Infezioni nel paziente oncoematologico

Biagio Pinchera

Azienda Ospedaliera Universitaria Federico II
Integrata con il Servizio Sanitario Regionale

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Home › Infectious Diseases and Therapy › Article

Fatal Infections Among Cancer Patients: A Population-Based Study in the United States

Original Research | Open access | Published: 24 March 2021
Volume 10, pages 871–895, (2021) Cite this article

Infections are one of the leading causes of mortality in cancer patients and the rate of fatal infections is approximately three times higher than that of the general population

The incidence of sepsis is 16.4 cases per 1000 cancer patients per year, with in-hospital mortality of 37.8% in severe cases

Research | Open access | Published: 05 July 2004

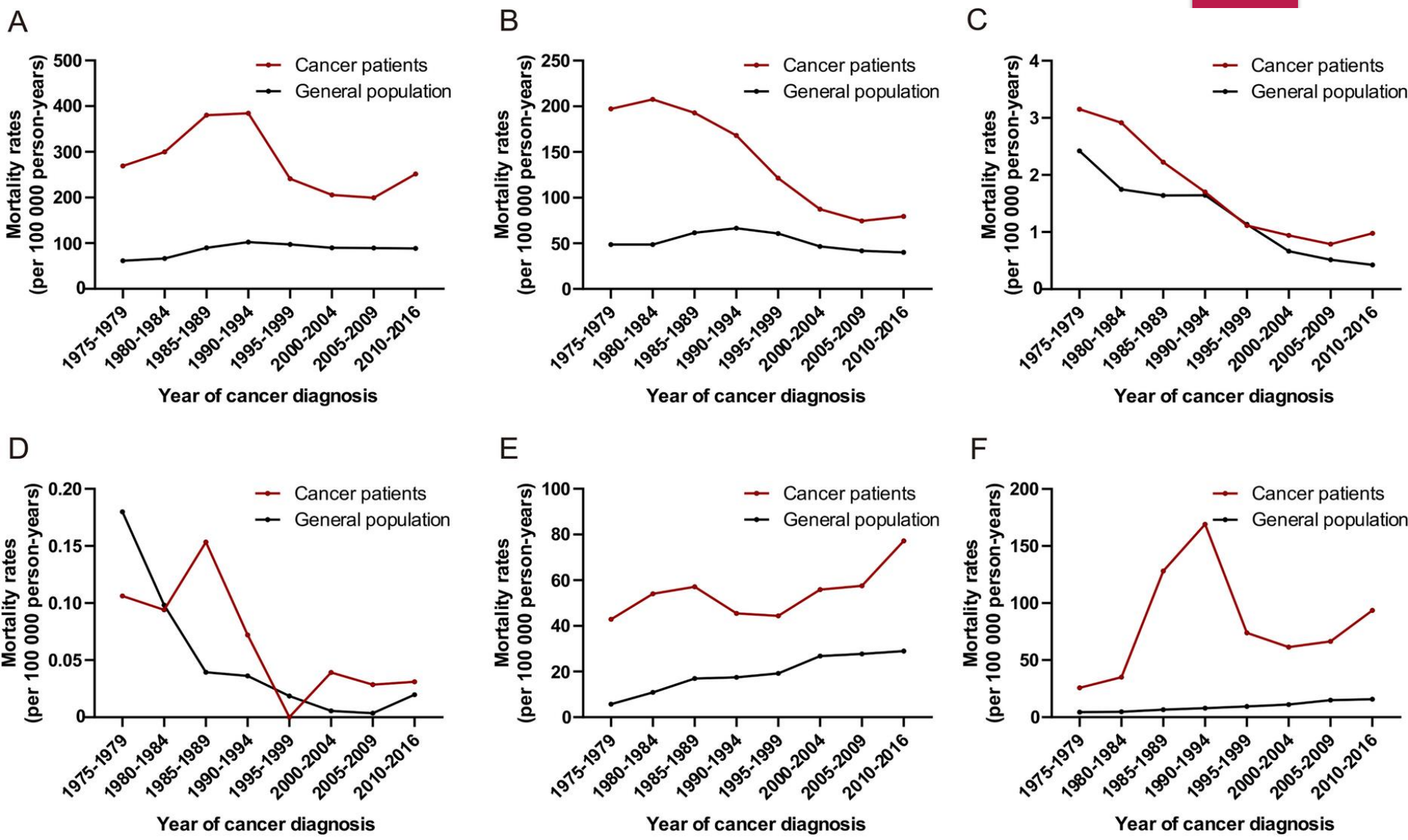
Hospitalized cancer patients with severe sepsis: analysis of incidence, mortality, and associated costs of care

Mark D Williams, Lee Ann Braun, Liesl M Cooper, Joseph Johnston, Richard V Weiss, Rebecca L Qualy & Walter Linde-Zwirble

Critical Care **8**, Article number: R291 (2004)

BMC Part of Springer Nature

Mortality rates of fatal infection among cancer patients by year of cancer diagnosis



Zheng Y. et al. Fatal Infections among Cancer Patients: A Population-Based Study in the United States. *Infect. Dis. Ther.* 2021

Longitudinal surveillance of bacteraemia in haematology and oncology patients at a UK cancer centre and the impact of ciprofloxacin use on antimicrobial resistance FREE

S. Schelenz ✉, D. Nwaka, P. R. Hunter

Journal of Antimicrobial Chemotherapy, Volume 68, Issue 6, June 2013, Pages 1431–1438,

Journal of Antimicrobial Chemotherapy

Bloodstream infections are significantly more common in patients with hematologic malignancies than in those with solid tumors.

Interestingly, while there is a significant downward trend in bloodstream infection in hematologic patients over time, the incidence remains stable in patients with solid tumors

This underscores the importance of appropriate management of infections in cancer patients.

There are a number of differences between patients with solid tumors and those with hematologic malignancies.

the neoplastic process of those with solid tumors does not involve the effectors of the host immune system

Home > Infectious Diseases and Therapy > Article

Infections in Cancer Patients with Solid Tumors: A Review

Review | Open access | Published: 03 February 2017

the therapy of solid tumors usually does not lead to prolonged neutropenia

National Comprehensive Cancer Network NCCN Clinical Practice Guidelines in Oncology. Prevention and Treatment of Cancer-Related Infections 1. 2021

JOURNAL ARTICLE

Longitudinal surveillance of bacteraemia in haematology and oncology patients at a UK cancer centre and the impact of ciprofloxacin use on antimicrobial resistance FREE

S. Schelenz ✉, D. Nwaka, P. R. Hunter

Journal of Antimicrobial Chemotherapy, Volume 68, Issue 6, June 2013, Pages 1431–1438,

Consequently, the incidence of infections in patients with solid tumors is significantly lower compared to hematologic patients

Highlights

- **Bacteraemia in neutropenic cancer patients was mainly due to gram-negative bacilli.**
- **MDR gram-negatives were more frequent in patients with haematological malignancies.**
- **Pneumonia due to *Pseudomonas aeruginosa* was more common in patients with solid tumours.**

RESEARCH ARTICLE | VOLUME 69, ISSUE 5, P417-423, NOVEMBER 2014

Download Full Issue

JOURNAL OF INFECTION

Bloodstream infections in neutropenic patients with cancer: Differences between patients with haematological malignancies and solid tumours

Mar Marin • Carlota Gudiol • Carmen Ardanuy • ... Mariona Calvo • Montserrat Arnan • Jordi Carratalà

Life (Basel). 2021 Dec; 11(12): 1387.
Published online 2021 Dec 11. doi: 10.3390/life11121387
PMCID: PMC8705721
PMID: 34947918

Risk Factors for Infections, Antibiotic Therapy, and Its Impact on Cancer Therapy Outcomes for Patients with Solid Tumors

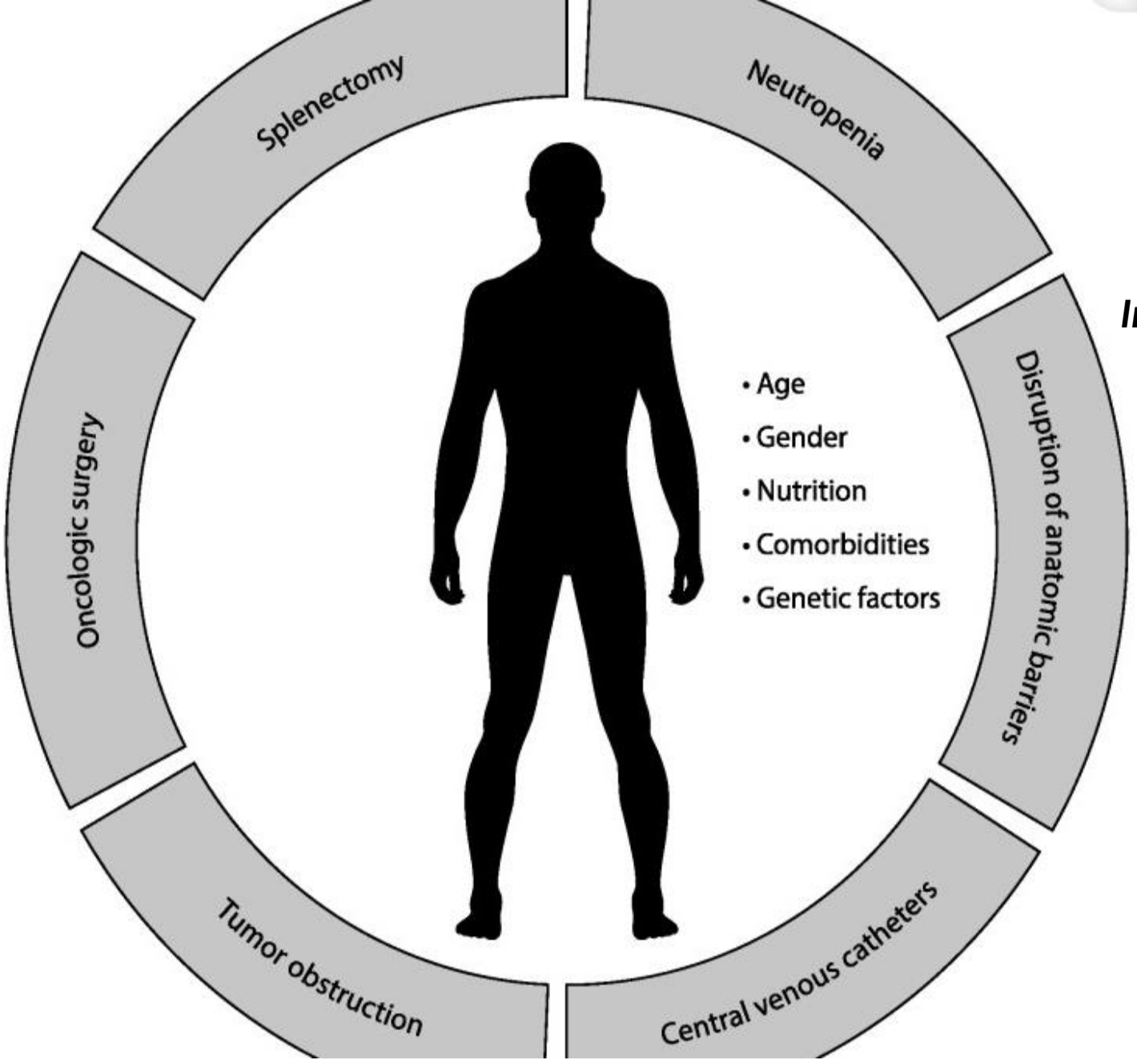
Ondřej Kubeček,[1] Pavla Paterová,[2,*] and Martina Novosadová[3]

Prophylactic use of antibiotics is, therefore, rarely used for patients with solid tumors

A possible exception is the use of trimethoprim/sulfamethoxazole for the prevention of *Pneumocystis jirovecii* pneumonia in patients receiving temozolomide together with radiation therapy, and moderate-to-high-dose corticosteroid therapy (prednisone equivalents ≥ 20 mg for ≥4 weeks)

National Comprehensive Cancer Network NCCN Clinical Practice Guidelines in Oncology. Prevention and Treatment of Cancer-Related Infections 1. 2024

Risk Factors for Infections in Patients



National Comprehensive Cancer Network NCCN Clinical Practice Guidelines in Oncology. Prevention and Treatment of Cancer-Related Infections 1. 2021

National Comprehensive Cancer Network®

Overall Infection Risk in Patients with Cancer[a]	Disease/Therapy Examples	Antimicrobial Prophylaxis
Low	• Standard chemotherapy regimens for most solid tumors • Anticipated neutropenia* <7 days	• Bacterial - None • Fungal - None • Viral - None unless prior HSV episode
Intermediate	• Autologous HCT • Lymphoma[c] • Multiple myeloma[c] • CLL[c] • Purine analog therapy (ie, fludarabine, clofarabine, nelarabine, cladribine) • Anticipated neutropenia* 7–10 days • CAR T-cell therapy	• Bacterial - Consider fluoroquinolone prophylaxis during neutropenia[d] • Fungal - Consider prophylaxis during neutropenia and for anticipated mucositis (INF-2); consider PJP prophylaxis (INF-6) • Viral - During neutropenia and longer depending on risk (INF-3, INF-4, INF-5) • CAR T-cell therapy (INF-A 10 of 12)
High[b]	• Allogeneic HCT including cord blood • Acute leukemia ▸ Induction ▸ Consolidation/maintenance • Alemtuzumab therapy • Moderate to severe GVHD • Anticipated neutropenia* >10 days	• Bacterial - Consider fluoroquinolone prophylaxis during neutropenia[d] • Fungal - Consider prophylaxis during neutropenia (INF-2); consider PJP prophylaxis (INF-6) • Viral - During neutropenia and longer depending on risk (INF-3, INF-4, INF-5) • Length of prophylaxis depends on immune reconstitution.

*Neutropenia: ≤500 neutrophils/mcL or ≤1000 neutrophils/mcL and a predicted decline to ≤500/ mcL over the next 48 hours.

National Comprehensive Cancer Network NCCN Clinical Practice Guidelines in Oncology. Prevention and Treatment of Cancer-Related Infections 1. 2024

Rolston K.V.I. Infections in Cancer Patients with Solid Tumors: A Review. Infect. Dis. Ther. 2017

Disruption of Anatomic Barriers

Mucositis is another important factor increasing the risk of bloodstream infections.

Mucosal barriers in the gastrointestinal, urogenital, and respiratory tract constitute the first line of host defense against various pathogens.

Coexisting neutropenia allows for the rapid development of severe infections

Chemotherapy-induced mucositis is associated with an increased risk of infections caused by viridans group streptococci, gram-negative rods, and Candida spp.

Although the risk and grade of mucositis is higher in hematologic patients receiving high-dose chemotherapy regimens with autologous hematopoietic stem cell transplantation, some of the cytotoxic drugs used in the therapy of solid tumors can induce mucositis. These include 5-fluorouracil, capecitabine, cyclophosphamide, ifosfamide, cisplatin, carboplatin, docetaxel, paclitaxel, and vinorelbine

ANNALS OF ONCOLOGY driving innovation in oncology

ESMO GOOD SCIENCE BETTER MEDICINE BEST PRACTICE

Management of oral and gastrointestinal mucosal injury: ESMO Clinical Practice Guidelines for diagnosis, treatment, and follow-up

D.E. Peterson • C.B. Boers-Doets • R.J. Bensadoun • J. Herrstedt • on behalf of the ESMO Guidelines Committee ✉* • Show footnotes

National Comprehensive Cancer Network®

Neutropenia

Severe neutropenia is defined as the ANC of <500 cells/mm3 according to the Common Terminology Criteria for Adverse Events (CTCAE)

A drop of ANC below this threshold is associated with an increased risk of infections

The incidence and severity of infections are inversely related to ANC, with the highest risk when ANC drops below 100 cells/mm3

Duration of neutropenia is another important risk factor

Chemotherapy regimens resulting in neutropenia lasting >10 days are considered high risk

However, most regimens used in the therapy of solid tumors result in neutropenia lasting <7 days and are therefore considered low risk

National Comprehensive Cancer Network NCCN Clinical Practice Guidelines in Oncology. Prevention and Treatment of Cancer-Related Infections 1. 2021

Ann Hematol. 2021; 100(6): 1603–1620.
Published online 2021 Apr 13. doi: 10.1007/s00277-021-04452-9
PMCID: PMC8116237
PMID: 33846857

Primary prophylaxis of bacterial infections and *Pneumocystis jirovecii* pneumonia in patients with hematologic malignancies and solid tumors: 2020 updated guidelines of the Infectious Diseases Working Party of the German Society of Hematology and Medical Oncology (AGIHO/DGHO)

Annika Y. Classen,[1,2] Larissa Henze,[3] Marie von Lilienfeld-Toal,[4] Georg Maschmeyer,[5] Michael Sandherr,[6] Luisa Durán Graeff,[1,2] Nael Alakel,[7] Maximilian Christopeit,[8] Stefan W. Krause,[9] Karin Mayer,[10] Silke Neumann,[11] Oliver A. Cornely,[1,2,12,13] Olaf Penack,[14] Florian Weißinger,[15] Hans-Heinrich Wolf,[16] and Jörg Janne Vehreschild[1,2,17]

Neutropenia is defined as an absolute neutrophil count (ANC) < 500 cells/mm3 or an expected ANC of < 500 cells/mm3 within the next 48 hours.

Chemotherapy-induced neutropenia and mucositis can lead to invasive infection most often with bacteria and fungi

Neutropenic fever occurs in 10-50% with solid tumors and >80% of patients with hematological malignancies and those receiving hematopoietic stem cell transplant (HCT).

Risk factors for bacterial infection during neutropenia

Clinical situation	Intention/recommendation	Intervention
Patients with prolonged neutropenia (> 7 days)[a]	Identify patients at risk for FN	Consider as high-risk patients
Patients with neutropenia > 0 and ≤ 7 days[a] and significant additional risk factors[b]		Consider as high-risk patients
Patients with neutropenia ≤ 7 days without additional risk factors		Consider as low-risk patients

Patient-related risk factors

Patient-related risk factors[a]
Prolonged neutropenia (> 7 days)
Type and stage of underlying malignancy
Administered type and dosage of chemotherapy
First chemotherapy cycle
Cardiac insufficiency
Low baseline creatinine clearance
Low baseline leukocyte count
Elevated baseline levels of alkaline phosphatase and bilirubin

Factors that were found independently associated with development of fever during neutropenia in multivariable analyses of either the majority of studies or the majority of patients in studies testing that risk factor

Ann Hematol. 2021; 100(6): 1603–1620. PMCID: PMC8116237
Published online 2021 Apr 13. doi: 10.1007/s00277-021-04452-9 PMID: 33846857

Primary prophylaxis of bacterial infections and *Pneumocystis jirovecii* pneumonia in patients with hematologic malignancies and solid tumors: 2020 updated guidelines of the Infectious Diseases Working Party of the German Society of Hematology and Medical Oncology (AGIHO/DGHO)

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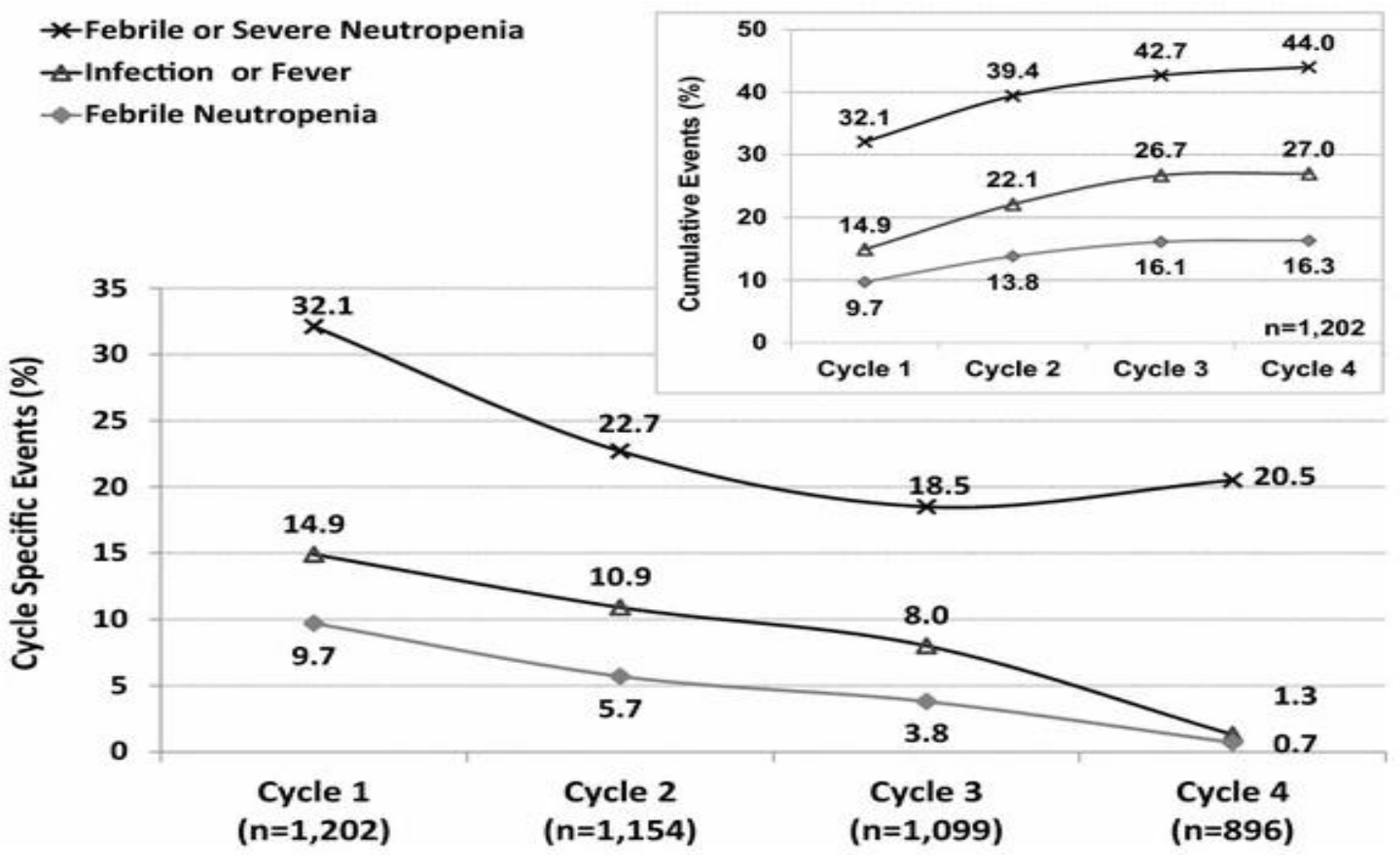
Home › Supportive Care in Cancer › Article

Incidence of febrile neutropenia in early stage breast cancer patients receiving adjuvant FEC-D treatment

Original Article | Published: 05 July 2014
Volume 22, pages 3227–3234, (2014) Cite this article



Neutropenic and infectious events during first 4 cycles. Cycle specific events and cumulative events are presented.

