



STUDY OF ANTIMICROBIAL AGENT SUSCEPTIBILITY IN PATIENTS WITH LOWER RESPIRATORY TRACT INFECTION ADMITTED IN INTENSIVE CARE UNIT OF LG HOSPITAL, AHMEDABAD.

General Medicine

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ABSTRACT

Aim - To study susceptibility of antimicrobial agents against microorganisms causing lower respiratory tract infections.

Materials & Method - Total 185 patients with symptoms & signs of lower respiratory tract infection admitted in ICU of LG hospital were taken & m lower respiratory tract were sent & were given antimicrobial agents for 5 days according to culture & sensitivity report.

Result - Patients with comorbidities are more likely to be admitted in ICU for management of LRTI & may require oxygen or ventilatory support. m the lower respiratory tract should be sent for culture & sensitivity as early as possible. Various microorganisms, usually gram negative bacilli are h variable sensitivity to antimicrobial agents.

Discussion - Patients admitted to ICU for management of LRTI should be started on empirical antimicrobial agents immediately after sending m the lower respiratory tract for culture & sensitivity. Majority of the patients require a shift to an antimicrobial agent of choice according to report. Patients with requirement of ventilatory support on admission yielded more resistant microorganisms & had poor prognosis despite itimicrobial agent therapy.

KEYWORDS

INTRODUCTION

Lower respiratory tract infection is a broad terminology which includes acute bronchitis, pneumonia, acute exacerbations of chronic emphysema / chronic bronchitis & acute exacerbation of bronchiectasis. Acute lower respiratory tract infections are one of the common clinical problems in community and hospital settings and many of the complicated patients are admitted or shifted to intensive care units for management.

Management of community-acquired pneumonia & acute exacerbations of chronic obstructive pulmonary disease may pose challenges because of diagnostic difficulty in differentiating infections caused by typical and atypical microorganisms. Beta-lactam antibiotics, macrolides, and fluoroquinolones are routinely prescribed medicines for the empirical management of these, but with time the response to these antimicrobial agents is highly varying because of the change in the sensitivity patterns of microorganisms causing lower respiratory tract infections.

AIM OF THE STUDY

Aim is to study susceptibility of antimicrobial agents against microorganisms causing lower respiratory tract infections.

MATERIALS & METHODS

Study Location - The present study was carried out in intensive care unit of LG hospital at Ahmedabad.

Study Design - Retrospective clinical study conducted from 01/01/2019 to 30/06/2020 (18 months).

Sample Size - 185 patients (100 male & 85 female)

Inclusion Criteria -

- Age > 18 years
- Patient with clinical or radiological evidence of acute lower respiratory tract infection
- Patient admitted in intensive care unit for management

Exclusion Criteria -

- Age < 18 years
- Patient who had already taken any antimicrobial agent in last 1

month

- Patients with additional active source of infection other than lower respiratory tract
- Patients with active pulmonary tuberculosis according to RNTCP
- Patients with lower respiratory tract infection but normal report of culture from lower respiratory tract sample

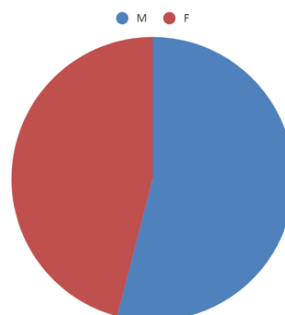
Method -

Total 185 newly admitted patients in the intensive care unit of LG hospital at Ahmedabad were selected based on inclusion & exclusion criteria. Basic patient details like age, gender, comorbidities, oxygen requirement on admission were noted. Single specimen of lower respiratory tract either sputum or endotracheal tube aspiration was obtained in a sterile container according to the clinical condition of the patient. Sample was sent for culture & sensitivity testing in the Department of microbiology, LG hospital. Reports were usually obtained in 48 hours & patients were either continued or shifted to an antimicrobial agent of choice for 5 days according to sensitivity report of microorganism/s. After 5 days of treatment by antimicrobial agent of choice, change in patient status were denoted as either improved, static or deteriorated based on clinical, laboratorial or radiological evidences.

