

Shortening the Course of Carbapenem for Acute Pyelonephritis in female patient caused by *Escherichia coli* and *Klebsiella pneumoniae* Resistant to Ceftriaxone: Short vs Long Duration of Treatment Comparison (SCAPER study)



Harit Thongwitokomarn, MD; Jetanat Chantrapitak, MD

Division of Infectious Disease, Department of Internal Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand



Introduction

In the past decade, treatment of upper urinary tract infection (uUTI) has shifted from a conventional 14-day antibiotic course to shorter regimens, even in the presence of bacteremia. Current guidelines generally recommend 7 days, and hospital practice has followed.

However, uncertainty remains regarding whether shorter courses are sufficient in critically ill patients or those infected with resistant organisms, since most supporting studies were not designed for these groups. We therefore aimed to determine whether a shorter course is non-inferior to a longer course for uUTI caused by ceftriaxone-resistant *E. coli* or *K. pneumoniae*.

Materials and Method

We reviewed medical records up to two years prior to study initiation, identifying cases from laboratory reports of resistant organisms isolated in urine cultures. Records were screened using predefined inclusion and exclusion criteria, and only patients with a clinical diagnosis of upper urinary tract infection were included. Patients were categorized into two groups based on antibiotic duration: a shorter course (6–8 days of intravenous antibiotics) and a longer course (13–15 days). A 1:2 propensity score-matched non-inferiority analysis was then conducted to compare clinical outcomes between the groups.

Objectives

Primary Objective

- To compare the clinical cure between patients with upper urinary tract infection caused by ceftriaxone-resistant *E. coli* or *K. pneumoniae* who received shorter course of antibiotics against those who received longer course of antibiotics

Secondary Objectives

- To compare the rate of clinical recurrence within 90 days of the onset of infection
- To compare the occurrence of antibiotic-related adverse events
- To study the risk factors that contribute to recurrence of urinary tract infections

Results

Table 1: Baseline Characteristics (unmatch)

Characteristics	Shorter Regimen (N=41)	Longer Regimen (N=18)	p-value
Age (years) [Median (IQR)]	76 (62-88)	66.5 (55-81)	0.105
Presenting symptom(s) [%]			
Fever	38 (92.7)	17 (94.4)	1.0
Chills	8 (19.5)	4 (22.2)	1.0
Nausea/Vomiting	7 (17.1)	3 (16.7)	1.0
CVA tenderness	2 (4.9)	2 (11.1)	0.578
Bacteremia [%]	2 (4.9)	8 (44.4)	0.001
Shock upon arrival [%]	2 (4.9)	4 (22.2)	0.064
Charlson Comorbidity Index (CCI) [Median (IQR)]	2 (1-4)	3.5 (1-5)	0.237
Bacteria [%]			0.049
<i>Escherichia coli</i>	38 (92.7)	13 (72.2)	
<i>Klebsiella pneumoniae</i>	3 (7.3)	5 (27.8)	
MIC (µg/mL) [%]			0.902
≤ 8	2	0	
16-32	8	2	
≥ 64	31	16	
UA WBC (cells/HPF) [%]			0.730
> 100	30 (73.2)	11 (61.1)	
50-100	6 (14.6)	4 (22.2)	
30-50	2 (4.9)	1 (2.6)	
≤ 20	3 (7.3)	2 (11.1)	
CBC WBC (cells/ µL) [Median (IQR)]	9990 (7560-13000)	10210 (9420-13570)	0.204
Absolute neutrophil count (ANC) (cells/ µL) [Median (IQR)]	7772 (5297-10738)	8801 (7105-11212)	0.126
Antibiotics [%]			0.409
Meropenem	18 (43.9)	10 (55.6)	
Ertapenem	23 (56.1)	8 (44.4)	

Results

Table 2 and Figure 1: Clinical cure, clinical recurrence and adverse events

Outcome	Total (N=30)	Shorter Regimen (N=12)	Longer Regimen (N=18)	Difference [95% CI]	p
Clinical cure, n (%)	28 (93.3%)	11 (91.7%)	17 (94.4%)	-2.8% [-16.1% to 21.7%]	1.00
90-day Recurrence, n (%)	9 (30.0%)	3 (25.0%)	6 (33.3%)	-8.3% [-41.1 to 24.4]	0.67
Adverse events	0				