Predisposing factors for bloodstream infections in neutropenic and non-neutropenic patients within 48 h before bloodstream infection

Factor	No. (%) of patients			OR (95% CI)	P^a
	ANC, neutrophils/μL				
	<1000 (n = 696)	⩾1000 (n = 1644)	Total (n = 2340)		
Central venous line present	626 (89.9)	1319 (80.2)	1945 (83.1)	2.2 (1.66–2.93)	<.001
Peripheral intravenous line present	97 (13.9)	378 (23.0)	475 (20.3)	1.8 (1.44–2.37)	<.001
Arterial line present	18 (2.6)	60 (3.6)	78 (3.3)	0.7 (0.39–1.23)	.24
Urinary catheter present	83 (11.9)	381 (23.2)	464 (19.8)	2.2 (1.71–2.90)	<.001
Receipt of total parenteral nutrition	112 (16.1)	316 (19.2)	428 (18.3)	0.8 (0.63–1.03)	.08
Dialysis performed	5 (0.7)	43 (2.6)	48 (2.1)	3.7 (1.40–10.69)	.005
Stay in intensive care unit	48 (6.9)	223 (13.6)	271 (11.6)	2.1 (1.51–2.97)	<.001
Receipt of ventilator support	27 (3.9)	118 (7.2)	145 (6.2)	1.9 (1.23–3.01)	.003

NOTE. ANC, absolute neutrophil count.

[a] Patients with an ANC of <1000 neutrophils/μL vs. those with an ANC of ⩾1000 neutrophils/μL.

JOURNAL ARTICLE

Current Trends in the Epidemiology of Nosocomial Bloodstream Infections in Patients with Hematological Malignancies and Solid Neoplasms in Hospitals in the United States FREE

Hilmar Wisplinghoff ✉, Harald Seifert, Richard P. Wenzel, Michael B. Edmond

Clinical Infectious Diseases, Volume 36, Issue 9, 1 May 2003, Pages 1103–1110,

The NEW ENGLAND JOURNAL of MEDICINE

Prophylaxis

G-CSF

- Risk of febrile neutropenia > 20%
- Risk of febrile neutropenia 10 – 20% with associated risk factor such as
  - ≥ 65 years
  - coexisting illness (renal, hepatic or cardiac dysfunction)
  - preexisting condition (infection, open wound or recent surgery)
  - compromised marrow reserve

CLINICAL THERAPEUTICS

Colony-Stimulating Factors for Febrile Neutropenia during Cancer Therapy

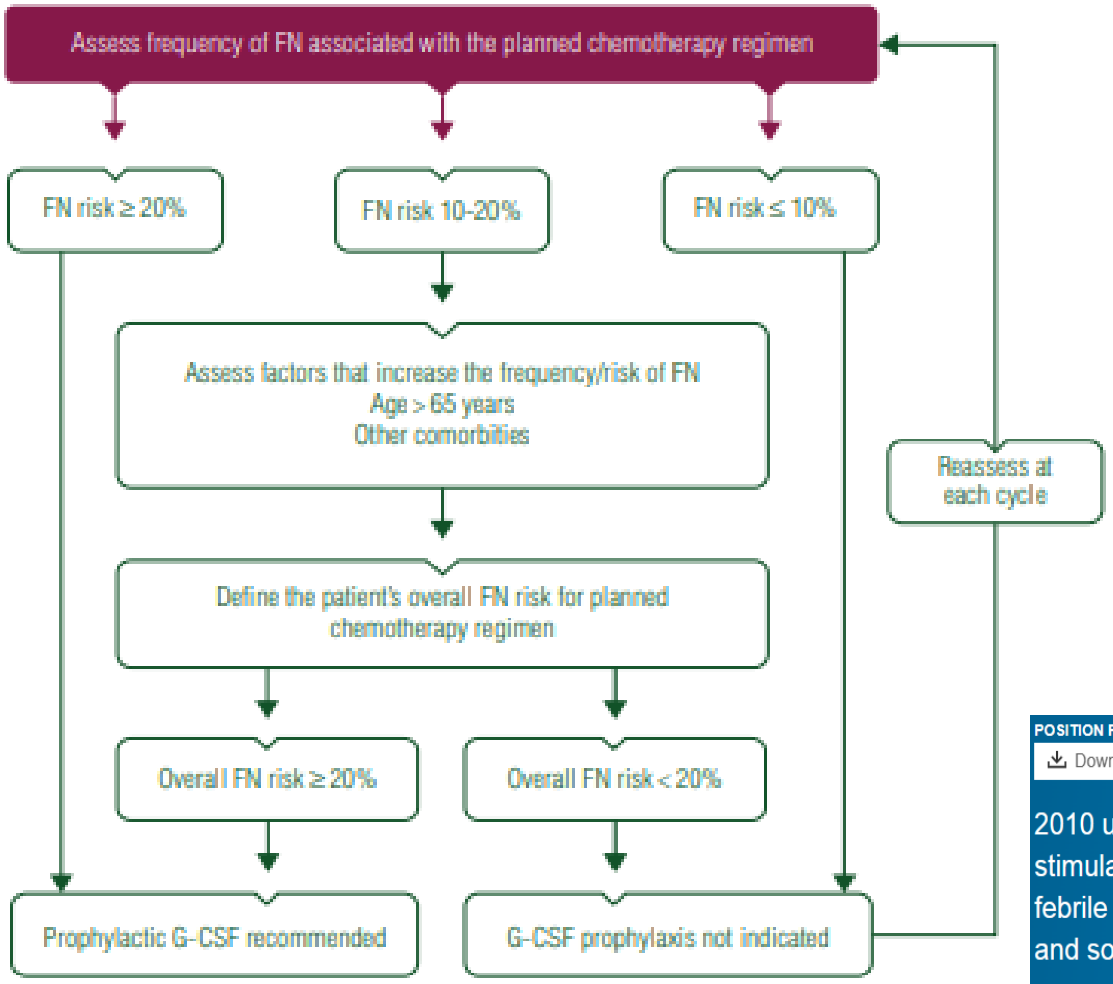
This article has been corrected. VIEW THE CORRECTION

Authors: Charles L. Bennett, M.D., Ph.D., Benjamin Djulbegovic, M.D., Ph.D., LeAnn B. Norris, Pharm.D., and James O. Armitage, M.D. Author Info & Affiliations

Published March 21, 2013 | N Engl J Med 2013;368:1131-1139 | DOI: 10.1056/NEJMct1210890 | VOL. 368 NO. 12

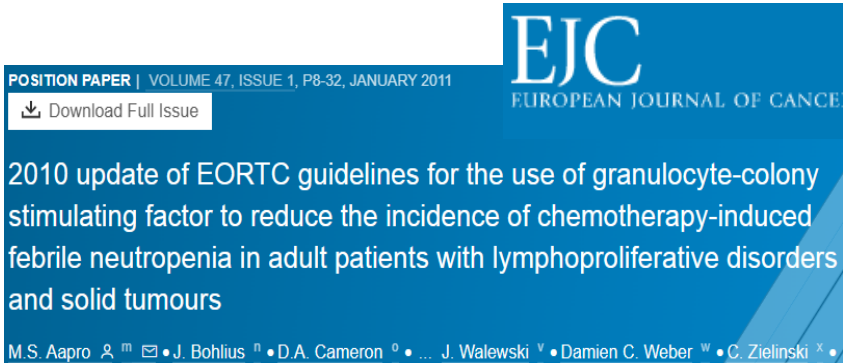
indications for primary prophylaxis of FN with G-CSF

Several meta-analyses indicate that primary prophylaxis with GCSF (i.e. G-CSF administered immediately after cycle 1 of ChT) reduces the risk of FN by at least 50%



Most guidelines recommend that G-CSF be administered prophylactically if the risk of FN is >20% for all planned cycles of treatment

Algorithm to decide primary prophylactic granulocyte colonystimulating factor usage, adapted from European Organisation for Research and Treatment of Cancer guidelines. FN, febrile neutropaenia; G-CSF, granulocyte colony-stimulating factor.



The NEW ENGLAND JOURNAL of MEDICINE

Prophylaxis

G-CSF

Filgrastim 5 µg/kg/day per subcutaneous injection starting 24-72 hours after chemotherapy until count recovery

Pegfilgrastim 6 mg subcutaneous once 24 hours after discontinuation of chemotherapy

CLINICAL THERAPEUTICS

Colony-Stimulating Factors for Febrile Neutropenia during Cancer Therapy

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Authors: Charles L. Bennett, M.D., Ph.D., Benjamin Djulbegovic, M.D., Ph.D., LeAnn B. Norris, Pharm.D., and James O. Armitage, M.D. Author Info & Affiliations

Published March 21, 2013 | N Engl J Med 2013;368:1131-1139 | DOI: 10.1056/NEJMct1210890 | VOL. 368 NO. 12

FREE ACCESS | ASCO SPECIAL ARTICLES | January 14, 2013

Antimicrobial Prophylaxis and Outpatient Management of Fever and Neutropenia in Adults Treated for Malignancy: American Society of Clinical Oncology Clinical Practice Guideline

Authors: Christopher R. Flowers, Jerome Seidenfeld, Eric J. Bow, Clare Karten, Charise Gleason, Douglas K. Hawley, Nicole M. Kuderer, Amelia A. Langston, Kieren A. Marr, Kenneth V.I. Rolston, and Scott D. Ramsey | AUTHORS INFO & AFFILIATIONS

Publication: Journal of Clinical Oncology • Volume 31, Number 6 • https://doi.org/10.1200/JCO.2012.45.8661

Journal of Clinical Oncology
An American Society of Clinical Oncology Journal

Antibacterial Prophylaxis
Indications

- ***Anticipate ANC ≤ 100 cells/mm³ for > 7 days***

(most commonly HCT recipients and patients undergoing induction therapy for acute leukemia)

Levofloxacin 500 – 750 mg po/iv q24h
or
Ciprofloxacin 500-750 mg po/iv x 2/day

ORIGINAL ARTICLE

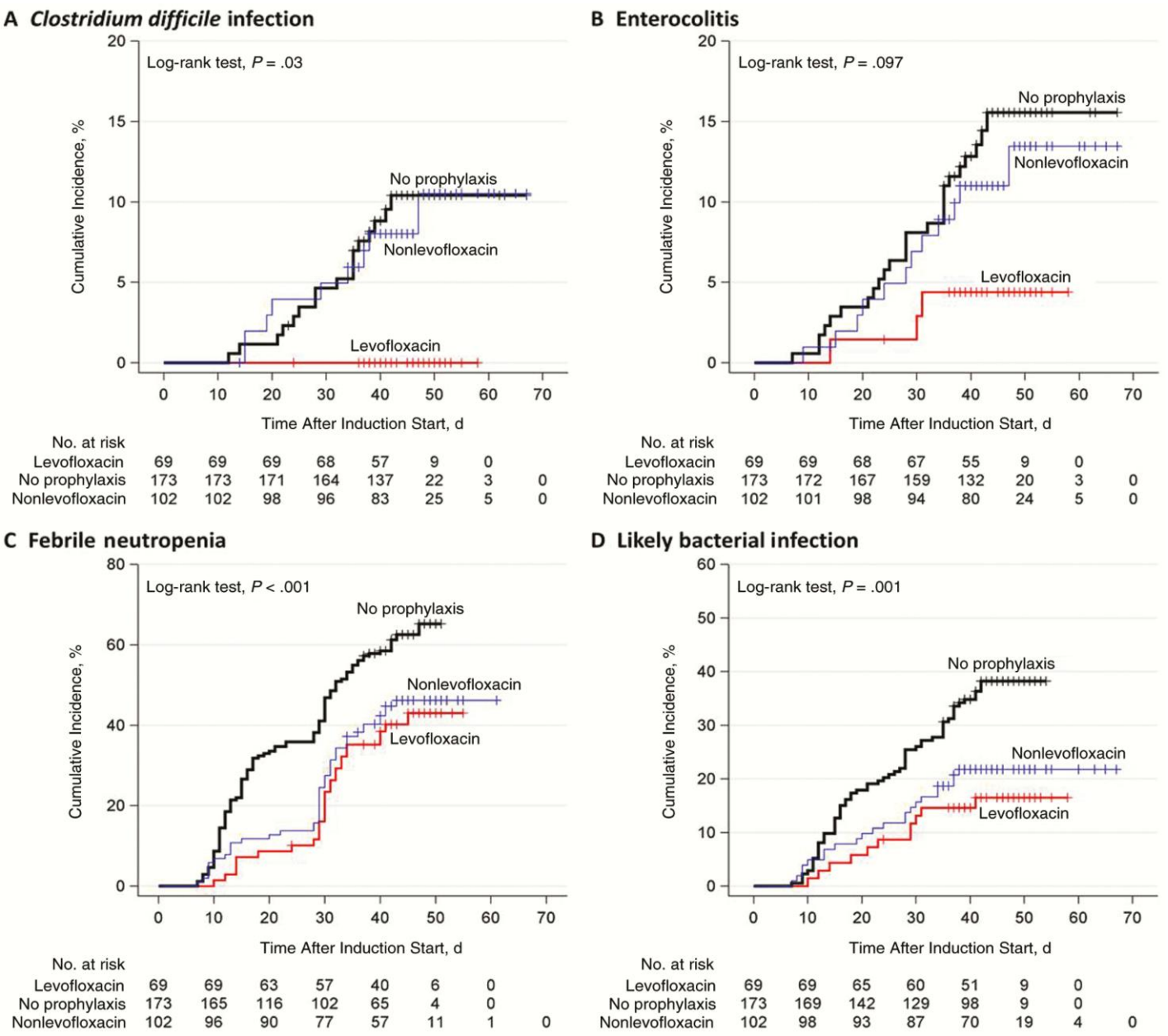
Levofloxacin to Prevent Bacterial Infection in Patients with Cancer and Neutropenia

Authors: Giampaolo Bucaneve, M.D., Alessandra Micozzi, M.D., Francesco Menichetti, M.D., Pietro Martino, M.D., M. Stella Dionisi, M.D., Giovanni Martinelli, M.D., Bernardino Allione, M.D., +13, for the Gruppo Italiano Malattie Ematologiche dell'Adulto (GIMEMA) Infection Program* Author Info & Affiliations

Published September 8, 2005 | N Engl J Med 2005;353:977-987 | DOI: 10.1056/NEJMoa044097

The NEW ENGLAND JOURNAL of MEDICINE

Kaplan-Meier analysis of time to infectious complications during induction for each antibiotic prophylaxis group.



Clin Infect Dis,
Volume 65, Issue 11, 1
December 2017

Anti-candidal Prophylaxis

Indications

Acute Leukemia undergoing intensive induction or reinduction

Allogenic HCT recipients until engraftment when mold-active prophylaxis is not felt to be indicated

Autologous HCT recipients with mucositis pre-engraftment

Fluconazole 400 mg po/iv q24h

until recovery of neutropenia

FREE ACCESS | ASCO SPECIAL ARTICLES | January 14, 2013

Journal of Clinical Oncology
An American Society of Clinical Oncology Journal

Antimicrobial Prophylaxis and Outpatient Management of Fever and Neutropenia in Adults Treated for Malignancy: American Society of Clinical Oncology Clinical Practice Guideline

Authors: Christopher R. Flowers, Jerome Seidenfeld, Eric J. Bow, Clare Karten, Charise Gleason, Douglas K. Hawley, Nicole M. Kuderer, Amelia A. Langston, Kieren A. Marr, Kenneth V.I. Rolston, and Scott D. Ramsey | AUTHORS INFO & AFFILIATIONS

Anti-candidal Prophylaxis

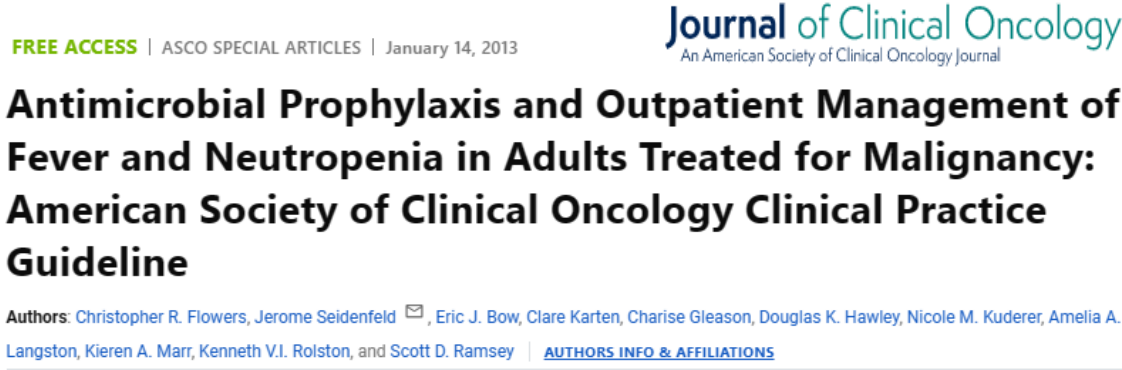
Caspofungin, Micafungin or Anidulafungin

Itraconazole 200 mg po x 2/day

Posaconazole 300 mg po daily

Voriconazole 200 mg po/iv x 2/day

Liposomal Amphotericin B 3-5 mg/kg/day iv



Anti-aspergillus Prophylaxis

Indications

Acute Myeloid Leukemia with neutropenia

Myelodysplastic Syndromes with neutropenia

Allogenic HCT recipients

Posaconazole 300 mg po daily

ORIGINAL ARTICLE

The NEW ENGLAND JOURNAL of MEDICINE

Posaconazole vs. Fluconazole or Itraconazole Prophylaxis in Patients with Neutropenia

Authors: Oliver A. Cornely, M.D., Johan Maertens, M.D., Drew J. Winston, M.D., John Perfect, M.D., Andrew J. Ullmann, M.D., Thomas J. Walsh, M.D., David Helfgott, M.D., +6, and David Angulo-Gonzalez, M.D.* Author Info & Affiliations

Published January 25, 2007 | **N Engl J Med 2007;356:348-359** | **DOI: 10.1056/NEJMoa061094** | **VOL. 356 NO. 4**

Anti-aspergillus Prophylaxis

Voriconazole 200 mg x 2/die

Itraconazole 200 mg x 2/die

Inhaled Amphotericin B 12.5 mg on 2 consecutive days/week

ORIGINAL ARTICLE

The NEW ENGLAND JOURNAL of MEDICINE

Posaconazole vs. Fluconazole or Itraconazole Prophylaxis in Patients with Neutropenia

Authors: Oliver A. Cornely, M.D., Johan Maertens, M.D., Drew J. Winston, M.D., John Perfect, M.D., Andrew J. Ullmann, M.D., Thomas J. Walsh, M.D., David Helfgott, M.D., +6, and David Angulo-Gonzalez, M.D.* Author Info & Affiliations

