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CLINICAL, MICROBIOLOGICAL AND RADIOLOGICAL PROFILE OF BRONCHIECTASIS: A TERTIARY CARE HOSPITAL STUDY IN SOUTHERN RAJASTHAN

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ABSTRACT

Background: Bronchiectasis is an irremediable dilatation of more than one bronchus, with decrease clearance of secretions and expiratory flow. Secondary bacterial infection is very common and leads to worsening of disease. The sequel of the disease leads to poor quality of life, with higher morbidity and mortality. This issue has limited literature. **Material & Methods:** All patients with diagnosis of bronchiectasis by HRCT thorax in tertiary care hospital in Udaipur were included after obtaining informed consent. Detailed clinical history was recorded. Sputum for microbiological profile was sent. Symptomatic along with supportive treatment was initiated. Results of microbiological profile were obtained and analyzed on the basis of inferential statistics to fulfill the objectives of the study. **Results:** Total of 50 patients were enrolled for this study. There was female predominance 29 patients (58%) over males 21 patients (42%) in our study. Out of all patients, 34 (68%) patients were smokers. Commonest symptom/sign was Cough (100%), Dyspnea (76%), Fever (16%), Hemoptysis (12%) and Crepitation (72%). All patients shown increased growth of aerobic bacteria in sputum specimen. Pseudomonas Aeruginosa (34%), Klebsiella Pneumoniae (20%), Acinetobacter (10%), Stapylococcus Aureus (8%) and Streptococcus Pneumoniae (8%), Acinetobacter (10%) and Aspergillus (8%). **Conclusion:** Pseudomonas being the most common colonizing organism in bronchiectasis patients, it must be underlined that the intensification of anti-Pseudomonas Aeruginosa antibiotic therapy among these cases (e.g., with higher doses, prolonged treatment, or combined therapy) possibly could slower even stop the impairment of lung function over the longer term.

Keywords: Bronchiectasis, Colonization, Pseudomonas

INTRODUCTION

Bronchiectasis is an irremediable dilatation of more than one bronchus, with decreased mucociliary clearance which results in recurrent infections and reduction in airflow (expiratory) **(1)**. This disease leads to repeated lower respiratory tract infections, deterioration of pulmonary function, pulmonary hypertension and respiratory failure, results into poor in quality of life, with higher mortality and morbidity **(2-4)**.

Nowadays bronchiectasis had high incidence rates, mainly because of the better diagnostic modalities such as high resolution computerized tomography **(5)**.

The prevalence of bronchiectasis was also reported higher among developing countries in comparison to developed countries, especially in cases with less access to healthcare; however, it is probably underestimated **(6)** in reports which were focused on

healthcare claims and physician reported cases.

Among the non-smokers the lower respiratory tract is comparatively sterile **(7, 8)** in contrast to patients who had bronchiectasis or chronic obstructive pulmonary disease (COPD) which were reported with pathogenic microorganisms (PPMs) **(9)**. Various researches reports that the pathogenic microorganisms were found in distal airways and correlated with patients who had bronchiectasis.

These pathogenic bacteria because a potential harm to the lung parenchyma and may release numerous inflammatory mediators that are responsible for further of airways. This process of chronic bacterial infections and tissue damage and obstruction and secondary inflammatory processes act in a "vicious cycle" and this is the main reason behind the chronicity of disease. **(10)** Hence various researches are required in this particular field to overcome this vicious cycle and to found out various effective treatment measures and antibiotics.

Although various researches conducted based on sputum microscopy and culture as a diagnostic method to find out the presence of bronchial pathogens during chronic exacerbations among patients with bronchiectasis **(11)**, out of them only few of research's found out bacterial colonization among clinically stable patients with chronic bronchiectasis. Sputum microscopy and culture is an easy, cost effective and non-invasive procedure, however there is a risk of contamination during procedure by commensal flora of or oro-pharyngeal wall.

The use of flexible bronchoscopy and other newer diagnostic procedure reports decrease contamination by oro-pharyngeal flora and results better diagnostic accuracy among samples compared to older procedure. Although, few researches had reported that bronchoscopic guided techniques of distal airways for bacteriological evaluation in patients with bronchiectasis in a clinically stable condition **(12, 13)**. These researches have observed that pathogenic microbes, namely Pseudomonas spp, and Haemophilus Influenzae were isolated from 60-90% of the cases.

