

Current Antibiotic Sensitivity Pattern of Bacteria Causing Urinary Tract Infection in Adult Patients Admitted in the Department of Medicine of Dhaka Medical College Hospital

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Introduction

- Urinary tract infection (UTI) is a major public health problem worldwide with an estimate of 150 million cases per year.¹
- Important cause of morbidity, and the second commonest cause of hospital visit.²
- Accounts for 10-20% of all infections treated in primary care and 30-40% of infections treated in hospitals.



1. Ronald AR, Pattullo AL. The natural history of urinary infection in adults. *Med Clin North Am* 1991; 75(2): 299-312.

2. Kunin CM. Urinary tract infections in females. *Clin Infect Dis* 1994; 18(1): 1-10.

Introduction cont.

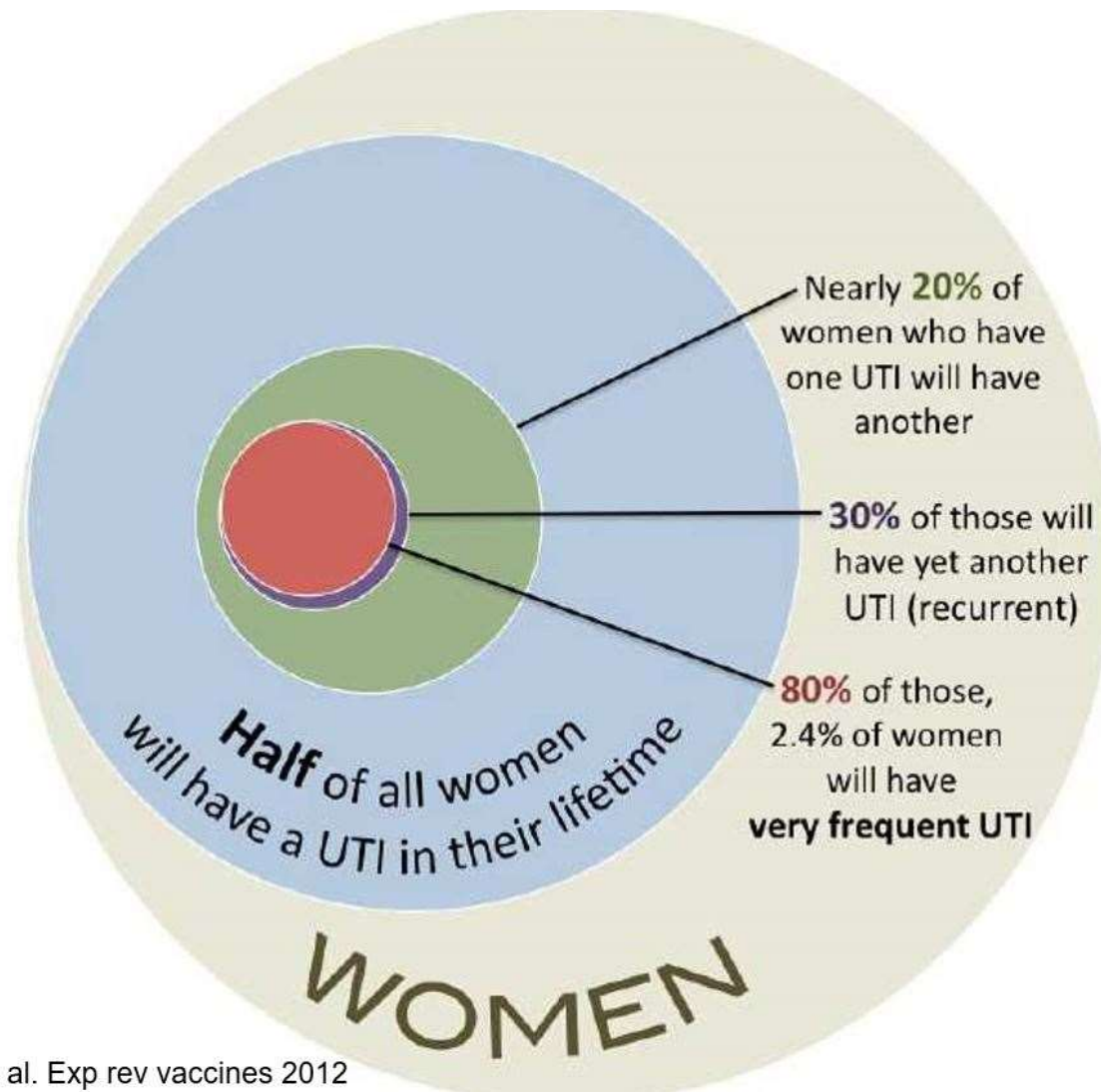
- Affects all populations and ages.¹
- Most common in women, especially during reproductive age,²
- The major pathogens
 - *Escherichia coli*
 - *Proteus* spp.
 - *Klebsiella*
 - *Pseudomonas* spp etc.



spp.

