Efficacy of Fluoroquinolone Prophylaxis in Reducing Infectious Complications During Induction Chemetherapy in Pediatric ALL: A Meta-Analysis

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BACKGROUND

Infectious complications remain a major contributor to treatment-related mortality during induction chemotherapy for pediatric acute lymphoblastic leukemia (ALL), particularly in resource-limited settings. Fluoroquinolone prophylaxis has shown potential benefit in reducing infections in hematologic malignancies, but its role specifically during induction therapy in children with ALL remains uncertain.

METHODS

Search Strategy: PubMed, Scopus, and Cochrane databases were searched for studies evaluating fluoroquinolone prophylaxis (levofloxacin or ciprofloxacin) during induction chemotherapy in children (≤18 years) with ALL.

Study Selection: Randomized controlled trials and observational studies were included.

Outcomes: The primary outcome was febrile neutropenia (FN), while secondary outcomes included bloodstream infections (BSI), *Clostridioides difficile* infection (CDI), and all-cause mortality (ACM).

Statistical Analysis: Pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using a random-effects model.

7	991	439	552
Studies Included	Total Patients	Fluoroquinolone Prophylaxis	Control (Usual Care)

3 RCTs and 4 cohort studies

RESULTS

Outcome	Events / Total (%)		Odds Ratio (OR) (95% CI)	p-value	I^2 (%)	Forest Plot (Random-Effects Model)
	Fluoroquinolone Prophylaxis (n = 439)	Control (n = 552)				
Febrile Neutropenia (FN)	202 / 439 (46.1%)	358 / 552 (64.9%)	**0.44** (0.33–0.59)	0.0015	0	0.01 0.1 1 10 100
Bloodstream Infections (BSI)	41 / 439 (9.3%)	80 / 552 (14.4%)	**0.50** (0.32–0.81)	0.019	0	0.01 0.1 1 10 100
Clostridioides difficile Infection (CDI)	11 / 439 (2.4%)	55 / 552 (9.9%)	**0.43** (0.00–42.30)	0.508	39.6	0.01 0.1 1 10 100
All-Cause Mortality (ACM)	34 / 439 (7.8%)	38 / 552 (6.9%)	**1.04** (0.20–5.38)	0.948	54.3	0.01 0.1 1 10 100

- Sensitivity analyses confirmed the robustness of these findings.
- Heterogeneity in ACM was largely attributable to a single study, but exclusion did not alter the overall conclusion.

Risk of bias ranged from low to serious, and GRADE assessment indicated **low** certainty for FN and BSI, and **very low** certainty for ACM and CDI.

FN: febrile neutropenia; **BSI:** bloodstream infections; **CDI:** *Clostridioides difficile* infection; **ACM:** all-cause mortality; **CI:** confidence interval; **OR:** odds ratio; I^2: heterogeneity statistic.

CONCLUSIONS

Fluoroquinolone prophylaxis during induction therapy in pediatric ALL is associated with a significant reduction in febrile neutropenia and bloodstream infections, without a clear impact on mortality or CDI. While these findings support a protective effect against infectious complications, the overall certainty of evidence is limited. Further high-quality, adequately powered trials are needed to inform clinical guidelines.