Microbiological assessment of the distal airways samples among patients with clinically stable bronchiectasis may help in evaluating the role of colonization in disease progression. Bronchiectasis sometimes referred as an "orphan disease" which is due to less clinical diagnosis, few research activity and also less commercial interest **(14)**. As a sequel, and decreasing researchers interest in non-cystic fibrosis bronchiectasis, there is very less reference literature was found on the subject in comparison to other causes of obstructive lung diseases and also pneumonia **(15)**.

Specific bacteriological evaluations are necessary for decreasing the occurrence of complications and for better treatment outcomes. There is also an issue of increasing antimicrobial resistance in the pathogenic microorganisms **(16)**, mainly due to the irrational use of antibiotics prophylactic or therapeutically even before the results of the bacteriological culture, it is also a matter of potential global concern.

This study has reviewed our current understanding on clinical, radiological aspect and microbiological profile, especially the nature of the bacterial flora commonly colonizing the airways in Bronchiectasis, in a tertiary care hospital of Southern Rajasthan, thus enabling the clinicians to appropriately formulate and endorse a competent and rational antibacterial policy, to further curb the worsening of the disease leading to poor quality of life of the patient.

MATERIAL AND METHODS

Source of Data collection: Patient presented to or referred by other departments to the Department of Respiratory Medicine in GMCH, Udaipur.

Study Area: Department of Respiratory Medicine, Geetanjali Hospital, Udaipur.

Study Design: Cross sectional, observational, clinic laboratory analytic study.

Study Period: January 2016 to July 2017.

Sample Size: 50.

Inclusion Criteria: Patients >18 years of age having Bronchiectasis on High Resonance Computed Tomography.

Exclusion Criteria: Patients with history of Interstitial Lung Diseases, Radiation Therapy, Cystic Fibrosis, AIDS and Patients who are not willing to be enrolled into the study.

Patients fulfilling the selection criteria, were informed in detail about the nature of the study and a written informed consent was obtained and the patient was enrolled.

After taking written consent and obtaining the demographic data, all the 50 subjects had detailed clinical assessment performed at GMCH with a pre designed and pretested proforma to record findings.

Early-morning sputum samples were taken because of higher probability of pathogenic bacteria in overnight secretions which are more likely to be pooled and concentrated. Twenty four hour collections should be discouraged **(17, 18)**.

Specimens were delivered to the laboratory as quickly as possible, preferably within 2 hours, for delicate bacterial, viral and mycoplasma pathogens may die out during longer delay.

Gram staining along with culture and sensitivity of the samples was done to guide the clinicians in deciding the appropriate treatment option.

Sensitivity and resistance pattern of the antibiotics to both gram positive and gram negative bacteria were noted down. Final assessment of patients were done after collecting sputum culture and sensitivity report.

Pulmonary Function Test

Pulmonary function assessment was done on all the subjects on spirometer (RMS Helios 401, Medicare Systems and Recorders (P) LTD) performed for forced vital capacity (FVC) and forced expiratory volume in 1st second (FEV1) according to American Thoracic Guidelines 64.

Patients were categorized into four different groups according to the findings on pulmonary function tests. Normal pulmonary function test was classified as FEV1and FVC more than 80% of predicted as well as FEV1/FVC reduced to 70% of predicted value. Cases with restrictive lung disease had FVC and FEV1 values reduced to 80% of predicted value and a maintained FEV/FVC ratio of more than 70%, however cases with undifferentiated disease had FEV1 and FVC values reduced to 80% of predicted value and an FEV/FVC ratio reduced to 70% of predicted value.

The following hypothesis was based upon data: Chi-square/ Fischer Exact tests were applied to find out the significance of study variables of categorical scale among two or more groups. Statistical software namely SPSS V19 was used for calculation and test of the data.

RESULTS

Out of the total 50 patients, there were 6 patients (12%) in 31to 40 age group, 11 cases (22%) in 41-50 age group, 19 patients (38%) in 51-60 age group, 10 cases (20%) in 61-70 age group and 4 cases (8%) in 71-80 age group. The maximum incidence was observed in 51-60 age group accounting for 38%.

(Graph 1) Out of the total 50 patients, 29 patients, females were (58%) and 21 patients (42%) were male. Incidence of bronchiectasis was maximum in farmers (50%), followed by labours (18%), housewives (12%), office workers (10%) and in teachers (10%). Out of all patients, 34 (68%) patients were smokers. Average pack years in smokers was 28.97 ± 10.66 years. 16 (32%) patients were non-smokers.