1. Hooton TM. Pathogenesis of urinary tract infections: an update. J Antimicrob Chemother 2000; 46(1): 1-7.

2. Kunin CM. Urinary tract infections in females. Clin Infect Dis 1994; 18(1): 1-10.



The Antimicrobial Agents Used in Treatment of UTI

Cell wall synthesis inhibitors

- Penicillin
- Third generation cephalosporins (cefotaxime, cephradine, ceftazidime, cefaclor)

DNA gyrase inhibitors

- Fluoroquinolones (ciprofloxacin, ofloxacin, sparfloxacin and enoxacin)

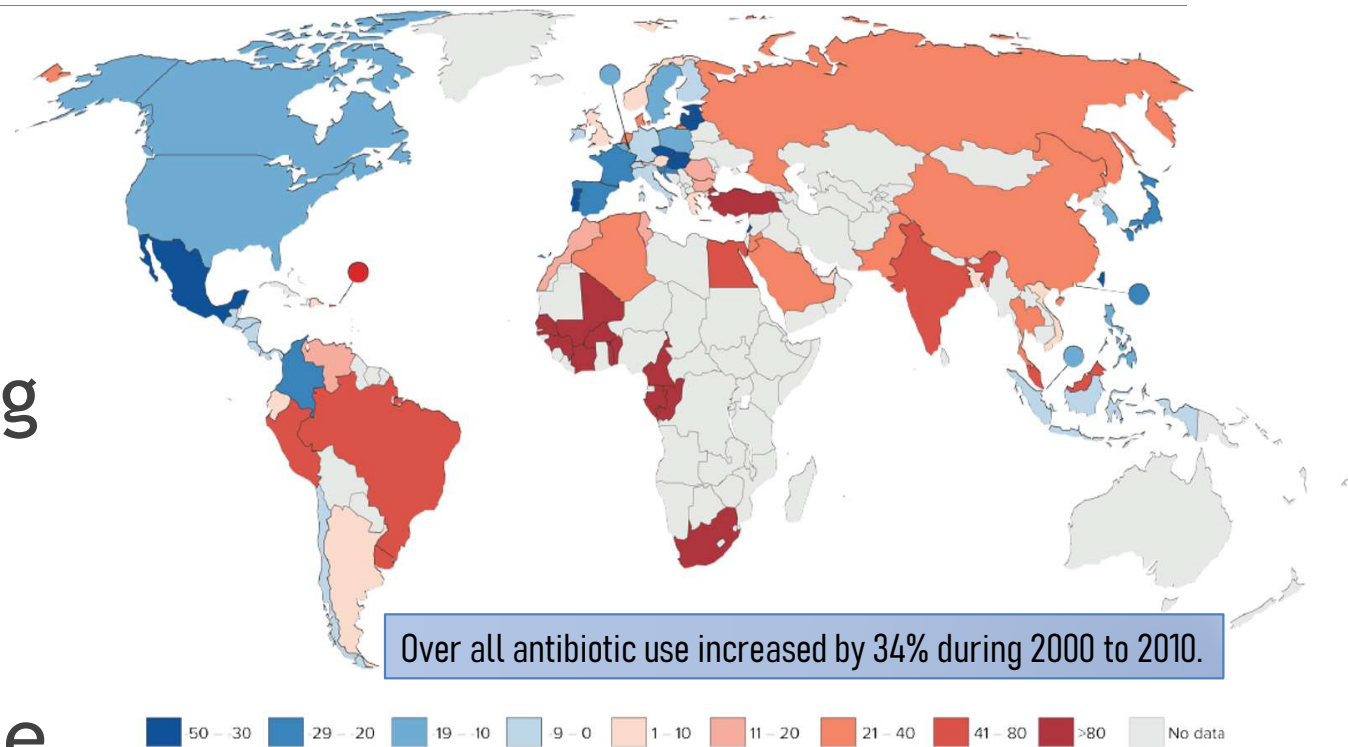
Protein synthesis inhibitors

◦ Aminoglycosides (amikacin, gentamicin, kanamycin)



Background

The ever changing antimicrobial sensitivity of bacteria causing UTI demands frequent study of antibiogram for judicious use of appropriate antibiotics.



