



11th EUROPEAN CONFERENCE on INFECTIONS in LEUKAEMIA



► **CONFERENCE**
From September
17th to 19th, 2026

Revised Guidelines slide set
September 2026

Recommendations from the 11th European Conference on Infections in Leukaemia:

Antibacterial prophylaxis - an update

Malgorzata Mikulska (leader) (Italy), Dina Averbuch (co-leader) (Israel)

Group members in alphabetical order: Murat Akova (Turkey), Elio Castagnola (Italy), Lubos Drgona (Slovak Republic), Carlota Gudiol (Spain), Johan Maertens (Belgium), Agnieszka Piekarska (Poland), Maurizio Sanguinetti (Italy), Maria Stamouli (Greece), Anat Stern (Israel), Daniel Teschner (Germany)

Chairs: Nina Khanna (Switzerland), Livio Pagano (Italy), Nicole Blijlevens (the Netherlands)

11th



CONFERENCE

From September 17th to 19th, 2026

ECIL-1 2005
published 2007

www.sciencedirect.com

ScienceDirect

page: www.ejonline.com



Quinolone prophylaxis for bacterial infections in afebrile high risk neutropenic patients ☆

Giampaolo Bucaneve^{a,*}, Elio Castagnola^b, Claudio Viscoli^c, Leonard Leibovici^d,
Francesco Menichetti^e

^aIstituto di Medicina Interna e Scienze Oncologiche, Azienda Ospedaliera di Perugia, Policlinico Monteluce, 06100 Perugia, Italy

^bUnità di Malattie Infettive, Dipartimento di Ematologia e Oncologia, Ospedale "G. Gaslini", Genova, Italy

^cClinica Malattie Infettive, Università di Genova, Azienda Ospedale-Università "San Martino", Genova, Italy

^dDepartment of Medicine "E. Rabin" Medical Center, Beilinson Campus Petah-Tiqua, Israel

^eUnità di Malattie Infettive, Ospedale Cisanello, Pisa, Italy

Table 3 – Recommendations for fluoroquinolone prophylaxis for prevention of bacterial infections in neutropenic patients with acute leukaemia or haematopoietic stem cell transplant

Does fluoroquinolone prophylaxis prevent bacterial infections in patients with acute leukaemia?	Yes Levofloxacin (500 mg once daily): AI Ciprofloxacin (500 mg bid): AI Ofloxacin (200–400 mg bid): BI Norfloxacin (400 mg bid): BI
When should fluoroquinolone prophylaxis be started and how long should it be continued?	Start with chemotherapy and continue until resolution of neutropenia or initiation of empirical antibacterial therapy for febrile neutropenia (AII)

Journal of Infection (2018) 76, 20–37



ELSEVIER

BIAM
British Infection Association

www.elsevierhealth.com/journals/jinf

Fluoroquinolone prophylaxis in haematological cancer patients with neutropenia: ECIL critical appraisal of previous guidelines

Malgorzata Mikulska^{a,*}, Diana Averbuch^{1,b}, Frederic Tisot^{1,c},
Catherine Cordonnier^d, Murat Akova^e, Thierry Calandra^f,
Marcello Ceppi^g, Paolo Bruzzi^g, Claudio Viscoli^a on behalf of the
European Conference on Infections in Leukemia (ECIL), a joint
venture of the European Group for Blood and Marrow
Transplantation (EBMT), the European Organization for Research
and Treatment of Cancer (EORTC), the International
Immunocompromised Host Society (ICHS) and the European
Leukemia Net (ELN)

The possible benefits of FQ prophylaxis on BSI rate, but not on overall mortality, should be weighed against its impact in terms of toxicity and changes in local ecology in single centres.

