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Community-acquired pneumonia

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Introduction

Introduction: Community-acquired pneumonia (CAP) today, as well as a few decades ago, is a current medical problem considering the incidence and the mortality rate of the population, despite the availability of new and powerful antimicrobials and vaccines effectiveness.

Objective: Analysis of outpatients diagnosed with pneumoniae, determination of the most common risk factors for their development, analysis of the success of outpatients' treatments and complications.

Methods: Medical exams of 38 patients were analyzed. Each case is chosen by following previously prepared protocol, including patients with respiratory symptoms and infectious syndrome, positive auscultatory findings on the lungs which are radiologically confirmed and laboratory treated (SE, Le, FBC, the first and the tenth day of the therapy). Demographic data and associated illnesses, as well as a severity assessment of the illness, were made at the first medical examination, when pneumonia was suspected.

Results: In the period from 01.11.2014 to 01.05.2015, there were 33 diagnosed pneumoniae. Associated illnesses, in population older than 65 years, were present in 92.85% of patients and some of them had two or three comorbidities. CPB65 proved itself as a good parameter in assessment of the disease severity for both groups. Applied antibiotic therapy proved to be effective in 80% of patients. There is no significant difference in pneumonia presentation with regards to gender and age. In data processing, descriptive statistics methods and no parameter χ^2 test were used for statistical significance assessment.

Conclusion: All patients with clear indications should be hospitalized, but large percentage of patients can be treated in outpatients' facilities, with good patient cooperation. Also vaccination, as an available resource, seems to have not received a significant place in our environment.



Introduction

Community-acquired pneumonia (CAP) is nowadays, as several decades ago, an ongoing medical problem, considering the incidence and population mortality rate and despite the availability of new and powerful antimicrobials and vaccines' efficacy.

Pneumonia is the eighth leading cause of death in the USA and leading cause of death from infectious diseases. Although mortality dropped with antimicrobial drugs use, since 1950, it stays relatively stable despite development of other antimicrobial resources. Today, it is the second leading cause of death, with more than 50.000 death cases, every year¹.

The most common comorbidities in people with CAP are COPD (Chronic obstructive pulmonary disease)- up to 68% of patients, chronic heart diseases up to 47% or heart failure up to 46%, diabetes, cerebrovascular disease and dementia, together, up to 33%. Chronic liver disease and chronic kidney insufficiency appear in 20-27% CAP patients. The incidence of comorbidities is generally higher in patients over 65 years (compared to younger ones) and in those with COPD, chronic kidney insufficiency and liver cirrhosis, as compared to ones free of these diseases².

The definition of community acquired pneumonia includes:

- Acute symptoms of the lower respiratory tract illness (cough and at least one more symptom of the lower respiratory tract)
- New, local pulmonary finding, during patient examination
- At least one systemic characteristic (symptom or complex of symptoms, sweating, fever, pains and/or high body temperature, 38°C)
- There is no other explanation for the disease symptoms and it is treated as CAP

In the previous century, a large body of evidence confirmed that treatment results in patients with severe CAP were much better if the combination of antibiotics was used, instead of only one antibiotic. Mortality, in patients who used only one antibiotic was 1.5 to 6 times higher as compared to those who used a combination of antibiotics, which isn't suprising. Benefites of macrolides was mainly seen in those with the most severe form of the disease. Benefits of combined therapy was only seen when macrolide antibiotic was the part of the regime.

Objective

The aim was to determine the efficacy of evaluation of severity of CAP, inspect risk factor frequency for pneumonia onset and analysis of the successfulness of the outpatient treatment of pneumonia.

Method

Descriptive (retrospective-prospective) study was conducted in suburban city area, from November 11th, 2014 to May 1st, 2015, in outpatient clinic Laus, Banja Luka, during the period when the incidence of the disease was on the rise.

The study included 38 patients, aged 18 to 65 years and older (males 55.2%, females 44.7%).

The examinees were divided into two groups: 22 aged 18 to 65 years (57.89%), of whom 13 (34.21%) were males and 9 women (23.68%) and 16 aged 65 and older (42.10%), 9 males (23.68%) and 7 females (18.42%). Age of the examinees was from 18 to 86 years (mean age 51.73, SD=22.07).

The study included patients with respiratory symptoms and infectious syndrome, positive auscultatory lung findings, which were radiologically confirmed and lab tests were performed (SR, Le, TBC- on the first day and after ten days of therapy). In patients with continuously high sedimentation rate and CRP, control and additional analyses (urea, creatinine, transaminases, glycemia) were repeated, until they were within normal range. Risk factors were determined during the initial appointment, based on anamnestic data and physical findings of the examinees, as well as BMI (Body mass index) according to the current formula of the degree of obesity.