The mean time duration of cough was 10.14 ±5.49 yrs. Cough and sputum was found in all the patients i.e. in 100% cases. Mean amount of expectoration in 24 hrs was 120.9 ±56.05 ml. The characteristics of sputum was mucopurulent in 21 (42%) patients, purulent in 16 (32%) and mucoid in 13 (26%) cases Dyspnea was reported in 38 (76%) and mean MMRC grade of dyspnea was 1.86 ±1.43. Hemoptysis was found among 12(24%) cases whereas fever was in 16

(32%) cases.

Crepts was the maximum sign seen in 36 (72%) cases followed by clubbing in 13 (26%) and ronchii in 9 (18%) cases. (Table 1) Among total, 25 (50%) patients had post infectious bronchiectasis and previous history of pneumonia in 16(32%) and tuberculosis in 19(38%) of cases respectively. Among 50 patients we studied, 14 cases (28%) reported bilateral bronchiectasis, 10 cases (20%) reported right upper lobe bronchiectasis, 11 cases (22%) reported left lower lobe bronchiectasis, 4 cases (8%) reported right middle lobe and right lower lobe bronchiectasis, 5 cases (10%) reported right middle lobe bronchiectasis, 2 cases (4%) reported left upper lobe bronchiectasis, 3 cases (6%) reported right lower lobe bronchiectasis and 1 case (2%) reported left lower lobe and left upper lobe bronchiectasis on HRCT.

Out of 50 cases, 25 cases (50%) reported cystic bronchiectasis, 13 cases (26%) reported traction bronchiectasis, 12 cases (24%) hadcylindrical bronchiectasis, and none reported varicose bronchiectasis. (Table 2) Out of the 50 cases studied 50 cases reported growth of aerobic bacteria in sputum culture. Among the 50 cases, 17 patients (34%) had reported Pseudomonas aeruginosa, 10 cases (2 0%) had grown Klebsiella pneumoniae, 4 cases (8%) each in S.Aureus and Streptococcus Pneumoniae, 5 cases (10%) shown Acinetobacter an d 4 (8%) had grown aspergilus. (Table 3) Among the 50 cases 4 cases shown Aspergillus fumigatus growth and 46 had shown no fungal growth. As reported in above figure percentages data of resistance of drugs noted among present study was highest for Amikacin (56%), Ampicillin (54%), Amoxicillin (52%), Gentamicin (48%) Amoxicillin Clavulinic acid (40%), Cotrimaxazole (36%), ceftriaxone (26%), cefuroxime (26%), ciprofloxacin (6%), piperacillin tazobactam (2%) and imipenem (0%). The most sensitive drug found in present study was imepenim (100%) which followed by pipercillin and tazobactam (98%), ciprofloxacin (94%), cefuroxime (74%) and ceftriaxone (74%).

(Graph 2) Infection caused by Pseudomonas results in worsening of lung function along with higher morbidity and mortality in comparision to other aerobic bacterial infections. Infections of Pseudomonas Aeruginosa, reports the highly significant association between severity of FEV1 and isolated vs non-isolated groups. In case of streptococcus species and klebsiella pneumonia there was no statistical significance was reported.

(Table 4) Dyspnea was reported in around 2/3rd of the patients, MMRC grade of dyspnea in patients who had pseudomonas infection was more in comparison with colonization with other organisms, comparison was tested by using Chi square test and the p value found to be significant i.e. <0.05. (Table 5)

DISCUSSION

In the present study we enrolled maximum number of adult patients according to inclusion and exclusion criteria, post-infectious study for bronchial destruction was recorded and the most common reason was evaluated for non-cystic fibrosis bronchiectasis.

The disease was typically diagnosed by symptoms of dyspnea, chronic productive cough, bi-basilar crackles and pattern of obstructive signs on assessment of pulmonary function in our subjects. We have assessed 50 patients with adult bronchiectasis to help describe the characteristic features of this disorder and to identify the clinical sign and symptoms of the disease leading up to this time. In this study the mean time duration of cough was 10.14 ±5.49 yrs. Cough and sputum was found in all the patients i.e. in 100% cases.

Mean amount of expectoration in 24 hrs was 120.9 ±56.05 ml. The characterstics of sputum was mucopurulent in 21 (42%) patients, purulent in 16 (32%) and mucoid in 13 (26%) cases Dyspnea was reported in 38 (76%) and mean MMRC grade of dyspnea was 1.86 ±1.43. Hemoptysis was found among 12 (24%) cases whereas fever was in 16 (32%) cases.

