cardiac surgery. |
| Physical examination | New auscultation of regurgitant murmur when echocardiography is unavailable. |

Abbreviations: [18F]FDG PET CT, positron emission computed tomography with 18F-fluorodeoxyglucose; CIED, cardiac implantable electronic device; IFA, immunofluorescence assay; PCR, polymerase chain reaction.

# «Cerrahi» kriter

Clinical Infectious Diseases
VIEWPOINTS

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

**NEW MAJOR CRITERION—SURGICAL EVIDENCE**

The intraoperative inspection of cardiac pathology by cardiovascular surgeons is invaluable in a case of suspected IE, particularly if further pathologic or microbiologic confirmation is not available. As a result, the ISCVID Working Group has added intraoperative evidence of IE (eg, vegetations, abscess, valvular destruction, dehiscence or loosening of prosthetic valve, other direct evidence of IE) as a new Major Criterion in the 2023 Duke-ISCVID IE Criteria when other definitive criteria (eg, cardiac imaging, histology, microbiology) IE are unavailable (Table 2).

Cerrahın ameliyatta endokardit olduğunu düşünmesi
–başka hiçbir bulgu olmaksızın-
majör kriter olarak değerlendiriliyor

Clinical Infectious Diseases
VIEWPOINTS

# The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

Vance G. Fowler Jr,[1,2,3] David T. Durack,[1] Christine Selton-Suty,[4] Eugene Athan,[5] Arnold S. Bayer,[6,7] Anna Lisa Chamis,[1] Anders Dahl,[7] Louis DiBernardo,[1] Emanuele Durante-Mangoni,[8] Xavier Duval,[9] Claudio Querido Fortes,[10] Emil Fosbol,[11] Margaret M. Hannan,[12] Barbara Hasse,[13] Bruno Hoen,[14] Adolf W. Karchmer,[15] Carlos A. Mestres,[16] Cathy A. Petti,[1,17] Maria Nazarena Pizzi,[18] Stephen D. Preston,[19] Albert Roque,[20] Francois Vandenesch,[21,22]

**Table 3. Updates to Modified Duke Criteria Proposed by 2023 Duke-International Society for Cardiovascular Infectious Diseases Infective Endocarditis (IE) Criteria**

| CRITERIA | Change |
|---|---|
| **PATHOLOGIC CRITERIA** | |
| Microorganism identification | Microorganisms identified in appropriate sample by PCR, amplicon or metagenomic sequencing, or in situ hybridization |
| **MAJOR CLINICAL CRITERIA** | |
| **Microbiology** | |
| Blood cultures | Removed requirements for timing and separate venipunctures for blood cultures. |
| Definition of typical organisms | Added typical pathogens:<br>1) *S. lugdunensis*; *E. faecalis*; all streptococci except *S. pneumoniae* and *S. pyogenes*; *Granulicatella* spp.; *Abiotrophia* spp.; and *Gemella* spp.<br>2) Organisms to be considered "typical" IE pathogens in the setting of intracardiac prosthetic material: coagulase negative staphylococci, *Corynebacterium striatum*; *C. jeikeium*, *Serratia marcescens*, *Pseudomonas aeruginosa*, *Cutibacterium acnes*, nontuberculous mycobacteria, and *Candida* spp. |
| Other microbiologic tests | Added new Major Criteria for fastidious pathogens:<br>1) PCR or amplicon/metagenomic sequencing identifies *C. burnetii*, *Bartonella* spp., or *T. whipplei* from blood; or<br>2) IFA ≥1:800 for IgG antibodies identifies *B. henselae* or *B. quintana*. |
| **Imaging** | |
| Echocardiography | Similar to earlier versions. Cornerstone of imaging criterion. |
| Cardiac computed tomography | Added new Major Criterion.<br>Findings equivalent to echocardiography. |
| [18F]FDG PET/CT | Added new Major Criterion.<br>Findings for native valve, cardiac device, or prosthetic valve >3 mo after cardiac surgery are equivalent to echocardiography. |
| **Surgical** | Added new Major Criterion.<br>Intraoperative inspection constitutes Major Criterion in absence of Major Criterion by cardiac imaging or histopathology. |
| **MINOR CLINICAL CRITERIA** | |
| Predisposition | Added transcatheter valve implant/repair, endovascular CIED, and prior diagnosis of IE. |
| Fever | Unchanged. |
| Vascular phenomena | Added splenic and cerebral abscess. |
| Immunologic phenomena | Added definition for immune complex mediated glomerulonephritis. |
| Microbiological | Added PCR or amplicon/metagenomic sequencing evidence of typical pathogen. |
| Imaging | Added PET/CT evidence <3 mo of cardiac surgery. |
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Abbreviations: [18F] FDG PET CT, positron emission computed tomography with 18F-fluorodeoxyglucose; CIED, cardiac implantable electronic device; IFA, immunofluorescence assay; PCR, polymerase chain reaction.

# Mikrobiyolojik kriterlerde neler değişti?


**Table 3. Updates to Modified Duke Criteria Proposed by 2023 Duke-International Society for Cardiovascular Infectious Diseases Infective Endocarditis (IE) Criteria**

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| **Microbiology** | |
| Blood cultures | Removed requirements for timing and separate venipunctures for blood cultures. |

- Kan kültürü «halen» çok önemli
- Kan kültürünü alma zamanına ilişkin önerilerde değişiklik var

  önceki önerilere göre 1 saat içinde 3 set kan kültürü almak gerekiyordu
  şimdiki önerilerde süre belirtilmiyor

# Mikrobiyolojik kriterlerde neler değişti?


| Microbiology | |
|---|---|
| Blood cultures | Removed requirements for timing and separate venipunctures for blood cultures. |
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- **Endokardit açısından «tipik» kabul edilecek etkenlere yeni eklenenler:**

*S.lugdunensis*
*E.faecalis*
*S.pneumoniae* ve *S.pyogenes* dışındaki tüm streptokoklar
*Granulicatella spp.*
*Abiotrophia spp.*
*Gemella spp.*

**Tablo 11. Avrupa Kardiyoloji Derneği 2015 Modifikasyonlarına Göre İnfektif Endokardit Tanı Ölçütleri (65)**

**Majör Ölçütler**

1. **İnfektif endokarditle uyumlu pozitif kan kültürü**
   a. İki ayrı kan kültüründe İE ile uyumlu tipik mikroorganizmaların üremesi (viridans streptokoklar, *Streptococcus bovis*, HACEK grubu, *Staphylococcus aureus*; ya da başka bir odak odak olmaması koşuluyla, toplumdan edinilmiş enterokoklar

*ya da*

   b. İE ile uyumlu mikroorganizmaların kan kültürlerinde sürekli üremesi >12 saat arayla alınmış en az iki kan kültüründe pozitif sonuç alınması; ya da üç ayrı kan kültürünün hepsinde ya da 4 ayrı kan kültürünün çoğunda (birinci ve son örnekler arasında en az 1 saat olması koşuluyla) pozitif sonuç alınması

# Mikrobiyolojik kriterlerde neler değişti?


**Microbiology**

| | |
|---|---|
| Blood cultures | Removed requirements for timing and separate venipunctures for blood cultures. |
| Definition of typical organisms | Added typical pathogens:<br>1) *S. lugdunensis*; *E. faecalis;* all streptococci except *S. pneumoniae* and *S. pyogenes*; *Granulicatella* spp.; *Abiotrophia* spp.; and *Gemella* spp.<br>2) Organisms to be considered "typical" IE pathogens in the setting of intracardiac prosthetic material: coagulase negative staphylococci, *Corynebacterium striatum; C. jeikeium, Serratia marcescens, Pseudomonas aeruginosa, Cutibacterium acnes,* nontuberculous mycobacteria, and *Candida* spp. |

- **İntra-kardiyak yabancı cisim** olduğunda

endokardit açısından «tipik» kabul edilecek etkenler:

Koagülaz negatif stafilokok

*Corynebacterium striatum*

*Corynebacterium jeikeium*

*Serratia marcescens*

*Pseudomonas aeruginosa*

*Cutibacterium acnes*

Non-tuberculosis mikobakteriler

*Candida* spp.

**Tablo 11. Avrupa Kardiyoloji Derneği 2015 Modifikasyonlarına Göre İnfektif Endokardit Tanı Ölçütleri (65)**

**Majör Ölçütler**

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*ya da*

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# Mikrobiyolojik kriterlerde neler değişti?


| | |
|---|---|
| Other microbiologic tests | Added new Major Criteria for fastidious pathogens:<br>1) PCR or amplicon/metagenomic sequencing identifies *C. burnetii*, *Bartonella* spp., or *T. whipplei* from blood; or<br>2) IFA ≥1:800 for IgG antibodies identifies *B. henselae* or *B. quintana*. |

Zor üreyen bakteriler için «diğer» mikrobiyolojik testler eklendi:

- *Coxiella burnetti*, *Bartonella spp* veya *Tropheryma whipplei* için kanda PCR veya amolikon/metagenomik sekanslama
- *Bartonella henselae* ve *Bartonella quintana* Ig G antikorlarının IFA yöntemi ile 1/800 ve üzerinde olması

**c.** *Coxiella burnetii* için tek şişe pozitif kan kültürü ya da faz I antijenlerine karşı IgG antikor titresinin >1:800 olması

# Görüntüleme kriterlerinde neler değişti?


The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

| Imaging | |
|---|---|
| Echocardiography | Similar to earlier versions. Cornerstone of imaging criterion. |
| Cardiac computed tomography | Added new Major Criterion.<br>Findings equivalent to echocardiography. |
| [18F]FDG PET/CT | Added new Major Criterion.<br>Findings for native valve, cardiac device, or prosthetic valve >3 mo after cardiac surgery are equivalent to echocardiography. |

Kardiyak BT ve PET-BT bulguları
- EKO bulguları ile benzer şekilde-
majör kriter olarak değerlendiriliyor

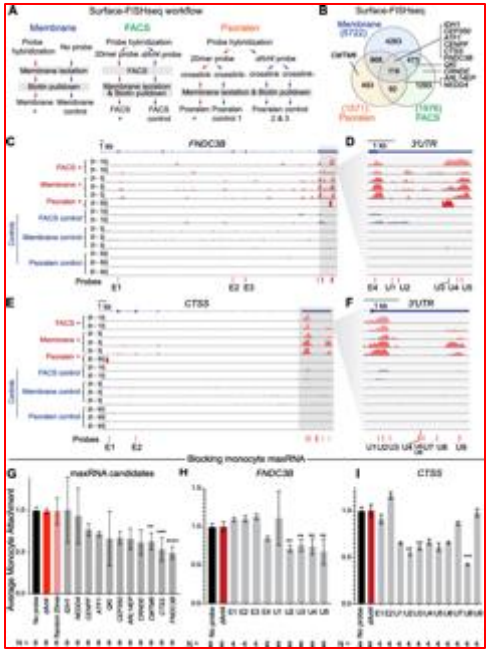
# Patolojik inceleme bulgularına ilişkin

Clinical Infectious Diseases
VIEWPOINTS

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

**DEFINITE IE—PATHOLOGIC CRITERIA**

The Pathologic Criteria for Definite IE in the Modified Duke Criteria relied on identifying either microorganisms or histopathologic evidence of active IE in operative or postmortem specimens. The 2023 Duke-ISCVID IE Criteria clarify and extend these criteria by incorporating recent genetic, molecular, and tissue staining techniques by which etiologic microorganisms can be detected (Table 1). A variety of newer laboratory diagnostics, including 16S/18S rRNA gene polymerase chain reaction (PCR), new sequencing techniques [11], and fluorescence in situ hybridization [12], can enhance our ability to diagnose IE. For example, fluorescence in situ hybridization combined with PCR/sequencing (FISHseq) in the analysis of infected prosthetic heart valves demonstrated a 30% increase in the detection/clarification of causative microorganisms over routine blood and valve cultures [12]. The ISCVID Working Group incorporated these new diagnostic approaches into the Pathologic Criteria of Definite IE in the 2023 Duke-ISCVID 2023 Criteria.