The examinees were not previously hospitalized, nor treated for respiratory diseases in previous 14 days and they had at least two symptoms of pneumonia (one respiratory and one general symptom) as well as auscultatory lung findings. The study didn't include patients with existing lung cancer, AIDS, patients with organ transplants, immobile patients, patients using corticosteroid therapy, pregnant women. Patients' choice was decided on recommendations for CAP and it included patients with respiratory symptoms (cough, pleural pain, difficulty breathing) and infectious syndrome (sweating, fever, pains) and in the absence of alternative diagnosis, physical findings (body temperature over 38°C, puls > 100/min, crackles, decreased breath sounds- patient doesn't have asthma).

All patients had a chest X ray, at the begining and at the end of treatment. Disease severity evaluation of the followed cases and deciding on hospitalization was done during the first appointment if pneumonia was suspected, all based on recommendations from BTS (*British Thoracic Society*), 2004 and severity score for pneumonia (CRB65 score)^{3,5}. Sputum culture wasn't ordered.

Antibiotic therapy was started right after ausculting pneumonic findings and getting lab results- sedimentation rate, leucocytes and TBC (aproximate time for lab results is two hours) and according to recommendations of the American Thoracic Society (ATS) for community-acquired pneumonia treatment⁶.

First line treatment antibiotics in patients aged 18 to 65 years were: amoxicillin/clavulanic acid (*Co-amoxicillin*)

alone, or combined with doxycycline, gentamycin, fluoroquinolones, and then cefuroxime, macrolides and fluoroquinolones.

In patients 65 years or older, first line treatment drugs were *Co-amoxicillin*, cephalosporines, fluoroquinolones, macrolides, tetracyclines and drug combinations (*Co-amoxicillin*+fluoroquinolones). The least used antibiotics were third generation cephalosporines.

All patients were treated from 10 to 21 days. Average treatment duration was 14 days. Methods of descriptive statistics were used to calculate frequency and percentages, arithmetic mean (M) and standard deviation (SD). For relation check between categoric variables, χ^2 test with Yates continuity correction for 2x2 array was used, in the situations when conditions were fulfilled. Student's t-test, i.e. one factor variance analysis (*ANOVA*) was used to calculate mean sedimentation rate discrepancy significance as compared to other categoric variables. Confidence interval of $p < 0.05$ was

chosen as margin of data statistical significance. Cumulative statistical analysis was performed with software package *IBM SPSS Statistics 21*.

Results

Pneumonia diagnosis was confirmed in 33 patients (86.84%). In study participants, aged 18-65, pneumonia was diagnosed in 19 patients (57.57%), 11 males (33.33%) and 8 females (24.24%). There were 14 patients (42.42%) with pneumonia aged 65 or older, of whom 8 were males (24.24%) and 6 females (18.18%). Five patients didn't have radiologic findings of pneumonia (13.15%), of whom 2 were with congestive heart failure, 2 had acute bronchitis and one had lung scars with symptoms of pulmonary infection that had clinical presentation of pneumonia.

Table 1. Presence of risk factors, significant for pneumonia onset, in relation to age and gender of the examinees

Табела 1. Присућност појединих фактора ризика за настанак пнеумоније у односу на старосно доба и пол испитаника

Risk factors	Examinees	N	No f (%)	Yes f (%)	χ^2	df	p
Previously treated respiratory infections	Total	33	31 (93.9%)	2 (6.1%)	25.49	1	0.000**
	Males	19	17 (89.4%)	2 (11.1%)	11.49	1	0.549
	Females	14	14 (100%)	0 (0%)	14		
	(18 – 65)	19	18 (94.7%)	1 (5.2%)	15.21	1	1.00
	≥ 65	14	13 (92.9%)	1 (7.1%)	10.29		
Smoking	Total	33	25 (75.8%)	8 (24.2%)	8.76	1	0.003**
	Males	19	14 (73.6%)	5 (26.3%)	4.26	1	0.486
	Females	14	11 (78.5%)	3 (20%)	4.57		
	(18 – 65)	19	14 (73.7%)	5 (26.3%)	4.26		
	≥ 65	14	11 (78.6%)	3 (21.4%)	4.57		
Obesity (BMI ≥ 30)	Total	33	24 (72.7%)	9 (27.3%)	6.82	1	0.009**
	Males	19	15 (78.9%)	4 (22.2%)	6.37	1	0.934
	Females	14	9 (64.2%)	5 (33.3%)	1.14		
	(18 – 65)	19	15 (78.9%)	4 (21.1%)	0.29	1	0.590
	≥ 65	14	9 (64.3%)	5 (35.7%)			
Prednison (10 mg/D)	Total	33	33 (100%)	0 (0%)	-	-	-
Alcohol	Total	33	33 (100%)	0 (0%)	-	-	-
Comorbidities	Total	33	17 (51.5%)	16 (48.5%)	0.03	1	0.862
Gender	Males	19	9 (47.3%)	10 (55.6%)	0.052	1	0.589
	Females	14	8 (57.1%)	6 (40%)			
Age	(18 – 65)	19	17 (89.5%)	2 (10.5%)	11.84	1	0.000**
	≥ 65	14	0 (0%)	14 (100%)	14		