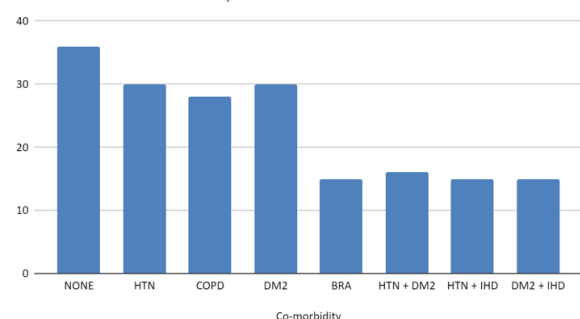
OBSERVATION & RESULTS -

For 185 patients selected on the basis of inclusion & exclusion criteria, basic patient details like age, gender & co-morbidities were noted.

Patient data - Gender

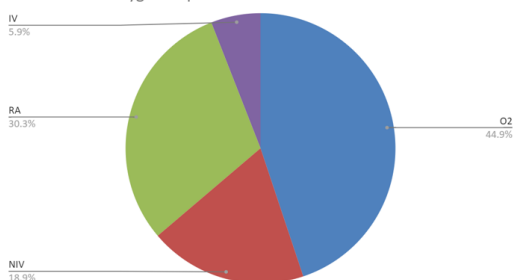


Patient data - Co-morbidity



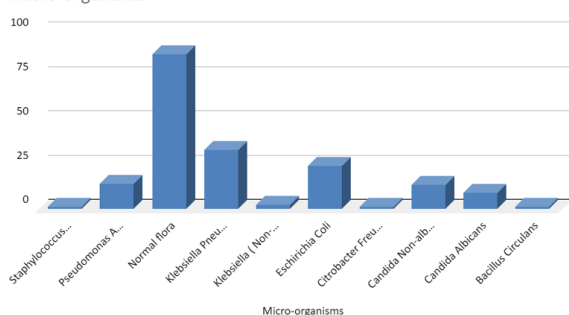
Patients were also categorised based on oxygen requirement on admission. According to clinical status of patient, sample for lower respiratory tract of patient either sputum or endotracheal aspirate was collected in a sterile container for culture & sensitivity.

On admission oxygen requirement

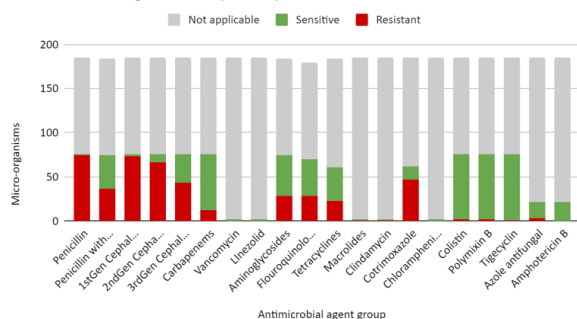


Reports of culture were usually obtained within 48 hours & different microorganisms were isolated. Maximum number of isolated microorganisms were gram positive cocci which are normal respiratory flora & are usually not associated with any pathology. Maximum number of pathogenic microorganisms were gram negative bacilli like Klebsiella Pneumoniae, Escherichia Coli, Pseudomonas Aeruginosa. A fair number of fungal microorganisms mostly Candida (Albicans & non-albicans) were also isolated.