Enfekte kalp kapaklarının floresan in situ hibridizasyon ve PCR/sekanslama (**FISHseq**) ile incelenmesi sonucunda etken saptama olasılığı rutin kan ve kapak kültürlerine göre **%30** artmış

# Değişmeyenler


Clinical Infectious Diseases
VIEWPOINTS
IDSA hivma OXFORD

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

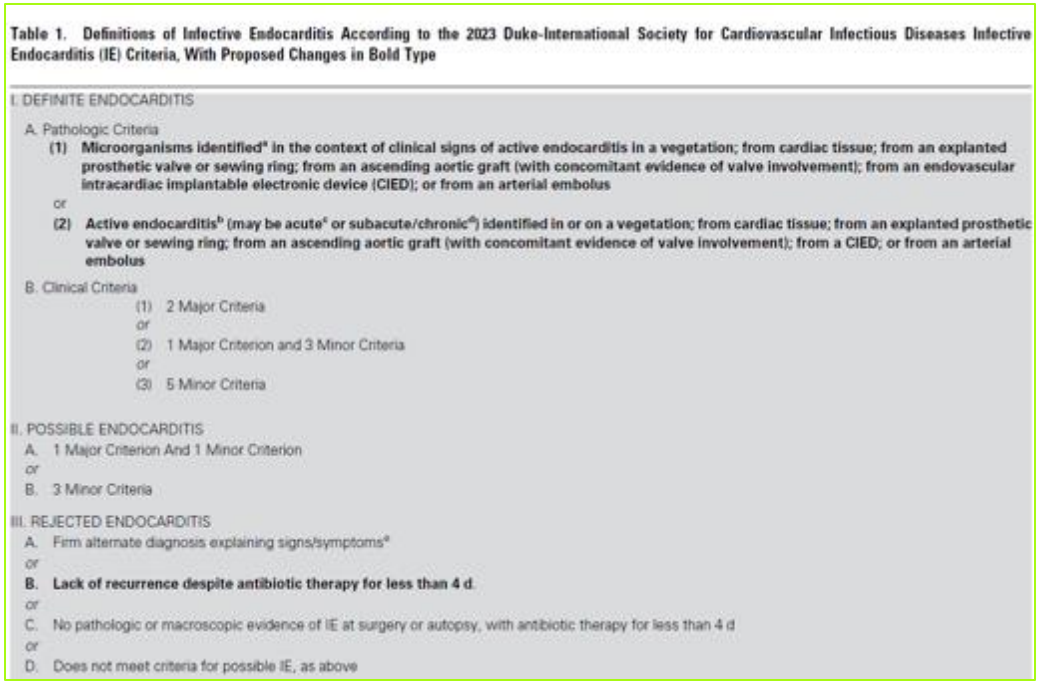


**Table 1. Definitions of Infective Endocarditis According to the 2023 Duke-International Society for Cardiovascular Infectious Diseases Infective Endocarditis (IE) Criteria, With Proposed Changes in Bold Type**

I. DEFINITE ENDOCARDITIS

A. Pathologic Criteria

**(1) Microorganisms identified[a] in the context of clinical signs of active endocarditis in a vegetation; from cardiac tissue; from an explanted prosthetic valve or sewing ring; from an ascending aortic graft (with concomitant evidence of valve involvement); from an endovascular intracardiac implantable electronic device (CIED); or from an arterial embolus**

or

**(2) Active endocarditis[b] (may be acute[c] or subacute/chronic[d]) identified in or on a vegetation; from cardiac tissue; from an explanted prosthetic valve or sewing ring; from an ascending aortic graft (with concomitant evidence of valve involvement); from a CIED; or from an arterial embolus**

B. Clinical Criteria

(1) 2 Major Criteria

or

(2) 1 Major Criterion and 3 Minor Criteria

or

(3) 5 Minor Criteria

II. POSSIBLE ENDOCARDITIS

A. 1 Major Criterion And 1 Minor Criterion

or

B. 3 Minor Criteria

III. REJECTED ENDOCARDITIS

A. Firm alternate diagnosis explaining signs/symptoms[e]

or

**B. Lack of recurrence despite antibiotic therapy for less than 4 d.**

or

C. No pathologic or macroscopic evidence of IE at surgery or autopsy, with antibiotic therapy for less than 4 d

or

D. Does not meet criteria for possible IE, as above

- Kesin endokardit
- Olası endokardit
- Dışlanmış endokardit

- Majör kriterler
- Minör kriterler

# Minör kriterlerde neler değişti?


Clinical Infectious Diseases
VIEWPOINTS

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

**Minör Ölçütler***

1. **Yatkınlık:** İE'ye yatkınlık oluşturan kalp hastalığı, IVDU olma
2. **Ateş:** vücut sıcaklığının >38°C olması
3. **Vasküler olaylar** (sadece görüntülemeyle saptananlar dahil): majör arteriyel embolizm, septik pulmoner infarktlar, mikotik anevrizma, intrakraniyal kanama; konjunktival kanamalar ve Janeway lezyonları
4. **İmmünolojik olaylar:** glomerülonefrit, Osler nodülleri, Roth lekeleri, romatoid faktör pozitifliği
5. **Mikrobiyolojik kanıtlar:** majör ölçütleri karşılamayan kan kültürü pozitiflikleri ya da İE ile uyumlu bir mikroorganizmayla aktif infeksiyonu gösteren serolojik kanıtlar

Vaküler fenomenlere eklenenler:

- Splenik abse
- Serebral abse

Eğilim yaratan durumlara eklenenler:

- TAVI gibi işlemler
- Kalp pili gibi elektronik cihazlar
- Daha önce İE geçirmiş olma

**NEW MINOR CLINICAL CRITERIA**

Clinical features added to the list of possible Minor Criteria by the ISCVID Working Group as predisposing conditions included additional types of cardiac prosthetic material (eg, transcatheter valve implant/repair, endovascular leads of CIEDs), an updated list of congenital heart conditions [43, 44], and a prior diagnosis of IE [45]. The ISCVID Working group recognized additional vascular phenomenon, including cerebral abscess and splenic abscess. Last, the ISCVID Working group developed a practical definition of immune complex mediated glomerulonephritis within the immunologic phenomena category.

# Yeni kriterlere ilişkin değerlendirme


- Önerilen yöntemlerin tamamının kaynakları kısıtlı ülkelerde yapılması mümkün olmayabilir
- Validasyon çalışmaları önemli
- Değişen bilgiler ve veriler ışığında sürekli güncellenmeli

# 2023 Duke ISCVID kriterleri **vs** Modifiye Duke Kriterleri

Clinical Infectious Diseases
MAJOR ARTICLE

## External Validation of the 2023 Duke–International Society for Cardiovascular Infectious Diseases Diagnostic Criteria for Infective Endocarditis

Thomas W. van der Vaart,[1,2,3] Patrick M. M. Bossuyt,[4] David T. Durack,[5] Larry M. Baddour,[6,7] Arnold S. Bayer,[7,8] Emanuele Durante-Mangoni,[9] Thomas L. Holland,[5,7] Adolf W. Karchmer,[10] Jose M. Miro,[11,12] Philippe Moreillon,[13] Magnus Rasmussen,[14,15] Christine Selton-Suty,[16,17] Vance G. Fowler Jr.,[5,7] and Jon T. M. van der Meer[1]

[1]Division of Infectious Diseases, Amsterdam University Medical Center, Universiteit van Amsterdam, Amsterdam, The Netherlands; [2]Division of Infectious Diseases, Duke University Medical Center, Durham, North Carolina, USA; [3]Duke Clinical Research Institute, Durham, North Carolina, USA; [4]Department of Epidemiology and Data Science, Amsterdam University Medical Center, Universiteit van Amsterdam, Amsterdam, The Netherlands; [5]Division of Public Health, Infectious Diseases and Occupational Medicine, Department of Medicine, Mayo Clinic, Rochester, Minnesota, USA; [6]Department of Medicine and Cardiovascular Medicine, Mayo Clinic, Rochester, Minnesota, USA; [7]Division of Infectious Diseases, The Lundquist Institute at Harbor-UCLA, Torrance, California, USA; [8]Division of Infectious Diseases, The Geffen School of Medicine at UCLA, Los Angeles, California, USA; [9]Department of Precision Medicine, University of Campania "L. Vanvitelli", Monaldi Hospital, Naples, Italy; [10]Division of Infectious Diseases, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts, USA; [11]Infectious Diseases Service, Hospital Clínic IDIBAPS, University of Barcelona, Barcelona, Spain; [12]CIBERINFEC, Instituto de Salud Carlos III, Madrid, Spain; [13]Department of Fundamental Microbiology, UNIL—Université de Lausanne, Lausanne, Switzerland; [14]Department of Clinical Sciences, Division of Infection Medicine, Lund University, Lund, Sweden; [15]Centre Hospitalier Régional Universitaire (CHRU) Nancy, Cardiology Department, DC-EC, Nancy, France; and [16]Association pour l'Etude et la Prévention de l'Endocardite Infectieuse (AEPEI), France

(See the Invited Commentary by Chambers et al. on pages 964–7.)

***Background.*** The 2023 Duke–International Society of Cardiovascular Infectious Diseases (ISCVID) criteria for infective endocarditis (IE) were introduced to improve classification of IE for research and clinical purposes. External validation studies are required.

***Methods.*** We studied consecutive patients with suspected IE referred to the IE team of Amsterdam University Medical Center (from October 2016 to March 2021). An international expert panel independently reviewed case summaries and assigned a final diagnosis of "IE" or "not IE," which served as the reference standard, to which the "definite" Duke-ISCVID classifications were compared. We also evaluated accuracy when excluding cardiac surgical and pathologic data ("clinical" criteria). Finally, we compared the 2023 Duke-ISCVID with the 2000 modified Duke criteria and the 2015 and 2023 European Society of Cardiology (ESC) criteria.

***Results.*** A total of 595 consecutive patients with suspected IE were included: 399 (67%) were adjudicated as having IE; 111 (19%) had prosthetic valve IE, and 48 (8%) had a cardiac implantable electronic device IE. The 2023 Duke-ISCVID criteria were more sensitive than either the modified Duke or 2015 ESC criteria (84.2% vs 74.9% and 80%, respectively; $P < .001$) without significant loss of specificity. The 2023 Duke-ISCVID criteria were similarly sensitive but more specific than the 2023 ESC criteria (94% vs 82%; $P < .001$). The same pattern was seen for the clinical criteria (excluding surgical/pathologic results). New modifications in the 2023 Duke-ISCVID criteria related to "major microbiological" and "imaging" criteria had the most impact.

***Conclusions.*** The 2023 Duke-ISCVID criteria represent a significant advance in the diagnostic classification of patients with suspected IE.