Published January 25, 2007 | **N Engl J Med 2007;356:348-359** | **DOI: 10.1056/NEJMoa061094** | **VOL. 356 NO. 4**

Antiviral Prophylaxis

Indications

HSV – seropositive patients

undergoing allogenic HCT

or

Induction for acute leukemia

Aciclovir 800 mg po x 2/die or Aciclovir 400 mg po x 4/die
or
Valacyclovir 500 mg po x 3/die or Famciclovir 250 mg po x 2/die

Clinical Infectious Diseases

JOURNAL ARTICLE GUIDELINES

Executive Summary: Clinical Practice Guideline for the Use of Antimicrobial Agents in Neutropenic Patients with Cancer: 2010 Update by the Infectious Diseases Society of America FREE

Alison G. Freifeld, Eric J. Bow, Kent A. Sepkowitz, Michael J. Boeckh, James I. Ito, Craig A. Mullen, Issam I. Raad, Kenneth V. Rolston, Jo-Anne H. Young, John R. Wingard

Clinical Infectious Diseases, Volume 52, Issue 4, 15 February 2011, Pages 427–431,

Antiviral Prophylaxis

Indications

Prevention of CMV in HSCT patients receiving an allogenic transplant

Risk factors:

R+ D-

T-cell depleted or cord blood transplants

GVHD

Prevention strategies include both prophylaxis and preemptive therapy

Antiviral Prophylaxis

Letermovir 480 mg iv or po q24h

Valganciclovir 900 mg po q24h

(beginning post-engraftment)

ORIGINAL ARTICLE

The NEW ENGLAND JOURNAL of MEDICINE

Letermovir Prophylaxis for Cytomegalovirus in Hematopoietic-Cell Transplantation

Authors: Francisco M. Marty, M.D., Per Ljungman, M.D., Ph.D., Roy F. Chemaly, M.D., M.P.H., Johan Maertens, M.D., Ph.D., Sanjeet S. Dadwal, M.D., Rafael F. Duarte, M.D., Ph.D., Shariq Haider, M.D., D.T.M.&H., +15, and Cyrus Badshah, M.D., Ph.D. Author Info & Affiliations

Published December 21, 2017 | N Engl J Med 2017;377:2433-2444 | DOI: 10.1056/NEJMoa1706640

Antiviral Prophylaxis

Letermovir was approved for the prevention of CMV infection following stem cell transplant

It is not active against HSV or VZV so addition of another agent for HSV/VZV prophylaxis is required

ORIGINAL ARTICLE

The NEW ENGLAND JOURNAL of MEDICINE

Letermovir Prophylaxis for Cytomegalovirus in Hematopoietic-Cell Transplantation

Authors: Francisco M. Marty, M.D., Per Ljungman, M.D., Ph.D., Roy F. Chemaly, M.D., M.P.H., Johan Maertens, M.D., Ph.D., Sanjeet S. Dadwal, M.D., Rafael F. Duarte, M.D., Ph.D., Shariq Haider, M.D., D.T.M.&H., +15, and Cyrus Badshah, M.D., Ph.D. Author Info & Affiliations

Published December 21, 2017 | N Engl J Med 2017;377:2433-2444 | DOI: 10.1056/NEJMoa1706640

Antiviral Prophylaxis

Valganciclovir prophylaxis was not superior to a preemptive strategy in preventing CMV infection post-HCT

Valganciclovir prophylaxis was associated with increase in use of hematopietic growth factors

Annals of Internal Medicine

Original Research | 6 January 2015

Valganciclovir for the Prevention of Complications of Late Cytomegalovirus Infection After Allogeneic Hematopoietic Cell Transplantation: A Randomized Trial

Authors: Michael Boeckh, MD, W. Garrett Nichols, MD, MS, Roy F. Chemaly, MD, MPH, Genovefa A. Papanicolaou, MD, John R. Wingard, MD, Hu Xie, MS, Karen L. Syrjala, PhD, Mary E.D. Flowers, MD, Terry Stevens-Ayers, MS, Keith R. Jerome, MD, PhD, and Wendy Leisenring, ScD | AUTHOR, ARTICLE, & DISCLOSURE INFORMATION

Journal of Antimicrobial Chemotherapy

JOURNAL ARTICLE

Drug-resistant cytomegalovirus in transplant recipients: a French cohort study FREE

Sébastien Hantz, Françoise Garnier-Geoffroy, Marie-Christine Mazeron, Isabelle Garrigue, Pierre Merville, Catherine Mengelle, Lionel Rostaing, Franck Saint Marcoux, Marie Essig, Jean-Philippe Rerolle ... Show more

Author Notes

Journal of Antimicrobial Chemotherapy, Volume 65, Issue 12, December 2010, Pages

Resistance demonstrated in 5% of transplant recipients receiving prophylaxis

Antibiotic and Antifungal Prophylaxis

Antibiotic prophylaxis is commonly followed in patients with hematologic malignancies and solid tumors who receive myeloablative therapy and develop profound neutropenia as well as in patients in the early post-transplant period

This approach has previously been shown to reduce the risk of all-cause mortality (RR, 0.52; 95% confidence interval [95% CI], 0.35-0.77)

CA CANCER J CLIN 2018;68:340–355

Update on Infection Control Practices in Cancer Hospitals

Ella J. Ariza-Heredia, MD [1]; Roy F. Chemaly, MD, MPH [2]

Most standard-dose ChT regimens are associated with 6–8 days of neutropaenia,

FN is observed in ~8 cases per 1000 patients receiving cancer ChT.

FN is responsible for considerable morbidity as 20%–30% of patients present complications that require in-hospital management, with an overall in-hospital mortality of ~10%.

The mean cost per hospitalisation in Western countries is ~13 500E (15 000 US$)

clinical practice guidelines

Annals of Oncology 27 (Supplement 5): v111–v118, 2016
doi:10.1093/annonc/mdw325

Management of febrile neutropaenia: ESMO Clinical Practice Guidelines†

J. Klastersky[1], J. de Naurois[2], K. Rolston[3], B. Rapoport[4], G. Maschmeyer[5], M. Aapro[6] & J. Herrstedt[7] on behalf of the ESMO Guidelines Committee*

The presence of a focal site of presumed infection (e.g. pneumonia, abscess, cellulitis) also makes the outcome worse.

Mortality varies according to the Multinational Association of Supportive Care in Cancer (MASCC) prognostic index: lower than 5% if the MASCC score is ≥21, but possibly as high as 40% if the MASCC score is <15

Table 1. MASCC febrile neutropaenia risk index

Characteristics	Score
Burden of illness: no or mild symptoms	5
Burden of illness: moderate symptoms	3
Burden of illness: severe symptoms	0
No hypotension (systolic BP > 90 mmHg)	5
No chronic obstructive pulmonary disease	4
Solid tumour/lymphoma with no previous fungal infection	4
No dehydration	3
Outpatient status (at onset of fever)	3
Age <60 years	2

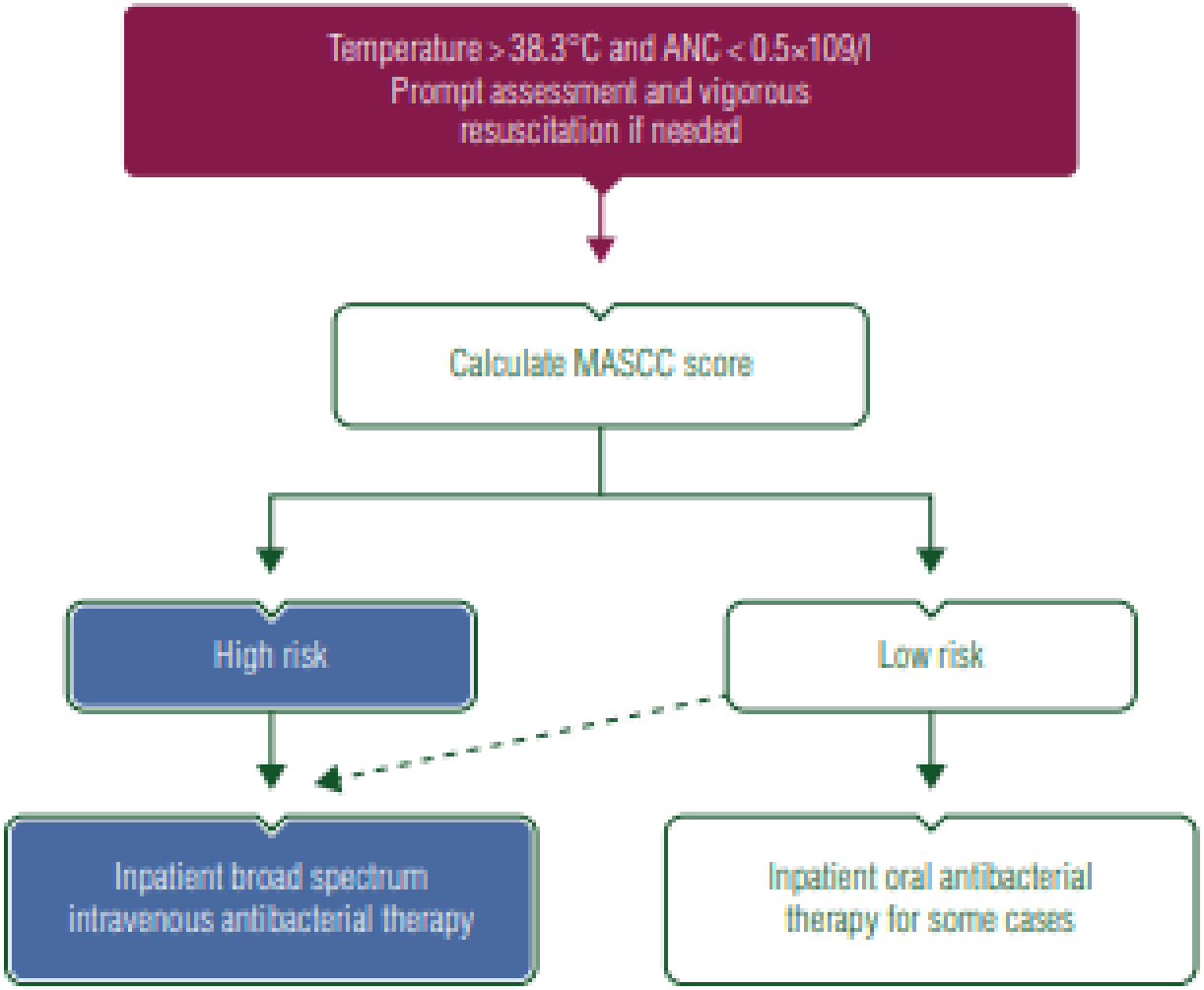
Journal of Clinical Oncology
An American Society of Clinical Oncology Journal

ORIGINAL REPORT | August 16, 2000

The Multinational Association for Supportive Care in Cancer Risk Index: A Multinational Scoring System for Identifying Low-Risk Febrile Neutropenic Cancer Patients

Authors: Jean Klastersky, Marianne Paesmans, Edward B. Rubenstein, Michael Boyer, Linda Elting, Ronald Feld, James Gallagher, Jorn Herrstedt, Bernardo Rapoport, Kenneth Rolston, and James Talcott for the Study Section on Infections of Multinational Association for Supportive Care in Cancer | AUTHORS INFO & AFFILIATIONS

Initial management of febrile neutropaenia



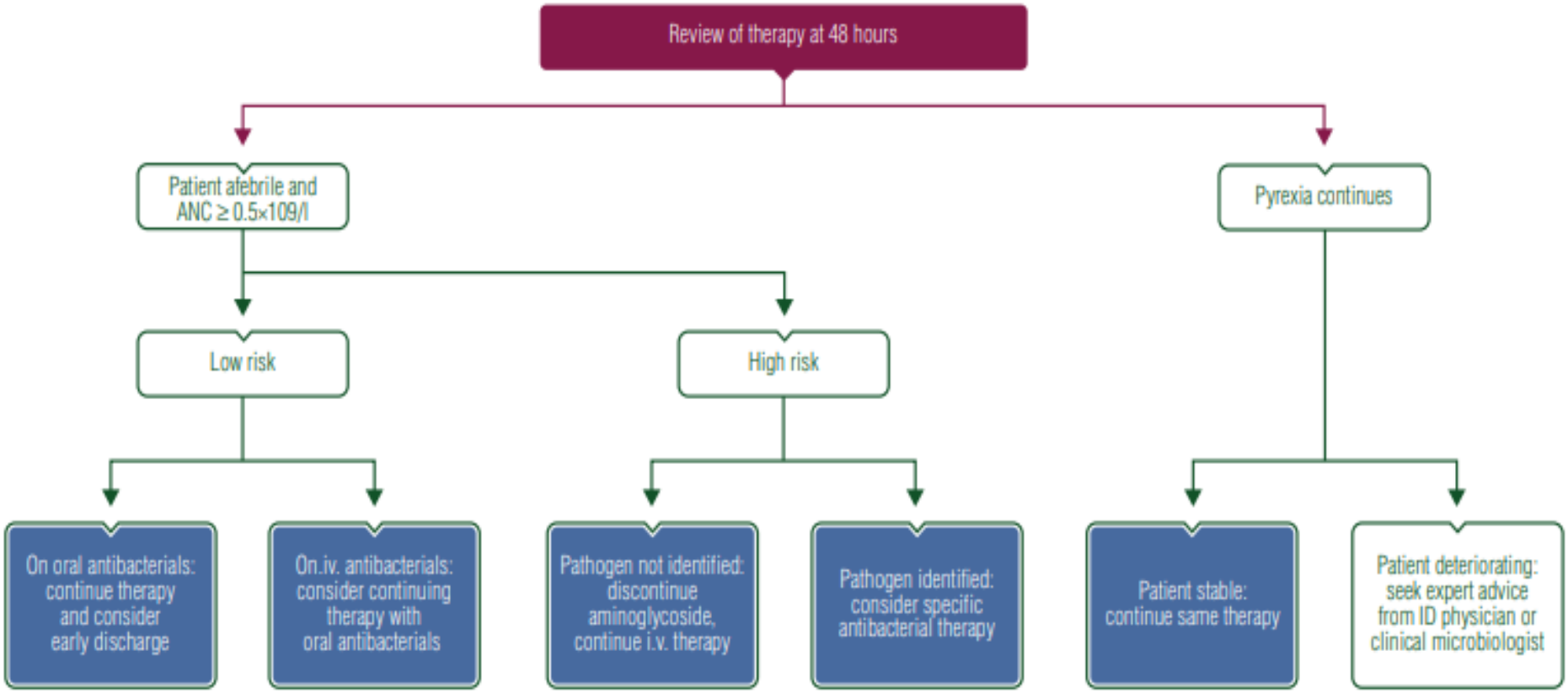
clinical practice guidelines

Annals of Oncology 27 (Supplement 5): v111–v118, 2016
doi:10.1093/annonc/mdw325

Management of febrile neutropaenia: ESMO Clinical Practice Guidelines†

J. Klastersky[1], J. de Naurois[2], K. Rolston[3], B. Rapoport[4], G. Maschmeyer[5], M. Aapro[6] & J. Herrstedt[7] on behalf of the ESMO Guidelines Committee*

Assessment of response and subsequent management



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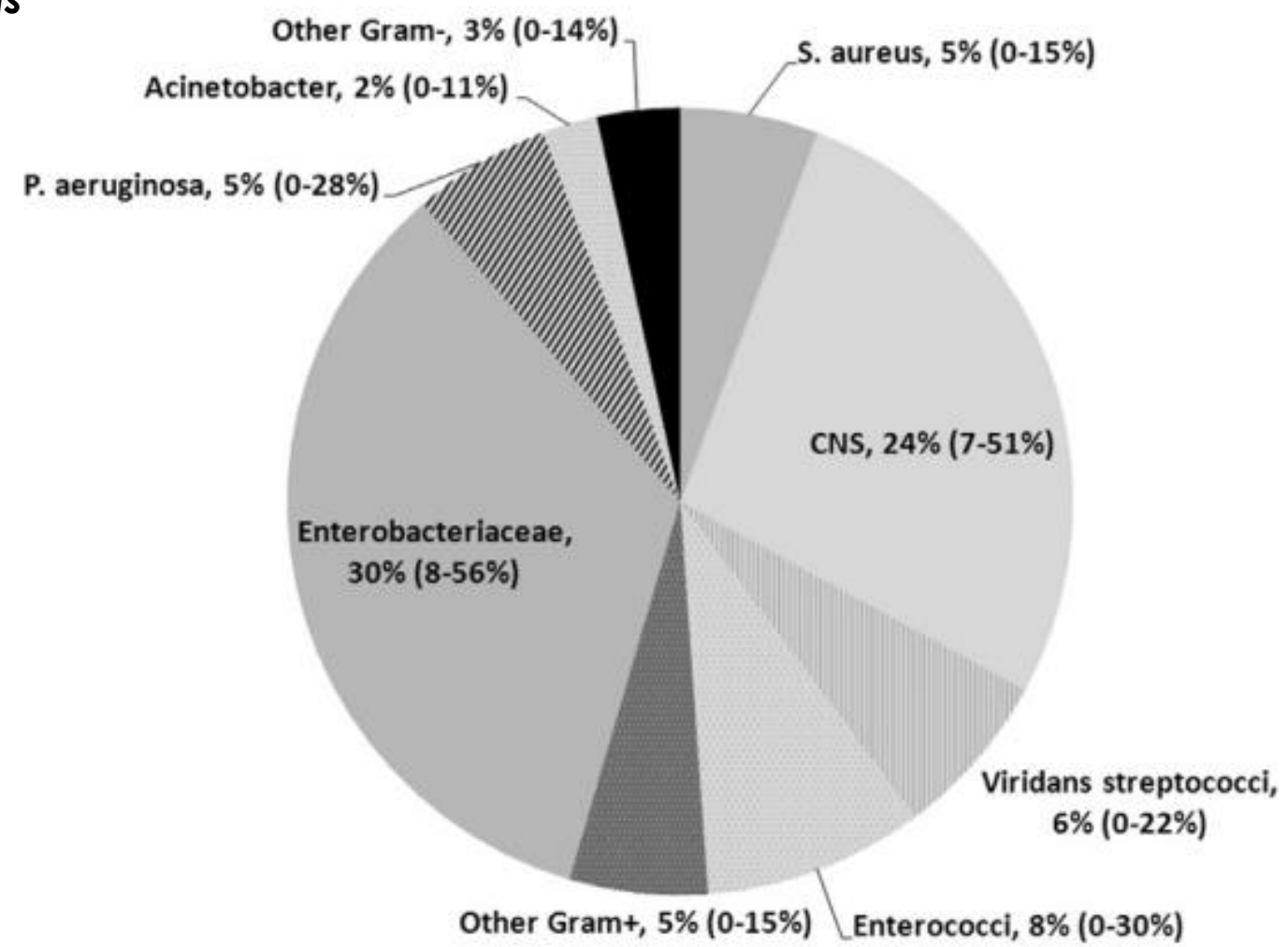
Spectrum of pathogens in infections of neutropenic patients



RESEARCH ARTICLE | VOLUME 68, ISSUE 4, P321-331, APRIL 2014
Download Full Issue
JOURNAL OF INFECTION

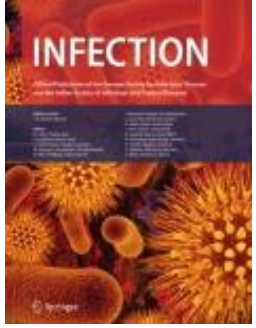
Aetiology and resistance in bacteraemias among adult and paediatric haematology and cancer patients

Małgorzata Mikulska • Claudio Viscoli • Christina Orasch • ... Catherine Cordonnier • Murat Akova
on behalf of the Fourth European Conference on Infections in Leukemia Group (ECIL-4), a joint venture of EBMT, EORTC, ICHS, ELN and ESGICH/ESCMID •

Aetiology of bacteraemias (median prevalence with range) reported in the ECIL-4 questionnaire survey. Notes: CNS,coagulase negative staphylococci

The current spectrum of infection in cancer patients with chemotherapy related neutropenia

Review | Published: 23 August 2013



The first administration of therapy should be given in the hospital within 1 h from the admission of a patient with FN.

Delay in antibiotic administration has been associated with significant prolongation of the hospital stay and increased mortality.