Objectives of the Study

General Objective:

- To assess the antibiotic sensitivity pattern of bacteria causing UTI in adult patients.

Specific Objectives:

- To detect the common bacteria responsible for UTI.
- To assess antibiotic sensitivity pattern of bacteria causing UTI.



Methodology

- **Place of study** : Department of Medicine, Dhaka Medical College Hospital (DMCH), Dhaka.
- **Period of study** : Six months (January, 2018 to June, 2018).
- **Study population** : Patients admitted to the Department of Medicine, DMCH, Dhaka.



Methodology cont.

- **Study design** : Descriptive, cross-sectional, hospital based observational study.
- **Sample Size** : 220 patients were initially enrolled. Per-protocol, antibiotic sensitivity pattern was observed in 87 culture-positive UTI cases.
- **Sampling Method:** Convenient sampling.



Methodology: Inclusion Criteria

- Age ≥ 18 years, including both genders
- Patients diagnosed with UTI on the basis of presence of all 3 of the following criteria:
 - **Clinical features** (fever, increased frequency, urgency, dysuria, loin pain, suprapubic pain and tenderness, strangury, hematuria or passage of cloudy and smelly urine), and...



Methodology: Inclusion Criteria cont.

- **Significant pyuria** in urinalysis (pus cells: ≥ 5 /HPF in male and ≥ 10 /HPF in female)
- **Positive bacteriological culture** with colony count $\geq 10^5$ /mL



Methodology: Exclusion Criteria

- **Patients not fulfilling inclusion criteria (e.g.: patients with asymptomatic bacteriuria, symptomatic patients with insignificant pyuria and/or sterile pyuria)**
- **Pregnant patients**
- **Terminally ill patients**
- **Patients and/ or attendants unwilling to give written consent**



Methodology cont.