11th



► **CONFERENCE**
From September 17th to 19th, 2026

Antibacterial prophylaxis - update 2026

- Focus on recent data
- Literature review **2015-2026**: Pubmed and Cochrane, in English
 - Both RCT and observational studies (including pre/post or discontinuation studies)
 - For observational studies, included those focusing on FQP/other antibiotic prophylaxis, e.g. comparison of two cohorts, comparison with historical cohorts. e.g. pre/post discontinuation studies
 - Included studies in patients with high-risk neutropenia, defined as profound prolonged neutropenia ($< 100 \text{ cell/mm}^3$ for ≥ 7 days), i.e. including patients undergoing induction chemotherapy, autologous haematopoietic cell transplantation (auto-HCT), or allogeneic haematopoietic cell transplantation (allo-HCT) (Freifeld CID 2011)
 - Recent meta-analyses used to identify relevant studies within our timeframe
 - PROSPERO protocol for systematic reviews for FQP efficacy in neutropenia: both RCT and observational studies
- Focus on resistance, impact on microbiota and other side effects of prophylaxis
- Data on geographical location should be included in retrieved data



► **CONFERENCE**
From September 17th to 19th, 2026

Search results

- Search strategy (PUBMED) and Cochrane
- Revised combined search strategy (quinolones and non-quinolones)
- **1329 results initially, 1352 on updated search performed 8/09/2026**
- 8 RCT
- 6 meta-analyses
- 91 observational studies

11th



CONFERENCE

From September 17th to 19th, 2026

ECIL-11: PICO 1 - FQP

In patients with high-risk neutropenia (< 100 cell/mm³ for ≥ 7 days), does fluoroquinolone prophylaxis (I), compared with no antibiotic prophylaxis (C), reduce the incidence of mortality, bloodstream infections, and febrile episodes (O)?

11th



CONFERENCE

From September 17th to 19th, 2026

PICO 1 – Efficacy of antibiotic prophylaxis

Results of the literature review

Pooled analysis of all identified studies on fluoroquinolone prophylaxis (FQP)

- no benefit on overall mortality or on infection-related mortality
- lower rate of bloodstream infections (BSI), lower rate of Gram-negative (GN) BSI
- lower rate of febrile neutropenia (FN)

11th



CONFERENCE

From September 17th to 19th, 2026

* profound prolonged neutropenia (< 100 cell/mm³ for ≥ 7 days), Freifeld CID 2011

Above mentioned benefits of FQP have been demonstrated in the studies from rather low setting of resistance

In both adults and children

Rate of ESBL+ Enterobacteriaceae BSI among patients (16 studies)

- With FQP: median 2.3% (range, 0-8.7%),
- Without FQP: median 2.4% (range, 0-14.7%)

Rate FQR BSI among patients (19 studies)

- With FQP: median 8.3% (range, 0-19.8%),
- Without FQP: median 4.8% (range, 0-20.2%)

11th



CONFERENCE

From September 17th to 19th, 2026

Prophylaxis in children, outcomes

	All cause mortality	BSI	GN BSI	FN
Addressed in	12 papers	16 papers	9 papers	13 papers
No difference	10 (incl. 1 RCT*)	8 + 1 RCT* in HSCT	5	5 (incl. 1 RCT*)
Increased in prophylaxis	Wintjes 2023**: no difference until discharge (primary outcome); higher mortality on prophylaxis at d180	0	0	0
Decreased in prophylaxis	Davis**: overall mortality lower on prophylaxis, no difference in mortality due to bacterial infections	7 + 1 RCT in Acute leukaemia (specifically only in rALL)	4	8
Questionable	Yeh**: figure shows higher survival on prophylaxis but p value not provided	0	0	0

* Alexander, JAMA, 2018; **before/after studies

Conclusions:

- Paediatric data includes one good RCT that analysed data more than 10 years ago, already included in ECIL-8
- Other studies are mainly before/after, which makes it difficult to differentiate the influence of prophylaxis vs other factors that could change over time
- Prophylaxis did not influence mortality; decrease in FN, BSI and GN BSI was reported in some of them. In the RCT, decrease in BSI was reported among children with rALL, not after HCT and not after AML
- In both studies that demonstrated difference between on and off prophylaxis in mortality, lower mortality was recorded in the more recent periods

Recommendation: ECIL-8 did not recommend routine antibacterial prophylaxis for paediatric patients with haematological malignancies/HSCT and neutropenia level of evidence was D III

Since ECIL-8, only uncontrolled mainly before and after studies were published. They did not present an evidence that should lead to change in the level of recommendation provided by ECIL-8.

Does FQP during high-risk neutropenia influence outcomes in FQ-R/MDR-colonised patients?