Crepts was the maximum sign seen in 36 (72%) cases followed by clubbing in 13 (26%) and ronchii in 9

(18%) cases. Habesoglu M A et al. (2011) reported that the mean time duration of signs and symptoms was 17.4 ± 15.3 years. Cough seen in (83.6%) and sputum in (83.6%) of cases were the most frequent complaints. Dyspnea was reported in two-thirds of the total patients.

Hemoptysis was found in 103 patients mainly as the blood streakes,; 19 of these patients were admitted with presenting massive hemoptysis and requiring urgent medical treatment, bronchial embolization done in 8 patients and surgery in 2 patients and follow-up. These findings were nearly similar to that of present study **(19)**. They further described that the most common sign of the physical examination was crackles (71.1%); rhonchi and wheezes (28.3%), (21.7%) respectively were the other frequent findings on examination. Only 13 cases reported finger clubbing. Crackles as auscultatory finding and finger clubbing were also common in cystic fibrotic type of the disease (P value < 0.05). These findings were nearly similar to the findings in our population.

Radiological Profile

Out of 50 cases, 25 cases (50%) reported cystic bronchiectasis, 13 cases (26%) reported traction bronchiectasis, 12 cases (24%) hadcylindrical bronchiectasis, and none reported varicose bronchiectasis. Among 50 patients we studied, 14 cases (28%) reported bilateral bronchiectasis, 10 cases (20%) reported right upper lobe bronchiectasis, 11 cases (22%) reported left lower lobe bronchiectasis, 4 cases (8%) reported right middle lobe and right lower lobe bronchiectasis, 5 cases (10%) reported right middle lobe bronchiectasis, 2 cases (4%) reported left upper lobe bronchiectasis, 3 cases (6%) reported right lower lobe bronchiectasis and 1 case (2%) reported left lower lobe and left upper lobe bronchiectasis on HRCT.

In a study by Kumar GS et al. (2017) observed similar findings to ours. On HRCT, presentation of Post TB Bronchiectasis among patients was most commonly reported as multilobar (28%) which was followed by left lower lobe (24%) and right upper lobe (18%) **(20)**. Studies by Cohen AG **(21)**, Bombarda S **(22)** had shown that right middle lobe was commonly involved in post TB bronchiectasis.

In present study out all cases 50 cases were identified with growth of aerobic bacteria in culture of sputum. Among the 50 patients, 17 patients (34%) had grown Pseudomonas aeruginosa, 10 patients (20%) had grown Klebsiella pneumoniae, 4 patients (8%) each in S. Aureus and S. Pneumoniae, 5 patients (10%) had Acinetobacter and 4 (8%) had grown aspergillus.

Kumar GS et al. (2017) observed bronchial colonization by aerobic bacteria especially Pseudomonas (32%) and klebsiella (24%) were common **(20)**. In a study conducted by S. Rajasekharan et al,, 50 patients with bronchiectasis were admitted, the bacteriological profile of the patients presented that the commonest organism producing secondary infection was H. influenza (46%) followed by S. Pneumoniae (16%), Beta-haemolytic streptococci (14%) coliform group (12%), Klebsiella Pneumoniae (8%) and Pseudomonas aeruginosa (4%) **(23)**.

Our study presented a significant percentage of aerobic bacterial colonization and the commonest organism is Pseudomonas aeruginosa followed by klebsiella Pneumoniae. Our result was similar to all the above studies.

However the present study did not show anaerobic organisms in post TB bronchiectasis patients as anaerobic bacteriological culture techniques were not available in our institution. Therefore additional studies are required to know the distribution of these organisms.

In our study we observed similar findings, out of the 50 patients 4(8%) patient had grown Aspergillus fumigatus and 46(92%) had no fungal growth. The limitation of the study was small sample size and short duration. In our study, bronchial colonization by fungi was uncommon with Aspergillus and Candida.

In a study done by Sobti KL et al. **(24)** and Sahoo RC et al **(25),** they found that tuberculosis of lung can be a predisposing factor in colonization of Aspergillus.

However in our study, bronchial colonization by fungi is uncommon in post tubercular bronchiectasis as in 46 subjects out of 50, there was absence of fungal growth and further studies are required in this context.