**Keywords.** infective endocarditis; diagnosis; Duke criteria; validation.

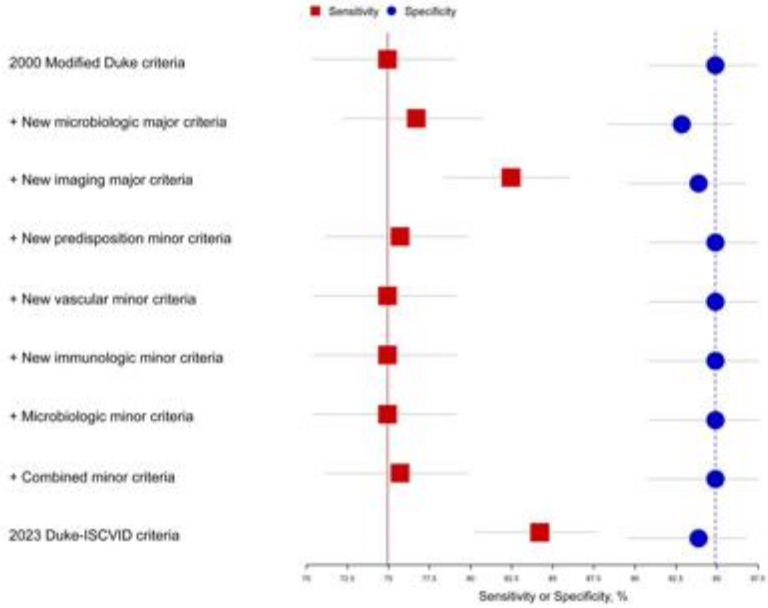



**Figure 1.** Added value of each change in the Duke–International Society of Cardiovascular Infectious Diseases (ISCVID) criteria compared with the modified Duke criteria. Each point (*square for sensitivity, circle for specificity*) provides the diagnostic accuracy measure for the 2000 modified Duke criteria with the addition of a specific change from the Duke-ISCVID criteria. Horizontal bars represent 95% confidence intervals for the point estimates. The complete Duke-ISCVID criteria.

**2023 Duke-ISCVID kriterleri**,
Modifiye Duke kriterlerine göre **daha yüksek duyarlılığa (sensitivite)** ve
**benzer özgüllüğe (spesifisite)** sahiptir

Our investigation provides evidence that the 2023 Duke-ISCVID criteria should replace previous versions of the Duke criteria because they have superior sensitivity and comparable specificity. While the 2023 Duke-ISCVID criteria can provide a useful framework to assist in the diagnosis of IE, clinicians should be aware that the sensitivity of the criteria is not perfect. This is apparent in the sensitivity analysis of the 2023 Duke-ISCVID clinical criteria in surgically treated patients. The sensitivity of the clinical criteria in this group was 75%, indicating that 25% of patients who will have surgically confirmed IE did not meet the clinical criteria for definite IE before surgery. Using a combination of both the definite and the possible classifications to define IE would be of limited use, as the specificity of this combination would be unacceptably low (21%). Clinicians should always consider pretest prob-

# Avrupa Endokardit Rehberi- 2023

ESC European Society of Cardiology

European Heart Journal (2023) 00, 1–95
https://doi.org/10.1093/eurheartj/ehad193

ESC GUIDELINES

## 2023 ESC Guidelines for the management of endocarditis

**Developed by the task force on the management of endocarditis of the European Society of Cardiology (ESC)**

***Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS) and the European Association of Nuclear Medicine (EANM)***

**Authors/Task Force Members: Victoria Delgado *†, (Chairperson) (Spain), Nina Ajmone Marsan ‡, (Task Force Co-ordinator) (Netherlands), Suzanne de Waha‡, (Task Force Co-ordinator) (Germany), Nikolaos Bonaros (Austria), Margarita Brida (Croatia), Haran Burri (Switzerland), Stefano Caselli (Switzerland), Torsten Doenst (Germany), Stephane Ederhy (France), Paola Anna Erba [1] (Italy), Dan Foldager (Denmark), Emil L. Fosbøl (Denmark), Jan Kovac (United Kingdom), Carlos A. Mestres (South Africa), Owen I. Miller (United Kingdom), Jose M. Miro [2] (Spain), Michal Pazdernik (Czech Republic), Maria Nazarena Pizzi (Spain), Eduard Quintana [3] (Spain), Trine Bernholdt Rasmussen (Denmark), Arsen D. Ristić (Serbia), Josep Rodés-Cabau (Canada), Alessandro Sionis (Spain), Liesl Joanna Zühlke (South Africa), Michael A. Borger *†, (Chairperson) (Germany), and ESC Scientific Document Group**

# 2023 Avrupa Endokardit Rehberi'nde neler değişti?

Review article

OPEN

## The 2023 new European guidelines on infective endocarditis: main novelties and implications for clinical practice

Massimo Imazio[a,b]

The 2023 European Society of Cardiology (ESC) guidelines for the management of infective endocarditis update the previous 2015 guidelines with main novelties in five areas: (1) antibiotic prevention for high-risk patients, and prevention measures for intermediate-risk and high-risk patients; (2) diagnosis with emphasis on multimodality imaging to assess cardiac lesions of infective endocarditis' (3) antibiotic therapy allowing an outpatient antibiotic treatment for stabilized, uncomplicated cases; (4) cardiac surgery with an emphasis on early intervention without delay for complicated cases; and (5) shared management decision by the endocarditis team. Most evidence came from observational studies and expert opinions. The guidelines strongly support a patient-centred approach with a shared decision process by a multidisciplinary team that should be implemented either in tertiary referral centres, becoming heart valve centres, and referral centres. A continuous sharing of data is warranted in the hospitals' network between heart valve centres, which are used for referrals for complicated cases of infective endocarditis, and referral centres, which should be able to manage uncomplicated cases of infective endocarditis.

J Cardiovasc Med 2024, 25:718–726

Keywords: antibiotic therapy, cardiac surgery, heart team, infective endocarditis, prevention

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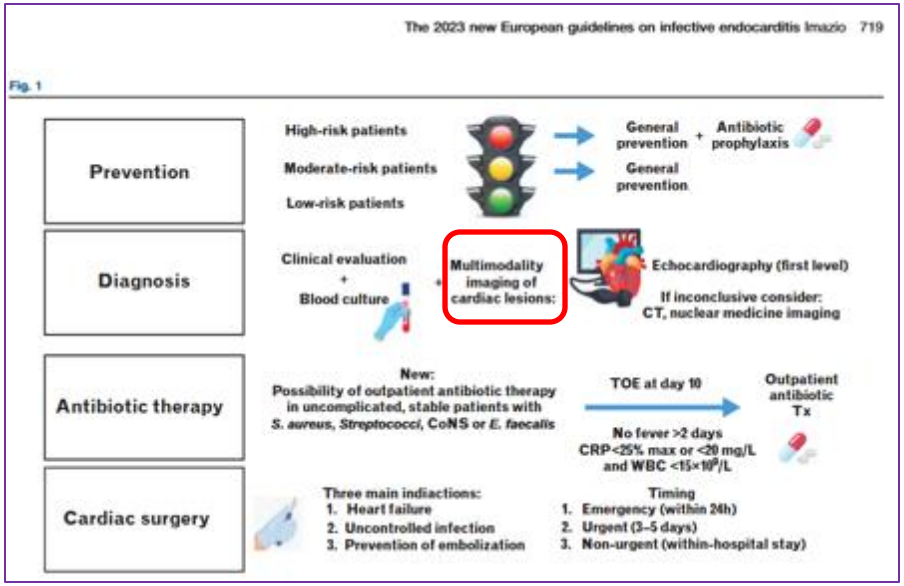
### Introduction

The 2023 European guidelines for the management of infective endocarditis[1] update the old 2015 guidelines[2] providing new important novelties in five main areas: prevention of infective endocarditis; diagnosis with multimodality imaging; antibiotic therapy and possibility of outpatient antibiotic therapy for stabilized, uncomplicated cases; timing of cardiac surgery; and role of the endocarditis team with a network of heart centres and referral centres (Fig. 1).

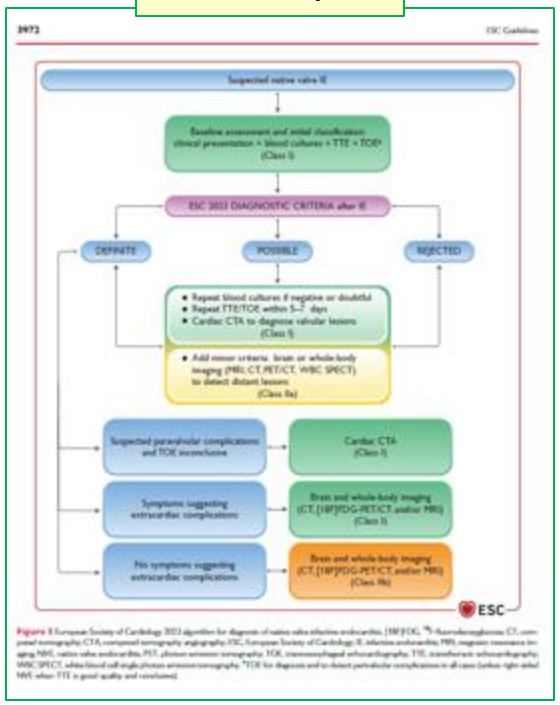
on antibiotic prophylaxis based on previous guidelines, have also contributed to this increase in the incidence of infective endocarditis.[1,5,6]

The development of infective endocarditis requires a predisposing condition, pathogens entering the bloodstream (from oral cavity, skin, gastrointestinal or genitourinary tract), and host's immune response with a reduced capacity for clearance of the infectious agent. The role of pre-

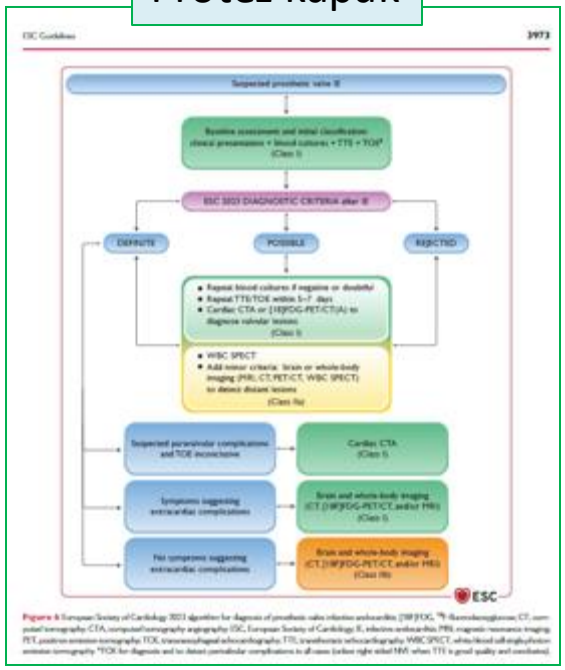


# Avrupa Endokardit Rehberi- 2023

Nativ kapak




Protez kapak

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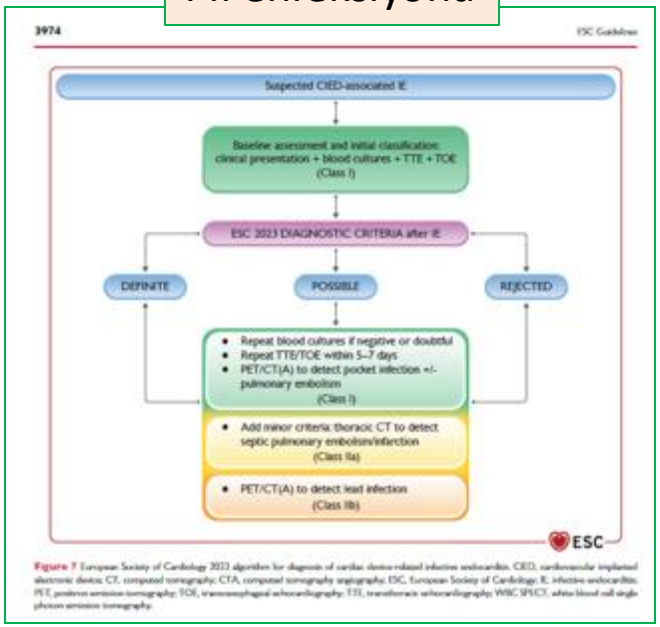
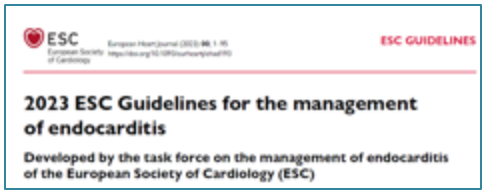