As already mentioned, the spectrum of infection in cancer patients is different from place to place and changes over time; therefore, paying attention to local epidemiology is crucial

clinical practice guidelines

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1 Note the presence of indwelling i.v. catheters
2 Symptoms or signs suggesting an infection focus:
  Respiratory system
  Gastrointestinal tract
  Skin
  Perineal region/genitourinary discharges
  Oropharynx
  Central nervous system
3 Knowledge of previous positive microbiology results by checking clinical records
4 Routine investigations:
  Urgent blood testing to assess bone marrow, renal and liver function
  Coagulation screen
  C-reactive protein
  Blood cultures (minimum of two sets) including cultures from indwelling i.v. catheter
  Urinalysis and culture[a]
  Sputum microscopy and culture[a]
  Stool microscopy and culture[a]
  Skin lesion (aspirate/biopsy/swab)
  Chest radiograph
5 Further investigations (profound/prolonger neutropaenia/following allografts)
  High-resolution chest CT (if pyrexial despite 72 h of appropriate antibiotics)
  Bronchoalveolar lavage

initial assessment and investigations

clinical practice guidelines

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Spectrum of pathogens in infections of neutropenic patients

Pathogen and studies	Type of resistance	Adults median rate of resistance (range)	Children median rate of resistance (range)
S. aureus	MRSA	56% (18–100%)[a]	0% (0–26%)[b]
CNS	MR-CNS	80% (33–100%)[c]	38% and 39%[d]
Enterococci	VRE	23% (0–50%)[e]	0%[f]
Gram-negatives	Fluoroquinolone-resistant	41% (18–74%)[g]	7% and 32%[t,h]
Gram-negatives	Carbapenem-resistant	20% (11–72%)[i]	9% and 10%[h]
Gram-negatives	Aminoglycoside-resistant	28% (6–41%)[j]	Gentamicin-resistant 26% (25–28%)[k]
Gram-negatives	Ceftazidime-resistant	43% (17–45%)[l]	18% and 27%[h]
Enterobacteriaceae	ESBL-producing	34% (16–44%)[m] + 42% of *E. coli*[n]	18%[o]
Enterobacteriaceae	Fluoroquinolone-resistant	56% (28–87%)[p] + 63% of *E. coli*[n]	4%[o]
P. aeruginosa	Fluoroquinolone-resistant	53% (7–72%)[q]	18%[r]
P. aeruginosa	Carbapenem-resistant	44% (3–66%)[s]	25%[r]

Median rates of resistance to different antibiotics in pathogens causing bacteraemias in haematology-oncology adults and children, based upon literature reports

RESEARCH ARTICLE | VOLUME 68, ISSUE 4, P321-331, APRIL 2014
Download Full Issue
JOURNAL OF INFECTION

Aetiology and resistance in bacteraemias among adult and paediatric haematology and cancer patients

Małgorzata Mikulska • Claudio Viscoli • Christina Orasch • ... Catherine Cordonnier • Murat Akova
on behalf of the Fourth European Conference on Infections in Leukemia Group (ECIL-4), a joint venture of EBMT, EORTC, ICHS, ELN and ESGICH/ESCMID •

Pathogen	No. (%) of patients, by year					
	1995 (n = 390)	1996 (n = 556)	1997 (n = 508)	1998 (n = 451)	1999 (n = 336)	2000 (n = 411)
Gram-positive organisms	241 (61.8)	339 (61.0)	267 (52.6)	251 (55.7)	201 (59.8)	312 (75.9)
Gram-negative organisms	84 (21.5)	154 (27.7)	145 (28.5)	164 (36.4)	100 (29.8)	59 (14.4)
Anaerobic organisms	7 (1.8)	13 (2.3)	48 (9.4)	10 (2.2)	8 (2.4)	6 (1.5)
Fungi	58 (14.9)	50 (9.0)	48 (9.4)	26 (5.8)	27 (8.0)	34 (8.3)

Pathogen	No. (%) of patients				
	ANC, neutrophils/μL				
	<1000 (n = 798)	⩾1000 (n = 1913)	Total (n = 2711)	OR (95% CI)	P[a]
Gram-positive organisms					
All	487 (61.0)	1152 (60.2)	1639 (60.5)	1.0 (0.87–1.23)	.7
CoNS	252 (31.6)	566 (29.6)	818 (30.2)	1.1 (0.91–1.32)	.3
Staphylococcus aureus	98 (12.3)	213 (11.1)	311 (11.5)	1.1 (0.86–1.45)	.4
Enterococci					
All	50 (6.3)	265 (13.9)	315 (11.6)	2.4 (1.74–3.34)	<.001
Enterococcus faecalis	25 (3.1)	100 (5.2)	125 (4.6)	1.7 (1.07–2.73)	.02
Enterococcus faecium	18 (2.3)	122 (6.4)	140 (5.2)	3.0 (1.75–5.04)	<.001
Streptococci					
All	73 (9.1)	90 (4.7)	163 (6.0)	2.0 (1.46–2.84)	<.001
VGS	23 (2.9)	15 (0.8)	38 (1.4)	1.9 (1.87–7.60)	<.001
Other	14 (1.8)	18 (0.9)	32 (1.2)	1.9 (0.88–3.99)	.1
Gram-negative organisms					
All	199 (24.9)	521 (27.2)	720 (26.6)	0.9 (0.73–1.08)	.2
Escherichia coli	58 (7.3)	148 (7.7)	206 (7.6)	0.9 (0.67–1.29)	.7
Klebsiella species	43 (5.4)	130 (6.8)	173 (6.4)	0.8 (0.54–1.13)	.2
Pseudomonas aeruginosa	29 (3.6)	90 (4.7)	119 (4.4)	0.8 (0.49–1.19)	.3
Enterobacter species	25 (3.1)	55 (2.9)	80 (3.0)	1.1 (0.66–1.81)	.8
Other Enterobacteriaceae	14 (1.8)	42 (2.2)	56 (2.1)	0.8 (0.41–1.49)	.5
Other gram-negative organisms	30 (3.8)	57 (3.0)	87 (3.2)	1.3 (0.79–2.04)	.4
Anaerobes	38 (4.8)	55 (2.9)	93 (3.4)	1.7 (1.08–2.63)	.02
Fungi					
All	74 (9.3)	185 (9.7)	259 (9.6)	0.9 (0.71–1.28)	.8
Candida species	69 (8.6)	161 (8.4)	230 (8.5)	1.0 (0.76–1.39)	.9
Other	5 (0.6)	23 (1.2)	28 (1.0)	0.5 (0.17–1.44)	.3

NOTE. ANC, absolute neutrophil count; CoNS, coagulase-negative staphylococci; VGS, viridans group streptococci.

[a] Patients with an ANC of <1000 neutrophils/μL vs. those with an ANC of ⩾1000 neutrophils/μL.

JOURNAL ARTICLE

Current Trends in the Epidemiology of Nosocomial Bloodstream Infections in Patients with Hematological Malignancies and Solid Neoplasms in Hospitals in the United States FREE

Hilmar Wisplinghoff ✉, Harald Seifert, Richard P. Wenzel, Michael B. Edmond

Clinical Infectious Diseases, Volume 36, Issue 9, 1 May 2003, Pages 1103–1110,

Duration of therapy

If the ANC is ≥0.5 × 109 /l, the patient is asymptomatic and has been afebrile for 48 h and blood cultures are negative, antibacterials can be discontinued.

If the ANC is ≤0.5 × 109 /l, the patient has suffered no complications and has been afebrile for 5–7 days, antibacterials can be discontinued except in certain high-risk cases with acute leukaemia and following high-dose ChT when antibacterials are often continued for up to 10 days, or until the ANC is ≥0.5 × 109 /l.

Patients with persistent fever despite neutrophil recovery should be assessed by an ID physician or clinical microbiologist and antifungal therapy considered.

clinical practice guidelines

Annals of Oncology 27 (Supplement 5): v111–v118, 2016
doi:10.1093/annonc/mdw325

Management of febrile neutropaenia: ESMO Clinical Practice Guidelines†

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Contemp Intern Med. 1995 Jan;7(1):35-7, 41-5.

Fever and neutropenia: still a challenge

M J DiNubile [1]

Clinic in Oncohematologic Patients

Early detection of infections is essential in cancer patients. Clinical signs of infection might be vague, especially in neutropenic patients, but fever remains an early, although non-specific, sign of infection

Approximately 50–60% of patients who became febrile have an underlying infection

However, non-infectious causes of fever, including paraneoplastic etiology (neoplastic fever) and drug reactions, are not rare in cancer patients

Home › Supportive Care in Cancer › Article

Neoplastic fever: a neglected paraneoplastic syndrome

Review Article | Published: 29 April 2005

REVIEW ARTICLE | DRUG THERAPY

The NEW ENGLAND JOURNAL of MEDICINE

Management of Fever in Patients with Cancer and Treatment-Induced Neutropenia

Author: Philip A. Pizzo Author Info & Affiliations

Published May 6, 1993 | N Engl J Med 1993;328:1323-1332 | DOI: 10.1056/NEJM199305063281808

Cancer. 2001 Nov 1;92(9):2399-405.
doi: 10.1002/1097-0142(20011101)92:9<2399::aid-cncr1588>3.0.co;2-w.

Tumor-related leukocytosis is linked with poor prognosis in patients with lung carcinoma

I Kasuga [1], S Makino, H Kiyokawa, H Katoh, Y Ebihara, K Ohyashiki

Moreover, laboratory markers of infection, including elevated C-reactive protein and leukocytosis, are frequently present in cancer patients

Front Immunol. 2020; 11: 595835.
Published online 2020 Nov 19. doi: 10.3389/fimmu.2020.595835

frontiers in Immunology

C-Reactive Protein and Cancer—Diagnostic and Therapeutic Insights

Peter C. Hart, * Ibraheem M. Rajab, May Alebraheem, and Lawrence A. Potempa *

Making the diagnosis of infection challenging.

In such circumstances, additional markers such as procalcitonin can be used

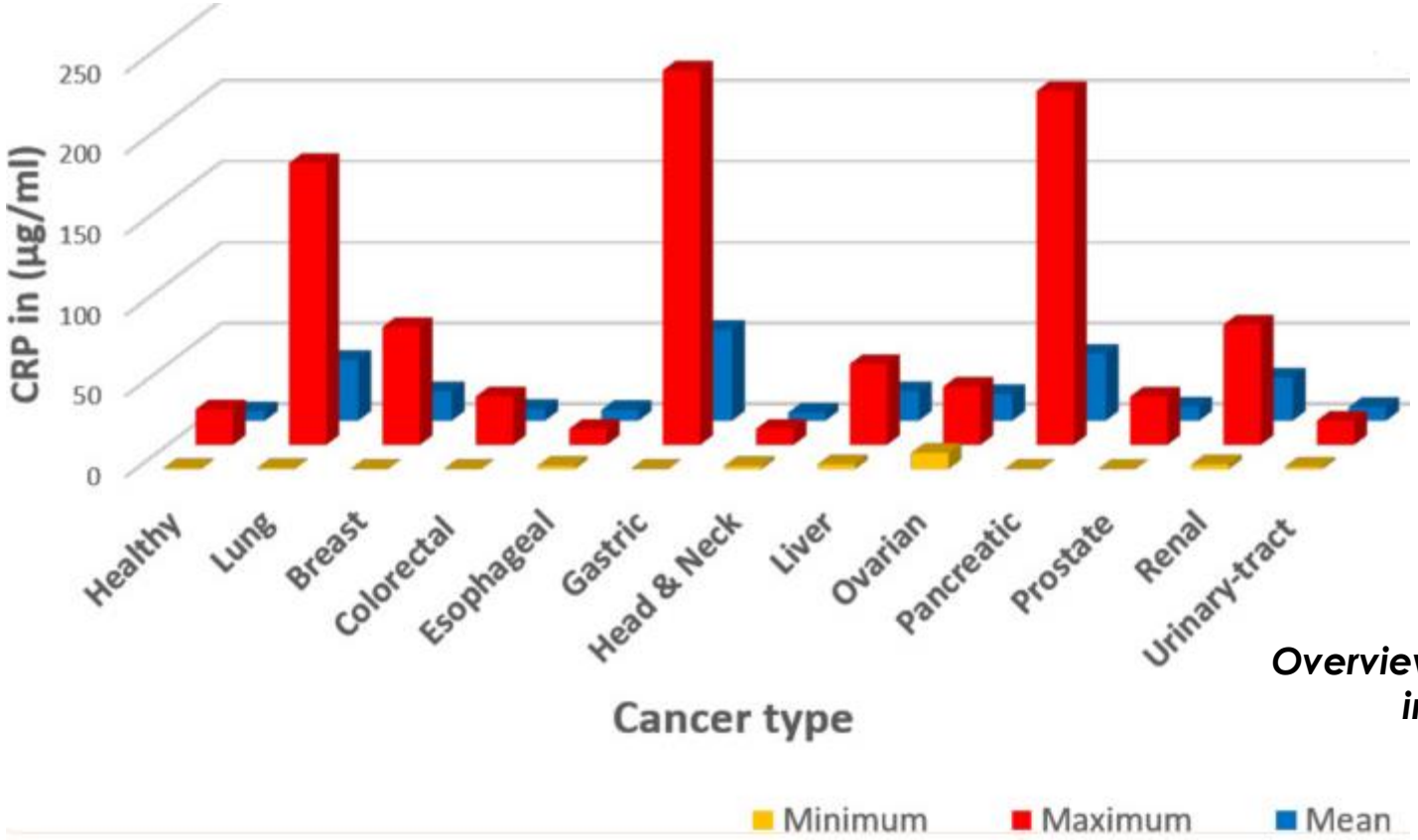
Front Immunol. 2020; 11: 595835.
Published online 2020 Nov 19. doi: 10.3389/fimmu.2020.595835

frontiers in Immunology

C-Reactive Protein and Cancer—Diagnostic and Therapeutic Insights

Peter C. Hart, * Ibraheem M. Rajab, May Alebraheem, and Lawrence A. Potempa *

A comprehensive review of the literature on the diagnostic significance and therapeutic value of CRP blood levels in cancer proved to be problematic. Reported CRP levels varied from <1 µg/ml to more than 175 µg/ml and were most often reported with reference to the tissues affected with cancerous growths (e.g. lung, breast, gastrointestinal, esophageal, head and neck, sexual and reproductive organs, renal, pancreas, and blood)



Overview of CRP values reported in various cancers

It achieves a risk reduction to overestimate an infection status of 23.4%.

It supports the clinic usefulness of serum PCT dosage in febrile advanced solid tumor patients.

A PCT cut-off of 1.52 ng/dL could be helpful in the management of the antibiotic therapy preventing delays of oncologic treatments.

nature › scientific reports › articles › article

scientific reports

Article | Open access | Published: 17 June 2016

Procalcitonin as diagnostic marker of infection in solid tumors patients with fever

B. Vincenzi, I. Fioroni, F. Pantano, S. Angeletti, G. Dicuonzo, A. Zoccoli, D. Santini & G. Tonini

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nature › scientific reports › articles › article

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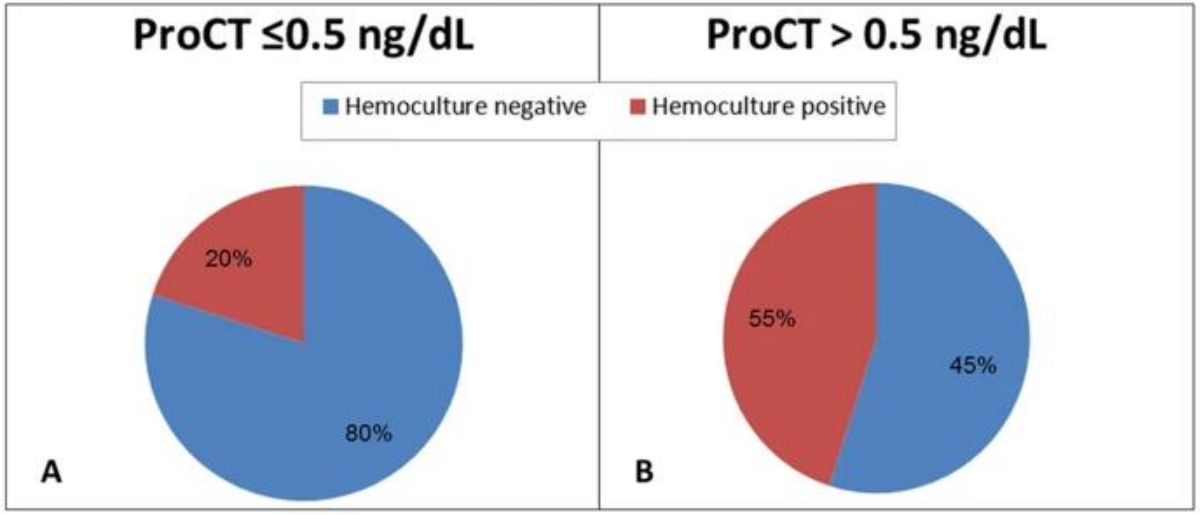
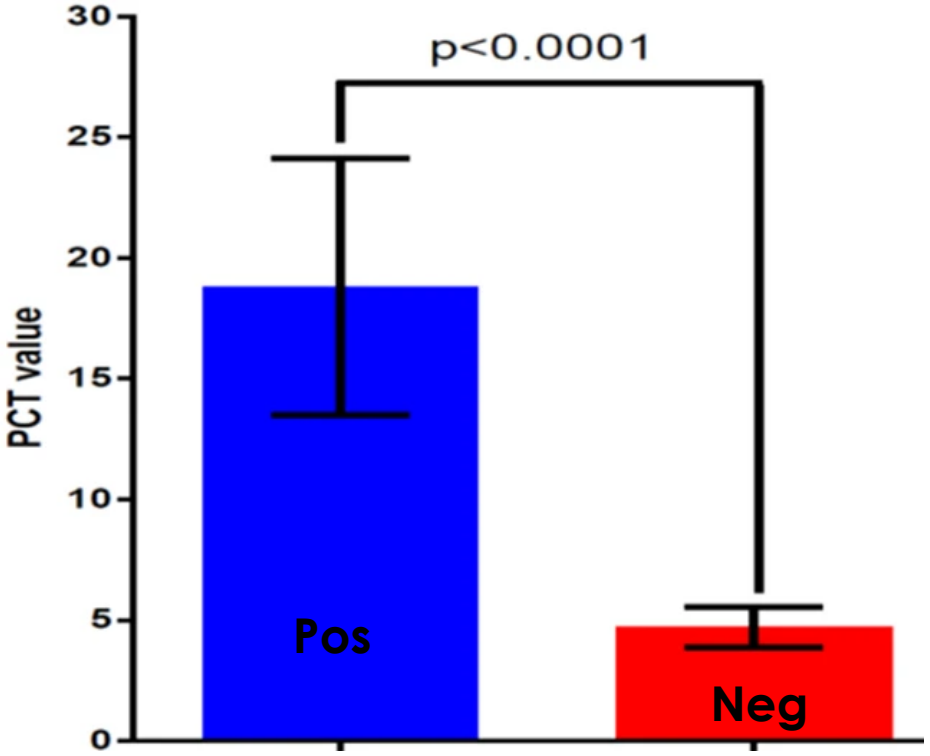
(A) Hemoculture stratification for PCT ≤0.5 ng/dL patients;

(B) Hemoculture stratification for PCT >0.5 ng/dL patients



Non parametric Mann-Whitney test results describing difference between hemoculture positive vs. hemoculture negative population



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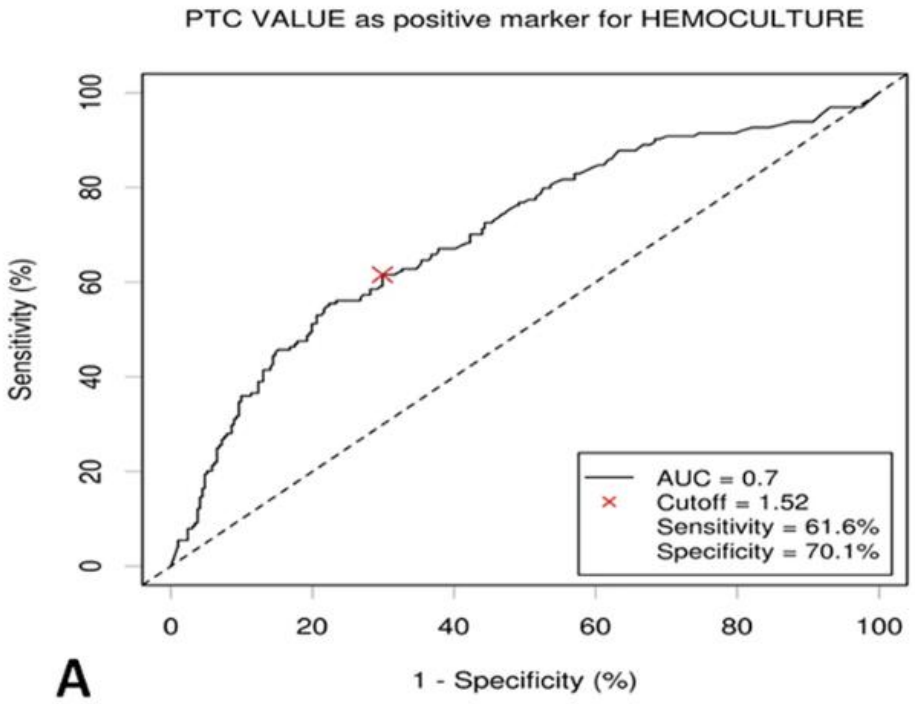
scientific reports

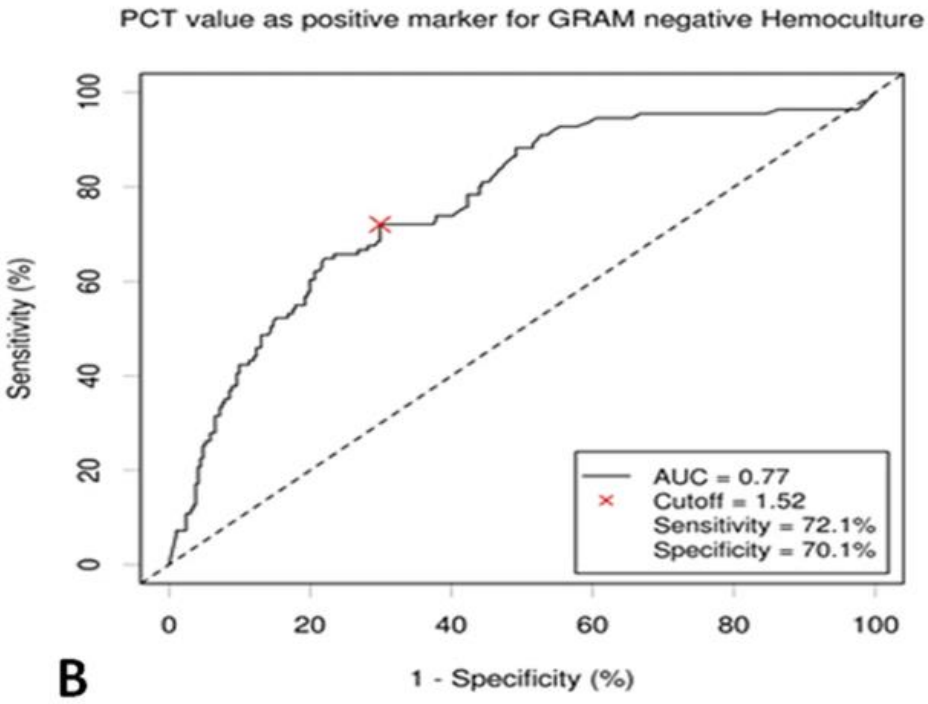
Article | Open access | Published: 17 June 2016

Procalcitonin as diagnostic marker of infection in solid tumors patients with fever

B. Vincenzi, I. Fioroni, F. Pantano, S. Angeletti, G. Dicuonzo, A. Zoccoli, D. Santini & G. Tonini

The following analysis showed that patients with a positive hemoculture mostly presented a Gram-negative bacteria infection (130 patients (72%)) and only 45 patients (24.8%) had a Gram-positive bacteria infection and only 6 patients (3.3%) showed a funginemia





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Article | Open access | Published: 17 June 2016

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(A) ROC curve for various cut-off levels of PCT in differentiating patients with positive and negative hemoculture;

(B) ROC curve analysis of sensitivity and specificity for the Gram-negative bacteria patients' group.

