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Central Venous Catheter-related Infections (CRI) in Hematology and Oncology

Recommendations from the society for diagnosis and therapy of haematological and oncological diseases

DGHO Deutsche Gesellschaft für Hämatologie und Medizinische Onkologie
ÖGHO Österreichische Gesellschaft für Hämatologie & Medizinische Onkologie
SSMO SSOM SGMO
SGH+SSH

Publisher

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Central Venous Catheter-related Infections (CRI) in Hematology and Oncology

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Compliance rules:

- Guideline
- Conflict of interests

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on behalf of the AGIHO Infectious Diseases Working Party of the DGHO

1 Definition and Basic Information

Insertion of central venous catheters is a common procedure in the treatment of patients with hematologic malignancies and solid tumors. Catheter-related infections (CRI) cause considerable morbidity. They are also one of the differential diagnoses of fever of unknown origin in neutropenic patients. This guideline on diagnostics and therapy of CRI was developed by the AGIHO Infectious Diseases Working Party of the DGHO.

Categories are based on the evaluation of study results and the recommendations developed by the Infectious Diseases Society of America, ISDA, see Table 1.

Table 1: Categories of Evidence

Category, grade Strength of Recommendation	**Definition**
A	Good evidence to support a recommendation for use
B	Moderate evidence to support a recommendation for use
C	Poor evidence to support a recommendation for use
D	Moderate evidence to support a recommendation against use
E	Good evidence to support a recommendation against use
Quality of Evidence	**Definition**
I	Evidence from ≥ 1 properly randomized, controlled trial
II	Evidence from ≥ 1 well-designed clinical trial, without randomization; from cohort or case-controlled analytic studies (preferable from > 1 centre); from multiple time series; or from dramatic results of uncontrolled experiments
III	Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports from expert committees

2 Prevention of Catheter-Related Infections

Recommendations are summarized in Table 2.

Table 2: Prevention of Catheter-Related Infections

Recommendation	Category of Evidence
Access via the subclavian vein is associated with a lower CRI rate as compared to internal jugular vein	A-I
Compliance with hygiene principles during insertion and standardized aseptic placement help to avoid infections	A-I
Impregnation of CVCs with antiseptics (chlorhexidine/silver sulfadiazine) or antibiotics (minocycline/rifampicin) reduces incidence of catheter colonization	A-I
Education programs for nurses and physicians help to reduce the incidence of CRI	A-II
Ultrasound-guided placement helps to reduce CRI rates	B-I
Alcoholic chlorhexidine solution, alcoholic polyvidone–iodine solutions or 70% propanolol should be used for disinfection of the catheter insertion site	A-I
More frequent replacement does not reduce the incidence of infection	D-I
Systemic prophylactic antibiotic treatment prior to catheter insertion is not recommended	E-I
Topical application of antibiotic ointments for reducing staphylococcal colonization at the catheter insertion site and as a nasal ointment is not recommended	E-I

3 Diagnosis

3.1 Diagnostic Criteria

In clinical practice, diagnosis of central venous catheter-related infections is based on symptoms and test results not always withstanding strict definitions. In many cases, CRI can only be presumed backed-up by clinical symptoms and test results listed in Table 3.

Table 3: Diagnostic Criteria for CRI

Diagnosis	Criteria
Definite CRI	• Pathogen detected at the catheter tip by a standard method plus same pathogen with the same susceptibility pattern detected in blood culture and / or • DTTP[1] > 2 h and / or • CFU Ratio[2] ≥ 10
Probable CRI	• Local infection at the insertion site and / or • Remission of previously refractory fever within 48h after catheter removal plus positive blood culture and / or • Colonization of the catheter tip[3]
Possible CRI	• Pathogen detected in blood culture that is typically implicated in causing catheter infections (*S. epidermidis*, *S. aureus* or other coagulase – negative Staphylococci, *Candida* spp.) and / or • Positive blood culture and no other focus identified in a patient with an indwelling central venous catheter (CVC)

Legend:
[1] DTTP (Differential Time To Positivity) – Difference in time between positivity of results of catheter culture and peripheral blood culture;
[2] CFU Ratio – Ratio of Colony Forming Units between pathogen detected in quantitative catheter and peripheral blood cultures;
[3] Results above the limit specified for the method

3.2 Diagnostics

Recommendations are summarized in Table 4.

Table 4: Diagnostics of Central Venous CRIs

Recommendation	Category of Evidence
One pair of blood cultures (aerobic and anaerobic) to be taken from the catheter and one from a peripheral vein for microbiological evaluation	A-II
DTTP[1] for routine diagnostic purposes	A-I
Semiquantitative culturing for microbiological diagnosis of CRI after catheter removal	A-II
Quantitative culturing from the interior surface of the catheter, vortex and ultrasound treatment of the catheter to disengage adhesive bacteria	A-II
Endoluminal brushing if blood cultures cannot be drawn via CVC line	C-II
Ultrasound imaging along the catheter tunnel for diagnosis of CRI	C-III
Blood cultures from all lumina of the catheter	C-III
No cultures from the catheter hub	D-II
No skin swab for diagnosis of CRI	D-II
No placing of the catheter tip in broth and subsequently culturing the pathogen	E-II

Legend:
[1] DTTP (Differential Time To Positivity) – Difference in time between positivity of results of catheter culture and peripheral blood culture;

4 Therapy

First goal is the successful treatment of CRI using systemic antimicrobial therapy. Second goal is the prevention of secondary infection.

4.1 Antimicrobial Therapy

Recommendations are summarized in Table 5.

Table 5: Antimicrobial Therapy in CRI

Recommendation	Category of Evidence
Antimicrobial treatment of suspected CRI based on the same principles as treatment of fever of unknown origin (FUO)	
Prompt empirical vancomycin therapy is not required	A-II
At least 2 weeks of systemic antimicrobial treatment in immunosuppressed patients	B-III
For *in vitro* susceptible pathogens, therapy with a penicillinase-resistant penicillin is more effective and, therefore, preferable to treatment with glycopeptide antibiotics	B-II
Antibiotic lock in addition to systemic antibiotic therapy has shown to reduce the relapse rate of CRI	C-III

4.2 Management of CVC

Recommendations are summarized in Table 6.

Table 6: Management of CVC

Recommendation	Category of Evidence
Primary catheter removal is necessary in • CRI due to *Staphylococcus aureus* • CRI due to *Candida* spp. • Tunnel or pocket infection • Complicated CRI (e.g. metastatic organ or severe soft tissue infections)	A-II B-II B-III B-II
Preservation of CVC may be initially attempted in clinically stable patients in the presence of the following pathogens • Coagulase-negative Staphylococci • *Corynebacterium jeikeium* • *Acinetobacter baumannii* • *Stenotrophomonas maltophilia* • *Pseudomonas aeruginosa* • *Bacillus* spp.	B-III

9 References

1. Wolf H. H. al.: Central venous catheter-related infections in hematology and oncology. Ann Hematol 2008;87:863-876. DOI:10.1007/s00277-008-0509-5

15 Links

https://www.agiho.de/ueber-die-agiho

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17 Disclosures

according to the rules of the responsible Medical Societies.

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according to the rules of the German Association of Hematology and Oncology (DGHO, Deutsche Gesellschaft für Hämatologie und Mediziniesche Onkologie) and the recommendations of the AWMF (version dated April 23, 2010) and international recommendations.