Results:

- 7 studies
- FQRE/MDR-GN colonization significantly decreased the effectiveness of FQP
- FQP in colonised patients seems to be associated with higher risk of resistant and MDR GN infections

FQRE, FQ resistant Enterobacteriaceae; MDR-GN, multidrug-resistant Gram-negative bacteria

11th



CONFERENCE

From September 17th to 19th, 2026

ECIL-11: PICO 1 A

In patients with high-risk neutropenia (< 100 cell/mm³ for ≥ 7 days), does antibiotic prophylaxis with antibiotics other than fluoroquinolones (I), compared to no antibiotic prophylaxis or FQP (C), reduce the incidence of mortality, bloodstream infections, and febrile episodes (O)?

11th



CONFERENCE

From September 17th to 19th, 2026

PICO 1A: high risk neutropenia and non-FQ antibiotic prophylaxis

20 studies identified for evaluation, 17 selected: most compared non-FQ with FQP, 7 studies analysed the period > 2015

- 2 RTC:
 - TMP/SMX (doxycycline if intolerant) vs IgRT (McQuilten 2024)
 - Fosfomycin versus ciprofloxacin (Moreno 2026) – **lower rate of GN BSI with FQP compared to fosfomycin**
- 15 observational studies, mainly with FQ as comparator or another antibiotic added to FQ
 - 1 TMP/SMX vs FQ, 1 TMP/SMX + colistin vs FQ – no benefit on FN or BSI
 - 1 colistin vs FQ, 1 polymyxin vs FQ, - no benefit on BSI in 1, lower any infection rate in 1
 - 1 oral gentamycin/vancomycin/amphotericin vs no FQP– **lower rate BSI**
 - 2 doxycycline added to FQ vs only FQ in MM ASCT – lower rate of FN and BSI in 1, but the same centre and not the same conditioning in both groups
 - 2 rifaximin vs FQ and 1 vs FQ+ metronidazole – lower TRM with rifaximin, but no effect on BSI
 - 2 cefpodoxime vs FQ – **lower rate of BSI**
 - 3 other (FQ + ceftriaxone vs FQ + pip/taz, cipro +/- V PNC vs cipro + teicoplanin, cefepime vs no prophylaxis)



CONFERENCE

From September 17th to 19th, 2026

Conclusion: no clear benefit

ECIL-11: PICO 2

impact on modern antibiotic use

In patients with high-risk neutropenia who develop fever (P), does prior fluoroquinolone prophylaxis (I), compared with no prophylaxis (C), facilitate or support the use of early antibiotic de-escalation or discontinuation strategies without increasing adverse clinical outcomes (O)?

11th



CONFERENCE

From September 17th to 19th, 2026

Review of the literature on the role of FQP in de-escalation or discontinuation (d/c)

- 1) 37 studies reported on prophylaxis during neutropenia **before initiation of antibiotics**
 - None compared de-escalation/discontinuation in patients with or without prophylaxis before FN
- 2) 33 studies reported on prophylaxis during neutropenia **after d/c of antibiotics**
 - Comparative studies addressed only patients who stopped empirical antibiotic therapy (EAT) and switched to prophylaxis vs those who continued EAT
 - No comparison of outcomes of patients who stopped EAT and switched to prophylaxis vs those who stopped EAT without prophylaxis

Conclusion: the safety and outcomes of d/c strategy were similar in setting that did and did not use FQP

11th



CONFERENCE

From September 17th to 19th, 2026

ECIL-11: PICO 3

impact on resistance

In patients with high-risk neutropenia (P), does fluoroquinolone prophylaxis or other antibiotic prophylaxis (I), compared with no antibiotic prophylaxis (C), increase the rate of antimicrobial resistance, including colonization or infection with fluoroquinolone-resistant or multidrug-resistant organisms (O)?

11th



CONFERENCE

From September 17th to 19th, 2026

Resistance

Results

- 50 studies reported any outcome of resistance development in patients receiving **FQP versus no prophylaxis or placebo**
- Of these: 31 studies reported MDRO infections (17 GN MDR, 15 VRE, 14 MRSA, 6 not specified)

In overall analyses

- No difference in the rate of infections due to the following pathogens: MDR, MDR GN, ESBL+ Enterobacterales, VRE, MRSA
- **Significantly more patients receiving FQP had FQR infections and new MDR colonization compared to no FQ prophylaxis**

11th



CONFERENCE

From September 17th to 19th, 2026

Selection of resistant strains by FQP

- **Prospective cohort, multiple myeloma patients undergoing auto-HCT, US, n=117**
- Serial peri-anal screening for **fluoroquinolone-resistant Enterobacterales (FQRE)** before and after transplantation.
- **FQRE colonization increased after FQ prophylaxis:**
 - **19.6% pre-transplant → 29.6% at discharge ($p<0.001$) → 31.1% at day 100.**
- With serial sampling, **41.0%** of patients were FQRE-positive at ≥ 1 time point; **64.4% of FQRE isolates were also ESBL-producers.**
- **Conclusion:**
FQ exposure **selects/expands pre-existing low-level FQRE populations**, making them dominant and detectable after prophylaxis.