Central Venous Catheters

Central venous catheters (CVCs) are widely used in cancer patients and offer benefits to those who receive chemotherapy.

However, the presence of CVCs is considered a risk factor for infections in cancer patients and may affect the etiology of bacteremia

The incidence of CVC-associated bloodstream infections in cancer patients is estimated to be 0.5–10 per 1000 CVC days, with mortality ranging from 12% to 40%

Home › Annals of Hematology › Article

Central venous catheter–related infections in hematology and oncology: 2020 updated guidelines on diagnosis, management, and prevention by the Infectious Diseases Working Party (AGIHO) of the German Society of Hematology and Medical Oncology (DGHO)

Original Article | Open access | Published: 30 September 2020

REVIEW ARTICLE

Rates of infection for single-lumen versus multilumen central venous catheters: A meta-analysis

Dezfulian, Cameron MD; Lavelle, James MD; Nallamothu, Brahmajee K. MD, MPH; Kaufman, Samuel R. MA; Saint, Sanjay MD, MPH

Author Information

Critical Care Medicine 31(9):p 2385-2390, September 2003. | *DOI:* 10.1097/01.CCM.0000084843.31852.01

Critical Care Medicine

Society of Critical Care Medicine

The Intensive Care Professionals

Central Venous Catheters

A recent meta-analysis found a significantly higher risk of infectious complications in the PICC groups (RR 3.43; 95% CI 2.58–4.56; P < 0.05).

Both the local infections of punctures and catheter-related infections were more frequent in patients with PICCs

In addition, infection complications are more frequent in multi-lumen CVCs than in single-lumen CVCs

Complications and Costs of Peripherally Inserted Central Venous Catheters Compared With Implantable Port Catheters for Cancer Patients

A Meta-analysis

Pu, Ya-Lou MS, RN; Li, Zhuang-Shuang MS, RN; Zhi, Xiao-Xu MS, RN; Shi, Yi-An MMedSc, RN; Meng, Ai-Feng BSN, RN; Cheng, Fang MS, RN; Ali, Ali MD; Li, Cheng MS, RN; Fang, Hong MS, RN; Wang, Cheng MD

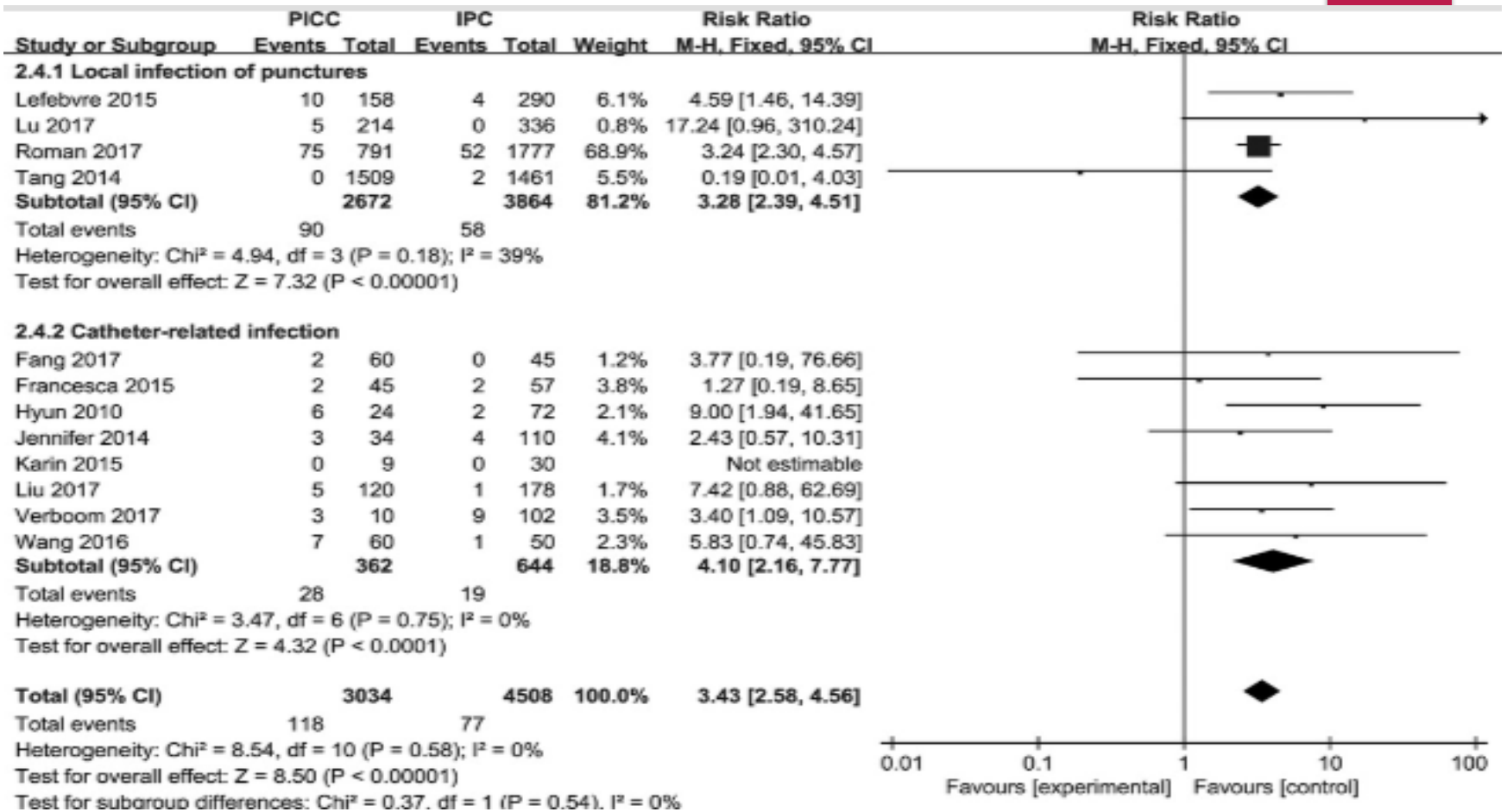
Author Information

Cancer Nursing 43(6):p 455-467, 11/12 2020. |

CANCER NURSING

An International Journal for Cancer Care Research

Forest plot of meta-analysis comparing the infection complications between PICC and IPC



Study or Subgroup	PICC Events	PICC Total	IPC Events	IPC Total	Weight	Risk Ratio M-H, Fixed, 95% CI
2.4.1 Local infection of punctures						
Lefebvre 2015	10	158	4	290	6.1%	4.59 [1.46, 14.39]
Lu 2017	5	214	0	336	0.8%	17.24 [0.96, 310.24]
Roman 2017	75	791	52	1777	68.9%	3.24 [2.30, 4.57]
Tang 2014	0	1509	2	1461	5.5%	0.19 [0.01, 4.03]
Subtotal (95% CI)		**2672**		**3864**	**81.2%**	**3.28 [2.39, 4.51]**
Total events	90		58			
Heterogeneity: Chi² = 4.94, df = 3 (P = 0.18); I² = 39%						
Test for overall effect: Z = 7.32 (P < 0.00001)						
2.4.2 Catheter-related infection						
Fang 2017	2	60	0	45	1.2%	3.77 [0.19, 76.66]
Francesca 2015	2	45	2	57	3.8%	1.27 [0.19, 8.65]
Hyun 2010	6	24	2	72	2.1%	9.00 [1.94, 41.65]
Jennifer 2014	3	34	4	110	4.1%	2.43 [0.57, 10.31]
Karin 2015	0	9	0	30		Not estimable
Liu 2017	5	120	1	178	1.7%	7.42 [0.88, 62.69]
Verboom 2017	3	10	9	102	3.5%	3.40 [1.09, 10.57]
Wang 2016	7	60	1	50	2.3%	5.83 [0.74, 45.83]
Subtotal (95% CI)		**362**		**644**	**18.8%**	**4.10 [2.16, 7.77]**
Total events	28		19			
Heterogeneity: Chi² = 3.47, df = 6 (P = 0.75); I² = 0%						
Test for overall effect: Z = 4.32 (P < 0.0001)						
Total (95% CI)		**3034**		**4508**	**100.0%**	**3.43 [2.58, 4.56]**
Total events	118		77			
Heterogeneity: Chi² = 8.54, df = 10 (P = 0.58); I² = 0%						
Test for overall effect: Z = 8.50 (P < 0.00001)						
Test for subgroup differences: Chi² = 0.37, df = 1 (P = 0.54), I² = 0%						

Central Venous Catheters

Complications and Costs of Peripherally Inserted Central Venous Catheters Compared With Implantable Port Catheters for Cancer Patients

A Meta-analysis

Pu, Ya-Lou MS, RN; Li, Zhuang-Shuang MS, RN; Zhi, Xiao-Xu MS, RN; Shi, Yi-An MMedSc, RN; Meng, Ai-Feng BSN, RN; Cheng, Fang MS, RN; Ali, Ali MD; Li, Cheng MS, RN; Fang, Hong MS, RN; Wang, Cheng MD

Author Information

Cancer Nursing 43(6):p 455-467, 11/12 2020. |

CANCER NURSING
An International Journal for Cancer Care Research

REVIEW | VOLUME 8, ISSUE 5, P265-274, MAY 2002 Download Full Issue

Catheter-related infections: diagnosis and intravascular treatment

E. Bouza • A. Burillo • P. Muñoz

CMI CLINICAL MICROBIOLOGY AND INFECTION

Most CVC infections originate from the skin flora (65%), catheter or catheter joints (30%), or other pathways (5%)

The most commonly detected pathogens causing CVC-related infections in cancer patients are
coagulase-negative staphylococci, followed by other gram-positive bacteria, including Staphylococcus aureus, enterococci, and streptococci

Home > Annals of Hematology > Article

Central venous catheter–related infections in hematology and oncology: 2020 updated guidelines on diagnosis, management, and prevention by the Infectious Diseases Working Party (AGIHO) of the German Society of Hematology and Medical Oncology (DGHO)

Original Article | Open access | Published: 30 September 2020

Central Venous Catheters

JOURNAL ARTICLE

Current Trends in the Epidemiology of Nosocomial Bloodstream Infections in Patients with Hematological Malignancies and Solid Neoplasms in Hospitals in the United States FREE

Hilmar Wisplinghoff ✉, Harald Seifert, Richard P. Wenzel, Michael B. Edmond

Clinical Infectious Diseases

Clinical Infectious Diseases, Volume 36, Issue 9, 1 May 2003, Pages 1103–1110,

Consensus guidelines for the diagnosis and management of invasive candidiasis in haematology, oncology and intensive care settings, 2021

Caitlin Keighley ✉, Louise Cooley, Arthur J. Morris, David Ritchie, Julia E. Clark, Peter Boan, Leon J. Worth, the Australasian Antifungal Guidelines Steering Committee

First published: 22 December 2021 | https://doi.org/10.1111/imj.15589 | Citations: 12

INTERNAL MEDICINE JOURNAL RACP Specialists. Together

Global Guideline for the Diagnosis and Management of Candidiasis:

An Initiative of the ECMM in Cooperation with ISHAM

ECMM

ISHAM INTERNATIONAL SOCIETY FOR HUMAN AND ANIMAL MYCOLOGY

Clinical Infectious Diseases

JOURNAL ARTICLE GUIDELINES

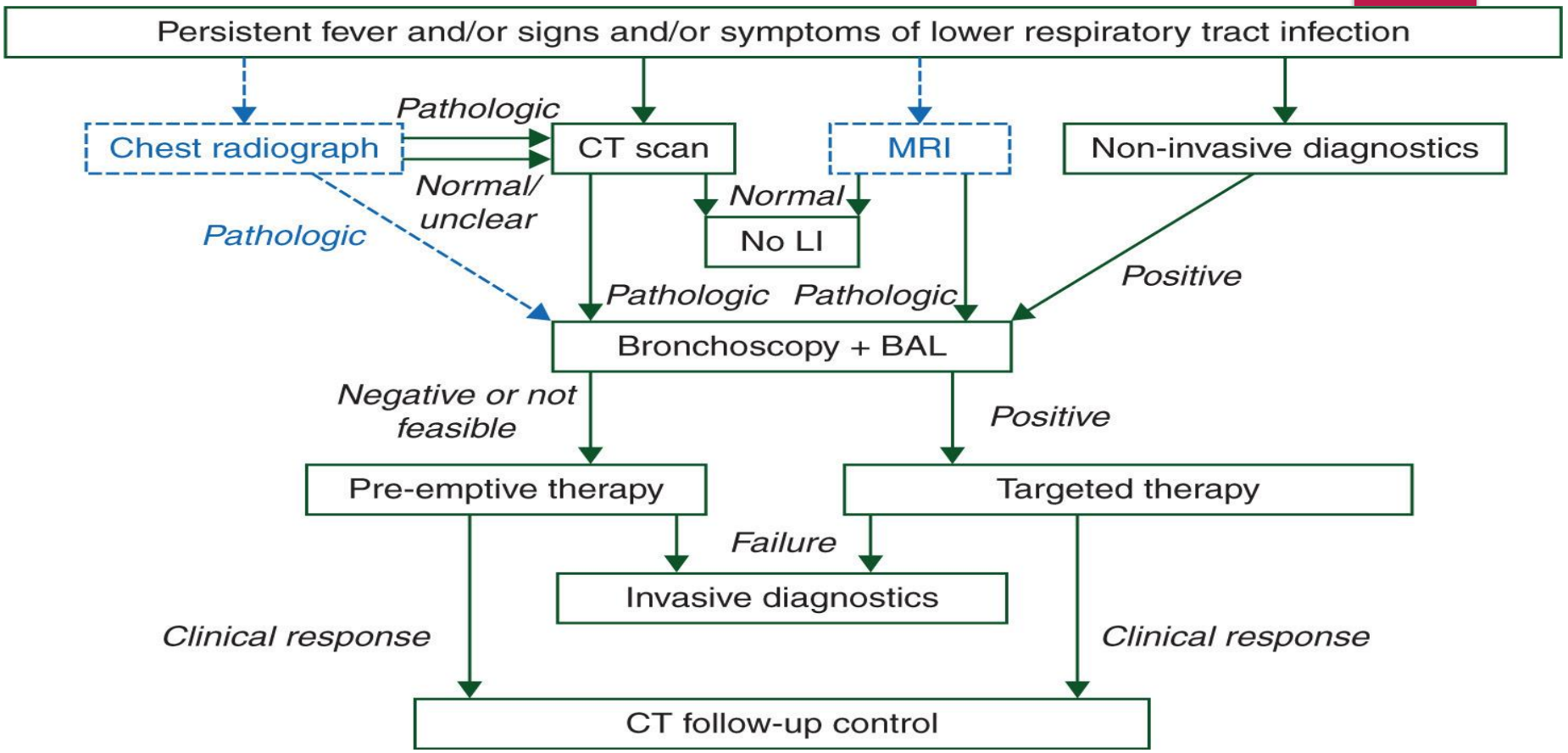
Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America

Peter G. Pappas, Carol A. Kauffman, David R. Andes, Cornelius J. Clancy, Kieren A. Marr, Luis Ostrosky-Zeichner, Annette C. Reboli, Mindy G. Schuster, Jose A. Vazquez, Thomas J. Walsh ... Show more

Clinical Infectious Diseases, Volume 62, Issue 4, 15 February 2016, Pages e1–e50, https://doi.org/10.1093/cid/civ933

Published: 16 December 2015 **Article history**

Diagnostic procedures and treatment of neutropenic patients with fever and suspected or proven lung infiltrates



REVIEWS | VOLUME 26, ISSUE 1, P21-33, JANUARY 2015
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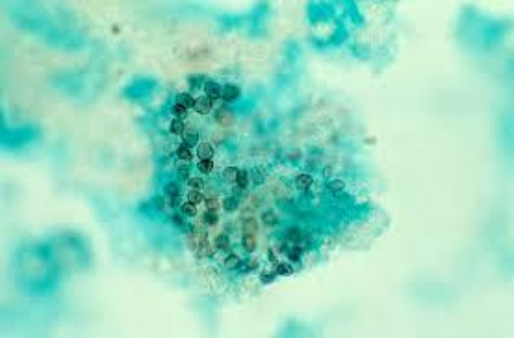
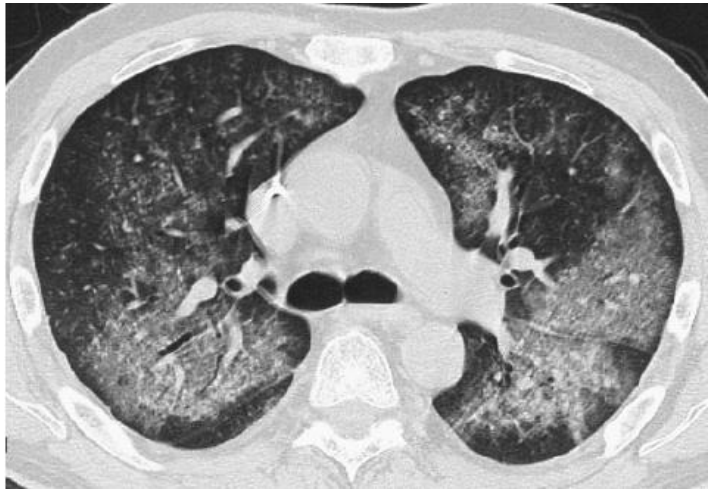
ANNALS OF ONCOLOGY
ESMO

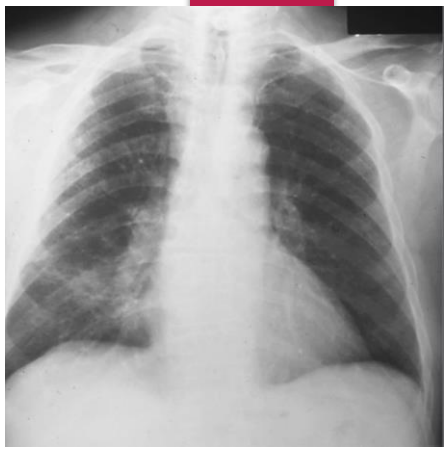
Diagnosis and antimicrobial therapy of lung infiltrates in febrile neutropenic patients (allogeneic SCT excluded): updated guidelines of the Infectious Diseases Working Party (AGIHO) of the German Society of Hematology and Medical Oncology (DGHO)†

