

COMMUNITY-ACQUIRED PNEUMONIA IN CHILDREN

TREATMENT STRATEGIES AND OUTCOMES

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Background

Community-acquired pneumonia (CAP) is among the leading causes of morbidity and mortality in children. Despite the clinical significance of CAP, there is still divergence of opinions on the etiology, role of atypical bacterial agents and on the recommendations for empirical antibiotic therapy of non-complicated CAP. In 2003 the Czech Medical Association issued the guidelines for the appropriate management of community-acquired respiratory infections. These guidelines reflect the clinical importance of bacterial agents covered in the initial regimen, local epidemiological situation including the levels of antibiotic resistance and the possibilities of the health-care system. The leading agent in bacterial CAP is *Streptococcus pneumoniae* due to its high incidence and risk of developing sepsis and other complications. In 2008 the non-susceptibility of *S. pneumoniae* to penicillins was reported in 2.9 % (MIC 0.125 - 1 mg/L) and resistance (MIC over or equal 2 mg/L) only sporadically in 0.4 % (1 strain in 2008) – Graph 1¹. This is the rationale for the recommendation of penicillins or aminopenicillins use (in sufficient doses) in the initial treatment of CAP².

The objective of the study was to describe the clinical course and outcomes of cases of CAP treated according to national guidelines.

Materials and Methods

Prospective study compared the clinical characteristics, treatment and outcomes of CAP in three paediatric university centers in Prague. To the study were included children admitted to hospital care with pneumonia confirmed by chest X-ray within 48 hours after admission. The adherence to national guidelines in therapeutical approach was recommended, the final decision was made by clinicians. In all cases recorded data included following parameters: demographic data, clinical and laboratory findings, treatment regimen and outcomes. Length of stay as a primary outcome in patients treated by different antibiotic classes was compared using Kruskal-Wallis nonparametric test.

Results

Since January 2005 to October 2009 a total of 520 children, 284 boys and 236 girls, were enrolled to the study. There were 251 children hospitalized at Motol University Hospital (UH), 172 at Thomayer's UH and 97 at Bulovka UH. The age median in the study group was 4.5 (IQR 2 - 8.5) years (Graph 2). 144 (27.7 %) children were admitted for antibiotic treatment failure in ambulatory care settings and 27 children from regional hospitals. Despite recommendations set by national guidelines the most commonly prescribed antibiotics by ambulatory paediatricians were macrolides in 38.9 %, followed by aminopenicillins/beta-lactamase inhibitors (24.3 %) and cephalosporins in 16.7 % (Graph 3). Unlike the ambulatory settings the hospital therapy followed recommended guidelines and was initiated in monotherapy with beta-lactams: intravenous penicillins in 45.0 %, followed by aminopenicillins/beta-lactamase inhibitors in 12.9 %, aminopenicillins 6.3 % and cephalosporins (2nd generation in 7.7 % and 3rd generation in 6.6 %). Aminopenicillins/beta-lactamase inhibitors and cephalosporins were indicated mainly in infants and toddlers. Macrolides were administered only in 9.0 % and doxycycline in 6.1 %. 24 children (4.6 %) were treated with combined therapy. There was not statistically significant difference in the length of stay in patients treated by penicillins vs patients treated by aminopenicillins/beta-lactamase inhibitors or cephalosporins or macrolides. The adherence to national guidelines differed among the study sites and is presented at Graph 4. The distribution of complications was as follows: atelectasis in 114 cases (21.9 %), pleural effusion in 49 (9.4 %) and cavitary pneumonia in 14 (2.7 %). 14 cases (2.7 %) were indicated to pleural fluid drainage and 4 patients (0.7 %) underwent video-assisted thoracoscopy with adhesion lysis. The outcome of patients treated by different antibiotic classes and need for antibiotic change (only in 10.0 %) are shown at Table 5.