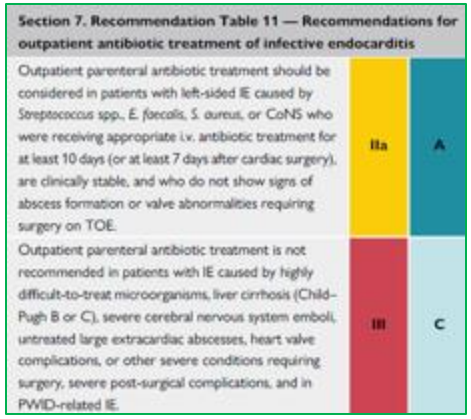
# Antibiyotik Tedavisi

# Ayaktan Parenteral Tedavi


ESC GUIDELINES

**2023 ESC Guidelines for the management of endocarditis**

Developed by the task force on the management of endocarditis of the European Society of Cardiology (ESC)


**Section 7. Recommendation Table 11 — Recommendations for outpatient antibiotic treatment of infective endocarditis**

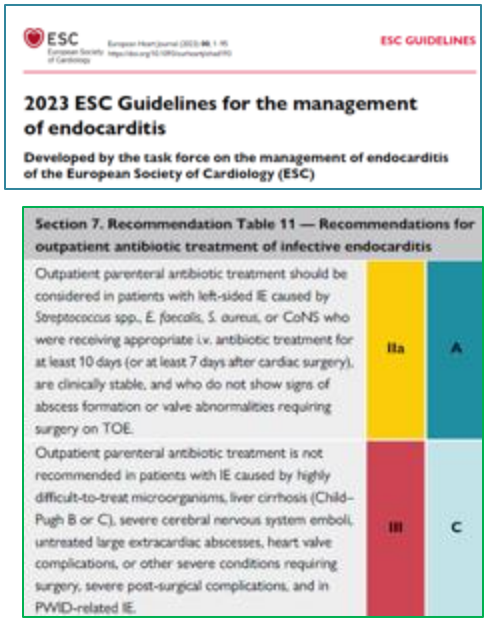
| | | |
|---|---|---|
| Outpatient parenteral antibiotic treatment should be considered in patients with left-sided IE caused by *Streptococcus* spp., *E. faecalis*, *S. aureus*, or CoNS who were receiving appropriate i.v. antibiotic treatment for at least 10 days (or at least 7 days after cardiac surgery), are clinically stable, and who do not show signs of abscess formation or valve abnormalities requiring surgery on TOE. | IIa | A |
| Outpatient parenteral antibiotic treatment is not recommended in patients with IE caused by highly difficult-to-treat microorganisms, liver cirrhosis (Child–Pugh B or C), severe cerebral nervous system emboli, untreated large extracardiac abscesses, heart valve complications, or other severe conditions requiring surgery, severe post-surgical complications, and in PWID-related IE. | III | C |

**Uygun koşullarda düşünülebilir (Sınıf IIa, Düzey A):**
Sol kalp tarafı enfektif endokarditi *Streptococcus spp.*, *E. faecalis*, *S. aureus* veya koagülaz-negatif stafilokoklar (CoNS) tarafından gelişmiş,
en az **10 gün (veya kardiyak cerrahiden sonra ≥7 gün)** uygun IV antibiyotik tedavisi almış,
**klinik olarak stabil**, apsesi olmayan ve **cerrahi gerektiren kapak anomalisi bulunmayan** hastalarda
ayaktan parenteral tedavi **düşünülebilir**

**Class I** → "Kesin yapılmalı"
**Class IIa** → "Yapılması güçlü biçimde önerilir"
**Class IIb** → "Yapılması düşünülebilir"
**Class III** → "Yapılmamalı"

**Level A** → "Yüksek kanıt (çok merkezli RCT'ler)"
**Level B** → "Orta kanıt (tek RCT veya gözlemsel veri)"
**Level C** → "Uzman görüşü / düşük düzey veri"

# Ayaktan Parenteral Tedavi



ESC GUIDELINES

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Sol kalp tarafı enfektif endokarditi *Streptococcus spp.*, *E. faecalis*, *S. aureus* veya koagülaz-negatif stafilokoklar (CoNS) tarafından gelişmiş,
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**klinik olarak stabil**, apsesi olmayan ve **cerrahi gerektiren kapak anomalisi bulunmayan** hastalarda
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**Class IIa** → "Yapılması güçlü biçimde önerilir"
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**Class III** → "Yapılmamalı"

**Level A** → "Yüksek kanıt (çok merkezli RCT'ler)"
**Level B** → "Orta kanıt (tek RCT veya gözlemsel veri)"
**Level C** → "Uzman görüşü / düşük düzey veri"

**Önerilmez (Sınıf III, Düzey C):**

- Zor tedavi edilen mikroorganizmalar
- Karaciğer sirozu (Child–Pugh B veya C)
- Ağır SSS embolisi
- Tedavi edilmemiş büyük ekstrakardiyak apse
- Kapak komplikasyonu veya cerrahi gerektiren durum
- Ciddi postoperatif komplikasyonlar
- Enjeksiyon yoluyla madde kullananlarda gelişen IE

# 2023 Avrupa Endokardit Rehberi'nde neler değişti?

Review article

OPEN

## The 2023 new European guidelines on infective endocarditis: main novelties and implications for clinical practice

Massimo Imazio[a,b]

The 2023 European Society of Cardiology (ESC) guidelines for the management of infective endocarditis update the previous 2015 guidelines with main novelties in five areas: (1) antibiotic prevention for high-risk patients, and prevention measures for intermediate-risk and high-risk patients; (2) diagnosis with emphasis on multimodality imaging to assess cardiac lesions of infective endocarditis' (3) antibiotic therapy allowing an outpatient antibiotic treatment for stabilized, uncomplicated cases; (4) cardiac surgery with an emphasis on early intervention without delay for complicated cases; and (5) shared management decision by the endocarditis team. Most evidence came from observational studies and expert opinions. The guidelines strongly support a patient-centred approach with a shared decision process by a multidisciplinary team that should be implemented either in tertiary referral centres, becoming heart valve centres, and referral centres. A continuous sharing of data is warranted in the hospitals' network between heart valve centres, which are used for referrals for complicated cases of infective endocarditis, and referral centres, which should be able to manage uncomplicated cases of infective endocarditis.

J Cardiovasc Med 2024, 25:718–726

Keywords: antibiotic therapy, cardiac surgery, heart team, infective endocarditis, prevention

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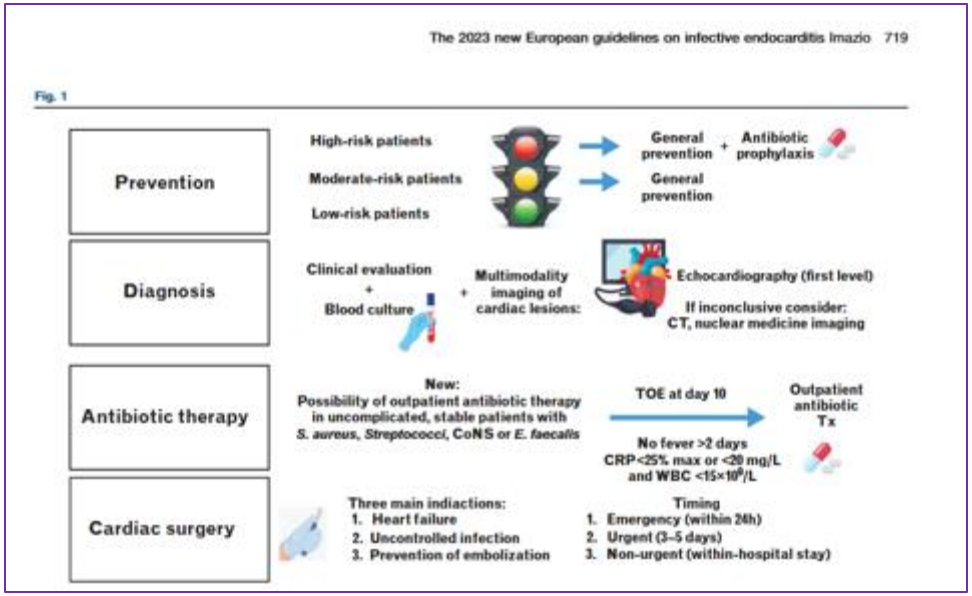
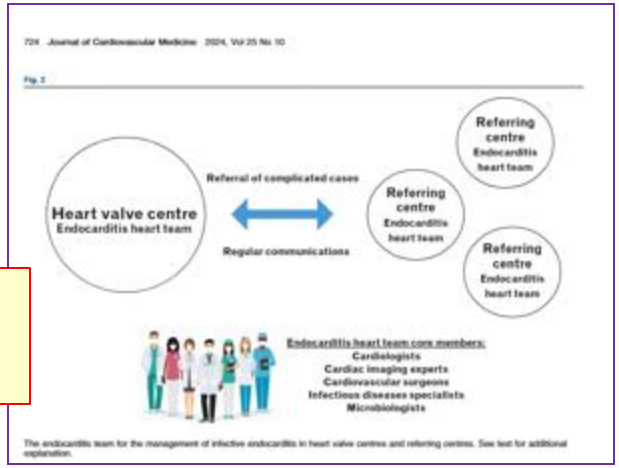
### Introduction

The 2023 European guidelines for the management of infective endocarditis[1] update the old 2015 guidelines[2] providing new important novelties in five main areas: prevention of infective endocarditis; diagnosis with multimodality imaging; antibiotic therapy and possibility of outpatient antibiotic therapy for stabilized, uncomplicated cases; timing of cardiac surgery; and role of the endocarditis team with a network of heart centres and referral centres (Fig. 1).

on antibiotic prophylaxis based on previous guidelines, have also contributed to this increase in the incidence of infective endocarditis.[1,5,6]

The development of infective endocarditis requires a predisposing condition, pathogens entering the bloodstream (from oral cavity, skin, gastrointestinal or genitourinary tract), and host's immune response with a reduced capacity for clearance of the infectious agent. The role of pre-




Oral geçişli antibiyotik tedavisi (IV→oral) stabil olgularda güvenli ve etkin olabilir

# Oral Tedaviye Geçiş Seçenekleri

JAMA Network Open

Consensus Statement | Infectious Diseases

## Guidelines for Diagnosis and Management of Infective Endocarditis in Adults
## A WikiGuidelines Group Consensus Statement