Micro-organisms

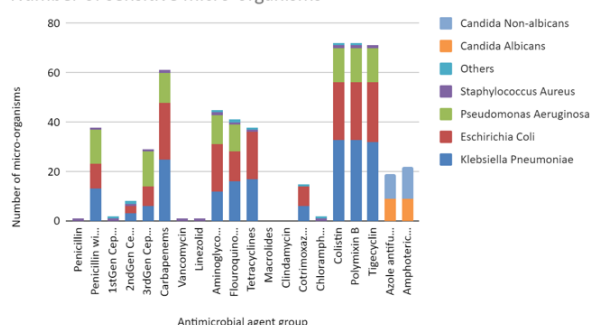


Antimicrobial agent susceptibility

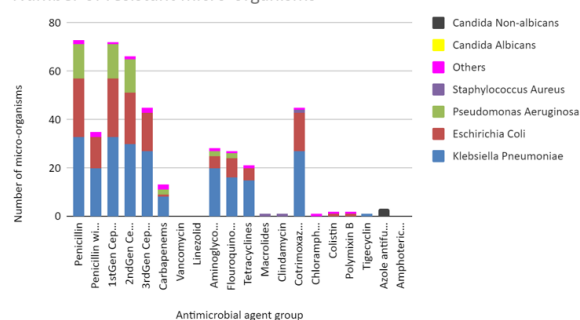


Every patient presented to ICU, LG hospital with provisional diagnosis of lower respiratory tract were given empirical antimicrobial agents usually Amoxicillin + Clavulanic acid or Cefoperazone + Sulbactam. Despite empirical antimicrobial therapy, various microorganisms were found which were resistant to various antimicrobial agents.

Number of sensitive micro-organisms

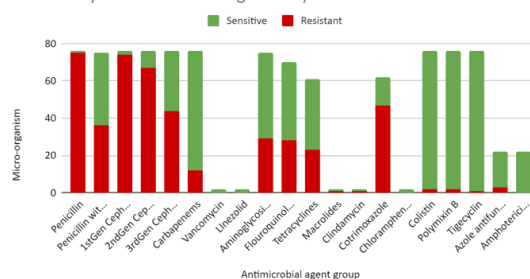


Number of resistant micro-organisms

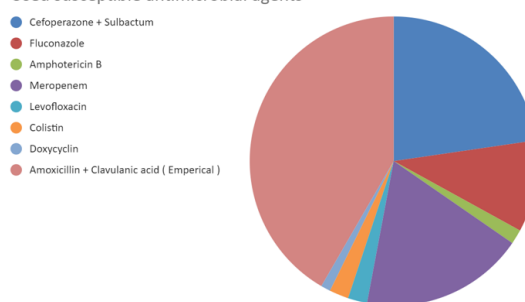


Depending upon the report of microorganism sensitivity to antimicrobial agents, patients were either continued or shifted to antimicrobial agent of choice according to sensitivity.

Antimicrobial agent susceptibility (Excluding normal flora & intrinsically resistant micro-organisms)

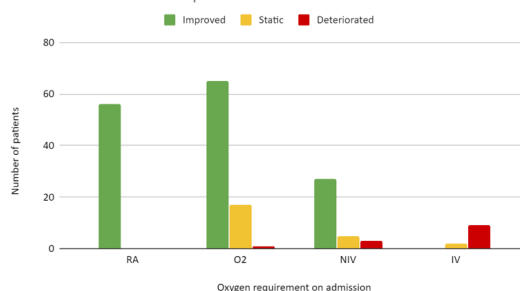


Used susceptible antimicrobial agents

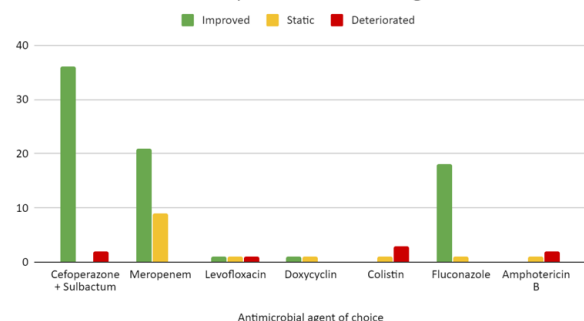


After 5 days of treatment by antimicrobial agent of choice, change in patient status were denoted as either improved, static or deteriorated based on clinical, laboratorial or radiological evidences.

Overall outcome of LRTI patients in ICU



Outcome after use of susceptible antimicrobial agent



Summary - From the above-mentioned observations, we can summarize the following.

