



Appropriateness of antibiotics use for patients with asymptomatic bacteriuria or urinary tract infection: A retrospective observational multicenter study in Korea

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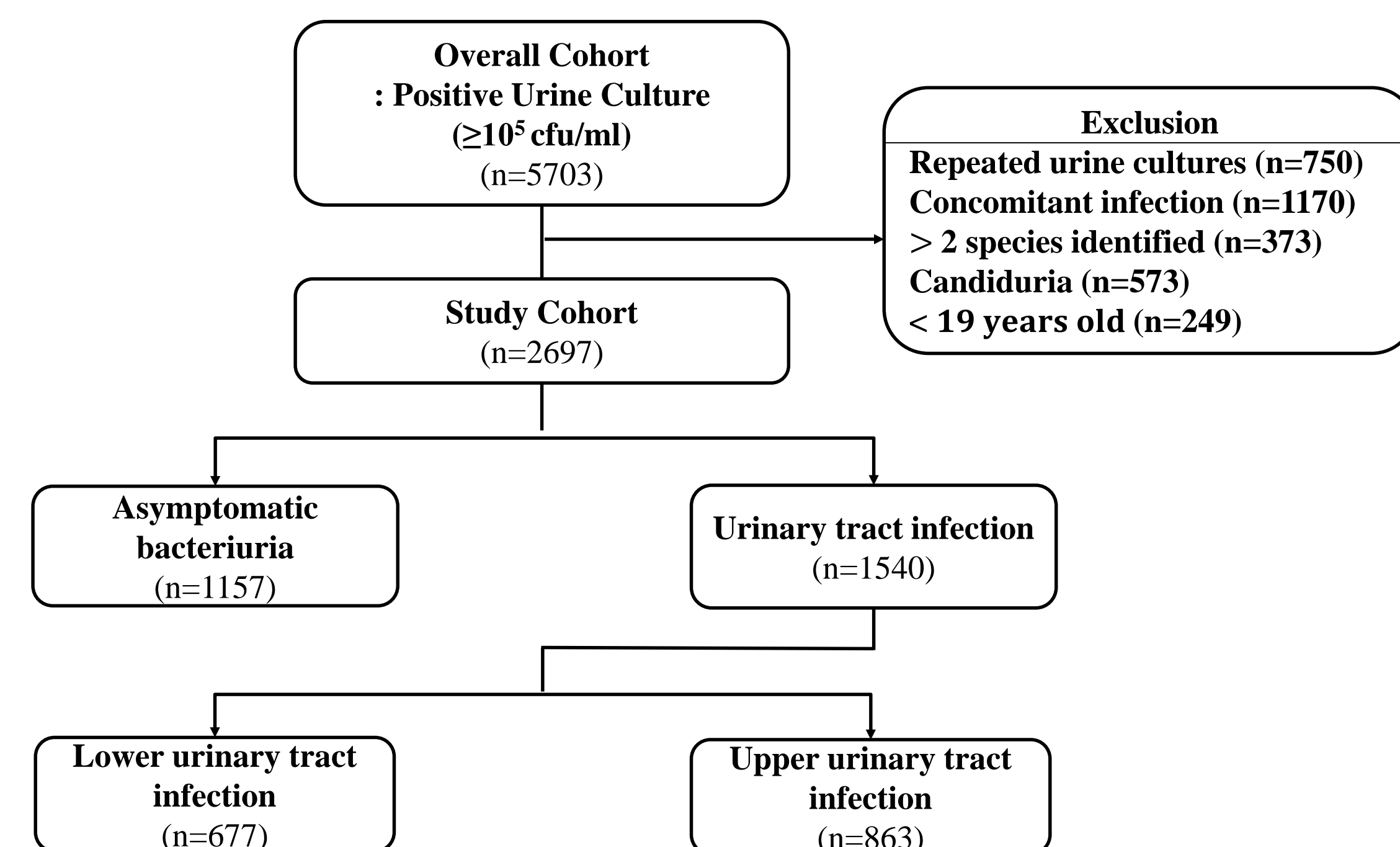
Introduction

- Antibiotic resistance threatens public health worldwide, and inappropriate use of antibiotics is one of the main causes.
- Antibiotic use for asymptomatic bacteriuria (ABU) has been defined as “antibiotics never events”, and urinary tract infection (UTI) is one of the most common infectious diseases for which antibiotics are prescribed in Korea.
- To establish an effective antimicrobial stewardship strategy, a qualitative assessment of antibiotic use in actual clinical syndrome is necessary.

Methods

- Cases of positive urine cultures ($\geq 10^5$ CFU/ml), performed in inpatient, outpatient, and emergency departments in April 2021 were screened in 26 hospitals located throughout Korea.
- Cases were classified into ABU, lower UTI, and upper UTI. The appropriateness of antibiotic use was retrospectively evaluated by infectious disease specialists using quality indicators based on the domestic clinical guideline for ABU and UTI.