Emily G. McDonald, MD, MSc; Gloria Aggrey, MD; Abdullah Tarik Aslan, MD; Michael Casias, PharmD, BCIDP, AAHIVP; Nicolas Cortes-Penfield, MD; Mei Qin (Donna) Dong, PharmD; Susan Egbert, PharmD; Brent Footer, PharmD; Burcu Isler, MD; Madeline King, PharmD; Mira Mastrorilli, PharmD, MSc, ACPR; Terrence C. Wiest, MD, MSc; Ahmed Abdul-Aziz, MD; Zeynep Kiziz-Aydin, MD; Anthony D. Ilai, MD; Michelle Blyth, MD, MSPH; Tim Boyles, MD; Juan Caceres, MD; Devin Clark, MD; Kusha Davar, MD, MBA, MS; Justin T. Denholm, BMed, PhD; Graeme Forrest, MBBS; Bassam Ghanem, PharmD, MS, BCPS; Stefan Hagel, MD, MS; Alexandra Horwitz, PharmD; Fergus Hamilton, MD; Philipp Jent, MD; Minji Kang, MD; Geena Kludjian, PharmD, BCIDP; Tim Lahey, MD, MMSc; Jonathan Lipin, PharmD; Rachael Lee, MD, MSPH; Timothy Li, MD; Dhara Mehta, PharmD, BCIDP; Jessica Moore, PharmD, MS; Clayton Mowrer, DO, MBA; Georges Ouellet, MD; Rebecca Reece, MD; Jonathan H. Ryder, MD; Alexandre Sanchaine, PharmD, MSc; James M. Sanders, PharmD, PhD; Bobbi Jo Stoner, PharmD, BCPS; Jessica M. So, MD, MS, MPH; Jean-François Tessier, BSc, MSc; Raghavendra Tirupathi, MD; Steven Y. C. Tong, MBBS, PhD; Noah Wald-Dickler, MD; Arthwana Yassin, PharmD; Christina Yen, MD; Brad Spellberg, MD; Todd C. Lee, MD, MPH

### Abstract

**IMPORTANCE** Practice guidelines often provide recommendations in which the strength of the recommendation is dissociated from the quality of the evidence.

**OBJECTIVE** To create a clinical guideline for the diagnosis and management of adult bacterial infective endocarditis (IE) that addresses the gap between the evidence and recommendation strength.

**EVIDENCE REVIEW** This consensus statement and systematic review applied an approach previously established by the WikiGuidelines Group to construct collaborative clinical guidelines. In April 2022 a call to new and existing members was released electronically (social media and email) for the next WikiGuidelines topic, and subsequently, topics and questions related to the diagnosis and management of adult bacterial IE were crowdsourced and prioritized by vote. For each topic, PubMed literature searches were conducted including all years and languages. Evidence was reported according to the WikiGuidelines charter: clear recommendations were established only when reproducible, prospective, controlled studies provided hypothesis-confirming evidence. In the absence of such data, clinical reviews were crafted discussing the risks and benefits of different approaches.

**FINDINGS** A total of 51 members from 10 countries reviewed 587 articles and submitted information relevant to 4 sections: establishing the diagnosis of IE (9 questions); multidisciplinary IE teams (1 question); prophylaxis (2 questions); and treatment (5 questions). Of 17 unique questions, a clear recommendation could only be provided for 1 question: 3 randomized clinical trials have established that oral transitional therapy is at least as effective as intravenous (IV)–only therapy for the treatment of IE. Clinical reviews were generated for the remaining questions.

**CONCLUSIONS AND RELEVANCE** In this consensus statement that applied the WikiGuideline method for clinical guideline development, oral transitional therapy was at least as effective as IV only therapy for the treatment of IE. Several randomized clinical trials are underway to inform other areas of practice, and further research is needed.

### Key Points

**Question** Using the WikiGuidelines approach to the construct of clinical guidelines, how often can clear recommendations be made in the diagnosis and management of adult bacterial infective endocarditis?

**Findings** In this consensus statement, a panel of 51 members found that only 1 of 17 questions had sufficiently high-quality data to allow for a clear recommendation. Oral transitional therapy is at least as effective as intravenous-only therapy for the treatment of infective endocarditis.

**Meaning** These findings suggest that a higher quality of evidence needs to be established to guide the diagnosis and management of infective endocarditis.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

**Table 3. Summary of Oral Transitional Antibiotics Used in Published Clinical Studies[a]**

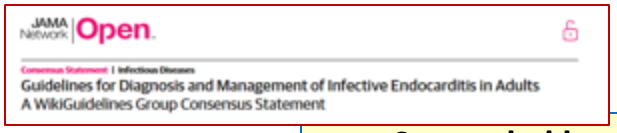
| Drug | Organism | Dose | References |
|---|---|---|---|
| Amoxicillin | • Sensitive streptococci (with or without combination treatment)<br>• Enterococci (only in combination with rifampin or linezolid) | 1 g 4 times daily | Iversen et al,[55] 2019; Stamboulian et al,[61] 1991 |
| Dicloxacillin | Sensitive staphylococci (data from RCT only in combination with rifampin) | 1 g 4 times daily | Iversen et al, 2019[55] |
| Levofloxacin[b] | Sensitive staphylococci (only in combination with rifampin) | 750 mg once daily | Iversen et al,[55] 2019; Heldman et al,[62] 1996 |
| Moxifloxacin | Sensitive streptococci, enterococci, or staphylococci (only in combination with amoxicillin, rifampin, or linezolid) | 400 mg once daily | Iversen et al,[55] 2019 |
| TMP-SMX | Sensitive staphylococci | 960 mg or 4800 mg daily in divided doses | Tissot-Dupont et al,[46] 2019; Freiing et al,[47] 2023 |
| Linezolid | Sensitive gram-positive cocci (alone or in combination with rifampin, moxifloxacin, or amoxicillin)[c] | 600 mg twice daily | Iversen et al,[55] 2019; Tascini et al,[68] 2011; Falagas et al,[69] 2006; Colli et al,[70] 2007; Muñoz et al,[71] 2007; Freiing S et al,[47] 2023 |
| Rifampin | Only as adjunctive agent (as previously described) | 600 mg once or twice daily | Iversen et al,[55] 2019; Heldman et al,[62] 1996; Acocella G,[72] 1983; Freiing et al,[47] 2023 |

Abbreviations: RCT, randomized clinical trial; TMP-SMX, trimethoprim-sulfamethoxazole.

[a] Combination regimens were used in the largest RCT; other published regimens have included either monotherapy or combination therapy regimens.[3]

[b] The study used ciprofloxacin rather than levofloxacin, the latter of which was not yet clinically available. However, in ensuing years, ciprofloxacin experienced rapid emergence of staphylococcal resistance. Levofloxacin or moxifloxacin are preferred to ciprofloxacin due to enhanced in vitro activity against staphylococci, but generally only in combination with a second agent.

[c] For most patients in published studies, linezolid was used alone, but in some references,[3,4,12] linezolid was given in combination with rifampin, moxifloxacin, or amoxicillin.




# Oral Tedaviye Geçiş Seçenekleri

- **Streptokoklar: Penisiline duyarlı (MIC ≤0.12 µg/mL)**

**Amoksisilin** 1 g günde 4 kez (yalnızca nativ kapak enfeksiyonlarında)

**Amoksisilin** 1 g günde 4 kez + **rifampisin** 600 mg günde 1 kez

**Linezolid** 600 mg günde 2 kez tek başına veya **rifampisin** 600 mg günde 1 kez ile

**Moksifloksasin** 400 mg günde 1 kez + **rifampisin** 600 mg günde 1 kez veya **linezolid** 600 mg günde 2 kez

- **Streptokoklar: Penisiline orta duyarlı (MIC 0.25–1.00 µg/mL) veya Enterokoklar**

**Amoksisilin** 1 g günde 4 kez + **rifampisin** 600 mg günde 1 kez veya **linezolid** 600 mg günde 2 kez

**Linezolid** 600 mg günde 2 kez tek başına veya **rifampisin** 600 mg günde 1 kez ile

**Moksifloksasin** 400 mg günde 1 kez + **rifampisin** 600 mg günde 1 kez

- **Streptokoklar: Penisiline dirençli (MIC ≥2 µg/mL) veya amoksisiline dirençli Enterokoklar**

**Linezolid** 600 mg günde 2 kez tek başına veya **rifampisin** 600 mg günde 1 kez ile

**Moksifloksasin** 400 mg günde 1 kez + **rifampisin** 600 mg günde 1 kez

- **Staphylococcus spp.**

**Levofloksasin** 750 mg günde 1 kez + **rifampisin** 600 mg günde 1 kez veya **linezolid** 600 mg günde 2 kez

**Linezolid** 600 mg günde 2 kez tek başına veya **rifampisin** 600 mg günde 1 kez ile (rifampisin linezolid düzeylerini düşürdüğünden monoterapi mi kombinasyon mu tercih edilmeli, belirsizdir)

**TMP-SMX** 960 mg veya 4800 mg/gün bölünmüş dozlarda

**Dikloksasilin** 1 g günde 4 kez + **rifampisin** 600 mg günde 1 kez (yalnızca metisiline duyarlı suşlar için)

# Cerrahi Tedavi

# Japonya: 2016–2021 Ulusal Kohort Verileri

Journal of the American Heart Association

ORIGINAL RESEARCH

## Trends in the Clinical Characteristics and Outcome of Infective Endocarditis: A Nationwide Study From 2016 to 2021

Hiroshi Okamoto, MD, PhD; Takeshi Nishi, MD, PhD; Kyo Kamisaka, MD; Yoshitaka Sasahira, MD; Koshiro Kanaoka, MD, PhD; Yoko Sumita; Yoshitaka Iwanaga, MD, PhD; Chisato Izumi, MD, PhD; Shiro Uemura, MD, PhD

**BACKGROUND:** Infective endocarditis (IE) is still a fatal disease, and given its rarity, ongoing updates to patient characteristics and outcomes of IE are essential for providing precision diagnoses and effective treatments. This study sought to examine temporal trends in the clinical characteristics and in-hospital occurrence of adverse outcomes of IE.

**METHODS AND RESULTS:** Using the Japan nationwide administrative database, we identified patients with IE in Japan from 2016 to 2021. A total of 17 407 patients with IE (37.8% women; median age, 72 [interquartile range, 59–81] years) were identified. The incidence of IE increased from 2.02 per 100 000 population in 2016 to 2.59 per 100 000 population in 2021. The median age of the patients increased from 70 years in 2016 to 73 years in 2021, and patient backgrounds were becoming more complex. The in-hospital mortality rate was 14.5%, which significantly increased from 14.1% in 2016 to 15.4% in 2021. Higher age (odds ratio [OR], 1.34 [95% CI, 1.29–1.40]), heart failure (OR, 1.37 [95% CI, 1.18–1.59]), cerebrovascular complications (OR, 1.78 [95% CI, 1.59–1.99]), renal failure (OR, 2.36 [95% CI, 2.06–2.70]), and sepsis (OR, 2.79 [95% CI, 2.48–3.13]), were independently associated with an increased in-hospital mortality rate. In contrast, cardiac surgery (OR, 0.47 [95% CI, 0.41–0.55]), and a higher number of total cardiac surgeries (OR, 0.77 [95% CI, 0.65–0.92]) independently predicted a lower in-hospital mortality rate.

Cardiac surgery was performed in 4993 (28.7%) patients, of which 2457 (14.1%) were performed within 7 days of admission. The overall rate of cardiac surgeries remained relatively constant over the study period (27.9% in 2016 to 28.8% in 2021; *P* for trend =0.47).