In our finding the percentages of resistance noted among these drugs was as follows: Amikacin (56%), Ampicillin (54%), Amoxicillin (52%), Gentamicin (48%) Amoxicillin and Clavulinic acid (40%), Cotrimaxazole (36%), ceftriaxone (26%), cefuroxime (26%), ciprofloxacin (6%) and imipenem (0%) and piperacillin and tazobactam (2%).

The most sensitive drug found in present study was imepenim (100%) which followed by pipercillin and tazobactam (98%), ciprofloxacin (94%), cefuroxime (74%) and ceftriaxone (74%). A study conducted by J Angrill et al have reported that resistance to antibiotics was observed among 30% of the total isolated microbes and also observed that 33% of total S. pneumonia strains isolated were shown resistant to penicillin and 33% of total Pseudomonas species were shown resistance to quinolones and 29% of total H. influenza were reported beta-lactamase positive, **(26).**

In a study conducted by HUO Hai-yan et al, reported that pseudomonas aeruginosa, klebsiella pneumoniae and E. coli were the most common micro-organisms. There was also high sensitivity with imipenem, piperacillin and tazobactam and quinolones **(27).** These results were similar to prent study. Further elaborative studies are needed to clarify further the causes of increased distribution and etiopathogenesis of these resistant microorganisms in various geographical areas.

Spirometry

In present study, Infections caused by Pseudomonas results in worsening of lung function along with higher morbidity and mortality in comparison to other aerobic bacterial infections. Infections of Pseudomonas Aeruginosa, reports the highly significant association between severity of FEV1 and isolated vs non-isolated groups. In case of streptococcus species and klebsiella pneumonia there was no statistical significance was reported.

In this study dyspnea was in approximately 2/3rd of the patients, MMRC grade of dyspnea in patients with pseudomonas colonization was more when compared with colonization with other organisms, comparison was done using Chi square test and the p value was significant i.e. <0.05.

Our study had shown concurrence with the previous studies in regard to the decline in FEV1 in patients colonized with Pseudomonas aeruginosa with p value <0.01. It must be underlined that the intensification of anti-Pseudomonas aeruginosa antibiotic treatment among these cases (e.g., with increased doses, combined therapy or prolonged treatment) possibly could slower even stop the impairment of lung function over the longer term.

CONCLUSION

In conclusion to our findings we reported that bronchiectasis was the major and one of the important ongoing causes of morbidity and mortality, along with poor quality of life in our geographical region. This respiratory disorder was commonly presented as dyspnea, recurrent productive cough, persistent secretory bibasilar crepitation and hemoptysis. Based on the high clinical suspicion the physician during primary evaluation of chronic lung disease cases may led to selection bias because patients were being selected from the inpatients departments of a single tertiary care hospital. Therefore, the findings could not represent the general population, until less severe and asymptomatic cases were not included.

Clinicians should evaluate the sign and symptoms along with radiographic presentation of the bronchiectasis for correct diagnosis and appropriate treatment initiation. Pseudomonas found to be most common colonizing organism in bronchiectasis patients, it is also reported that the anti-Pseudomonas aeruginosa antibiotic treatment among these cases (e.g.with increased doses, combined therapy or prolonged treatment) possibly could slower even stop the impairment of the lung function over the longer term.

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TABLES AND GRAPHS

Graph 1: Age distribution

Age Group (yrs)	No.	%
31-40	6	12.00%
41-50	11	22.00%
51-60	19	38.00%
61-70	10	20.00%
71-80	4	8.00%
Tota l	**50**	**100.00%**

Table 2: Clinical Profile

	No. (%) and
Symptoms	**Mean±SD**
Duration of Cough (Yrs)	10.14±5.49
Expectoration (ml) in 24 hrs	120.9±56.05
Purulent	16 (32%)
Mucous	13 (26%)
Mucopurulent	21 (42%)
Hemoptysis	12 (24%)
Dyspnea	38 (76%)
MMRC Grade	1.86±1.43
Fever	16 (32%)
Signs	
Crepts	36 (72%)
Clubbing	13 (26%)
Ronchii	9 (18%)

Table 3: Radiological profile

Lobes Involved	No.	%
Right upper lobe	10	20%
Right middle lobe & Right lower lobe	4	8%
Right middle lobe	10	20%
Right lower lobe	3	6%
Left upper lobe & Left lower lobe	1	2%
Left upper lobe	2	4%
Left lower lobe	11	22%
Bilateral	14	28%