G. Maschmeyer • J. Carratalà • D. Buchheidt • ... H. Salwender • M. Schmidt-Hieber • E. Azoulay •

Pneumocystis jirovecii



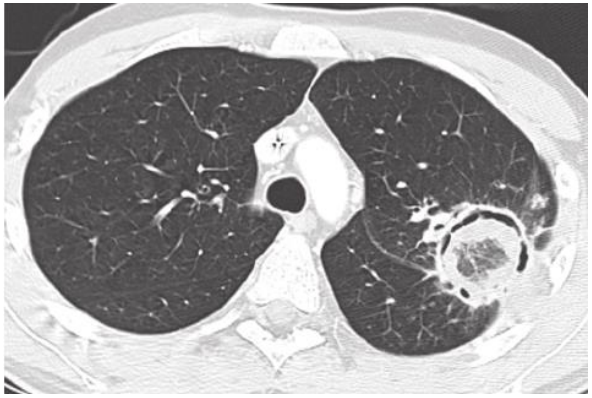


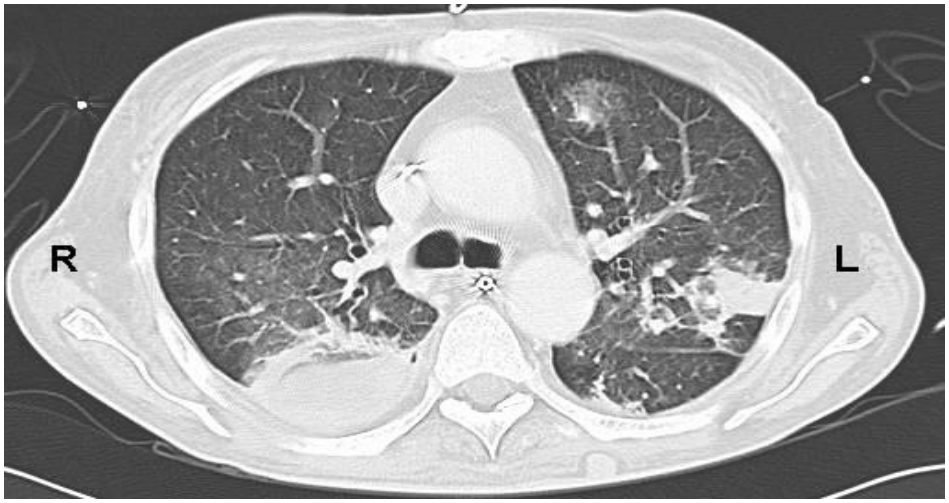


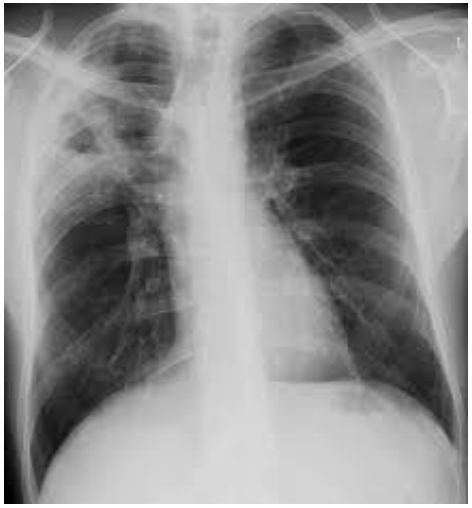
Recommendation		Guidelines (population)		
		CDC, NIH, HIVMA/IDSA (HIV) [12]	ECIL (hematology) [18]	American Society of Transplantation (SOT) [14]
Targeted Treatment	Population	HIV/AIDS patients with suspected/diagnosed PcP	Hematological malignancy, solid cancer, solid organ transplant, autoimmune/inflammatory conditions with suspected/diagnosed PcP	All SOT with suspected/diagnosed PcP
	Duration	3 weeks	A minimum of 14 days	At least 14 days, extended to 21 days for severe cases
	Therapy[a]	Frontline: Trimethoprim/sulfamethoxazole (15–20 mg/kg TMP; 75–100 mg/kg SMX per day) For moderate-to-severe disease (i.e. hypoxemia) adjunctive corticosteroids should be used Second line for severe disease: Primaquine and clindamycin (30 mg/(600mgx3)) per day Pentamidine IV (4 mg/kg/day) Second line for mild/moderate disease: Dapsone (100 mg daily) + trimethoprim (15 mg daily) Atovaquone (750 mg BID)	Frontline: Trimethoprim/sulfamethoxazole (15–20 mg/kg TMP; 75–100 mg/kg SMX per day) Second line: Primaquine and clindamycin (30 mg/(600mgx3)) per day Pentamidine IV (4 mg/kg/day)	Frontline: Trimethoprim/sulfamethoxazole (15–20 mg/kg TMP; 75–100 mg/kg SMX per day) with TMP administered by IV every 6–8 h. For hypoxemic patients potentially in combination with 40–60 mg of prednisolone (twice daily) Second line: IV Pentamidine (Initially 4 mg/kg/day over 1–2 h) Recipients of pancreas/islet transplants should receive an alternative second-line therapy.

Orozco-Ugarriza ME et al. Protocol for the systematic review of the Pneumocystis jirovecii-associated pneumonia in non-HIV immunocompromised patients. PLoS One. 2024 May.

Aspergillus spp.

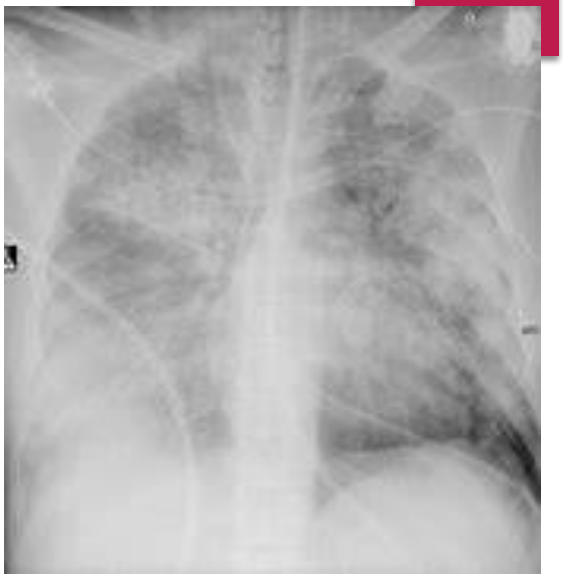


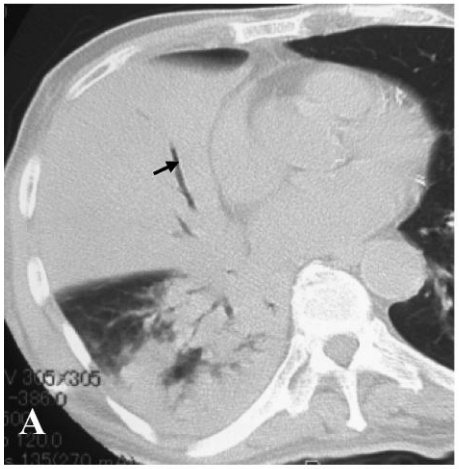


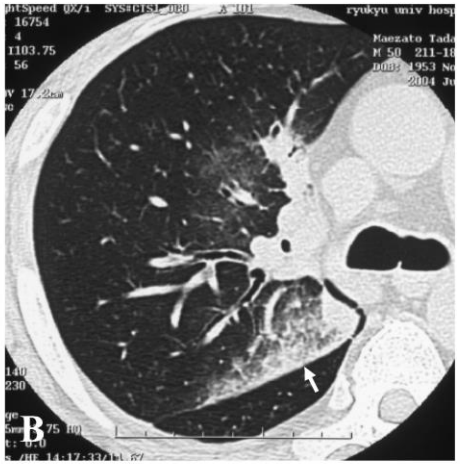


Azoulay E et al. Diagnosis of severe respiratory infections in immunocompromised patients. Intensive Care Med. 2020 Feb

Legionella




A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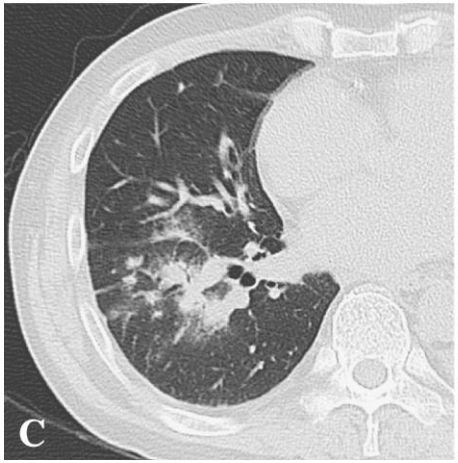
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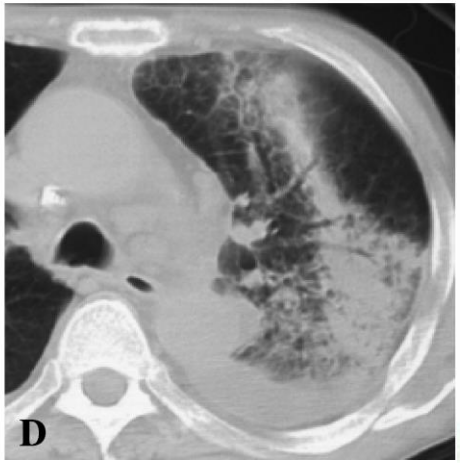
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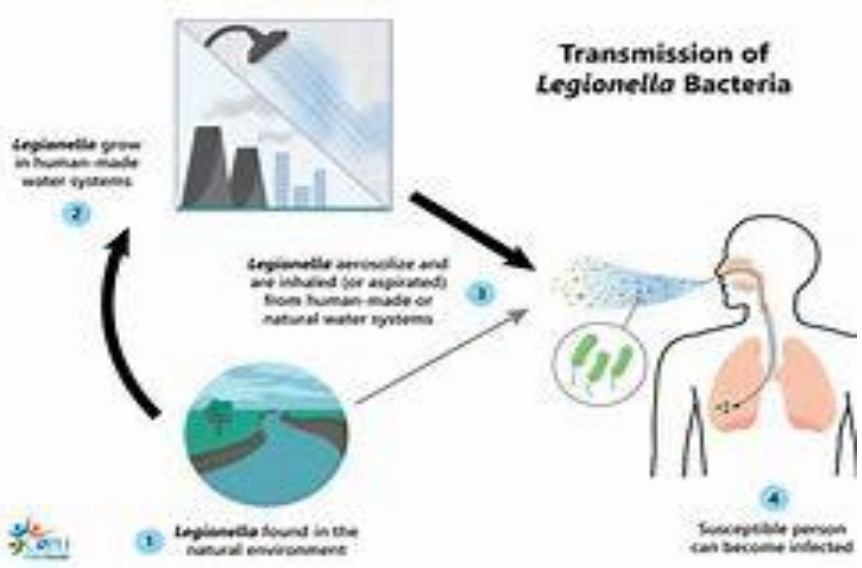
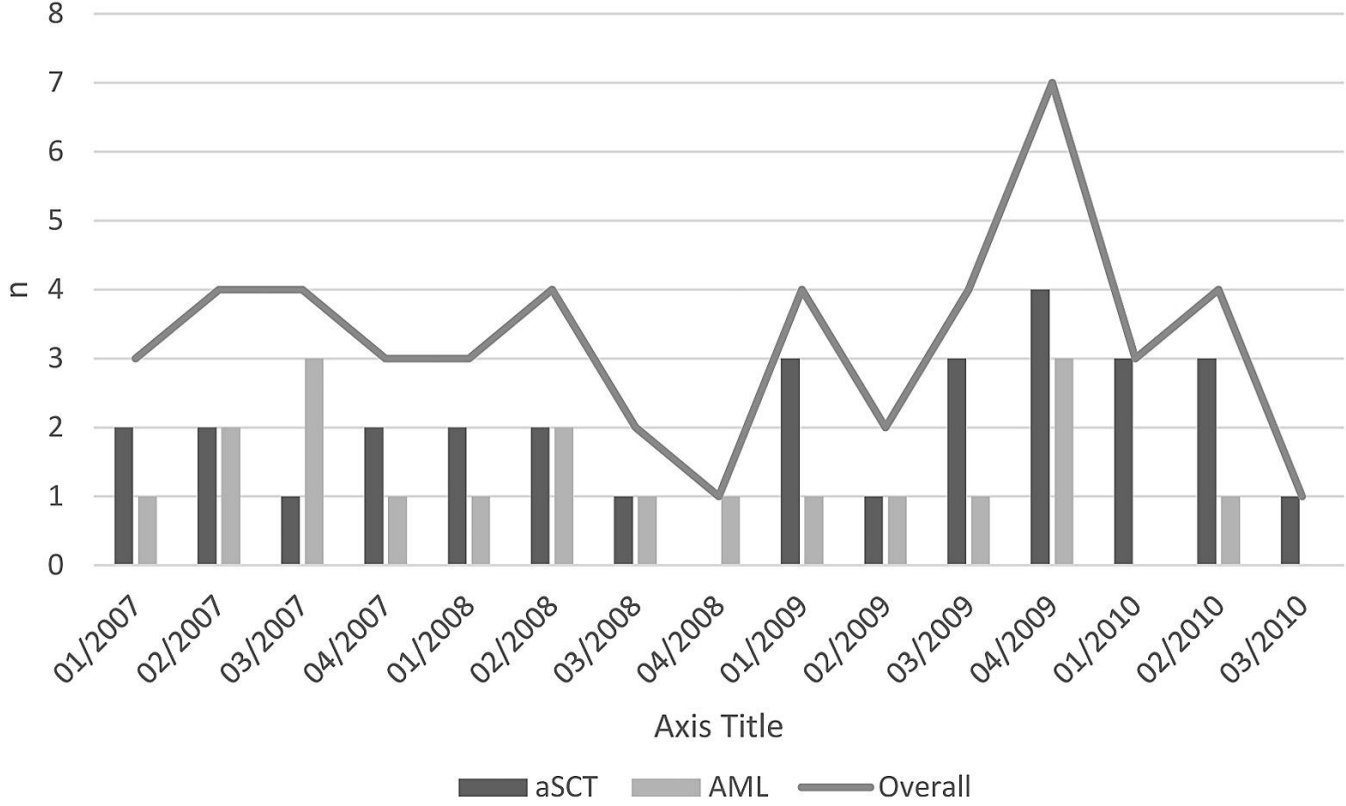

Transmission of
Legionella Bacteria
Legionella grow in human-made water systems
2
Legionella aerosolize and are inhaled (or aspirated) from human-made or natural water systems
3
1
Legionella found in the natural environment
4
Susceptible person can become infected

Distribution of CDI cases over time



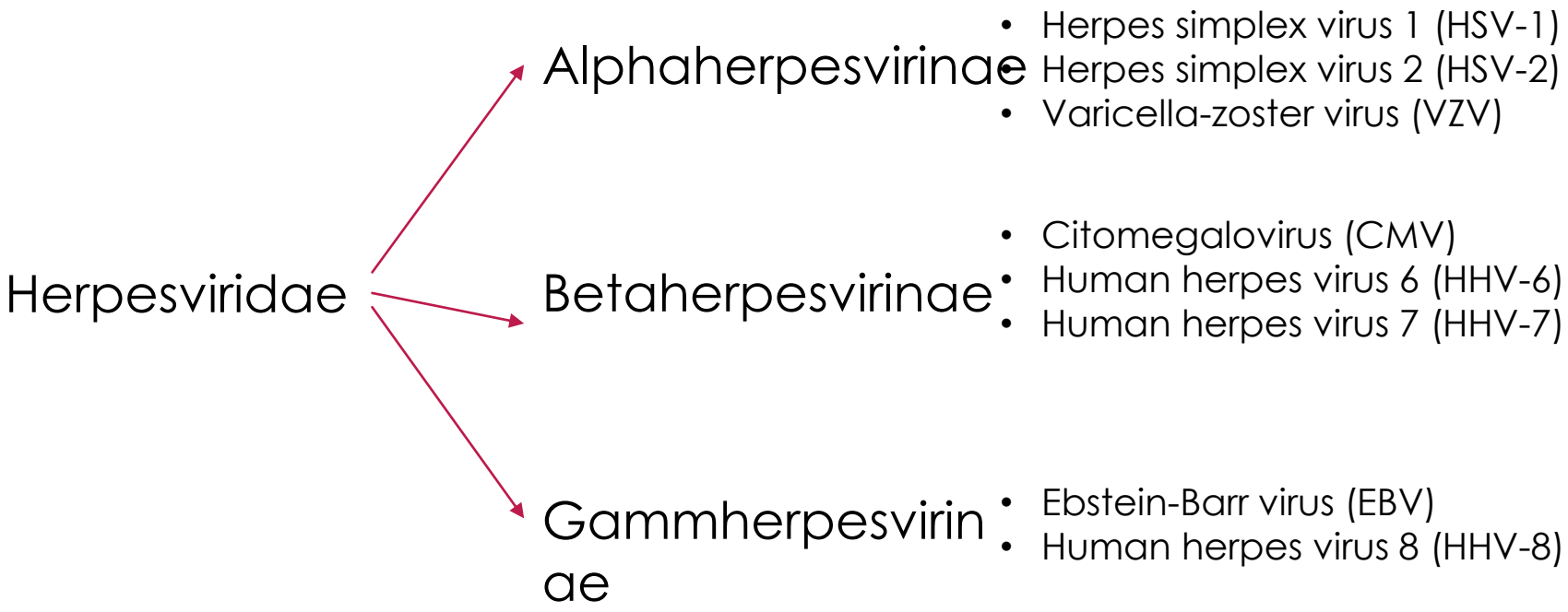
To better understand the impact of fluoroquinolone (FQ) prophylaxis on local epidemiology, continuous microbiological surveillance is highly recommended. This should not only focus on FQ-resistant pathogens but also on rates of Clostridioides difficile infection (CDI)

Clostridium Difficile Infection in Patients with Acute Myelogenous Leukemia and in Patients Undergoing Allogeneic Stem Cell Transplantation: Epidemiology and Risk Factor Analysis

Maria J.G.T. Vehreschild • David Weitershagen • Lena M. Biehl • ... Michael v. Bergwelt-Baildon • Oliver A. Cornely • Joerg J. Vehreschild • Show all authors

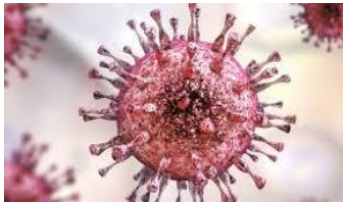
Transplantation and Cellular Therapy
The Official Journal of ASTCT
ASTCT
American Society for Transplantation and Cellular Therapy
Open Archive • Published: March 10, 2014 • DOI: https://doi.org/10.1016/j.bbmt.2014.02.022 •

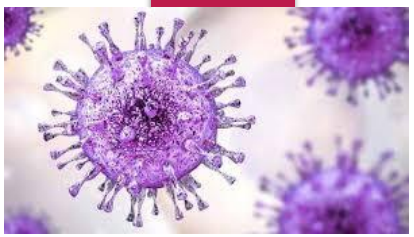
Herpesviridae family



Clinical Manifestations

Immunocompromised Host





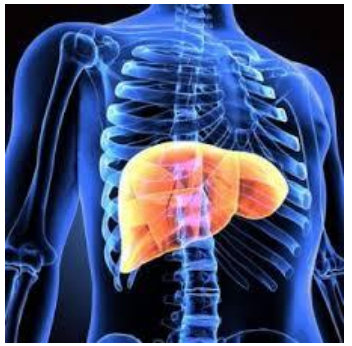
- *CMV Syndrome*
- *End-organ Disease*
- *Allograft Dysfunction*

Direct effects	
Gastrointestinal	Cardiovascular
Colitis	Myocarditis
Enteritis	Venous thrombosis
Gastritis	Neurological
Hepatitis	Meningitis
Pancreatitis	Encephalitis
Cholangitis	Myelitis
Respiratory	Retinitis
Pneumonitis	Uveitis
Haematological	Urological
Thrombocytopenia	Nephritis
Leukopenia	Prostatitis
Anaemia	
Disseminated intravascular coagulation	
Myelodysplastic change	
Indirect effects	
Atherosclerosis acceleration	Accelerated AIDS progression
Graft dysfunction and rejection	Increased opportunistic infections