### CLINICAL PERSPECTIVES

**What Is New?**

- Contemporary data from a national Japanese administrative database showed that the incidence of infective endocarditis increased over time, patients have been getting older, and there has been an increasing in-hospital mortality rate.
- Cardiac surgery and a high volume of cardiac surgeries independently predicted a lower in-hospital mortality rate.

**What Are the Clinical Implications?**

- Our study provides valuable insights into the epidemiology, risk factors, and outcomes of infective endocarditis, which may inform health service planning and treatment strategies.

**Mortaliteyi Azaltan Faktörler**

- Kardiyak cerrahi uygulanması
- Cerrahi hacmi yüksek merkezlerde tedavi

# Profilaksi

# Avrupa Endokardit Rehberi- 2023

ESC European Society of Cardiology
European Heart Journal (2023) 00, 1–95 https://doi.org/10.1093/eurheartj/ehad193
ESC GUIDELINES

## 2023 ESC Guidelines for the management of endocarditis

**Developed by the task force on the management of endocarditis of the European Society of Cardiology (ESC)**

***Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS) and the European Association of Nuclear Medicine (EANM)***

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## 2. Introduction

Infective endocarditis (IE) is a major public health challenge.[1] In 2019, the estimated incidence of IE was 13.8 cases per 100 000 subjects per year, and IE accounted for 66 300 deaths worldwide.[2] Due to the associated high morbidity and mortality (1723.59 disability-adjusted life years and 0.87 death cases per 100 000 population, respectively), identification of the best preventive strategies has been the focus of research.[2,3] Since the publication of the *2015 ESC Guidelines for the management of infective endocarditis*,[4] important new data have been published mandating an update of recommendations. First, the population at risk of IE has increased and new data on IE in different clinical scenarios have arisen.[5–11] Furthermore, the emerging and increasing antibiotic resistance among oral streptococci is of concern. The rate of resistance to azythromycin and clarithromycin is higher than that to penicillin.[12] Whether changes in national guidelines on the use of antibiotic prophylaxis have resulted in an increase in the incidence of IE remains unclear.[13–18] It is likely that the increased use of diagnostic tools to diagnose IE is an important contributor to the increase in the incidence of IE. The use of echocardiography has probably increased in patients with positive blood cultures for *Enterococcus faecalis*, *Staphylococcus aureus*, or streptococci due to the associated increased risk of IE.[19] In addition, computed tomography (CT) and nuclear imaging techniques have increased the number of definite IE cases particularly among patients with prosthetic valves and implantable cardiac devices.[20–22]

Data on the contemporary characterization of patients with IE have been taken into consideration to update the recommendations on the diagnosis and management of patients with IE.[5,19,23–41] Furthermore, the recommendations on antibiotic therapy have been updated based on the susceptibility of various microorganisms defined by the European Committee on Antimicrobial Susceptibility Testing (EUCAST) clinical breakpoints.[42] Recommendations on outpatient parenteral antibiotic therapy (OPAT) or oral antibiotic treatment have been included based on the results of the Partial Oral Treatment of Endocarditis (POET) randomized trial and other trials.[43–46]

# Avrupa Endokardit Rehberi- 2023

**Recommendation Table 1 — Recommendations for antibiotic prophylaxis in patients with cardiovascular diseases undergoing oro-dental procedures at increased risk for infective endocarditis**

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| General prevention measures are recommended in individuals at high and intermediate risk for IE. | I | C |
| Antibiotic prophylaxis is recommended in patients with previous IE.[47,84,86] | I | B |
| Antibiotic prophylaxis is recommended in patients with surgically implanted prosthetic valves and with any material used for surgical cardiac valve repair.[47,87–89] | I | C |
| Antibiotic prophylaxis is recommended in patients with transcatheter implanted aortic and pulmonary valvular prostheses.[91–94] | I | C |
| Antibiotic prophylaxis is recommended in patients with untreated cyanotic CHD, and patients treated with surgery or transcatheter procedures with post-operative palliative shunts, conduits, or other prostheses. After surgical repair, in the absence of residual defects or valve prostheses, antibiotic prophylaxis is recommended only for the first 6 months after the procedure.[8,47,97,101] | I | C |
| Antibiotic prophylaxis is recommended in patients with ventricular assist devices.[102] | I | C |
| Antibiotic prophylaxis should be considered in patients with transcatheter mitral and tricuspid valve repair.[95] | IIa | C |
| Antibiotic prophylaxis may be considered in recipients of heart transplant.[105–107] | IIb | C |
| Antibiotic prophylaxis is not recommended in other patients at low risk for IE.[11,51] | III | C |

CHD, congenital heart disease; IE, infective endocarditis.
[a]Class of recommendation.
[b]Level of evidence.

**Recommendation Table 2 — Recommendations for infective endocarditis prevention in high-risk patients**

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| Antibiotic prophylaxis is recommended in dental extractions, oral surgery procedures, and procedures requiring manipulation of the gingival or periapical region of the teeth.[11,49,51,108] | I | B |
| Systemic antibiotic prophylaxis may be considered for high-risk[c] patients undergoing an invasive diagnostic or therapeutic procedure of the respiratory, gastrointestinal, genitourinary tract, skin, or musculoskeletal systems.[6,11] | IIb | C |

**Sınıf IIb Kanıt Düzeyi C**

Zayıf öneri → Kanıt sınırlı, dikkatli uygulanmalı

# Avrupa Endokardit Rehberi- 2016

KLİMİK
TÜRK KLİNİK MİKROBİYOLOJİ VE İNFEKSİYON HASTALIKLARI DERNEĞİ
Bilimle Sağlıkla 30 Yıl

## Yüksek riskli kardiyak durumlar

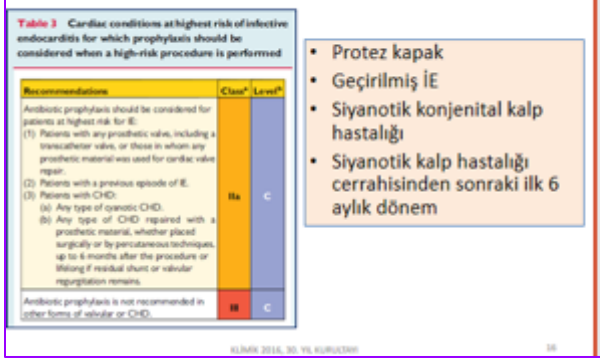


Table 3 Cardiac conditions at highest risk of infective endocarditis for which prophylaxis should be considered when a high-risk procedure is performed

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| Antibiotic prophylaxis should be considered for patients at highest risk for IE: (1) Patients with any prosthetic valve, including a transcatheter valve, or those in whom any prosthetic material was used for cardiac valve repair. (2) Patients with a previous episode of IE. (3) Patients with CHD: (a) Any type of cyanotic CHD. (b) Any type of CHD repaired with a prosthetic material, whether placed surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if residual shunt or valvular regurgitation remains. | IIa | C |
| Antibiotic prophylaxis is not recommended in other forms of valvular or CHD. | III | C |

- Protez kapak
- Geçirilmiş İE
- Siyanotik konjenital kalp hastalığı
- Siyanotik kalp hastalığı cerrahisinden sonraki ilk 6 aylık dönem

KLİMİK 2016, 30. YIL KURULTAYI 16

## Yüksek riskli hastalarda **profilaksi önerilen dental** işlemler

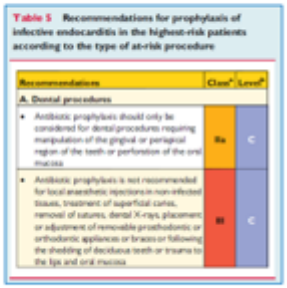


Table 5 Recommendations for prophylaxis of infective endocarditis in the highest-risk patients according to the type of at-risk procedure

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| A. Dental procedures | | |
| • Antibiotic prophylaxis should only be considered for dental procedures requiring manipulation of the gingival or periapical region of the teeth or perforation of the oral mucosa | IIa | C |
| • Antibiotic prophylaxis is not recommended for local anaesthetic injections in non-infected tissues, treatment of superficial caries, removal of sutures, dental X-rays, placement or adjustment of removable prosthodontic or orthodontic appliances or braces or following the shedding of deciduous teeth or trauma to the lips and oral mucosa | III | C |

- Jinjival işlemler
- Periapikal işlemler
- Oral mukozada perforasyon

**ÖNERİLMEYENLER!**
- Lokal anestezi
- Dolgu
- Film çekimi
- Prostodontik veya ortodontik işlemler

KLİMİK 2016, 30. YIL KURULTAYI 17

## Profilaksi **önerilmeyen** işlemler

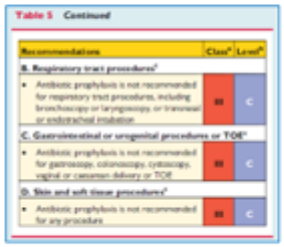


Table 5 Continued

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| B. Respiratory tract procedures[c] | | |
| • Antibiotic prophylaxis is not recommended for respiratory tract procedures, including bronchoscopy or laryngoscopy, or transnasal or endotracheal intubation | III | C |
| C. Gastrointestinal or urogenital procedures or TOE[c] | | |
| • Antibiotic prophylaxis is not recommended for gastroscopy, colonoscopy, cystoscopy, vaginal or caesarean delivery or TOE | III | C |
| D. Skin and soft tissue procedures[c] | | |
| • Antibiotic prophylaxis is not recommended for any procedure | III | C |

- Bronkoskopi, entübasyon
- Gastroskopi, kolonoskopi, sistoskopi, TÖE, sezeryan, doğum
- Deri ve yumuşak doku ile ilgili işlemler

KLİMİK 2016, 30. YIL KURULTAYI 18

# Avrupa Endokardit Rehberi- 2023

**Recommendation Table 1 — Recommendations for antibiotic prophylaxis in patients with cardiovascular diseases undergoing oro-dental procedures at increased risk for infective endocarditis**

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| General prevention measures are recommended in individuals at high and intermediate risk for IE. | I | C |
| Antibiotic prophylaxis is recommended in patients with previous IE.[47,84,86] | I | B |
| Antibiotic prophylaxis is recommended in patients with surgically implanted prosthetic valves and with any material used for surgical cardiac valve repair.[47,87–89] | I | C |
| Antibiotic prophylaxis is recommended in patients with transcatheter implanted aortic and pulmonary valvular prostheses.[91–94] | I | C |
| Antibiotic prophylaxis is recommended in patients with untreated cyanotic CHD, and patients treated with surgery or transcatheter procedures with post-operative palliative shunts, conduits, or other prostheses. After surgical repair, in the absence of residual defects or valve prostheses, antibiotic prophylaxis is recommended only for the first 6 months after the procedure.[8,47,97,101] | I | C |
| Antibiotic prophylaxis is recommended in patients with ventricular assist devices.[102] | I | C |
| Antibiotic prophylaxis should be considered in patients with transcatheter mitral and tricuspid valve repair.[95] | IIa | C |
| Antibiotic prophylaxis may be considered in recipients of heart transplant.[105–107] | IIb | C |
| Antibiotic prophylaxis is not recommended in other patients at low risk for IE.[11,51] | III | C |

CHD, congenital heart disease; IE, infective endocarditis.
[a]Class of recommendation.
[b]Level of evidence.