ECIL-11: PICO 4

Impact of prophylaxis on microbiota and GI GvHD

- Alterations in gut microbiota composition and diversity
- Microbiota dysbiosis
- Impact of frequency and duration of empirical antibiotic therapy on microbiota
- GvHD

11th



CONFERENCE

From September 17th to 19th, 2026

Study selection and the main findings

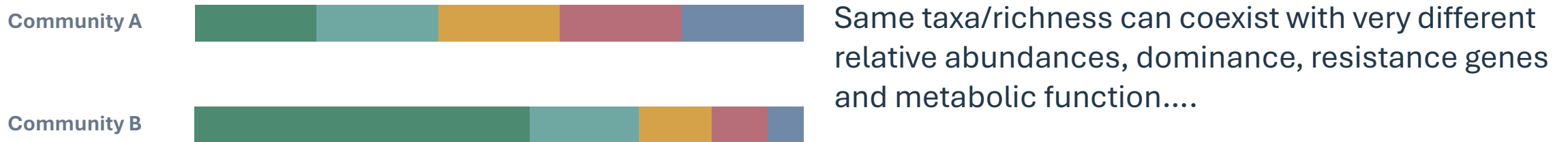
23 studies, including 1 small randomized trial; evidence predominantly observational

Fluoroquinolones

Effects on **alpha diversity** vary: some studies show **little or no change**, while others report **measurable reductions**.

Selective taxonomic shifts (beta-diversity) and **pressure on resistant flora / the resistome** provide more consistent findings

A crucial point for clinicians: same alpha diversity does not mean the same microbiota



Downstream antibiotics matter: Nørgaard et al. supports **an exposure-related effect** — **greater cumulative antibiotic exposure associated with stronger reductions in richness and diversity.**

11th



► **CONFERENCE**
From September 17th to 19th, 2026

Study selection and the main findings

23 extracted records, including 1 small randomized trial; evidence predominantly observational

Areas studied:

1. Direct impact of prophylaxis - inconsistent (9 studies)

reported compositional and resistance changes

rifaximin showed a microbiota-sparing signal compared to cipro+metronidazole

gut-decontamination strategies produce distinct ecological trajectories

2. Evidence of negative impact of any antibiotic-exposure (6)

3. Animal and in vitro models

Permissiveness to Pseudomonadota expansion on ciprofloxacin, facilitating GN-BSIs

Conclusions: Antibiotic exposure is detrimental to microbiota

The net microbiome effect of prophylaxis vs no prophylaxis cannot be interpreted without considering other antibiotic exposure

11th



CONFERENCE

From September 17th to 19th, 2026

Antibiotics and GVHD

1. „Unhealthy” microbiota increases the risk of aGVHD, especially GI-GVHD

Risk of GVHD-related death lower among patients with higher intestinal diversity (in a multicenter cohort: 17 GVHD-related deaths among 244 patients in the higher-diversity group vs. 26 among 184 patients in the lower-diversity group; HR, 0.49; 95% CI, 0.26 to 0.90) (1)

2. Most microbiota-oriented studies support withdrawal of prophylactic antibiotics in the allo-HCT setting; but other peritransplant medications, the procedure itself and nutrition have an impact on gut microbiota composition

Meta-analysis: Systemic antibiotic prophylaxis was associated with **increased acute GVHD** risk in pooled low-risk of bias studies (OR 1.65, 95% CI 1.08-2.53) (2)

Gut decontamination was associated with **increased intestinal GVHD** in genomic-marker studies (2,3)

3. Recent observational studies after antibiotic prophylaxis discontinuation show inconsistent results regarding GVHD-related outcomes

