

## BÖLÜM

# 6

## INTRAVASKÜLER KATETER İLİŞKİLİ KAN DOLAŞIMI ENFEKSİYONLARI

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### GİRİŞ

Intravasküler kateterler; intravenöz sıvı, ilaç, kan ürünlerini, parenteral beslenmenin uygulanması, hemodinamik izlem ve hemodiyaliz amaçlı kullanılmaktadır (1). Santral venöz kateterlerin (SVK) en önemli komplikasyonlarından biri lokal ya da sistemik enfeksiyonlardır. Kateter ilişkili kan dolaşımı enfeksiyonları (Kİ-KDE) hastanelerde en sık görülen enfeksiyon nedenleri arasındadır (2). Bununla birlikte primer kan dolaşımı enfeksiyonlarının (KDE) büyük kısmı kateter ilişkiliidir (2). Kateter ilişkili enfeksiyonların görülme sıklığı; kateter tipi, kullanım amacı, yerleştirilme yeri, kateteri yerleştiren bireyin deneyimi ve eğitimi, kateterin kullanım süresi, hastanın özellikleri ve önleme stratejilerinin uyumuna göre değişmektedir (3). Kİ-KDE mortaliteyi %12-25 artırmakla birlikte hastane maliyet ve yarış süresinde uzamaya yol açan bağımsız faktörler arasında yer almaktadır (3).

### KATETER KULLANIMI, TİPLERİ, ENFEKSİYON RİISKİ

Venöz ve arteriyel erişim için kullanılan kateterler ve özellikleri Tablo 1'de yer almaktadır (4).

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## KAYNAKLAR

1. Polderman KH, Girbes AR. Central venous catheter use . Part 2: infection complications. Intensive care medicine. 2002;28(1): 18-28.
2. Wisplinghoff H, Bischoff T, Tallent SM, Seifert H, et al. Nosocomial bloodstream infections in US hospitals: analysis of 24,179 cases from a prospective nationwide surveillance study. Clin Infect Dis. 2004 Aug 1;39(3):309-17.
3. Mermel LA, Farr BM, Sherertz RJ, et al. Guidelines for the management of intravascular catheter-related infections. Clin Infect Dis 2001;32:1249-72.
4. Çetinkaya Şardan Y, Güner R, Çakar N, Ağalar F et al. Damar İçi Kateter İnfeksiyonlarının Önlenmesi Kılavuzu. Turkish Journal of Hospital Infections 2013;17(2):233-279
5. Vincent JL, Bihari DJ, Sutter PM, et al. The prevalence of nosocomial infection in intensive care units in Europe. Results of the European Prevalence of Infection in Intensive Care (EPIC) study. JAMA 1995;274:639-44.
6. Pronovost PJ, Watson SR, Goeschel CA, Hyzy RC. Sustaining Reductions in Central Line-Associated Bloodstream Infections in Michigan Intensive Care Units: A 10-Year Analysis. Am J Med Qual. 2016 May;31(3):197-202.
7. Duke MA, Weiner LM, Allen-Bridson K, Malpiedi PJ, et al. National Healthcare Safety Network (NHSN) report, data summary for 2012, Device-associated module. Am J Infect Control. 2013 Dec;41(12):1148-66.
