Universe Scientific Publishing

ORIGINAL ARTICLE

Pathogenic Bacteria and Drug Sensitivity Analysis of Lower Respiratory Tract Infections in Patients

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ABSTRACT **Objective:** To study drug resistance of pathogenic bacteria in lower respiratory tract infection in patients in Respiratory Department of Internal Medicine. **Method:** On October 2011 to October 2013, there were 112 patients with lower respiratory tract infection in the hospital respiratory medicine ward were reviewed for analysis by collected patient's infected blood, urine and sputum for laboratory analysis and investigation of drug resistance. **Results:** In a total of 112 strains of pathogenic bacteria, gram negative bacteria, the number of strains was 68, accounting for 60.7% of all strains. The analysis of gram positive bacteria had the lowest drug resistance to vancomycin, but the resistance to erythromycin and penicillin was the highest, while gram negative bacteria were the lowest, but the drug resistance was high. **Conclusion:** In Respiratory Department of Internal Medicine, patients with lower respiratory tract infection, the pathogenic bacteria which is gram negative bacterial infection is more common, to clarify the distribution of the infection of pathogenic bacteria, and the drug resistance to do a good grasp of the lower respiratory tract infection in patients with lower respiratory tract infection in patients with the role of a thing.

KEYWORDS
Respiratory tract infection
Pathogenic bacteria
Drug resistance

1. Introduction

Lower respiratory tract infection is one of the most common infectious diseases in the elderly. Bacterial pneumonia is divided into community acquired infections and hospital acquired infections. Hospital-acquired infections (Hospital Acquired Pneumonia, HAP) is an infection that is acquired in the hospital, including infection during hospitalization and after discharge and get infections in hospitals. In recent years, there is a wide range of lower respiratory tract infections, and has become a common infectious disease in the Department of Respiratory Department of Internal Medicine. The wide range of population aging, basic diseases, invasive operation, immune inhibitors and antibiotics are widely used, which can lead to the occurrence of lower respiratory tract infections, whereby can lead to prolonged hospital stay, and thus medical expenses is increased [1]. At present, the prevalence of lower respiratory tract infections in the elderly, due to the decline in their own immunity, the body's function and the irrational use of antibiotics, the probability of a pathogen infection is extremely high [2]. To understand the distribution and drug resistance of pathogenic bacteria in Respiratory Department of Internal Medicine is very important as it can be more targeted to prevent and control the infection of patients [3]. As a result, the clinical data of 112 patients with lower respiratory tract infection treated in our hospital from October 2011 to October 2013, the number of infected patients with lower respiratory tract infection, and the distribution of pathogens and drug resistance were analyzed.

doi: 10.18686/aem.v3i1.2
Received: April 3, 2014; Accepted: June 17, 2014; Published online: August 15, 2014

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2. Research objects and methods

2.1. Research object

The study is included 112 patients with lower respiratory tract infection treated by the Department of Internal Medicine in October 2011 to October 2013. Among them, 60 patients were male, 52 female patients, aged between

59–86 years, the average age was 61.21 years old.

2.2. Collect samples

Collect the patient's discharge, operation flow according to the standard requirements of the hospital. Each patient was in the morning with 0.9% normal saline mouthwash abandoned after the first mouthful phlegm, and then forced coughing, from the deep respiratory expectoration of fresh sputum, filled in a sterile boxes, and inspection within 30 minutes. The bacterial culture and drug sensitivity test were carried out.

2.3. Pathogenic bacteria culture

The sputum of patients were collected, filled it into sterile containers and immediately sent to the laboratory for culture, continuous cultivated for 2 times, the last train out of the dominant strains is set as bacteria.

2.4. Quality control strains

Pseudomonas aeruginosa, *Klebsiella pneumoniae*, *Acinetobacter Bauman*, *Staphylococcus aureus* are typical of the United States of America Culture Preservation Center (ATCC) species, the National Health and Family Planning from the Clinical Laboratory Center.

2.5. Observation index and evaluation criteria

The specimens were inoculated on the flat plate, and the results were observed in 48 h after culture. The results were observed in 3–5 d. The colonies were identified by colony characteristics, such as size, shape, luster, color, hardness, transparency, and so on. The culture and identification of sputum specimens were tested by the national clinical laboratory operation standard: *Methicillin-resistant Staphylococcus aureus* (MRSA), extended-spectrum β-lactamases (ESBLs) by disk confirmatory test; agar diffusion susceptibility test law (K-B method); identify isolates using VITEK32 automated microbial analyzer (France).

2.6. Drug sensitivity test

Bacterial drug sensitivity test was carried out according to the method and standard recommended by NCCLS. Standard strains are ATCC25922, ATCC25923, ATCC27853, ATCC29212 (the center for clinical testing of the Ministry of health). Drug sensitive paper purchased from Oxoid company.

2.7. Statistical analysis

The statistical software SPSS 18.0 were used for data processing and analysis as count data were expressed as a ratio, using the Chi-Square test, when $p < 0.05$ the differences is statistical significance.

3. Results

3.1. Distribution of pathogenic bacteria

A total of 112 cases of infection were cultured and 112 strains of pathogenic bacteria were cultivated. Gram negative bacteria, the number of the 68 strains, accounting for 60.7% of all strains. The other pathogenic bacteria were 30 fungal strains (26.8%), 14 gram positive bacteria (12.5%). See Table 1.