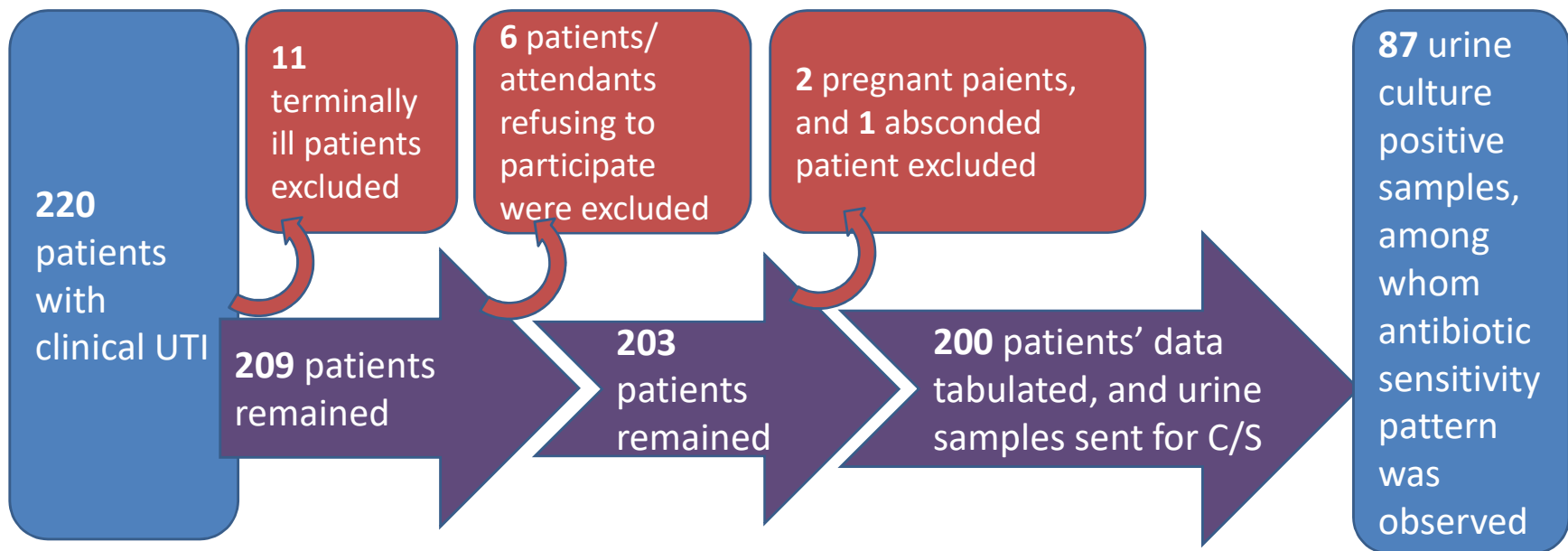


Figure 03. Flow chart showing the sequence of tasks.



Study Procedure

- Approved by the Ethical Review Committee of DMCH.
- A preformed questionnaire was used for collection of information by interviewing and examining patients.
- Urine culture and sensitivity test, along with routine investigations were carried out in patients with clinical UTI.



Study Procedure cont.

- The investigation reports were collected and reviewed.
- All collected data was checked, verified, edited, and charted by spreadsheet of Windows 10, and analyzed using SPSS version 20.
- The result was presented in different tables and charts.



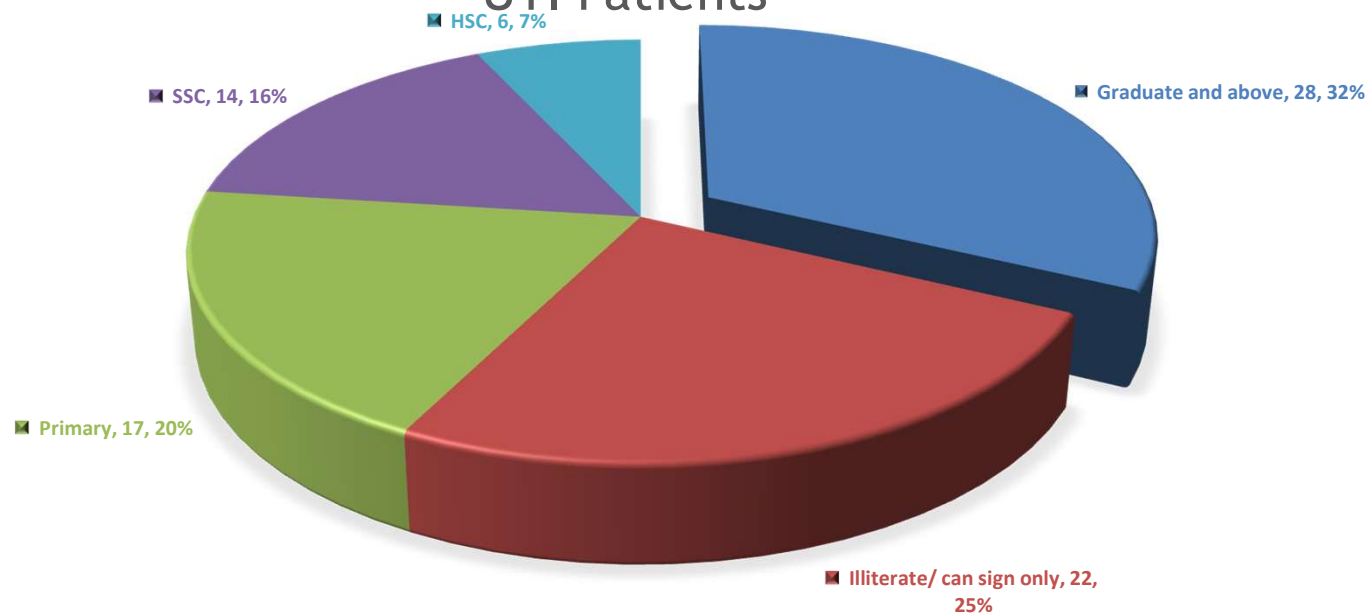
Results: Socio-demographic variables

Socio-demographic variables	Values (n=87)
Mean age \pm SD (in years)	45.79 \pm 16.76
Age range (in years)	18 - 71
Gender ratio (M:F)	1.23 : 1
Occupation (n, %)	
Day laborer	11 (12.6%)
Service holder	25 (28.8%)
Businessman	14 (16.1%)
Unemployed	37 (42.5%)



Results: Socio-demographic variables cont.