8. Meşe E.A. Ulusal sağlık hizmeti ilişkili enfeksiyonlar surveyans ağı özel raporu 2018. Haziran, 2019, ANKARA
9. Rosenthal RD, Bat-Erdene I, Gupta D, Belkembir S, International Nosocomial Infection Control Consortium (INICC) report, data summary of 45 countries for 2012-2017: Device-associated module. Am J Infect Control. 2019 Oct 29. pii: S0196-6553(19)30795-3.
10. April 2013 CDC/NHSN Protocol Corrections, Clarification, and Additions. Central Line-Associated Bloodstream Infection (CLABSI) Event. [http://www.cdc.gov/nhsn/pdfs/pscmanual/4psc\\_clabscurrent.pdf](http://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf) Accessed date: 14.06.2013
11. Gaynes R, Edwards JR. Overview of nosocomial infections caused by gram-negative bacilli. Clin Infect Dis 2005;41:848-54.
12. Bradley SF, Kaufmann CA, Infections assciated with vasculer catheters. In. Irwings RS, Rippe JM eds. Irwings and Rippe's Intensive Care Medicine 6th ed. Philedalphia: Lippincott Williams and Wilkins; 2008: p.1072-9
13. Henderson DK, Mandell GL, Bennett JE, Dolin K. Infections due to percutaneous intravascular devices. Principles and Practice of Infectious Diseases. 5th. Philadelphia: Churchill Livingstone, 2000:3005-8.
14. Marcinkiewicz J, Strus M, Pasich E. Antibiotic resistance: a "dark side" of biofilm associated chronic infections. Pol Arch Med Wewn. 2013;123(6):309-13.
15. Aybala TEMEL, Bayırı ERAÇ Bakteriyel Biyofilmler: Saptama Yöntemleri ve Antibiyotik Direncindeki Rolü Türk Mikrobiyol Cem Derg 2018;48(1):1-13
16. Stewart PS, William Costerton J. Antibiotic resistance of bacteria in biofilms. Lancet. 2001;358(9276):135-8.
17. Mermel LA. Clinical Practice Guidelines for the Diagnosis and Manangement of Intravascular Catheter-Related Infection: 2009 Update by IDSA. Clinical infectious diseases: an offical publication of Infectious Diseases Society of America. 2009;49:1-45
18. Safdar N, Fine JP, Maki DG. Meta-analysis: methods for diagnosing intravascular device-related bloodstream infection. Ann Intern Med. 2005 Mar 15;142(6):451-66.
19. Pearson ML; Hospital Infection Control Practices Advisory Committee (HICPAC). Guideline for prevention of intravascular device-related infections. Infect Control Hosp Epidemiol 1996;17:438-73.
20. Mayhall CG. Diagnosis and management of infections of implantable devices used for prolonged venous access. Curr Clin Top Infect Dis 1992; 12:83.
21. Guembe M, Rodríguez-Créixems M, Sánchez-Carrillo C, et al. How many lumens should be cultured in the conservative diagnosis of catheter-related bloodstream infections? Clin Infect Dis 2010; 50:1575.