Figure 1. Study flow diagram



Results

- A total of 2697 cases of ABU or UTI were included. The appropriateness of antibiotic use was assessed in 1157 cases with asymptomatic bacteriuria, 677 and 863 cases with lower and upper UTI (Figure 1).
- Antibiotics were prescribed in 21.7% (251 of 1157) of ABU without appropriate indication. Of 66 ABU cases with appropriate indication in which prophylactic antibiotics were prescribed, the duration of antibiotics was adequate in only 34.8% (Table 1).
- For lower UTI, the appropriateness of empirical and definite antibiotics was 77.8% (527 of 677) and 68.0% (353 of 519). In terms of upper UTI, 86.3% (745 of 863) and 78.2% (583 of 746) was appropriate, respectively. The duration of antibiotics was adequate in 65.7% (421 of 641) of lower UTI and 77.9% (592 of 760) in upper UTI (Table 2, 3).

Table 1. Appropriate antibiotics use for patients with asymptomatic bacteriuria

Quality indicator	n	%
1. Antibiotics were prescribed only when indicated for prophylaxis by the national guideline? (n=1157)		
Adequate	898	77.6%
Prescription of antibiotics in the indication for prophylaxis	66	5.7%
Withhold of antibiotics in the absence of indication for prophylaxis	832	71.9%
Inadequate	259	22.4%
Prescription of antibiotics in the absence of indication for prophylaxis	251	21.7%
Withhold of antibiotics in the indication for prophylaxis	8	0.7%
2. Appropriate antibiotics were prescribed on the basis of antibiotics susceptibility test? (n=66)		
Appropriate	49	74.2%
Optimal	15	22.7%
Adequate	34	51.5%
Inappropriate	18	27.3%
Suboptimal	6	9.1%
Inadequate	12	18.2%
3. Antibiotics were prescribed for the appropriate duration? (n=66)		
Adequate	23	34.8%
Total duration of antibiotics therapy (days) (median, IQR)	3	1.5,5.5
Inadequate	43	65.2%
Total duration of antibiotics therapy (days) (median, IQR)	8	6,11.5

Table 2. Appropriate antibiotics use for patients with lower urinary tract infection

Quality indicator	n	%
1. Empirical antibiotics were prescribed according to the national guideline? (n=677)		
Appropriate	527	77.8%
Optimal	336	49.6%
Adequate	191	28.2%
Inappropriate	150	22.2%
Suboptimal	24	3.5%
Inadequate	126	18.6%
2. Antibiotics were tailored on the basis of antibiotics susceptibility test? (n=519)		
Appropriate	353	68.0%
Optimal	240	46.2%
Adequate	113	21.8%
Inappropriate	166	32.0%
Suboptimal	42	8.1%
Inadequate	124	23.9%
3. Dosage and route were appropriate considering the renal function?		
Empirical antibiotics (n=677)		
Appropriate dosage	545	85.0%
Appropriate route	607	94.7%
Definitive antibiotics (n=519)		
Appropriate dosage	381	73.4%
Appropriate route	444	85.5%
4. Antibiotics were prescribed for the appropriate duration? (n=641)		
Adequate	421	65.7%
Total duration of antibiotics therapy (days) (median, IQR)	7	5,7
Inadequate	220	34.3%
Total duration of antibiotics therapy (days) (median, IQR)	11	7,14

Table 3. Appropriate antibiotics use for patients with upper urinary tract infection

Quality indicator	n	%
1. Empirical antibiotics were prescribed according to the national guideline? (n=863)		
Appropriate	745	86.3%
Optimal	559	64.8%
Adequate	186	21.6%
Inappropriate	118	13.7%
Suboptimal	36	4.2%
Inadequate	82	9.5%

2. Antibiotics were tailored on the basis of antibiotics susceptibility test? (n=746)		
Appropriate	583	78.2%
Optimal	480	64.3%
Adequate	103	13.8%
Inappropriate	163	21.8%
Suboptimal	77	10.3%
Inadequate	86	11.5%
3. Antibiotics were changed from intravenous to oral after 3days of effective antibiotics? (n=639)		
Appropriate	491	76.8%
Changed to oral antibiotics	214	
Not changed to oral antibiotics	277	
Inappropriate	148	23.2%
4. Dosage and route were appropriate considering the renal function?		
Empirical antibiotics (n=863)		
Appropriate dosage	770	89.2%
Appropriate route	819	94.9%
Definitive antibiotics (n=746)		
Appropriate dosage	634	85.0%
Appropriate route	677	90.8%
Oral antibiotics (n=214)		
Appropriate dosage	200	87.6%
5. Antibiotics were prescribed for the appropriate duration? (n=760)		
Adequate	592	77.9%
Total duration of antibiotics therapy (days) (median, IQR)	12	10,14
Inadequate	168	22.1%
Total duration of antibiotics therapy (days) (median, IQR)	16	7.25,21

Conclusion

- This nationwide qualitative assessment of antibiotic use in ABU and UTI revealed that a significant proportion of antibiotics were prescribed inappropriately and, furthermore the duration of antibiotics was prolonged unnecessarily.
- Interventions for appropriate antibiotic use in ABU and UTI at the national level are required.