Figure 04. Level of Education of Culture-positive UTI Patients



Results: Socio-demographic variables cont.

Socio-demographic variables	Values (n=87)
Monthly income (n, %)	
Poor	30 (34.5%)
Middle class	55 (63.2%)
Affluent class	2 (2.3%)
Place of residence (n, %)	
Rural	39 (44.8%)
Urban	48 (55.1%)



Results: Gender-wise Distribution of Clinical UTI Cases

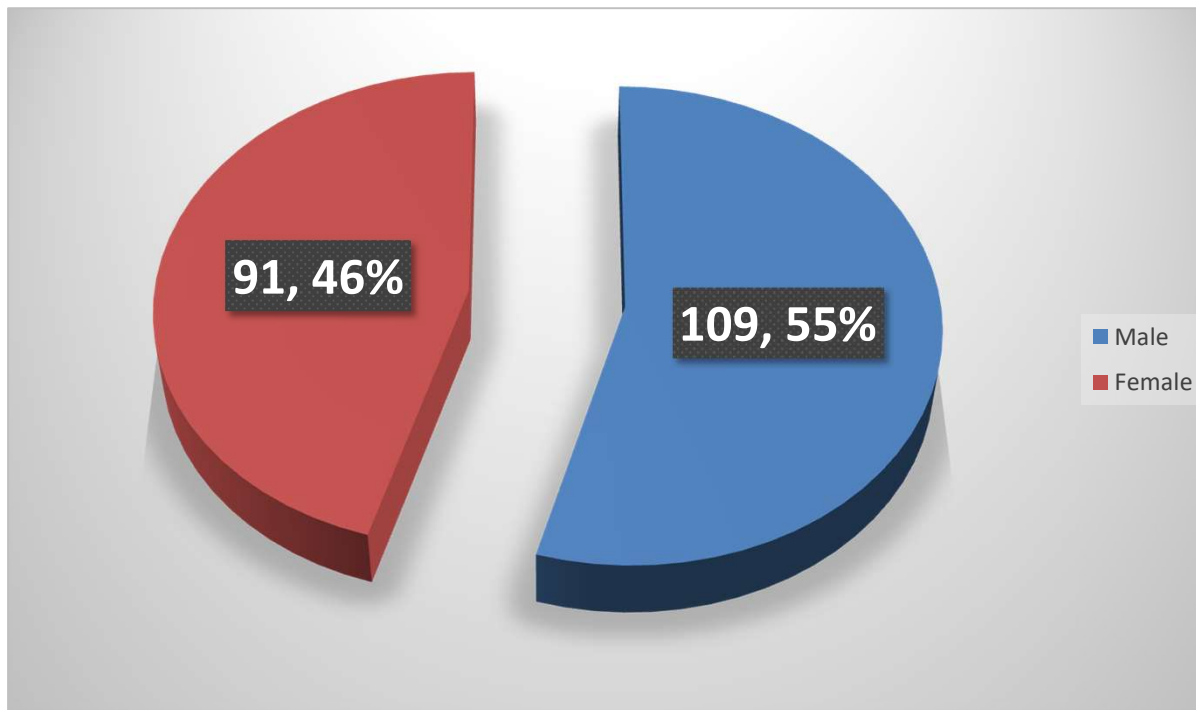


Figure 05.
Distribution of patients with clinical UTI according to gender (n= 200)

Out of 200 patients with clinical UTI, 109 (54.5%) were male and 91 (45.5%) were female. The male to female