Dioverti MV et al. Cytomegalovirus. Microbiol Spectr. 2016

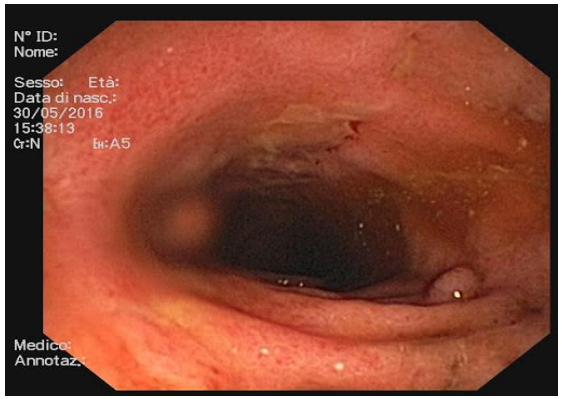
Clinical Manifestations

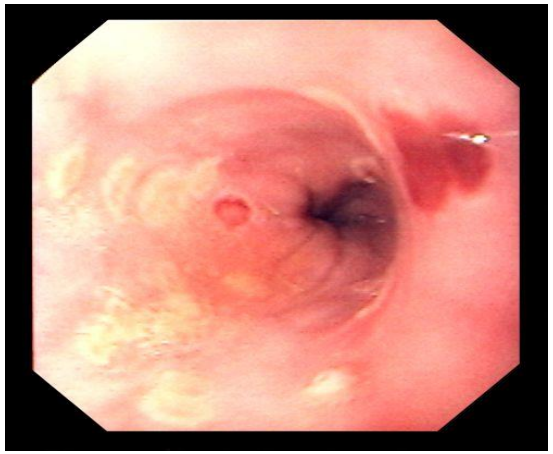
Immunocompromised Host



Gastrointestinal Disease

- *Colitis*
- *Hepatitis*
- *Esophagitis*

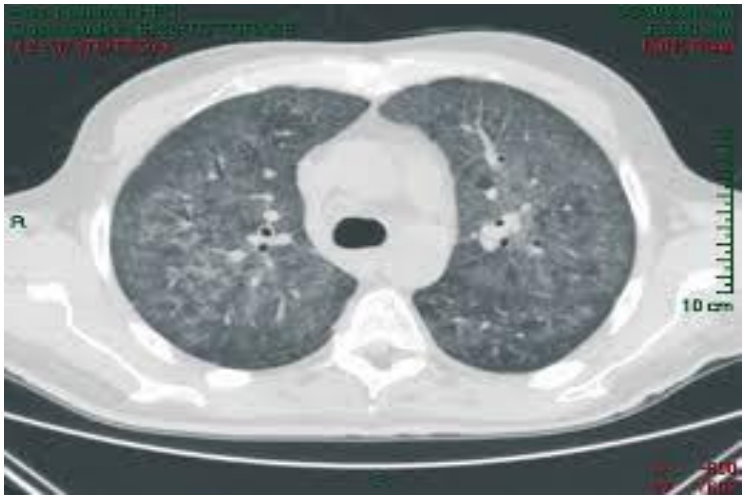


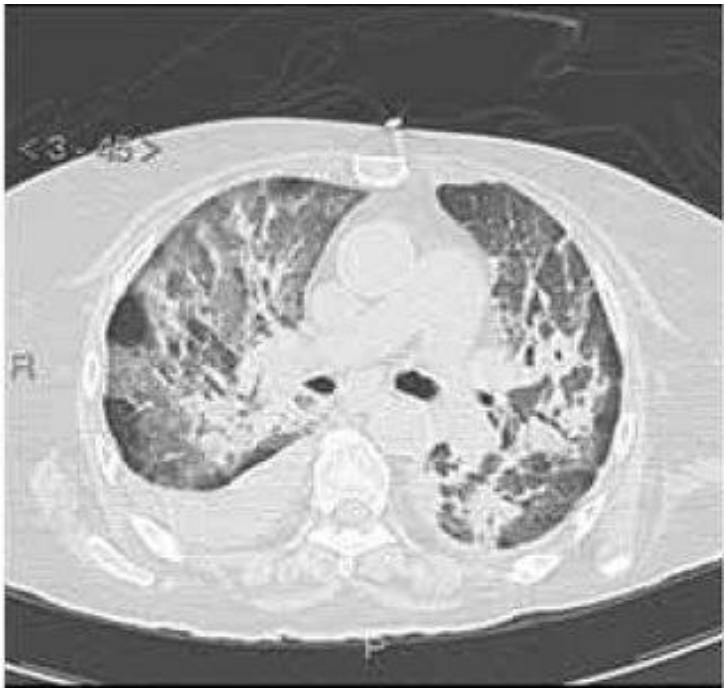


Dioverti MV et al. Cytomegalovirus. Microbiol Spectr. 2016

Clinical Manifestations
Immunocompromised Host

Pneumonia

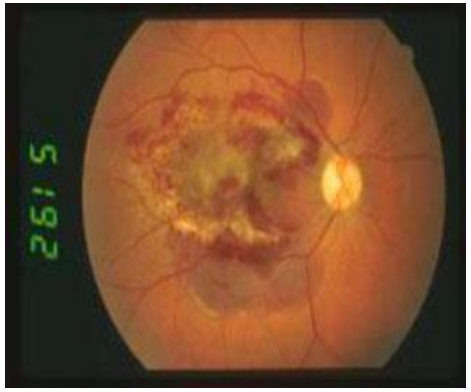




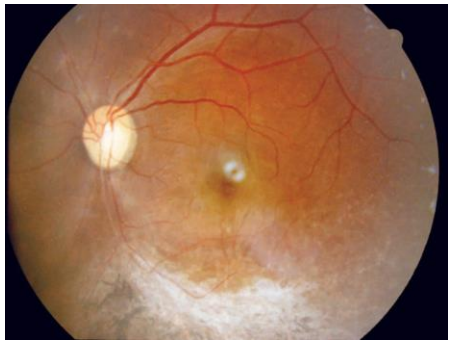
Dioverti MV et al. Cytomegalovirus. Microbiol Spectr. 2016

Clinical Manifestations Immunocompromised Host

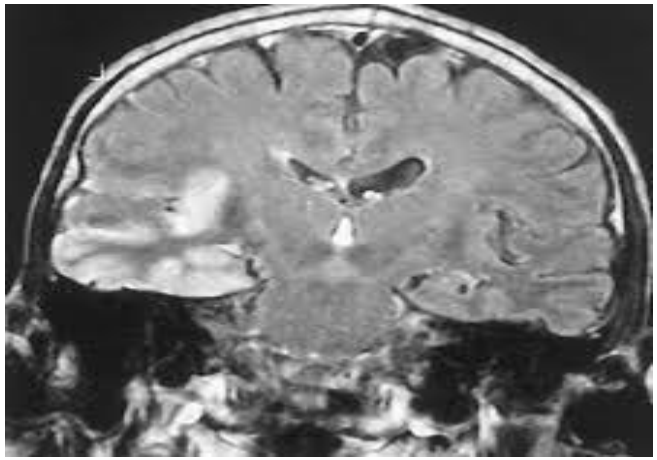
Central Nervous System

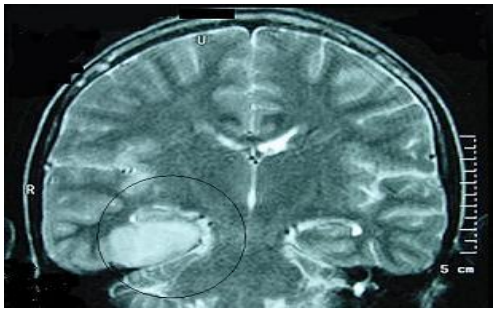


- ***Retinitis***



- ***Encephalitis***



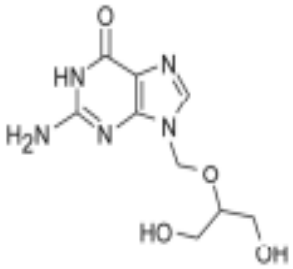


Dioverti MV et al. Cytomegalovirus. Microbiol Spectr. 2016

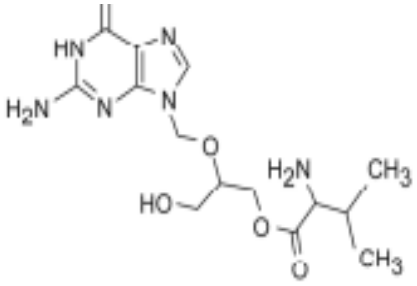
Review > Infect Dis Rep. 2024 Jan 18;16(1):65-82. doi: 10.3390/idr16010005.

Therapy

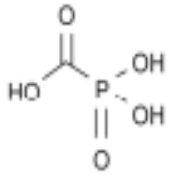
Management of Cytomegalovirus Infections in the Era of the Novel Antiviral Players, Letermovir and Maribavir



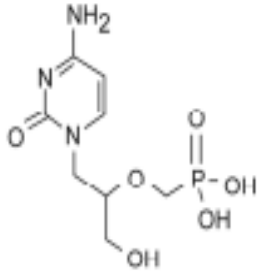
Ganciclovir
EC_{50} = 1–4 µM



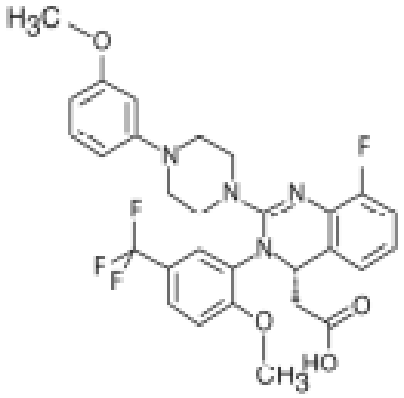
Valganciclovir



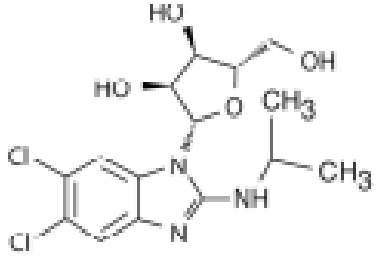
Foscarnet
EC_{50} = 40–200 µM



Cidofovir
EC_{50} = 0.2–0.4 µM



Letermovir
EC_{50} = 5 nM



Maribavir
EC_{50} = 0.1–13 µM

Antiviral agent	CMV	EBV	HHV-6	HHV-8	HSV	VZV	BK	Adenovirus
Acyclovir/valacyclovir/famciclovir[a]	High dose ±				X	X		
Ganciclovir IV/valganciclovir PO	X		X	±	X	X		
Foscarnet[b]	X		X	±	X	X		
Cidofovir[b]	X		X	±	X	X	Poor	IC_{50} ±
Letermovir[a] (prophylaxis only)	X							
Maribavir[b] (resistant/refractory CMV treatment only)	X	In vitro only						

Anti-CMV Immunoglobulins…therapy?

Currently indicated only for prophylaxis in patients undergoing SOT and HSCT

1 ml/kg for each administration for at least six administrations at intervals of two to three weeks.

TRANSPLANT INFECTIOUS DISEASE

ORIGINAL ARTICLE

Use of anti-CMV immunoglobulins in lung transplant recipients: The French experience

Charlotte Roy, François Parquin, Jonathan Messika, Boussaud Véronique, Olivier Brugière, Tristan Degot, Séverine Feuillet, Jérôme Lepavec, Adrien Tissot, Claire Dromer ... See all authors

First published: 01 November 2021 | https://doi.org/10.1111/tid.13754 | Citations: 2

frontiers in Immunology

CASE REPORT
published: 25 January 2021
doi: 10.3389/fimmu.2020.623178

ELSEVIER

Transplantation Proceedings, 53, 1284–1287 (2021)

Successful Treatment of UL97 Mutation Ganciclovir-Resistant Cytomegalovirus Viremia in a Renal Transplant Recipient With Letermovir and Adjunct Hyperimmune Cytomegalovirus Immunoglobulin: A Case Report

Aaron P. Pearston[a*], Amanda I. Ingemi[a], Kathryn Ripley[b], Tyler J. Wilson[a], Jacqueline Gruber[a], Megan McMahon[a], Sharon Sutton[a], and Nancy Khardori[b]

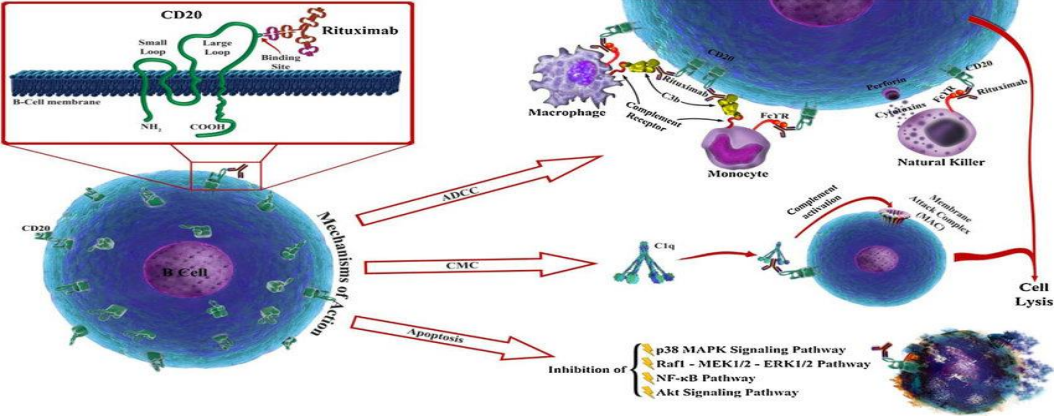
OPEN ACCESS

Edited by:
Oriol Bestard,
Bellvitge University Hospital, Spain

Reviewed by:
Lionel Couzi,

Case Report: Management of a Multidrug-Resistant CMV-Strain in a Renal Transplant Recipient by High-Dose CMV-Specific Immunoglobulins, Modulation in Immunosuppression, and Induction of CMV-Specific Cellular Immunity

Vanessa Wiening[1], Tina Schmidt[2], Maximilian Dahmen[1†], Sami Siam[1], Stefan Reuter[1], Hermann-Joseph Pavenstädt[1], Martina Sester[2] and Barbara Suwelack[1]*



cancers

MDPI

Cancers (Basel). 2018 Jun; 10(6): 197.
Published online 2018 Jun 13. doi: 10.3390/cancers10060197

Antiviral Drugs for EBV

Joseph S. Pagano,[1,*] Christopher B. Whitehurst,[2] and Graciela Andrei[3]

ELSEVIER

International Immunopharmacology
Volume 96, July 2021, 107606

Rituximab-containing immuno-chemotherapy regimens are effective for the elimination of EBV for EBV-HLH with only and mainly B lymphocytes of EBV infection

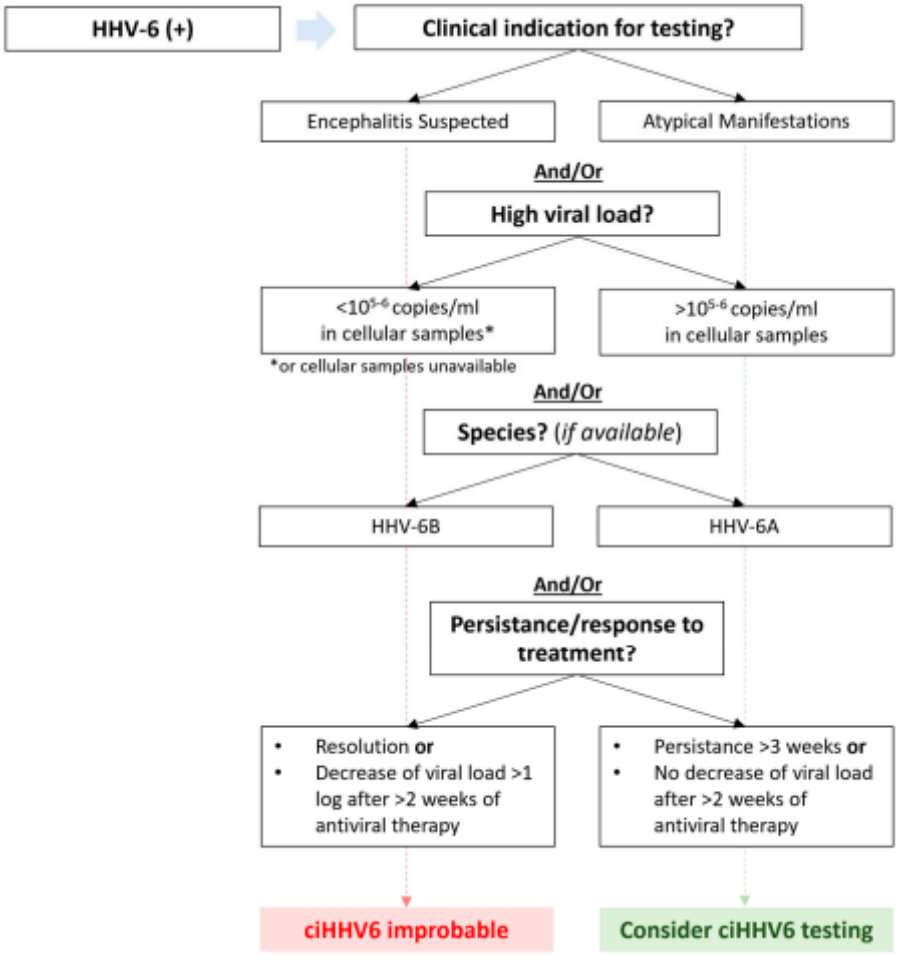
Guang-Qiang Meng, Jing-Shi Wang, Yi-Ni Wang, Na Wei, Zhao Wang

› J Virol. 2013 May;87(9):5311-5. doi: 10.1128/JVI.03505-12. Epub 2013 Feb 28.

Maribavir inhibits Epstein-Barr virus transcription through the EBV protein kinase

Christopher B Whitehurst [1], Marcia K Sanders, Mankit Law, Fu-Zhang Wang, Jie Xiong, Dirk P Dittmer, Joseph S Pagano

HHV-6



Algorithm for testing for chromosomally integrated HHV-6.

Testing for chromosomally integrated HHV-6 (ciHHV6) should be considered in cases with atypical manifestations and/or high viral load >$10^{5–6}$ in cellular samples (assuming that white blood count is normal) and/or detection of species HHV-6A (based on data that HHV-6A reactivation and disease are rarely seen in this patient population and appear to be primary detected in ciHHV6).

Testing should also be considered in the absence of a virological response despite antiviral treatment (e.g., persistent detection without a ≥log10 decline in viral load after ≥2 weeks).

viruses MDPI

Viruses. 2024 Apr; 16(4): 498.
Published online 2024 Mar 24. doi: 10.3390/v16040498
PMCID: PMC11054085
PMID: 38675841

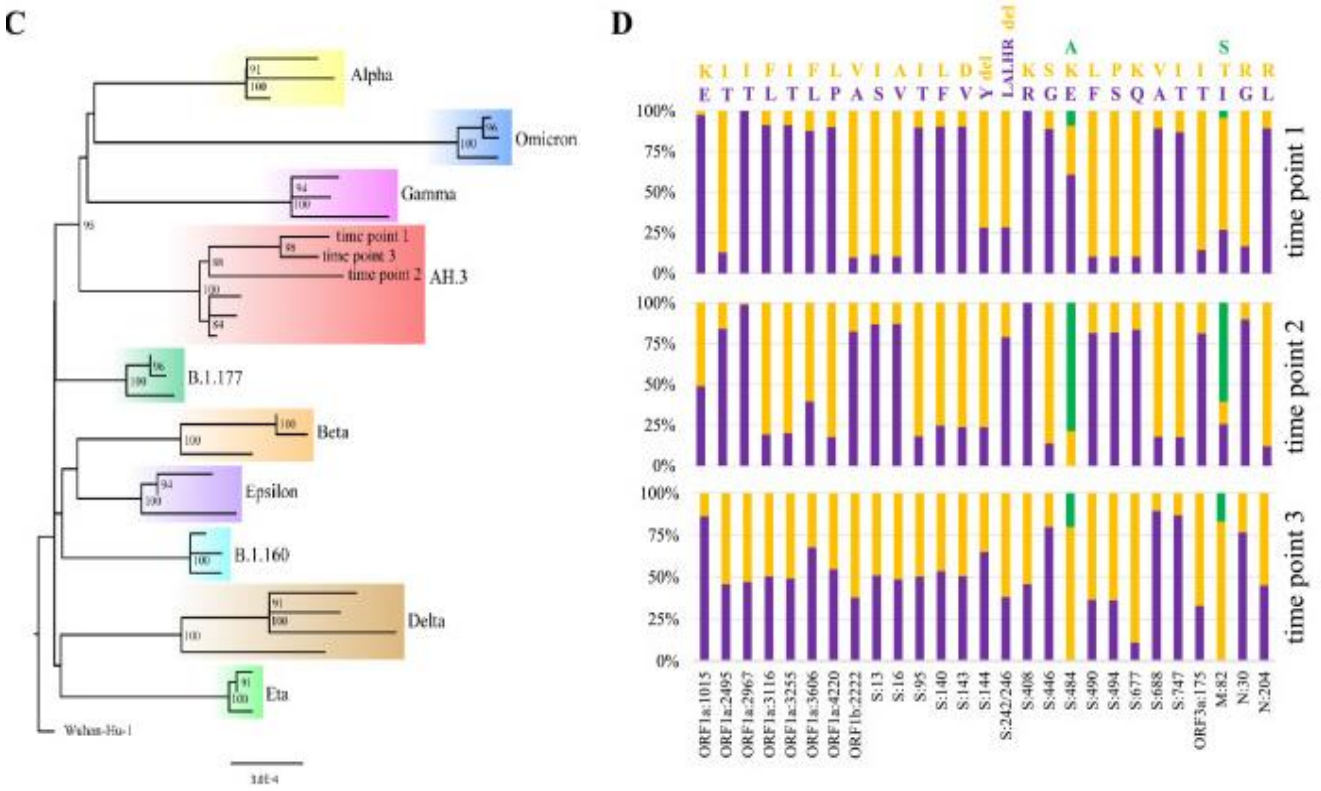
Human Herpes Virus-6 (HHV-6) Reactivation after Hematopoietic Cell Transplant and Chimeric Antigen Receptor (CAR)- T Cell Therapy: A Shifting Landscape

Eleftheria Kampouri,[1,*] Guy Handley,[2,3] and Joshua A. Hill[4,5,6]

Int J Infect Dis. 2022 Sep:122:444-448. doi: 10.1016/j.ijid.2022.06.023. Epub 2022 Jun 18.