*** didn't qualify for χ^2 -test

** significant at the level $p < 0.01$

If we analyse the frequency of singular risk factors in the overall sample, we'll find that, in the majority of the examinees, previous treatment, smoking and obesity, as risk factors, are missing, which is confirmed with χ^2 -test (differences significant at the level $p < 0.01$). Prednison and alcohol use, as risk factors, were not found in any of the examinees. Around 51.5% of the examinees, diagnosed with pneumonia, had no comorbidities, while in 16 patients (48.5%) they were sig-

nificant risk factor. The significant difference was found between comorbidities and age of the examinees ($\chi^2(1, N=33) = 11.84$; $p < 0.01$), so we can conclude that participants' age has significant connection with comorbidities occurrence, with 99% certainty.

Research results showing connection between the number of the registered comorbidities and the age and gender of the participants is given in Table 2.

Table 2. Number of comorbidities, in relation to age and gender of the examinees

Табела 2. Број придружених болести у односу на старосно доба и пол испитаника

Variable	Examinees	N	Number of comorbidities	χ^2	df	p		
			1	2	3 and more			
-	Total	16	5 (31.3%)	4 (25%)	7 (43.8)	0.875	2	0.646
Gender	Males	10	3 (30%)	3 (30%)	4 (40%)	***		
	Females	6	2 (33.3%)	1 (16.7%)	3 (50%)			
Age	(18 – 65)	2	2 (100%)	0 (0%)	0 (0%)	***		
	≥ 65	14	3 (21.4%)	4 (28.6%)	7 (50%)			

*** didn't qualify for χ^2 -test

Four study participants, aged 65 years and older, had 2 comorbidities (28.6%) and 7 (50%) had 3 and more. Those aged 18-65 had no significant comorbidities. There is no significant prevalence of pneumonia as compared to age and gender, in our research, ($p > 0.05$).

Research results showing relation between comorbidities and age and gender of the participants was given in Table 3.

Table 3. Presence of comorbidities, in relation to age and gender of the examinees

Табела 3. Присућност појединих придружених болести у односу на старосно доба и пол испитаника

Comorbidity	Examinees	N	No f (%)	Yes f (%)	χ^2	df	p
COPD	Total	33	26 (78.8%)	7 (21.2%)	10.94	1	0.001**
	Males	18	13 (72.2%)	5 (27.8%)	***		
	Females	15	13 (86.7%)	2 (13.3%)			
	(18 – 65)	19	19 (100%)	0 (0%)	***		
	≥ 65	14	7 (50%)	7 (50%)			
Hypertension	Total	33	18 (54.5%)	15 (45.5%)	0.27	1	0.602
	Males	18	9 (50%)	9 (50%)	0.05	1	0.823
	Females	15	9 (60%)	6 (40%)			
	(18 – 65)	19	18 (94.7%)	1 (5.3%)	25.48	1	0.000**
	≥ 65	14	0 (0%)	14 (100%)			