TABLE 4: Aerobic bacterial growth distribution

Aerobic Bacteria	No.	%
Pseudomonas	17	34%
Klebsiella	10	20%
H. Influenza	8	16%
S. Aureus	4	8%
S. Pneumoniae	4	8%
Acinetobacter	5	10%
Aspergilus	4	8%

TABLE 5: Antibiotic sensitivity pattern

Antibiotics	Sensitivity	Resistance
Imipenem	100%	0%
Piperacillin tazobactam	98%	2%
Ciprofloxacin	94%	6%
Amikacin	44%	56%
Gentamycin	52%	48%
Amoxicillin Clavulanic acid	60%	40%
Amoxicillin	48%	52%
Ampicillin	46%	54%
Ceftriaxone	74%	26%
Cefuroxime	74%	26%
Contrimoxazole	64%	36%

Table 6: Comparison of FEV1 with aerobic bacteria

	FEV1%						P value
Aerobic Bacteria	**<35**	**35-49**	**50-64**	**65-79**	**>80**	**Total**	
Pseudomonas							
Not Isolated	4	0	1	4	24	33	<0.001 (HS)
	66.67%	0.00%	20.00%	100.00%	88.89%	66.00%	
Isolated	2	8	4	0	3	17	
	33.33%	100.00%	80.00%	0.00%	11.11%	34.00%	
Klebseilla							
Not Isolated	4	8	4	3	21	40	0.58 (NS)
	66.67%	100.00%	80.00%	75.00%	77.78%	80.00%	
Isolated	2	0	1	1	6	10	
	33.33%	0.00%	20.00%	25.00%	22.22%	20.00%	
H. Influenzae							
Not Isolated	6	8	5	3	20	42	0.21 (NS)
	100.00%	100.00%	100.00%	75.00%	74.07%	84.00%	
Isolated	0	0	0	1	7	8	
	0.00%	0.00%	0.00%	25.00%	25.93%	16.00%	
S. Aureus							
Not Isolated	5	8	5	3	25	46	0.50 (NS)
	83.33%	100.00%	100.00%	75.00%	92.59%	92.00%	
Isolated	1	0	0	1	2	4	
	16.67%	0.00%	0.00%	25.00%	7.41%	8.00%	
S. Pneumoniae							
Not Isolated	6	7	5	4	24	46	0.75 (NS)
	100.00%	87.50%	100.00%	100.00%	88.89%	92.00%	
Isolated	0	1	0	0	3	4	
	0.00%	12.50%	0.00%	0.00%	11.11%	8.00%	
Acnetobacter							
Not Isolated	5	8	5	3	24	45	0.59 (NS)
	83.33%	100.00%	100.00%	75.00%	88.89%	90.00%	
Isolated	1	0	0	1	3	5	
	16.67%	0.00%	0.00%	25.00%	11.11%	10.00%	
Aspergilus							
Not Isolated	6	8	5	4	23	46	0.44 (NS)
	100.00%	100.00%	100.00%	100.00%	85.19%	92.00%	
Isolated	0	0	0	0	4	4	
	0.00%	0.00%	0.00%	0.00%	14.81%	8.00%	

Table 7: Comparison of MMRC grade of dyspnea with Aerobic bacteria

		MMRC Grade					Total	P value (with Pseudo)
		0	1	2	3	4		
Pseudomonas	No.	0	0	2	9	5	16	
	%	0.0%	0.0%	12.5%	56.3%	31.3%	100.0%	
Klebsiella	No.	2	2	3	2	1	10	0.05 (S)
	%	20.0%	20.0%	30.0%	20.0%	10.0%	100.0%	
H. Influenzae	No.	3	3	1	0	0	7	<0.001 (HS)
	%	42.9%	42.9%	14.3%	0.0%	0.0%	100.0%	
S. Aureus	No.	1	2	0	0	1	4	<0.01 (HS)
	%	25.0%	50.0%	0.0%	0.0%	25.0%	100.0%	
S. Pneumoniae	No.	0	3	0	1	0	4	<0.001 (HS)
	%	0.0%	75.0%	0.0%	25.0%	0.0%	100.0%	
Acinetobacter	No.	2	0	2	0	1	5	<0.01 (HS)
	%	40.0%	0.0%	40.0%	0.0%	20.0%	100.0%	
Aspergilus	No.	3	0	1	0	0	4	<0.01 (HS)
	%	25.0%	0.0%	11.1%	0.0%	0.0%	8.0%	