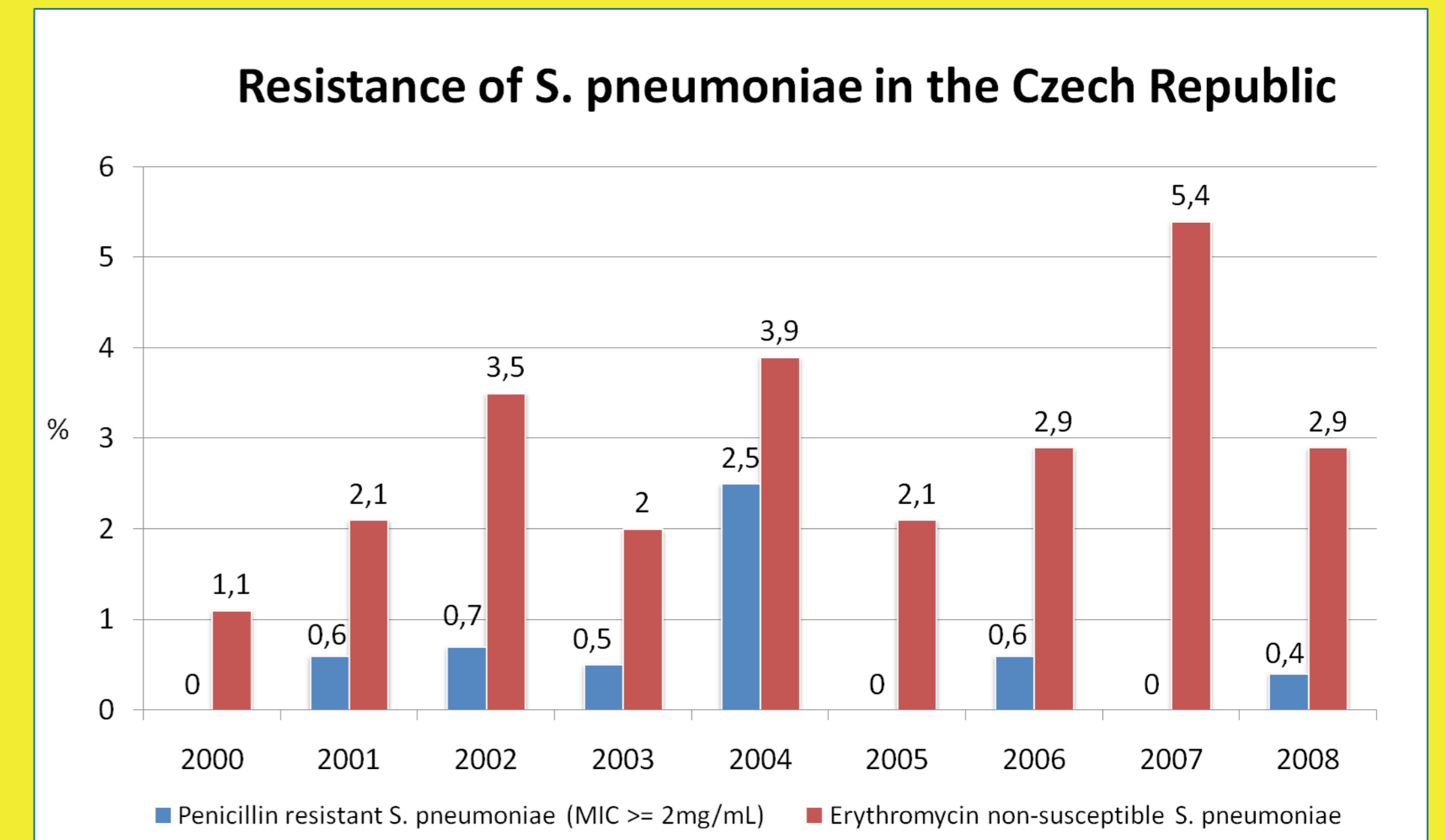
Conclusion

Judicious use of antibiotics is essential considering the growth of antimicrobial resistance and escalating costs in health care. The study results confirmed the relevancy of using beta-lactam antibiotics in empirical treatment of CAP in children under low pneumococcal resistance settings. In the Czech Republic is the use of penicillins in the initial management of CAP in consent with good antibiotic practice and eliminates the use of antibiotic classes which can affect the increase of antimicrobial resistance. Adherence to antibiotic treatment guidelines will result in a significant increase in appropriate antibiotic use and optimization of CAP management. Implementing, teaching and monitoring treatment guidelines can have a major impact on patient care.