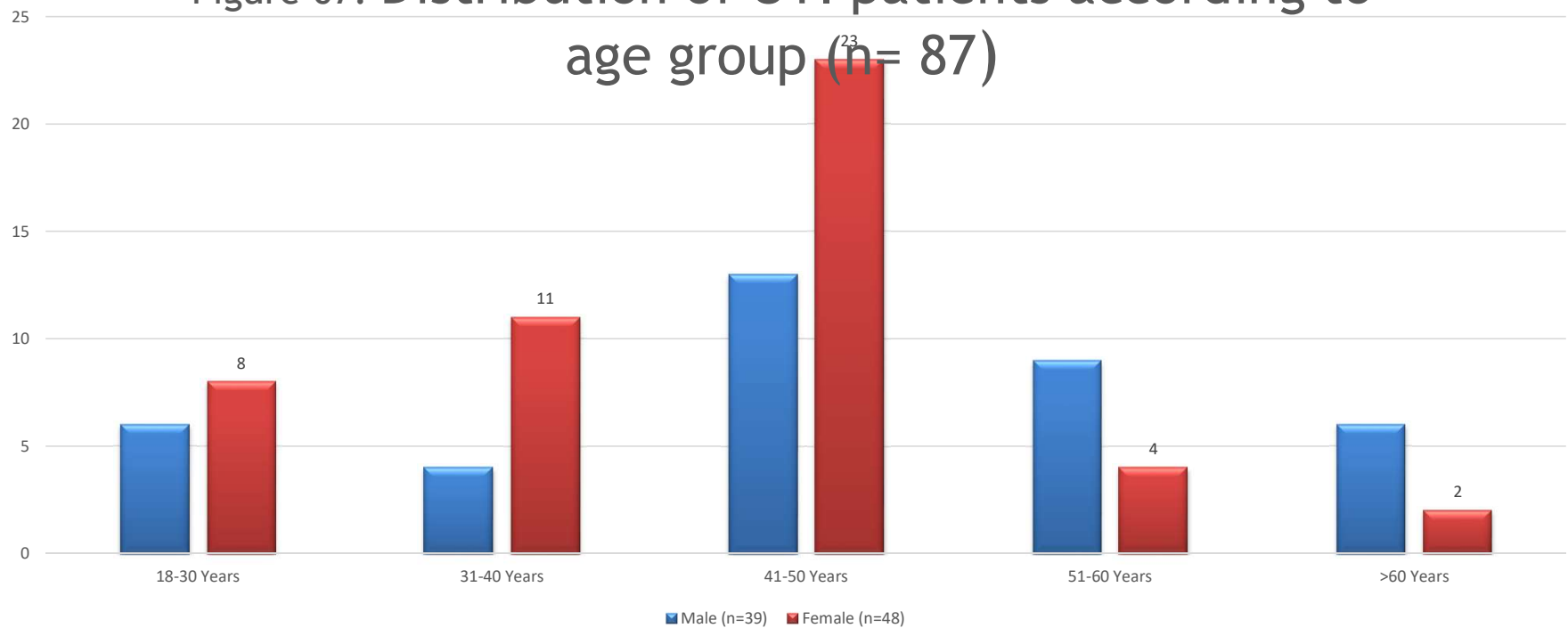
Results: Urine Culture-Positivity

Figure 06. Samples with positive urine culture in bacterial UTI in different gender groups (n=200)



