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Increased resistance and emergence of pathogens in cystic fibrosis patients over time

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Background: Bacterial airway colonization of cystic fibrosis (CF) patients shows a relatively well-established chronological sequence associated with the age. During the last decade epidemiological changes concerning the role of emerging pathogens causing CF have been observed. The aim of the study was to analyze the evolution of bronchopulmonar colonization/infection in CF patients attended in our hospital during 2015.

Material/methods: Retrospective study of 205 non-duplicated isolates from respiratory samples (sputum or oropharyngeal swab) belonging to patients attending the CF units during 2015. Bacterial identification was performed by MALDI-TOF mass spectrometry and antimicrobial susceptibility was determined by Microscan Walkaway according to EUCAST criteria. Clinical, epidemiological and microbiology data were reviewed.

Results: A total of 72 patients (56.9% male and 43.1% female) were included with an age range from 7 weeks to 58 years. Highest prevalence pathogens were *Staphylococcus aureus* (26%) and *Pseudomonas aeruginosa* (23%). Up to 5-10 years old, most frequent colonizers were *S. aureus* and *Haemophilus influenzae*. From that age on, *S. aureus* colonization decreased and significantly increased for *P. aeruginosa*, becoming the most prevalent pathogen in adult age. *Aspergillus* spp (10%), *Stenotrophomonas maltophilia* (6%), *Achromobacter xylosoxidans* (2%), *Burkholderia cepacia* (2%) and non-tuberculous mycobacteria (3%) were also emergent pathogens isolated (Figure 1).

Increase of antimicrobial resistance profile according to age was noteworthy (Table 1). However, percentage of methicillin-resistant *S. aureus* (MRSA) was 11.32% (6/53), which is lower than our local MRSA rate (22%), whereas resistance of *P. aeruginosa* increased to 33.3%, being 14.5% (7/48) multidrug-resistant (MDR) and 18.7% (9/48) extensively drug-resistant (XDR) strains. These percentages are significantly higher than our local average values (9.8% MDR, 10% XDR).

Age range	<i>S. aureus</i>				<i>P. aeruginosa</i>			
	Meticillin-susceptible		MRSA		Susceptible		MDR/XDR	
	n	%	n	%	n	%	n	%
<2	6	75	2	25	2	100	0	0
2-5	9	90	1	10	4	80	1	20
6-10	6	66.6	3	33.3	4	80	1	20
11-17	5	100	0	0	4	57.2	3	42.8
18-24	6	100	0	0	3	42.9	4	57.1
27-34	7	100	0	0	7	58.4	5	41.6
35-42	4	100	0	0	2	100	0	0
>45	4	100	0	0	6	75	2	25

Table 1. Antimicrobial susceptibility distribution by age range.

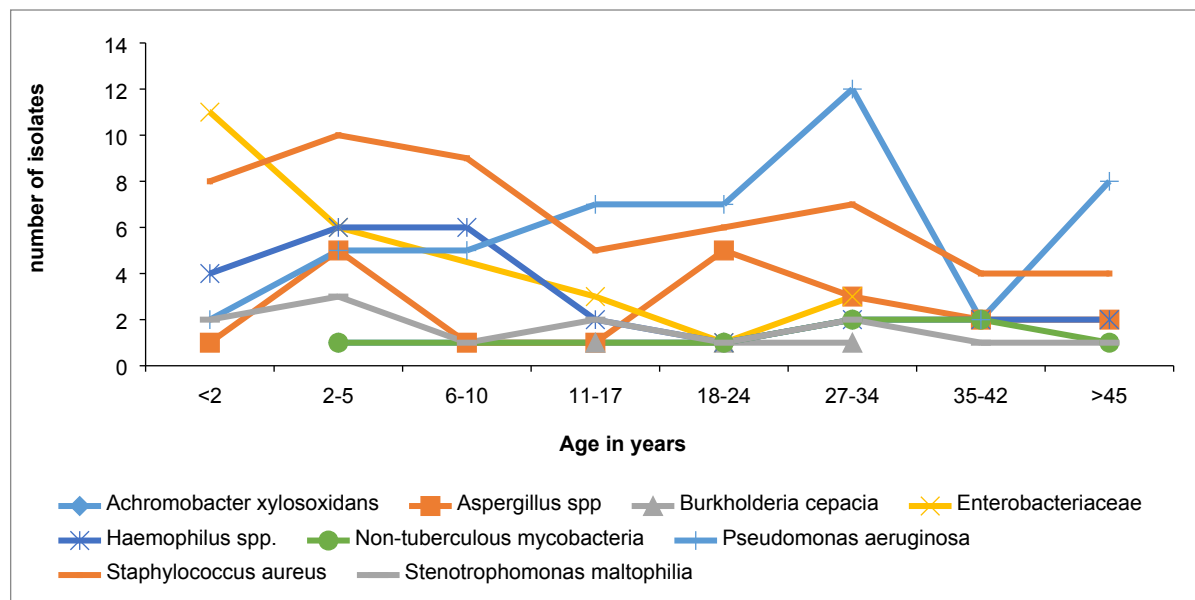


Figure 1. Chronological colonization by CF-related pathogens.

Conclusions: The chronological bronchopulmonar colonization analyzed is according to previously described; nevertheless the increase in life expectancy entails the emergence of new CF-related pathogens and a substantial increase of resistance rates. By our results, multidrug-resistant isolates of

P. aeruginosa in chronic infection are of major concern, due to continue antimicrobial treatment and acquisition of resistance mechanisms. The knowledge of epidemiological data may be useful for the treatment management in these patients.