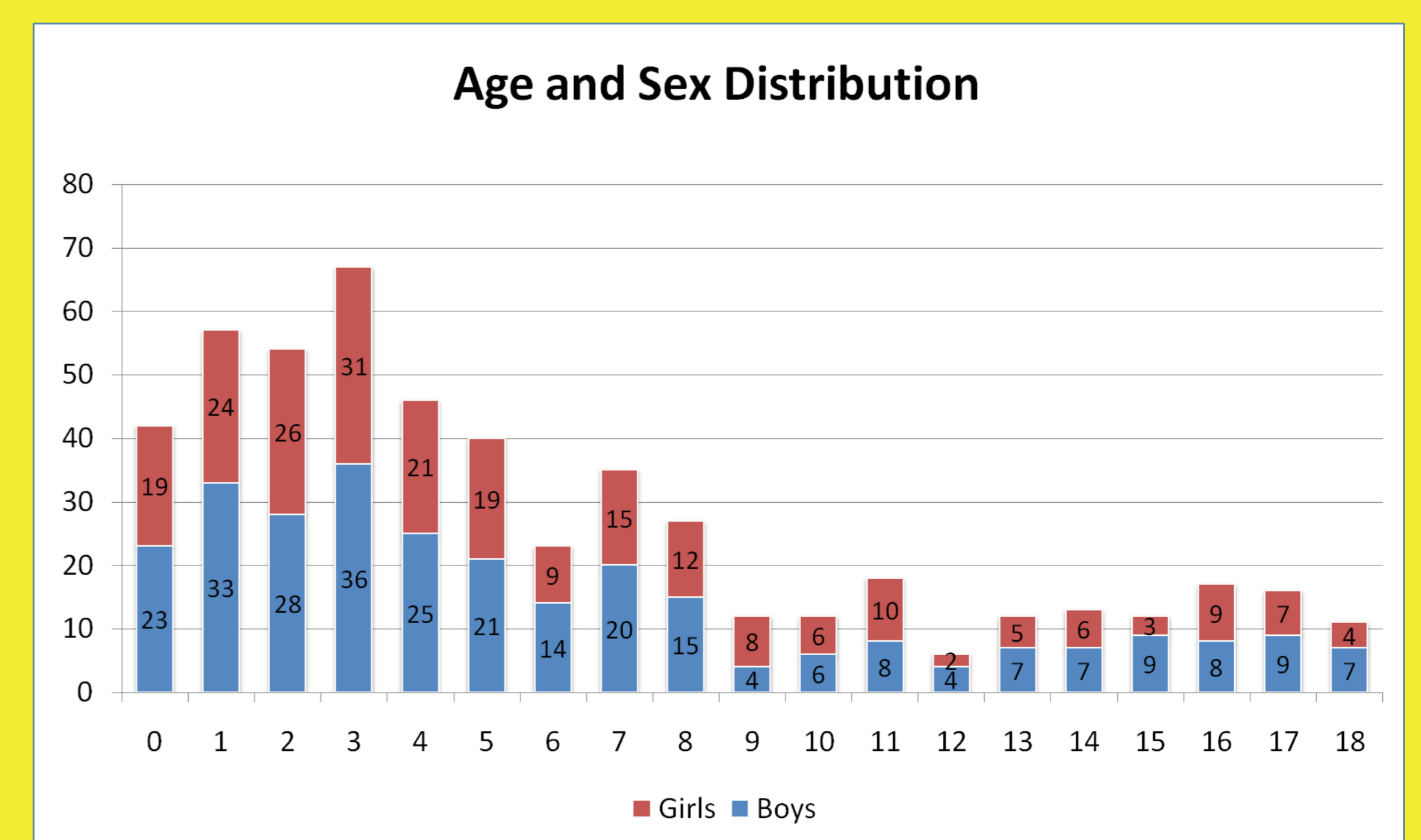
¹ EARRS Annual Report

² National guidelines for the management of respiratory tract infections (www.cls.cz)