**Recommendation Table 2 — Recommendations for infective endocarditis prevention in high-risk patients**

| Recommendations | Class[a] | Level[b] |
|---|---|---|
| Antibiotic prophylaxis is recommended in dental extractions, oral surgery procedures, and procedures requiring manipulation of the gingival or periapical region of the teeth.[11,49,51,108] | I | B |
| Systemic antibiotic prophylaxis may be considered for high-risk[c] patients undergoing an invasive diagnostic or therapeutic procedure of the respiratory, gastrointestinal, genitourinary tract, skin, or musculoskeletal systems.[6,11] | IIb | C |

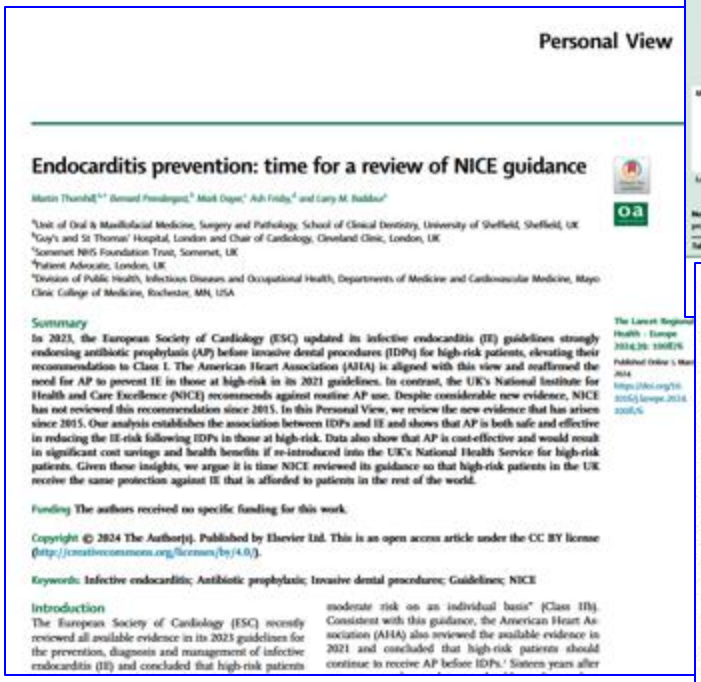
**Sınıf IIb Kanıt Düzeyi C**

Zayıf öneri → Kanıt sınırlı, dikkatli uygulanmalı

"Değişmeyen tek şey değişimdir"

Herakleitos (İÖ 535-475)

# NICE Rehberi- İngiltere



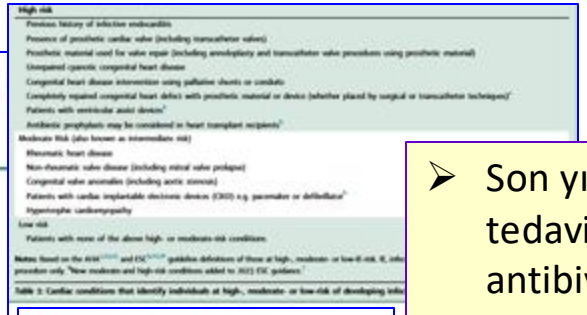
Personal View

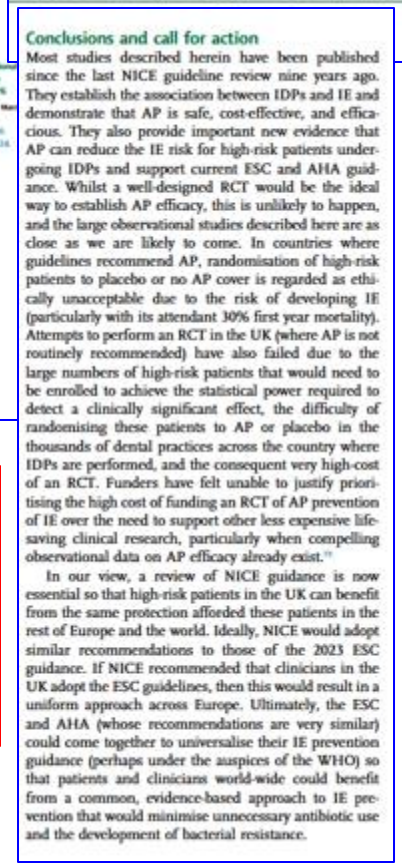
Endocarditis prevention: time for a review of NICE guidance

Summary

In 2023, the European Society of Cardiology (ESC) updated its infective endocarditis (IE) guidelines strongly endorsing antibiotic prophylaxis (AP) before invasive dental procedures (IDPs) for high-risk patients, elevating their recommendation to Class I. The American Heart Association (AHA) is aligned with this view and reaffirmed the need for AP to prevent IE in those at high-risk in its 2021 guidelines. In contrast, the UK's National Institute for Health and Care Excellence (NICE) recommends against routine AP use. Despite considerable new evidence, NICE has not reviewed this recommendation since 2015. In this Personal View, we review the new evidence that has arisen since 2015. Our analysis establishes the association between IDPs and IE and shows that AP is both safe and effective in reducing the IE-risk following IDPs in those at high-risk. Data also show that AP is cost-effective and would result in significant cost savings and health benefits if re-introduced into the UK's National Health Service for high-risk patients. Given these insights, we argue it is time NICE reviewed its guidance so that high-risk patients in the UK receive the same protection against IE that is afforded to patients in the rest of the world.

Introduction





Conclusions and call for action

Most studies described herein have been published since the last NICE guideline review nine years ago. They establish the association between IDPs and IE and demonstrate that AP is safe, cost-effective, and efficacious. They also provide important new evidence that AP can reduce the IE risk for high-risk patients undergoing IDPs and support current ESC and AHA guidance. Whilst a well-designed RCT would be the ideal way to establish AP efficacy, this is unlikely to happen, and the large observational studies described here are as close as we are likely to come. In countries where guidelines recommend AP, randomisation of high-risk patients to placebo or no AP cover is regarded as ethically unacceptable due to the risk of developing IE (particularly with its attendant 30% first year mortality). Attempts to perform an RCT in the UK (where AP is not routinely recommended) have also failed due to the large numbers of high-risk patients that would need to be enrolled to achieve the statistical power required to detect a clinically significant effect, the difficulty of randomising these patients to AP or placebo in the thousands of dental practices across the country where IDPs are performed, and the consequent very high-cost of an RCT. Funders have felt unable to justify prioritising the high cost of funding an RCT of AP prevention of IE over the need to support other less expensive life-saving clinical research, particularly when compelling observational data on AP efficacy already exist.

In our view, a review of NICE guidance is now essential so that high-risk patients in the UK can benefit from the same protection afforded these patients in the rest of Europe and the world. Ideally, NICE would adopt similar recommendations to those of the 2023 ESC guidance. If NICE recommended that clinicians in the UK adopt the ESC guidelines, then this would result in a uniform approach across Europe. Ultimately, the ESC and AHA (whose recommendations are very similar) could come together to universalise their IE prevention guidance (perhaps under the auspices of the WHO) so that patients and clinicians world-wide could benefit from a common, evidence-based approach to IE prevention that would minimise unnecessary antibiotic use and the development of bacterial resistance.


- Son yıllarda yapılan çalışmalar, diş tedavi girişimleri sonrası IE riskinin antibiyotik profilaksisi ile anlamlı biçimde azaldığını göstermiştir
- Bu bulgular, ESC ve AHA kılavuzlarını desteklemektedir
- Randomize kontrollü çalışmalar etik ve ekonomik nedenlerle zor olsa da, mevcut veriler yüksek riskli hastalarda profilaksinin yeniden önerilmesi gerektiğini göstermektedir
- Bu yaklaşımın DSÖ gibi kurumlarca da benimsenmesi, antibiyotik kullanımını rasyonelleştirirken direnç gelişimini en aza indirecek bilim temelli bir stratejinin benimsenmesini sağlayacaktır

# Endokardit Ekibi

# 2023 Avrupa Endokardit Rehberi'nde neler değişti?

Review article

OPEN

## The 2023 new European guidelines on infective endocarditis: main novelties and implications for clinical practice

Massimo Imazio[a,b]

The 2023 European Society of Cardiology (ESC) guidelines for the management of infective endocarditis update the previous 2015 guidelines with main novelties in five areas: (1) antibiotic prevention for high-risk patients, and prevention measures for intermediate-risk and high-risk patients; (2) diagnosis with emphasis on multimodality imaging to assess cardiac lesions of infective endocarditis' (3) antibiotic therapy allowing an outpatient antibiotic treatment for stabilized, uncomplicated cases; (4) cardiac surgery with an emphasis on early intervention without delay for complicated cases; and (5) shared management decision by the endocarditis team. Most evidence came from observational studies and expert opinions. The guidelines strongly support a patient-centred approach with a shared decision process by a multidisciplinary team that should be implemented either in tertiary referral centres, becoming heart valve centres, and referral centres. A continuous sharing of data is warranted in the hospitals' network between heart valve centres, which are used for referrals for complicated cases of infective endocarditis, and referral centres, which should be able to manage uncomplicated cases of infective endocarditis.

J Cardiovasc Med 2024, 25:718–726

Keywords: antibiotic therapy, cardiac surgery, heart team, infective endocarditis, prevention

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E-mail: massimo.imazio@uniud.it

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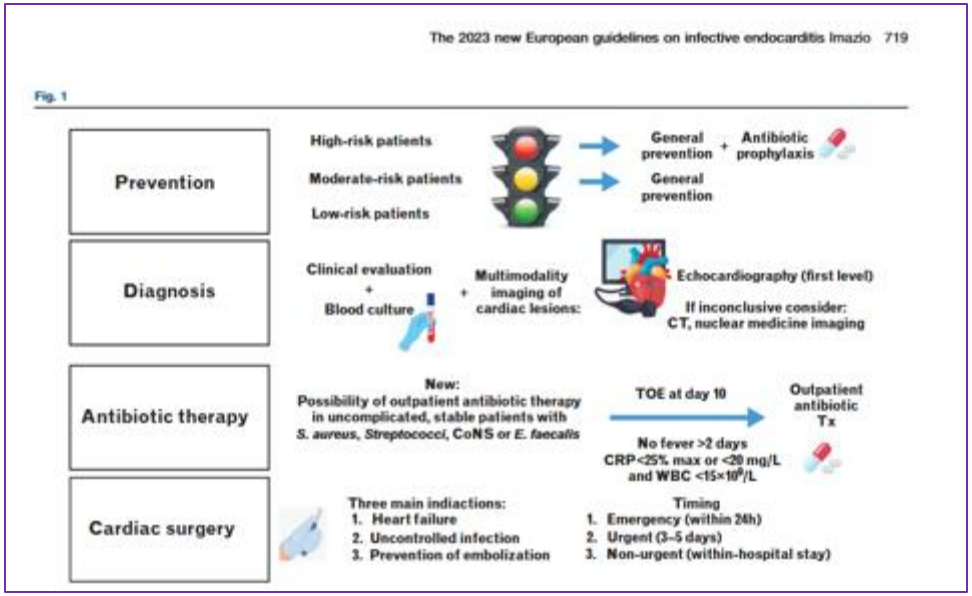
Accepted 19 May 2024