CHF	Total	33	32 (97%)	1 (3%)	29.12	1	0.000**
	Males	18	17 (94.4%)	1 (5.6%)	***		
	Females	15	15 (100%)	0 (0%)			
	(18 – 65)	19	19 (100%)	0 (0%)	***		
	≥ 65	14	13 (92.9%)	1 (7.1%)			
ICV	Total	33	30 (90.9%)	3 (9.1%)	22.09	1	0.000**
	Males	18	17 (94.4%)	1 (5.6%)	***		
	Females	15	13 (86.7%)	2 (13.3%)			
	(18 – 65)	19	19 (100%)	0 (0%)	***		
	≥ 65	14	11 (78.6%)	3 (21.4%)			
CKD	Total	33	31 (93.9%)	2 (6.1%)	25.49	1	0.000**
	Males	18	16 (88.9%)	2 (11.1%)	***		
	Females	15	15 (100%)	0 (0%)			
	(18 – 65)	19	18 (94.7%)	1 (5.3%)	***		
	≥ 65	14	13 (92.9%)	1 (7.1%)			
DM	Total	33	27 (81.8%)	6 (18.2%)	13.36	1	0.000**
	Males	18	15 (83.3%)	3 (16.7%)	***		
	Females	15	12 (80%)	3 (20%)			
	(18 – 65)	19	19 (100%)	0 (0%)	***		
	≥ 65	14	8 (57.1%)	6 (42.9%)			

***didn't qualify for χ^2 test

** significant at the level $p < 0.01$

Table 3. shows that hypertension was the most common comorbidity and it was found in 45.5% of the participants, and only in the case of this particular comorbidity there wasn't significant difference in the number of patients suffering from it or not. Hypertension was almost equally present in males and in females. It was more frequent in those 65 years or older, as compared to those 18-65 years of age ($p < 0.01$). Right behind the hypertension there were COPD with 21.1% and diabetes mellitus 18.2%, and somewhat less ICV with

9.1%, CKD 6.1% and CHF 3%. Taking into consideration all of the mentioned comorbidities (except hypertension), greater percentage of the participants didn't suffer from any of the former diseases. These differences were statistically significant, at the level $p < 0.01$.

Results of the evaluation of the pneumonia severity, using CRB65, in relation to age and gender of the participants were shown in Table 4.

Table 4. Results of CRB65, in relation to age and gender of the examinees

Табела 4. Резултати CRB65 у односу на старосно доба и пол испитаника

Variable	Examinees	N	1 point f (%)	2 points f (%)	3 points f (%)	χ^2	df	p
-	Total	33	30 (90.9%)	2 (6.1%)	1 (3%)	49.27	2	0.00**
Gender	Males	19	17 (89.4%)	1 (5.3%)	1 (5.3%)	26.94	2	0.65
	Females	14	13 (92.9%)	1 (7.1%)	0 (0%)	22.43		
Age	(18 – 65)	19	17 (89.5%)	2 (10.5%)	0 (0%)	27.26	2	0.24
	≥ 65	14	13 (92.9%)	0 (0%)	1 (7.1%)	22.42		

** significant at the level $p < 0.01$

Majority of the examinees, over 90.9%, scored one point at CRB65 test, which is confirmed by $p < 0.01$. There were 2 participants aged 18-65, who scored 2 points, and 1 over 65 years who scored 3 points at CRB65 test and all three were sent to hospital for consultation. Two of them were hospitalized (6.06%).

Research results showing sedimentation rate on the first and the tenth day of treatment are given in Table 5.

Table 5. Descriptive data for sedimentation rates

Табела 5. Дескриптивни подаци за вредности седиментације

Sedimentation rate	N	Min	Max	M	SD
SR 1. Day	33	15	70	35.73	13.97
SR 10. Day	31	2	32	10.29	6.50
Change in SR	31	-52	-10	-25.00	11.51

Mean sedimentation rate on the first day of treatment was 35.73 (SD 13.97), whereas minimal SR was 15 and maximum 70. SR values on the tenth day of treatment were drastically lower, except for the two patients, in whom SR decrease wasn't as expected, so the mean SR was 10.29 (SD=6.50), minimal value 2 and maximum 32. Mean SR fall was 25, minimal 10 and maximum 52. The t-test two paired samples confirmed that the mean registered difference between these two measurements was statistically significant ($t(30)=12.09$; $p < 0.001$), which loudly speaks for the treatment efficacy.

Results of the sedimentation rates, in relation to the existing comorbidities is shown in Table 6.

Table 6. Sedimentation rate differences, in relation to the presence of comorbidities (t-test)

Табела 6. Разлике у нивоу седиментације у односу на постојање коморбитета (t-тест)

Variable	Comorbidity	N	M	SD	t	df	p
SR 1. day	No	17	36.18	14.09	0.19	31	0.85
	Yes	16	35.25	14.28			
SR 10. day	No	16	8.38	5.24	-1.75	29	0.09
	Yes	15	12.33	7.24			
SR change	No	16	-26.94	12.05	-0.97	29	0.34
	Yes	15	-22.93	10.93			

There were no registered statistically significant differences in SR levels, in relation to existing comorbidities. None the less, in the patients with comorbidities, slightly higher SR

was found, after ten days of treatment and this difference was pretty close to statistical significance ($t(29) = -1.85$, $p = 0.07$).