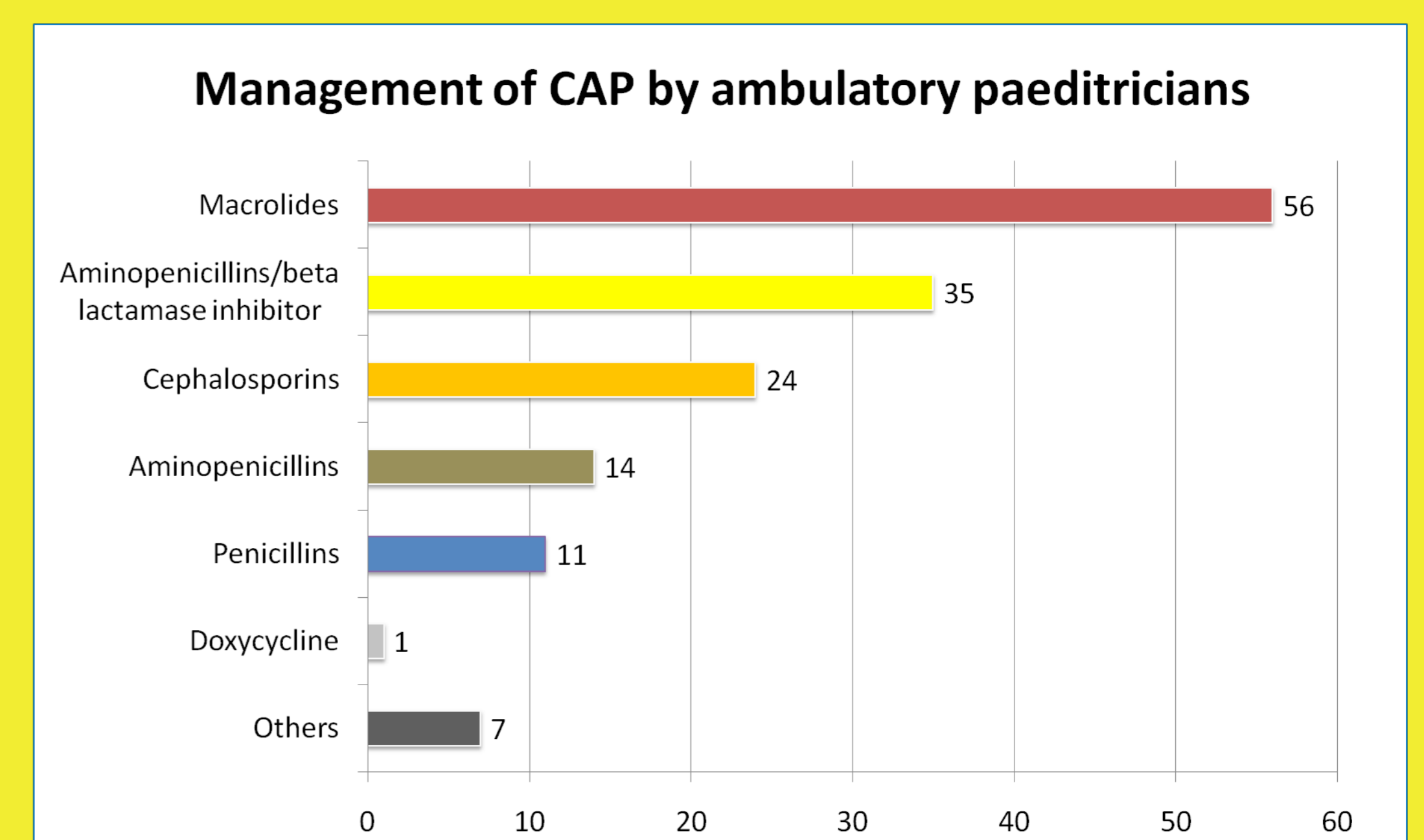
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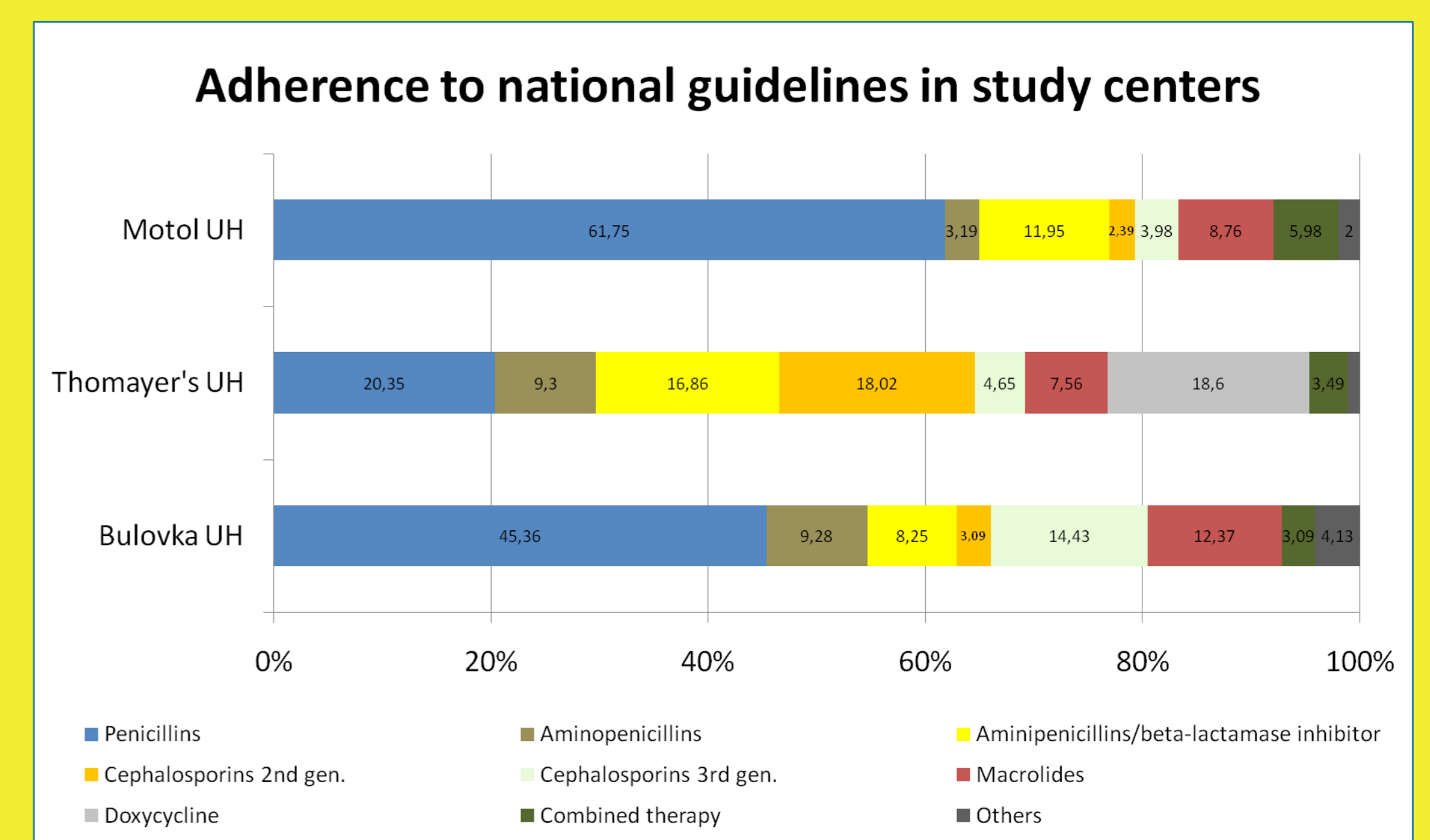
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Antibiotic Class	Number of patients	%	Age*	Length of stay*	Need of antibiotic change
Penicillins	234	45.0	4 (2.5-7.8)	6 (5-8)	28 (12.0 %)
Aminopenicillins/beta-lactamase inhibitor	67	12.9	3 (1.0-5.8)	5 (4-7)	5 (7.5 %)
Cephalosporins 2nd gen.	40	7.7	3.0 (2.0-5.3)	7 (4-9)	3 (7.5 %)
Cephalosporins 3rd gen.	32	6.2	3.9 (2.0-6.0)	7.5 (7-11.25)	8 (25.0 %)
Aminopenicillins	33	6.3	4.0 (2.5-7.0)	5 (4-10)	4 (12.1 %)
Macrolides	47	9.0	7.0 (3.0-9.2)	6 (4-9)	4 (8.5 %)
Doxycycline	32	6.1	15.0 (11.3-17.0)	4 (3-6)	1 (3.1 %)
Combination therapy	24	4.6	5.8 (2.4-12.5)	14.5 (9.75-23.75)	7 (29.2 %)
Other	11	2.2			

* Median (IQR)