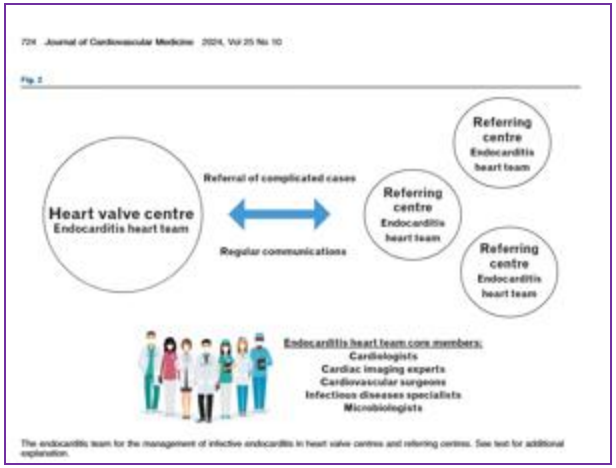
### Introduction

The 2023 European guidelines for the management of infective endocarditis[1] update the old 2015 guidelines[2] providing new important novelties in five main areas: prevention of infective endocarditis; diagnosis with multimodality imaging; antibiotic therapy and possibility of outpatient antibiotic therapy for stabilized, uncomplicated cases; timing of cardiac surgery; and role of the endocarditis team with a network of heart centres and referral centres (Fig. 1).

on antibiotic prophylaxis based on previous guidelines, have also contributed to this increase in the incidence of infective endocarditis.[1,5,6]

The development of infective endocarditis requires a predisposing condition, pathogens entering the bloodstream (from oral cavity, skin, gastrointestinal or genitourinary tract), and host's immune response with a reduced capacity for clearance of the infectious agent. The role of pre-



# Avrupa Endokardit Rehberi- 2023

## 4. The Endocarditis Team

The importance of an Endocarditis Team in the diagnosis, management, and clinical outcomes of patients with IE has been demonstrated in several observational studies.[36–41,122–126] Establishing multidisciplinary endocarditis teams according to the European Society of Cardiology (ESC) and the American College of Cardiology/American Heart Association Guidelines[4,127,128] has resulted in earlier and more accurate diagnosis of the primary disease and its complications,[5,22,31,40,129] uniform antibiotic treatment,[36,40,123] and optimized timing for surgical intervention.[36,37,40,123] A variety of scenarios of patients presenting with IE justifies a multidisciplinary approach.[5,25,27,28,130–135] Furthermore, the clinical presentation may vary significantly depending on the characteristics of the host and virulence of the microorganism. Accordingly, the concept of the Endocarditis Team needs to embrace a multidisciplinary approach that must adapt according to the patient's clinical needs and the local epidemiology to ensure prompt diagnosis and treatment.

The members of the Endocarditis Team should include the specialists with direct involvement in the diagnostic and therapeutic processes (*Table 7*), and may vary depending on the type of centre. In the

**Table 7 Members of the Endocarditis Team**

| | Heart Valve Centre |
|---|---|
| **Core members** | • Cardiologists.<br>• Cardiac imaging experts.<br>• Cardiovascular surgeons.<br>• Infectious disease specialist (or internal medicine specialist with expertise in infectious diseases).<br>• Microbiologist.<br>• Specialist in outpatient parenteral antibiotic treatment. |
| **Adjunct specialities** | • Radiologist and nuclear medicine specialist.<br>• Pharmacologist.<br>• Neurologist and neurosurgeon.<br>• Nephrologist.<br>• Anaesthesiologists.<br>• Critical care.<br>• Multidisciplinary addiction medicine teams.<br>• Geriatricians.<br>• Social worker.<br>• Nurses.<br>• Pathologist. |

| Recommendations for the Endocarditis Team | | |
|---|---|---|
| Diagnosis and management of patients with complicated IE are recommended to be performed at an early stage in a Heart Valve Centre, with immediate surgical facilities and an 'Endocarditis Team' to improve the outcomes. | I | B |
| For patients with uncomplicated IE managed in a Referring Centre, early and regular communication between the local and the Heart Valve Centre endocarditis teams is recommended to improve the outcomes of the patients. | I | B |

# İnfektif Endokardit: Bir ekip işi

ESC European Society of Cardiology
European Heart Journal (2025) 46, 2275–2288
https://doi.org/10.1093/eurheartj/ehaf219
STATE OF THE ART REVIEW
Valvular heart disease

## Infective endocarditis: it takes a team

Lawrence Lau[1,*], Larry Baddour[2], Núria Fernández Hidalgo[3,4,5], Thomas D. Brothers[6,7], William K. F. Kong[8], Michael A. Borger[9], Xavier Duval[10,11], Christophe Tribouilloy[12], Jean-Francois Obadia[13], Mehrdad Golian[1], Vicente F. Corrales-Medina[14], Francois Auclair[14], Mikael Mazighi[15], Kwan Leung Chan[1], Bernard Prendergast[16], Gilbert Habib[17], Fraser D. Rubens[18], and David Messika-Zeitoun[1,*]

Received 27 October 2024; revised 24 January 2025; accepted 18 March 2025; online publish-ahead-of-print 11 April 2025

**Graphical Abstract**



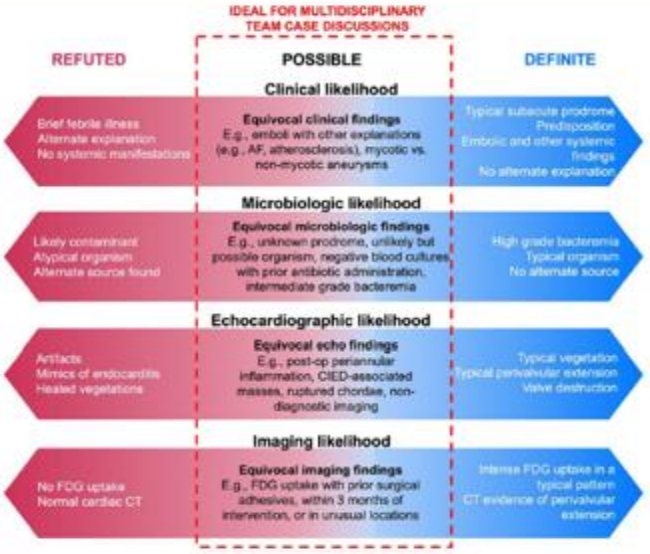




**Figure 1** Probabilistic classification of data points used in the diagnosis of infective endocarditis. The dashed box highlights situations in which the endocarditis team provides the highest additional diagnostic value.



## Conclusions

Infective endocarditis is a life-threatening infection characterized by both cardiac and extra-cardiac complications. The diagnosis, investigation and management of IE is increasingly complex and requires expertise in numerous disparate fields. Evidence suggests that ET may improve IE outcomes. Whereas many models of ET exist, flexibility to adapt to institutional and regional practices is paramount. The formation of an ET provides opportunities for mutual learning at a time when cardiovascular care is increasingly specialized and segregated and a framework for research and patient education in an area where these are often lacking.

# Endokardit Ekibi Deneyimi

**02837**
**Endocarditis team: Three years experience**

*02. Bacterial infection & disease*

2b. Severe sepsis, bacteraemia & endocarditis (incl. epidemiology, diagnosis, host bio-markers, treatment and outcome prediction)
**Likely attendance**
Onsite

*Nuran Sarı [1], Emir Karaçağlar [2], Elif Ateş [1], Bahadır Gültekin [3], Seda Kibaroğlu [4], Ayşen Terzi [5], Feride Kural Rahatlı [6], Ayşe Aktaş [7], Özlem Kurt Azap [1], Atilla Sezgin [3]*

*[1]Baskent University, Department of Infectious Diseases and Clinical Microbiology - Ankara (Turkey), [2]Baskent University, Department of Cardiology - Ankara (Turkey), [3]Department of Cardiovascular Surgery - Ankara (Turkey), [4]Department of Neurology - Ankara (Turkey), [5]Department of Pathology - Ankara (Turkey), [6]Department of Radiolog - Ankara (Turkey), [7]Department of Nuclear Medicine - Ankara (Turkey)*

# Endokardit Ekibi

Journal of Epidemiology and Global Health (2025) 15:69
https://doi.org/10.1007/s44197-025-00413-x

RESEARCH ARTICLE

**Global Trends and Regional Differences in the Burden of Infective Endocarditis, 1990–2021: An Analysis of the Global Burden of Disease Study 2021**

Huanhuan Miao[1] · Zhanyang Zhou[1] · Zheng Yin[1] · Xue Li[1] · Yuhui Zhang[1] · Yuqing Zhang[1] · Jian Zhang[1,2]

### 4.1 Public Health Implications

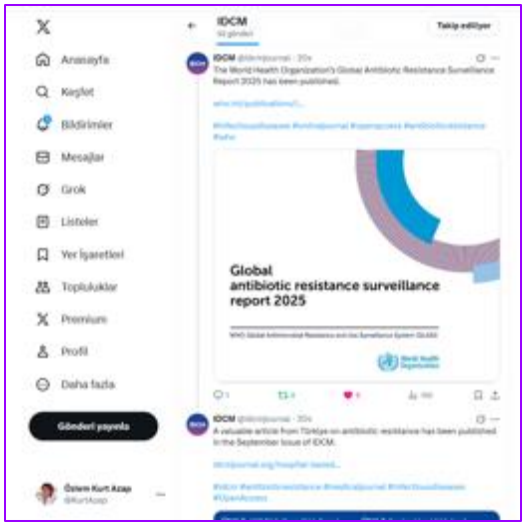
The study on the burden of IE had significant public health implications. Given the global increase in the ASIR and varying burdens across regions and demographics, healthcare resources must be reallocated. High-ASIR regions, especially those with high SDI, require more advanced diagnostic and treatment facilities, as well as more specialized cardiac care units. The involvement of a multidisciplinary Endocarditis Team is essential for the accurate diagnosis and comprehensive management of IE [18, 29]. While for the low SDI region, resources should be focused on improving basic healthcare infrastructure and access to treatment. Since males experienced a higher burden of IE compared to females, and the peak burden was shifting towards older individuals, resources should be targeted towards these demographics. In particular, screening programs for high-risk groups, such as elderly men with pre-existing heart conditions, should be enhanced. Additionally, the formulation of preventive measures is imperative. Launching public health initiatives to educate the population about the risk factors of IE, such as inadequate oral hygiene, intravenous drug usage, and underlying heart conditions, is crucial [30]. Moreover, the administration of antibiotic prophylaxis before invasive dental procedures is recommended as a preventive measure against IE in individuals at high risk [31, 32]. Future research should focus on clarifying risk factors across diverse regions and evaluating the efficacy of interventions to enhance the management and prevention of IE.

# IDCM


IDCM
Risk Factors for Mortality in Patients Treated with Colistin Monotherapy for Carbapenem-Resistant Acinetobacter baumannii Infections


IDCM
Indexes


IDCM
Aims and Scope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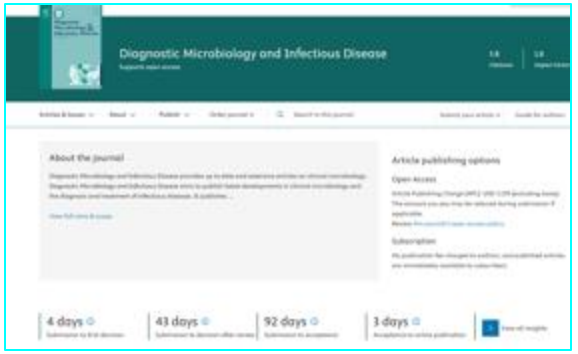
Global antibiotic resistance surveillance report 2025


Clinical Microbiology and Infection
ESCMID


International Journal of Infectious Diseases
Article Publishing Charge (APC)


Diagnostic Microbiology and Infectious Disease