Table 1. 112 constituent ratio of pathogenic bacteria (%).

Pathogenic bacteria		Strain	Composition ratio (%)
Gram negative bacteria		68	60.7
	Pseudomonas aeruginosa	45	66.1
	Klebsiella pneumoniae.	15	22.1
	Other	8	11.8
Fungus		30	26.8
	Candida albicans	23	20.5
	Other	13	6.3
Gram positive bacteria		14	12.5
	Staphylococcus aureus	9	8.0
	Other	5	4.5

3.2. Drug resistance analysis

3.2.1. Analysis of drug resistance of gram positive bacteria

The analysis showed that gram positive bacteria were the lowest drug resistance, but the resistance to erythromycin and penicillin was the highest (Table 2).

Table 2. Drug resistance analysis of gram positive bacteria (%).

Antimicrobial agents	Drug resistance (%)	
	Staphylococcus aureus	Others
Erythromycin	48.5	26.2
Penicillin	100	25.9
Co-trimoxazole	39.1	76.1
Miloxacin	43.1	11.0
Rifampicin	21.6	25.6
Gentamicin	20.2	20.0
Clindamycin	45.6	65.1
Levofloxacin	0.0	25.1

3.2.1. Analysis of drug resistance of gram negative bacteria

Analysis of gram negative bacteria showed that the resistance is the lowest, but the majority of penicillin and drug resistance is higher (Table 3).

4. Discussion

In recent years, the phenomenon of drug resistance has become a common concern and major issue in many countries and regions, including Europe and the United States. The spread of resistant bacteria, such as the spread of the super bacteria, and the emergence of a large num-

Table 3. Drug resistance analysis of gram negative bacteria (%).

Antimicrobial agents	Drug resistance (%)	
	Klebsiella pneumoniae	*Pseudomonas aeruginosa*
Ampicillin	19.2	52.1
Aztreonam	71.9	26.2
Ciprofloxacin	41.6	25.9
Co-trimoxazole	72.1	76.1
Cefepime	0.0	0.0
Cefatriaxone	56.9	25.6
Gentamicin	45.1	50.0
Ceftazidime	72.1	25.1
Levofloxacin	72.1	25.1

ber of bacteria resistant varieties, bring greater confusion and anxiety to human beings. At present, a large number of bacteria on the commonly used antibiotic resistance enhancement are more obvious. Some of the bacteria are commonly used as standard antibiotic drugs for more than half of the existence of drug resistance phenomenon. For more people, bacteria may be resistant to two or three kinds of drugs. Among them, this kind of bacterial resistance to the disease is the biggest blow to the hospital. This is because the patient is weak in immunity. Respiratory tract infections are the most common infectious diseases in clinic, which is a relatively complicated with lower respiratory tract infection. With the new infection of pathogenic bacteria, the bacterial spectrum distribution is becoming more and more complex. The drug resistance is more common, and the difficulty coefficient is increased obviously. There is still no more effective way to deal with the growing problem of bacterial resistance, which has now become a global concern. To master the distribution of pathogenic bacteria and the change of drug resistance is the first choice for clinical application of antibiotics [4].

A total of 112 cases of lower respiratory tract infection in the sputum of the patients for the cultivation and identification of pathogenic bacteria were found in a total of cultivate 112 strains of pathogenic bacteria where the number of gram negative bacteria is accounted for 60.7% of all the strains. This result also suggested that, in the pathogenic bacteria infection, gram negative bacteria is the main pathogenic bacteria which is should be highly valued. At the same time, the fungus is the main pathogenic bacteria causing lower respiratory tract infection, which is the absolute status of *Candida albicans*, and basically the fungal infection is caused by the strain.

The results of this study showed that gram positive bacteria were the lowest drug resistance to vancomycin, and the resistance to erythromycin and penicillin was the highest. At the same time, gram negative bacteria have the lowest drug resistance, but the resistance to most penicillin and the drug resistance of the drug are higher. These results also provide the basis for the future treatment of antibiotics, for different pathogenic bacteria; to take different antibiotics treatment is necessary, real-time monitoring of the drug resistance of pathogenic bacteria to help control and prevention of infection [5].

In the treatment of Respiratory Department of Internal Medicine, the establishments of artificial airway will increase the risk of lower respiratory tract infections. Therefore, try to reduce repetition of the tracheal intubation. This is because frequent intubation times will allow outside air ventilation to patients with airway, resulting pulmonary infection to the patients. In the process for establishment of artificial airway, as far as possible try to shorten the building time in order to avoid the wounds in the air exposure time is too long and leads to infected patients. Moreover, the abuse of antibiotics will cause lower respiratory tract infections, so the use of antibiotics to be reasonable.

To sum up, it is necessary to detect the pathogens of lower respiratory tract infection, and to detect the drug resistance of pathogens. This is because to understand the distribution of pathogenic bacteria and take the right action for combating the drug resistance and will able reducing the occurrence of infection which has a multiplier effect.

Conflicts of interest

These authors have no conflicts of interest to declare.

Authors' contributions

These authors contributed equally to this work.

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