SARS-CoV-2 intra-host evolution during prolonged infection in an immunocompromised patient

Erika Giorgia Quaranta [1], Alice Fusaro [2], Edoardo Giussani [2], Valeria D'Amico [2], Maria Varotto [2], Matteo Pagliari [2], Maria Teresa Giordani [3], Maira Zoppelletto [4], Francesca Merola [4], Antonio Antico [4], Paola Stefanelli [5], Calogero Terregino [2], Isabella Monne [2]

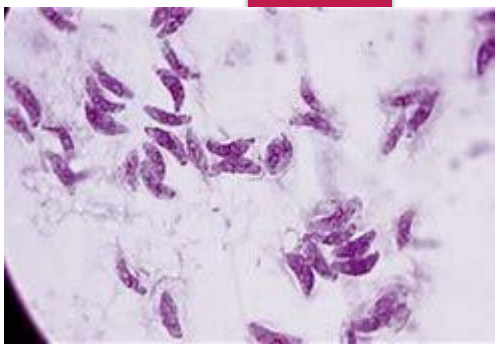


SARS-CoV-2 mutation accumulation during chronic infection in a patient with HIV over 109 days.

(C) Phylogenetic analysis of the sequences obtained from patient swabs at the three time points. The sequences were aligned to a set of representative SARS-CoV-2 genome sequences belonging to AH.3 lineage and the main lineages and VOCs identified so far. The maximum-likelihood phylogenetic tree was constructed with IQ-TREE (GTR+F+R2) and rooted on the Wuhan-Hu-1 reference genome. Ultra-fast bootstrap supports are indicated above the nodes.

(D) Histograms representing the amino acid frequency at the positions that differ between the three time points. Amino acids are indicated above the columns for each position. VOCs = variants of concern.

Toxoplasmosis

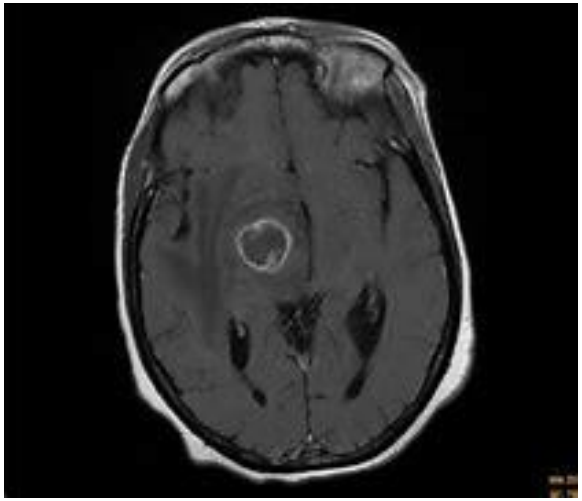


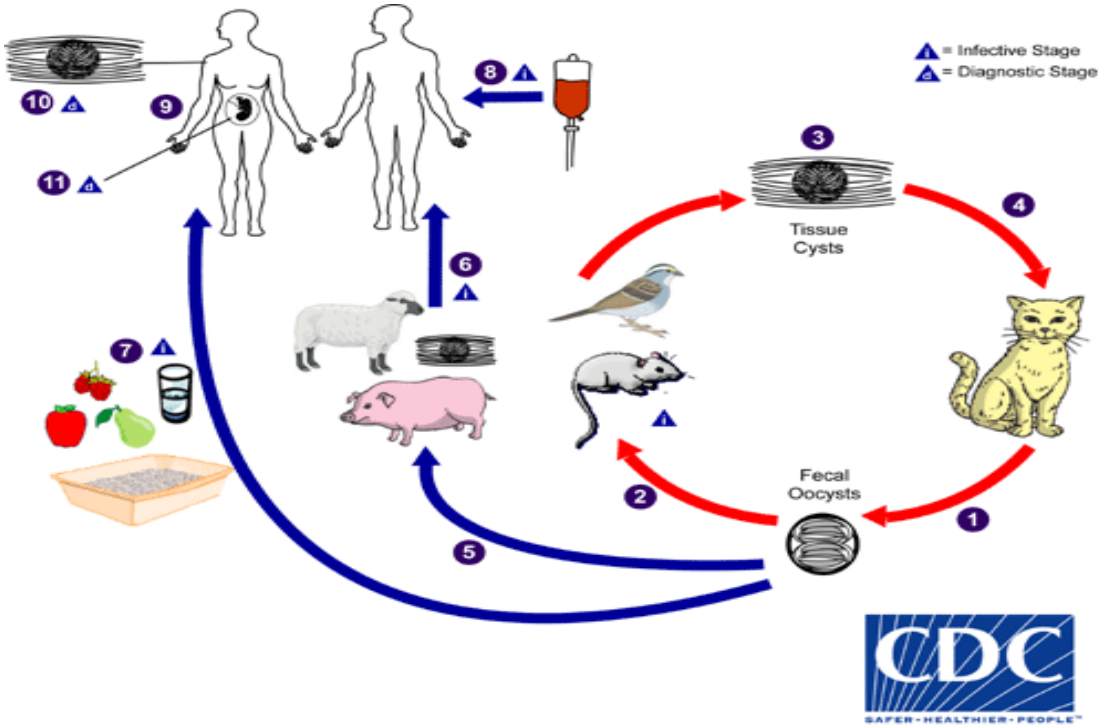
THE LANCET

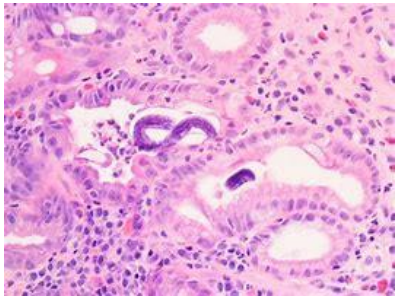
Toxoplasmosis

JG Montoya, MD • Prof O Liesenfeld, MD

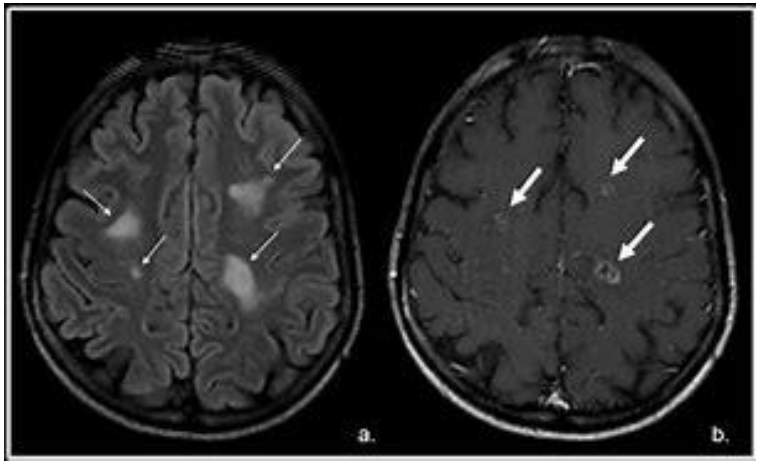
Published: June 12, 2004 • DOI: https://doi.org/10.1016/S0140-6736(04)16412-X

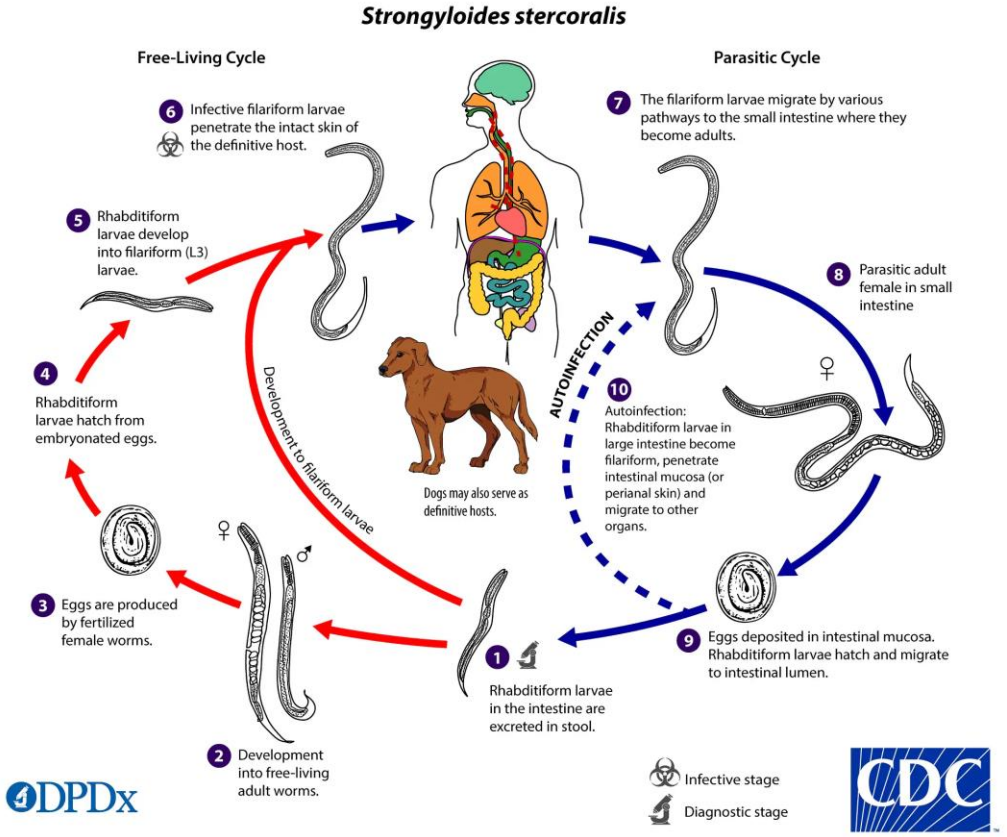






Strongyloidiasis





Primer | Published: 25 January 2024

nature reviews disease primers

Strongyloidiasis

Catherine A. Gordon, Jürg Utzinger, Stephen Muhi, Sören L. Becker, Jennifer Keiser, Virak Khieu & Darren J. Gray

Nature Reviews Disease Primers **10**, Article number: 6 (2024) | Cite this article

National Comprehensive Cancer Network®

Splenectomy and Function Asplenia

The number of indications for splenectomy in cancer patients has declined over the years.

In the case of solid tumors, splenectomy is traditionally performed in gastric cancer to dissect the splenic hilar lymph nodes, although it seems to have no benefit in tumors located at lesser curvature

Splenectomy may also be performed in cases of oligometastatic disease from other sites, especially ovarian cancer

Additionally, intraoperative splenic injury during abdominal surgery may result in splenectomy

Besides surgical splenectomy resulting in asplenia, radiotherapy and some pathologic conditions (including graft versus host disease following allogeneic hematopoietic stem cell transplantation) lead to a decreased function of the spleen—hyposplenism (function asplenia)

National Comprehensive Cancer Network NCCN Clinical Practice Guidelines in Oncology. Prevention and Treatment of Cancer-Related Infections 1. 2024

Splenectomy and Function Asplenia

The spleen is a lymphoid organ that plays an important role in regulating immune homeostasis through both innate and adaptive immunity.

The function of the spleen is crucial in the elimination of encapsulated bacteria

Asplenic patients are therefore at risk of sepsis caused by ***encapsulated bacteria***

most commonly Streptococcus pneumoniae (50–70%), but also Haemophilus influenzae and Neisseria meningitidis (15–25% each)

Other pathogens causing serious infections in asplenic patients include Capnocytophaga canimorsus after animal bites, Bordetella holmesii, Ehrlichia spp., and intraerythrocytic parasites such as Babesia spp. after tick bites

Review

Medical complications following splenectomy

R. Buzelé [a 1], L. Barbier [b 2], A. Sauvanet [b], B. Fantin [a]

ELSEVIER

Journal of Visceral Surgery

Volume 153, Issue 4, August 2016, Pages 277-286

Hippocrates (circa 460-377 BCE) originally recognized the effects of our surroundings on human diseases in his treatise On Airs, Waters and Places, attributing illness to characteristics of climate, water, modes of life, and nutrition

Two thousand years later, in the 1800s, Ignaz Semmelweis (1818-1865 CE) documented the effects of environmental control through hand hygiene on clinical outcomes, achieving a dramatic decrease in puerperal mortality with the widespread use of aseptic techniques, in which practitioners cleaned their hands with chlorine solution in between patients

Provided to the PMC COVID-19 Collection by

Wiley

CA Cancer J Clin. 2018 Sep-Oct; 68(5): 340–355.

Published online 2018 Jul 9. doi: 10.3322/caac.21462

Update on infection control practices in cancer hospitals

Ella J. Ariza-Heredia, MD, Assistant Professor [1] and Roy F. Chemaly, MD, MPH, Professor [2]

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Important Aspects of Infection Control and Prevention in Patients Living With Cancer

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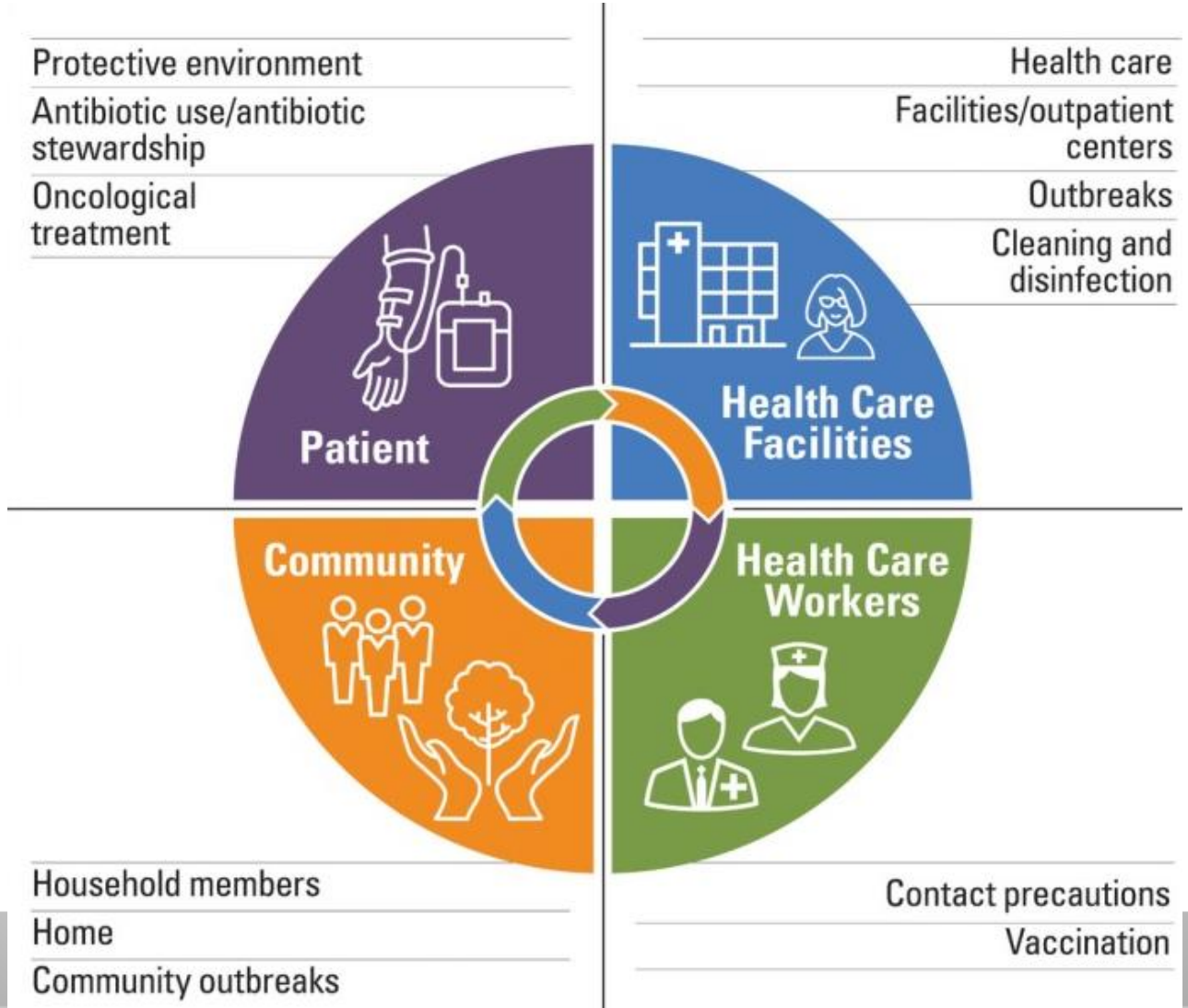
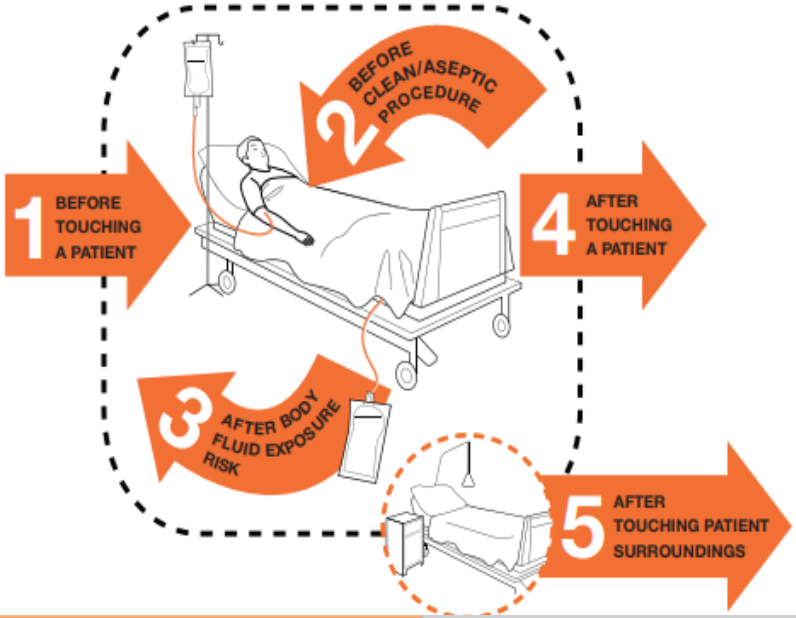


Your 5 Moments for Hand Hygiene

Hand Hygiene



"My Five Moments for Hand Hygiene"

World Health Organization

1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient when approaching him/her.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after an exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHEN?	Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.

Preventing Infection

Hand Hygiene

Siegel JH, Korniewicz DM. Keeping patients safe: an interventional hand hygiene study at an oncology center. Clin J Oncol Nurs. 2007

Regardless of the product used, hand washing is an important modality for the prevention of infection and should be performed by patients, visitors, and health care workers.

a 40% overall decrease in the rate of nosocomial infections

Research | Open access | Published: 19 April 2024

Ten years of hand hygiene excellence: a summary of outcomes, and a comparison of indicators, from award-winning hospitals worldwide

Ermira Tartari, Jacopo Garlasco, Marcela Hernández-de Mezerville, Moi Lin Ling, Hilda Márquez-Villarreal, Wing-Hong Seto, Anne Simon, Thomas-Jörg Hennig & Didier Pittet

Antimicrobial Resistance & Infection Control **13**, Article number: 45 (2024) | Cite this article

BMC Part of Springer Nature

REVIEW | VOLUME 6, ISSUE 10, P641-652, OCTOBER 2006

THE LANCET Infectious Diseases

Evidence-based model for hand transmission during patient care and the role of improved practices

Prof Didier Pittet, MD • Benedetta Allegranzi, MD • Hugo Sax, MD • Sasi Dharan, Dip HIC • Carmem Lúcia Pessoa-Silva, MD • Liam Donaldson, MD • et al. Show all authors

Grazie per l'attenzione