1. Patients from both genders are admitted in ICU for management of LRTI with slight male predominance.
2. Patients with comorbidities are more likely to get admitted in ICU for management of LRTI.
3. Patients may require oxygen or ventilatory (Non-invasive or invasive) support depending on the clinical condition of the patient.
4. Many of the samples sent from the patients with LRTI yield no pathogenic microorganism, which may be related to sampling errors.
5. Maximum numbers of pathological microorganisms isolated were gram negative bacilli like Klebsiella Pneumoniae, Escherichia Coli, Pseudomonas Aeruginosa.
6. A number of samples yielded growth of fungal microorganisms, usually Candida (Albicans or Non-albicans) which required antifungal agents.
7. Majority of microorganisms were resistant to older antimicrobial agents like penicillins, first & second generation cephalosporins.
8. Majority of microorganisms were sensitive to 3rd generation cephalosporins, carbapenems & higher antimicrobial agents like Colistin, Polymyxin B, Tigecycline.
9. Majority of patients required to switch from empirical antimicrobial agent to the antimicrobial agent of choice according to sensitivity.
10. Commonly used antimicrobial agents of choices were Cefoperazone + Sulbactam & Meropenem, while Fluconazole for fungal microorganisms.
11. Patients with requirement of ventilatory support on admission yielded more resistant microorganisms & had poor prognosis despite sensitive antimicrobial agent therapy.
12. Antimicrobial agents like Cefoperazone + Sulbactam & Meropenem & Fluconazole had better outcomes than higher antimicrobial agents like Colistin & Amphotericin B.

CONCLUSION -

From the above-mentioned study it can be concluded that patients with comorbidities are more likely to be admitted in intensive care unit for management of lower respiratory tract infection & may require oxygen or ventilatory (Non-invasive or invasive) support depending on the clinical condition. Empirical antimicrobial therapy should be started for patients with lower respiratory tract infections immediately after sending specimen for culture & sensitivity. Various microorganisms usually gram negative bacilli are isolated with variable sensitivity to antimicrobial agents, thus patients should be immediately shifted to antimicrobial agent of choice according to sensitivity report. Patients with requirement of ventilatory support on admission yielded more resistant microorganisms & had poor prognosis despite sensitive antimicrobial agent therapy.

REFERENCES

1. Goel N, Chaudhary U, Aggarwal R, Bala K. Antibiotic sensitivity pattern of gram negative bacilli isolated from the lower respiratory tract of ventilated patients in the intensive care unit. Indian J Crit Care Med. 2009;13:148–51. [PMC free article] [PubMed] [Google Scholar]
2. Veena Kumari HB, Nagarathna S, Chandramuki A. Antimicrobial resistance pattern among aerobic gram-negative bacilli of lower respiratory tract specimens of intensive care unit patients in a neurocentre. Indian J Chest Dis Allied Sci. 2007;49:19–22. [PubMed] [Google Scholar]
3. Hospital-acquired pneumonia in adults: Diagnosis, assessment of severity initial antimicrobial therapy, and preventive strategies A consensus statement, American Thoracic Society, November 1995. Am J Respir Crit Care Med. 1996;153:1711–25. [PubMed] [Google Scholar]
4. Gonlugur U, Bakici MZ, Ozdemir L, Akkurt I, Icagasioglu S, Gultekin F. Retrospective analysis of antibiotic susceptibility patterns of respiratory isolates of Pseudomonas

- aeruginosa in a Turkish University Hospital. Ann Clin Microbiol Antimicrob. 2003;2:5. [PMC free article] [PubMed] [Google Scholar]
5. Ayliffe GA, Fraiese AP, Geddes AM, Mitchell K. 4th ed. London: Arnold; 2000. Control of Hospital Infection: A Practical Handbook; pp. 1–10. [Google Scholar]
6. Navaneeth BV, Belwadi MR. Antibiotic resistance among gram-negative bacteria of lower respiratory tract secretions in hospitalized patients. Indian J Chest Dis Allied Sci. 2002;44:173–6. [PubMed] [Google Scholar]
7. Trupti Bajpai, G. Shrivastava, G. S. Bhatambare, A. B. Deshmukh, and V. Chitnis. Microbiological profile of lower respiratory tract infections in neurological intensive care unit of a tertiary care center from Central India [PMC free article]