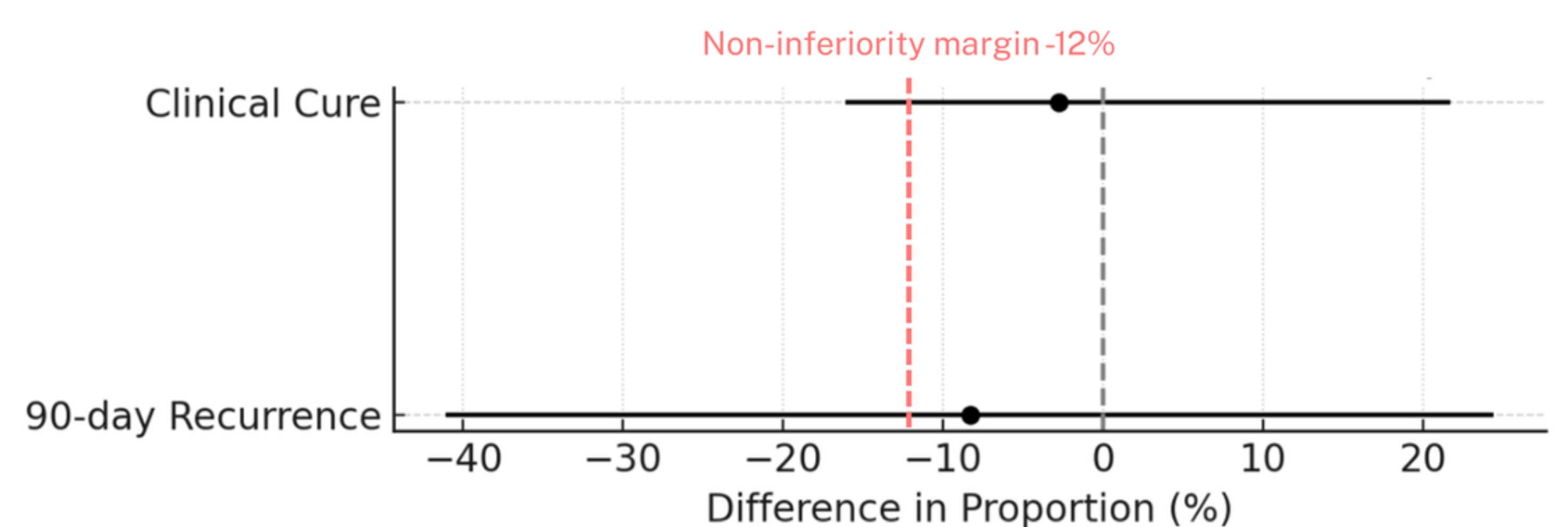


Table 3: Risk factors associated with clinical recurrence

Outcome	OR [95% CI]	p-value
Age (per year)	1.01 [0.97-1.04]	0.767
Pathogen (<i>K. pneumoniae</i> vs <i>E. coli</i>)	0.80 [0.14-4.42]	0.285
MIC (per µg/mL increase)	1.01 [0.97-1.05]	0.538
Pyuria at presentation (< 50 vs ≥ 50)	0.31 [0.35-2.76]	0.295
Fever	0.38 [0.05-2.91]	0.348
Chills	0.79 [0.18-3.34]	0.744
Nausea / Vomiting	3.08 [0.76-12.51]	0.862
CVA tenderness	0.81 [0.08-8.41]	0.862
Bacteremia	1.07 [0.24-4.74]	0.928

Conclusions

Shorter antibiotic regimens (6–8 days) appeared comparable to longer regimens (13–15 days) in treating upper urinary tract infections caused by ceftriaxone-resistant *E. coli* and *K. pneumoniae*. Nevertheless, given the study design and small number of primary events, further research with larger and prospective cohorts with possibly more diverse case inclusion criteria is needed for confirmation of these findings.

Acknowledgement

We would like to thank the Faculty of Medicine, Chiang Mai University, and the Division of Infectious Diseases and Tropical Medicine for their kind support of this research.

Disclosure

No conflicts of interest
No interference on the conclusions, opinions, and statements