Results of the therapy incidence are shown in Table 7.

Table 7. Representation of the applied therapies

Табела 7. Заступљеност примене појединих терапија

Therapy	f	%
Amoxicillin+clavulanic acid	17	51.5
macrolides	5	15.2
fluoroquinolones	4	12.1
Combo (Co-amox+ tetracyclines/gentamycine/fluoroquinolones.)	4	12.1
cephalosporins	3	9.1

Co-amoxicillin was the most commonly used therapy (51.5% of the examinees), somewhat less macrolides (15.2%), fluoroquinolones (12.1%) and cephalosporins (9.1%), while combo therapy (*Co-amoxicillin* combined with tetracycline,

gentamycin, fluoroquinolone) was applied in 12.1% participants.

Results of the sedimentation rate differences, in relation to the applied therapy are shown in Table 8.

Table 8. Sedimentation rate differences, in relation to applied therapy (ANOVA)

Табела 8. Разлике у нивоу седиментације у односу на примењену терапију (ANOVA)

Variable	Therapy	N	M	SD	F	df	p
SR 1. day	Amoxi+clav.a.	17	33.35	12.54	6.14	4	0.00**
	fluoroquinolones	4	35.25	8.06			
	macrolides	5	27.40	4.22			
	cephalosporins	3	31.00	13.53			
	<i>Co-амок+/gen/flu/тет/</i>	4	60.25	7.76			
SR 10. day	Amoxi+clav.a.	16	8.75	4.57	1.62	4	0.20
	fluoroquinolones	3	11.00	3.61			
	macrolides	5	9.60	4.16			
	cephalosporins	3	9.33	7.57			
	<i>Co-амок+/gen/flu/тет/</i>	4	17.50	12.79			
SR change	<i>Co-амок.</i>	16	-23.56	11.32	4.32	4	0.01*
	fluoroquinolones	3	-24.33	10.02			
	macrolides	5	-17.80	2.95			
	cephalosporins	3	-21.67	6.81			
	<i>Co-амок+/gen/flu/тет/</i>	4	-42.75	6.80			

** significant at the level $p < 0.01$

* significant at the level $p < 0.05$

There were statistically significant differences in sedimentation rate on the first day of treatment ($F(4)=6,14$; $p < 0,01$) and mean SR fall, after ten days of treatment ($F(4) = 4,32$; $p < 0,05$), in relation to applied medications. *Post hoc* analysis of the relation of the mean results, for every pair of

used medicines, showed that values were significantly higher when combo therapy was applied, as compared to use of single medicine.

Results of *post hoc* LSD test are shown in Table 9.

Table 9. Post hoc test – sedimentation rate to received therapies (LSD)

Табела 9. Post hoc тест односа нивоа седиментације и примењених терапија (LSD)

Dependable variable	(I) Therapy	(J) Therapy	M difference	Standard error	p
SR 1. DAY	Co-амох.	fluoroquinolone	-1.90	6.06	0.76
		Macrolide	5.95	5.55	0.29
		cephalosporin	2.35	6.83	0.73
		Co--амох+/gen/flu/tetr	-26.90	6.06	0.00**
	fluoroquinolone	Amox+clav.a.	1.90	6.06	0.76
		macrolide	7.85	7.31	0.29
		cephalosporin	4.25	8.33	0.61
		Co--ам+/gen/flu/tetr	-25.00	7.71	0.00**
	macrolides	Amox+clav.a.	-5.95	5.55	0.29
		Fluoroquinolone	-7.85	7.31	0.29
		cephalosporin	-3.60	7.96	0.66
		Co--амох.+/gen/flu/tetr	-32.85	7.31	0.00**
	cephalosporins	Co--амох.	-2.35	6.83	0.73
		fluoroquinolone	-4.25	8.33	0.61
		Macrolide	3.60	7.96	0.66
		Co--амох.+/gen/flu/tetr	-29.25	8.33	0.00**
	Amox.clav.a+/gent/flu/tetr/	Co-амох.	26.90	6.06	0.00**
		Fluoroquinolone	25.00	7.71	0.00**
		Macrolide	32.85	7.31	0.00**
		Cephalosporin	29.25	8.33	0.00**
SR change	Co -амох.	Fluoroquinolone	0.77	6.03	0.90
		Macrolide	-5.76	4.91	0.25
		Cephalosporin	-1.90	6.03	0.76
		Co-амох.+/fent/flu/tetr	19.19	5.36	0.00**
	fluoroquinolone	Co-амох.	-0.77	6.03	0.90
		macrolide	-6.53	7.00	0.36
		cephalosporin	-2.67	7.83	0.74
		Co-амох.+/gent/flu/tetr/	18.42	7.32	0.02*
	Macrolide	Co-амох.	5.76	4.91	0.25
		fluoroquinolone	6.53	7.00	0.36
		cephalosporin	3.87	7.00	0.59
		Co-амох.+/gent/flu/tetr	24.95	6.43	0.00**
	cephalosporins	Co-амох.	1.90	6.03	0.76
		fluoroquinolone	2.67	7.83	0.74
		macrolide	-3.87	7.00	0.59
		Co -амох.+/gent/flu/tetr	21.08	7.32	0.01*
	Co -амох.+/gent/flu/tetr	Co-амох.	-19.19	5.36	0.00
		fluoroquinolone	-18.42	7.32	0.02
		macrolide	-24.95	6.43	0.00
		cephalosporin	-21.08	7.32	0.01*