22. Everts RJ, Vinson EN, Adholla PO, Reller LB. Contamination of catheter-drawn blood cultures. *J Clin Microbiol* 2001; 39:3393.
23. Little JR, Murray PR, Traynor PS, Spitznagel E. A randomized trial of povidone-iodine compared with iodine tincture for venipuncture site disinfection: effects on rates of blood culture contamination. *Am J Med* 1999; 107:119.
24. Mimoz O, Villeminey S, Ragot S, et al. Chlorhexidine-based antiseptic solution vs alcohol-based povidone-iodine for central venous catheter care. *Arch Intern Med* 2007; 167:2066.
25. Chatzinikolaou I, Hanna H, Hachem R, et al. Differential quantitative blood cultures for the diagnosis of catheter-related bloodstream infections associated with short- and long-term catheters: a prospective study. *Diagn Microbiol Infect Dis* 2004; 50:167.
26. Brun-Buisson C, Abroux F, Legrand P, et al. Diagnosis of central venous catheter-related sepsis. Critical level of quantitative tip cultures. *Arch Intern Med* 1987; 147:873.
27. Sherertz RJ, Raad II, Belani A, et al. Three-year experience with sonicated vascular catheter cultures in a clinical microbiology laboratory. *J Clin Microbiol* 1990; 28:76.
28. Mermel LA, McCormick RD, Springman SR, Maki DG. The pathogenesis and epidemiology of catheter-related infection with pulmonary artery Swan-Ganz catheters: a prospective study utilizing molecular subtyping. *Am J Med* 1991; 91:1975.
29. Schierholz JM, Bach A, Fleck C, et al. Measurement of ultrasonic-induced chlorhexidine liberation: correlation of the activity of chlorhexidine-silver-sulfadiazine-impregnated catheters to agar roll technique and broth culture. *J Hosp Infect* 2000; 44:141.
30. Kite P, Dobbins BM, Wilcox MH, et al. Evaluation of a novel endoluminal brush method for in situ diagnosis of catheter related sepsis. *J Clin Pathol* 1997;50:278-82.
31. Bouza E, Alvarado N, Alcalá L, et al. A randomized and prospective study of 3 procedures for the diagnosis of catheter-related bloodstream infection without catheter withdrawal. *Clin Infect Dis* 2007; 44:820.
32. Ullman AJ, Cooke ML, Mitchell M, Lin F, New K, et al. Dressings and securement devices for central venous catheters (CVC). *Cochrane Database Syst Rev*. 2015 Sep 10;(9):CD010367.
33. Sychev D, Maya ID, Allon M. Clinical management of dialysis catheter-related bacteremia with concurrent exit-site infection. *Semin Dial*. 2011 Mar-Apr;24(2):239-41.
34. Broadhurst D, Moureau N, Ullman AJ; World Congress of Vascular Access (WoCoVA) Skin Impairment Management Advisory Panel. Management of Central Venous Access Device-Associated Skin Impairment: An Evidence-Based Algorithm. *J Wound Ostomy Continence Nurs*. 2017 May/Jun;44(3):211-220
35. Lebeaux D, Zarrouk V, Leflon-Guibout V, Lefort A, Fantin B. Totally implanted access port-related infections: features and management. *Rev Med Interne*. 2010 Dec;31(12):819-27.
36. Maddox RP, Seupaul RA. What Is the Most Effective Treatment of Superficial Thrombophlebitis? *Ann Emerg Med*. 2016 May;67(5):671-2.
37. Rijnders BJ, Peetermans WE, Verwaest C, et al. Watchful waiting versus immediate catheter removal in ICU patients with suspected catheter-related infection: a randomized trial. *Intensive Care Med* 2004; 30:1073.
38. Kassar R, Hachem R, Jiang Y, et al. Management of *Bacillus* bacteraemia: the need for catheter removal. *Medicine (Baltimore)* 2009; 88:279.
39. Raad I, Costerton W, Sabharwal U, et al. Ultrastructural analysis of indwelling vascular catheters: a quantitative relationship between luminal colonization and duration of placement. *J Infect Dis* 1993; 168:400.
40. Martínez E, Mensa J, Rovira M, et al. Central venous catheter exchange by guidewire for treatment of catheter-related bacteraemia in patients undergoing BMT or intensive chemotherapy. *Bone Marrow Transplant* 1999; 23:41.
41. Boucher HW, Sakoulas G. Perspectives on Daptomycin resistance, with emphasis on resistance in *Staphylococcus aureus*. *Clin Infect Dis* 2007; 45:601.
42. Pfizer halts pursuit of Zyvox indication based upon mortality signal. *The Pink Sheet* 2007; 69:8.
43. Raad I, Davis S, Khan A, et al. Impact of central venous catheter removal on the recurrence of catheter-related coagulase-negative staphylococcal bacteraemia. *Infect Control Hosp Epidemiol* 1992; 13:215.
44. Atkinson JB, Chamberlin K, Boody BA. A prospective randomized trial of urokinase as an adjuvant in the treatment of proven Hickman catheter sepsis. *J Pediatr Surg* 1998; 33:714.