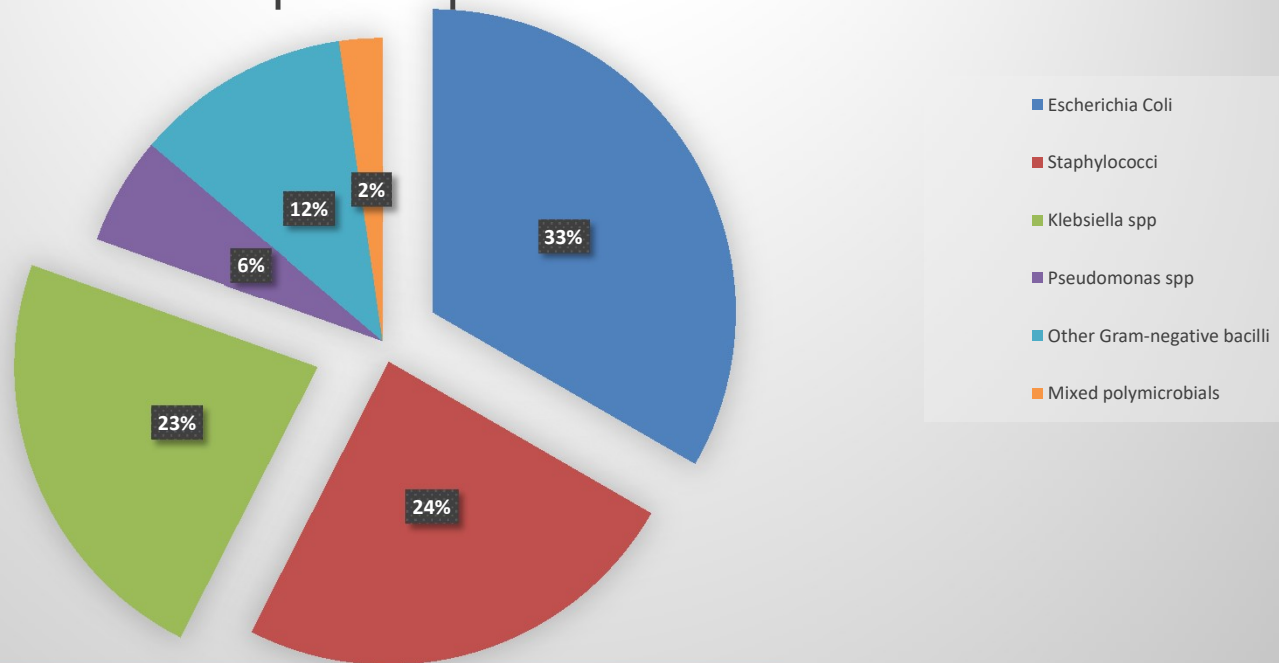
Results: Age-based Patient-distribution

Figure 07. Distribution of UTI patients according to age group (n= 87)



Results: Distribution of Bacterial Isolates

Figure 08. Distribution of bacterial isolates from urine samples of patients with UTI



Types of isolates	No. of isolates	Sensitivity of different antibiotics (%)										
		IMP	AZT	CIP	TE	AMP	SXT	GM	ATH	NA	NI	CFX
<i>Escherichia coli</i>	29	92	46.5	48.3	22.7	21.6	11.3	27.9	86.5	32.5	25.7	58.8
<i>Staphylococci</i>	21	100	37.6	38.5	00	55.5	63.6	73.8	9.62	15.3	10.36	65.7
<i>Klebsiella spp</i>	20	89.35	72.67	58.7	19.5	38.6	29.7	61.6	63.6	36.7	21.6	51.3
<i>Pseudomonas spp</i>	05	62.6	18.5	18.1	00	00	38.7	21.7	61.7	18.7	00	00
Other Gram-negative bacilli	10	78.9	61.7	65.7	61.7	30	40.1	31.6	63.6	48.6	00	29.1
Mixed polymicrobials	2	100	00	50	50	-	00	50	100	-	100	-



IMP: Imipenem, AZT: Aztreonam, CIP: Ciprofloxacin, TE: Tetracycline, AMP: Ampicillin, SXT: Co-trimoxazole, GM: Gentamicin, ATH: Azithromycin, NA: Nalidixic Acid, NI: Nitrofurantoin, CFX: Cephalexin

Discussion

- Predominant isolates:
 - *Escherichia coli* (33.33%)
 - *Klebsiella* spp
- Most of the bacteria showed 50% or higher sensitivity to imipenem, azithromycin and cephalexin separately, except Staphylococci (only 37.6% to azithromycin).



Discussion cont.

- All the isolates were highly sensitive to imipenem, even up to 100% by staphylococci.
- *Escherichia coli* showed less than 50% (11.3% - 48.3%) sensitivity to 8 antibiotics out of 11 used.
- Klebsiella showed less than 40% (19.5 - 38.6%) sensitivity to 5 antibiotics out of 11 used.



Limitations of Extrapolation

- This was a single-centered, cross-sectional study.
- Duration was short.
- Sample size was small.
- Pregnant ladies and terminally-ill patients were excluded- in whom frequency of UTI is expected to be high.
- Non-bacterial causes of UTI were out of the scope of this study.



Conclusion

- The Gram negative bacteria *Escherichia coli* is the commonest (culture-positive) cause of UTI in our perspective.
- Imipenem shows good sensitivity against majority of the isolates.
- Commonly used antibiotics like cefixime, cephalixin, co-trimoxazole, tetracycline and ampicillin are relatively less sensitive in UTI.



The Way Ahead

- A multi-centered study in the divisional/ tertiary hospitals of whole Bangladesh could reveal the real picture of UTI in Bangladesh.
- The study duration should be longer.
- Dissemination of study results to highlight the need for more stringent application of antibiotic stewardship program.



THANK
YOU!