1. Peled JU, et al. N Engl J Med. 2020 Feb 27;382(9):822-834; 2. Gavrilaki M, et al. Biol Blood Marrow Transplant. 2020 Sep;26(9):1738-1746; 3. Routy B, et al. Oncoimmunology. 2016 Dec 27;6(1):e1258506

11th



CONFERENCE

From September 17th to 19th, 2026

Impact of antibacterial prophylaxis on other outcomes: *C. difficile* infection, health-care costs (ICU-admission and length of stay), adverse events, and relative risk of Gram-positive (GP) vs. GN BSI with different FQP

- 73 studies included: 29 retrospective, 36 before-after, 3 prospective and 5 RCT
- No increase in *C. difficile* infection: probably balanced by less antibiotic exposure in the prophylaxis group due to fewer FN episodes
- No significant increase in side effects
- But also on increased rate of ICU admission or length of stay without FQP
- Higher rate of GP BSI with ciprofloxacin compared to levofloxacin



Antibiotic prophylaxis in adult non neutropenic patients

- **In multiple myeloma patients – 4 studies**
 - 2 RCT and 2 retrospective observational studies (3 in newly diagnosed, 1 relapsed-refractory)
 - 2 RCT: significant reduction in a composite endpoint of febrile episodes and deaths without increase in healthcare-associated infections or resistant organism carriage with levofloxacin in one, no benefit of ciprofloxacin in another
 - 2 retrospective: Lower risk of infections with levofloxacin, but multiple confounders
- **In non-Hodgkin lymphoma patients receiving R-CHOP chemotherapy – 2 studies**
 - 1 RCT: levofloxacin associated with lower rate of febrile episodes, no difference in mortality, infection-related mortality or GN BSI
 - 1 observational study: FQP lowered the risk of infection-related admission but not infection-related death (endpoint considered not very relevant clinically), and multiple confounders: prophylaxis used at only one institution, no data on GCSF use, no clear criteria for FQP

11th



CONFERENCE

From September 17th to 19th, 2026

Antibiotic prophylaxis in HM/HCT patients

Recommendation	Grade
Comprehensive antimicrobial stewardship program to reduce the negative impact of antibiotic exposure without compromising outcomes should be implemented	A II u, t

11th



CONFERENCE

From September 17th to 19th, 2026

Antibiotic prophylaxis in neutropenic patients

Recommendation	Grade
In adult patients with high-risk [^] neutropenia, universal fluoroquinolone prophylaxis should be replaced by a risk adapted approach*	A II u
Fluoroquinolone prophylaxis (preferably with levofloxacin) can be considered in adult patients with high-risk neutropenia who have a low risk of infection due to resistant GN ^{**}	C II u
In patients with high-risk neutropenia colonized with resistant GN bacteria^{^^}, fluoroquinolone prophylaxis is not recommended	D II u
Routine antibacterial prophylaxis is not recommended in children with high-risk neutropenia	D II u
Antibacterial prophylaxis with antibiotics other than fluoroquinolones is not recommended	D II u

[^] <100 cells/mm³ neutropenia for ≥ 7 days

^{*}Based on the risk of resistant infections, in agreement with local antibiotic stewardship policies, and the risk of severe infection-related complications

^{^^} including FQRE, ESBL-GN and CR-GN

^{**}E.g. Approx 2.5% risk of ESBL+ BSI among all patients in the analysed studies reporting benefit on BSI/GN-BSI/FN, and in patients not colonized with ESBL or FQ-R GN or CR-GN

When FQP is provided, evaluation of colonisation with resistant GN bacteria (including ESBL and FQRE) should be performed

11th



► **CONFERENCE**
From September 17th to 19th, 2026

Antibiotic prophylaxis in non-neutropenic patients with haematological malignancies

Recommendation	Grade
Antibacterial prophylaxis in patients without neutropenia is generally not recommended	D II u
In frail patients with newly diagnosed multiple myeloma (older age, poor performance status, comorbidities, frequently ineligible for high intensity treatment), antibacterial prophylaxis at the onset of chemotherapy could be considered	C I

11th



CONFERENCE

From September 17th to 19th, 2026

PLEASE SEND YOUR COMMENTS TO:

Malgorzata Mikulska: m.mikulska@unige.it

Dina Averbuch: ADiana@hadassah.org.il

11th



CONFERENCE

From September 17th to 19th, 2026