45. Poole CV, Carlton D, Bimbo L, Allon M. Treatment of catheter-related bacteraemia with an antibiotic lock protocol: effect of bacterial pathogen. *Nephrol Dial Transplant*. 2004; 19:1237–44.
46. Fernandez-Hidalgo N, Almirante B, Calleja R, et al. Antibiotic-lock therapy for long-term intravascular catheter-related bacteraemia: results of an open, non-comparative study. *J Antimicrob Chemother*. 2006; 57:1172–80.
47. Zinkernagel AS, Zinkernagel MS, Elzi MV, et al. Significance of *Staphylococcus lugdunensis* bacteraemia: report of 28 cases and review of the literature. *Infection* 2008; 36:314.
48. Abraham J, Mansour C, Veledar E, et al. *Staphylococcus aureus* bacteremia and endocarditis: the Grady Memorial Hospital experience with methicillin-sensitive *S aureus* and methicillin-resistant *S aureus* bacteremia. *Am Heart J* 2004; 147:536.
49. Rosen AB, Fowler VG Jr, Corey GR, et al. Cost-effectiveness of transesophageal echocardiography to determine the duration of therapy for intravascular catheter-associated *Staphylococcus aureus* bacteremia. *Ann Intern Med* 1999; 130:810.
50. Fowler VG Jr, Olsen MK, Corey GR, et al. Clinical identifiers of complicated *Staphylococcus aureus* bacteremia. *Arch Intern Med* 2003; 163:2066.
51. Vergis EN, Hayden MK, Chow JW, et al. Determinants of vancomycin resistance and mortality rates in enterococcal bacteraemia. a prospective multicenter study. *Ann Intern Med* 2001; 135:484.
52. Anderson DJ, Murdoch DR, Sexton DJ, et al. Risk factors for infective endocarditis in patients with enterococcal bacteraemia: a case-control study. *Infection* 2004; 32:72.
53. Sandoe JA, Witherden IR, Au-Yeung HK, et al. Enterococcal intravascular catheter-related bloodstream infection: management and outcome of 61 consecutive cases. *J Antimicrob Chemother* 2002; 50:577.
54. Seifert H. Catheter-related infections due to gram-negative bacilli. In: *Catheter-Related Infections*, Seifert H, Jansen B, Farr BM (Eds), Marcel Dekker, New York 1997. p.111.
55. Kuhn DM, George T, Chandra J, Mukherjee PK, Ghannoum MA. Antifungal susceptibility of *Candida* biofilms: unique efficacy of amphotericin B lipid formulations and echinocandins. *Antimicrob Agents Chemother*. 2002; 46:1773–80.
56. Cotton DJ, Gill VJ, Marshall DJ, et al. Clinical features and therapeutic interventions in 17 cases of *Bacillus* bacteraemia in an immunosuppressed patient population. *J Clin Microbiol* 1987; 25:672.
57. Peces R, Gago E, Tejada F, et al. Relapsing bacteraemia due to *Micrococcus luteus* in a haemodialysis patient with a Perm-Cath catheter. *Nephrol Dial Transplant* 1997; 12:2428.
58. Horino T, Sato F, Hosaka Y, et al. Predictive factors for metastatic infection in patients with bacteraemia caused by methicillin-sensitive *Staphylococcus aureus*. *Am J Med Sci*. 2015;349(1):24–28.
59. DesJardin JA, Falagas ME, Ruthazer R, et al. Clinical utility of blood cultures drawn from indwelling central venous catheters in hospitalized patients with cancer. *Ann Intern Med*. 1999; 131:641–7. [PubMed: 10577325]
60. Siegman-Igra Y, Anglim AM, Shapiro DE, Adal KA, Strain BA, Farr BM. Diagnosis of vascular catheter-related bloodstream infection: a meta-analysis. *J Clin Microbiol*. 1997; 35:928–36.
61. Fernandez-Guerrero ML, Herrero L, Bellver M, Gadea I, Roblas RF, de Gorgolas M. Nosocomial enterococcal endocarditis: a serious hazard for hospitalized patients with enterococcal bacteraemia. *J Intern Med*. 2002; 252:510–5
62. Sochowski RA, Chan KL. Implication of negative results on a monoplane transesophageal echocardiographic study in patients with suspected infective endocarditis. *J Am Coll Cardiol* 1993; 21:216.
63. Garrison RN, Richardson JD, Fry DE. Catheter-associated septic thrombophlebitis. *South Med J*. 1982; 75:917–9.
64. Ghannem GA, Boktour M, Warneke C, et al. Catheter-related *Staphylococcus aureus* bacteraemia in cancer patients: high rate of complications with therapeutic implications. *Medicine (Baltimore)*. 2007; 86:54–60.
65. Crowley AL, Peterson GE, Benjamin DK Jr, et al. Venous thrombosis in patients with short- and long-term central venous catheter-associated *Staphylococcus aureus* bacteraemia. *Crit Care Med*. 2008; 36:385–90.
66. Falagas ME, Vardakas KZ, Athanasiou S. Intravenous heparin in combination with antibiotics for the treatment of deep vein septic thrombophlebitis: a systematic review. *Eur J Pharmacol*. 2007; 557:93–8.
67. O'Grady NP, Alexander M, Dellinger EP, Gerberding JL. Guidelines for the Prevention of Intravascular Catheter-Related Infections. *Pediatrics* 2002;110;e51