Discussion

Based on the analysis of diagnosed pneumoniae, statistically significant presence of risk factors was not found (differences were significant at the level $p < 0.01$), except for ??? over 65 years of age. Therefore, we concluded, with 99% certainty, that examinee's age was significantly connected with comorbidity occurrence ($p < 0.01$). Dominant comorbidity in the elderly was hypertension ($p < 0.01$) and it was almost equally present in both genders. Other comorbidities- COPD (21,2%), DM (18,2), *ICV* (9,1%), CKD (6,1), *CHF* (3%) bore no statistically significant presence.

The research performed in the Clinic for pulmonary diseases and tuberculosis, Knez Selo, Clinical center Nis, in 240 patients, aged 65 or older, with diagnosis of *community-acquired pneumonia*, who were treated from 2005 to 2009, showed that 94,2% of the patients had at least one comorbidity⁷. In our group of the participants of 65 or older, 50% had 3 or more comorbidities and 100% had one comorbidity.

The reasearch performed in Barselona⁸ showed that comorbidity was also the reason for hospital readimssion and adverse outcome.

In our group of participants of 65 or older, one patient (72 years), with significant comorbidities (*CKD*, *CHF*, *Hypertension*, *COPD*, *AAA*), and recurrent pneumonia within a year, was admitted to the hospital and pulmonary *adenocarcinoma* was confirmed.

Based on the research performed in the Institute for pulmonary diseases of Vojvodina, Sremska Kamenica, in 550 patients, treated in the hospital setting, for community acquired pneumonia, in relation to their age, from June 1st 1995 to May 31st 2001, it was concluded that patients 65 or older had greater prognostic score and statistically significantly higher mortality then younger ones and comorbidities were statistically significantly more present⁹.

Severity score for pneumonia- CRB65 proved to be fast and efficient for severity evaluation of pneumonia, in both age groups and it confirms previous authors' notice, that age without comorbidities probably was not deciding mortality risk factor.

Considering that CRB65 wasn't sufficient enough for younger patients, to begin with, and they should have the advantage of not having age as risk factor, it turned out it wasn't the case. About 90.9% of patients scored 1 point at the test, two points led to hospitalisation and three points were absolute indication for hospitalisation and they had higher mortality outcome risk, so the estimation in younger patients had to be made based on clinical parameters and the possibility of safe CAP treatment in outpatient settings should be carefully evaluated.

Recognizing patients with lower risk of complications, who are due to this, convenient for out hospital treatment, aims at cutting unnecessary hospitalisations and treatment

costs. Eventually, the decision to treat patient with CAP is based on numerous factors, which includes the estimation that pneumonia is of low intensity, appropriate oral therapy will be followed, social circumstances and affordable care are appropriate¹⁰.

Treatment efficacy was estimated by the fall or stagnation of sedimentation rate and the mean SR fall was 25mm/h after ten days of treatment. Our reaserch confirmed that significant SR fall is a predictor of good clinical outcome and therapy efficiency. Stagnation in inflammation parameters was the reson for two patients to be asked to examine their sputum samples. In one patient *Mycobacterium tuberculosis* was confirmed and in the other *Staphylococcus aureus*. For the same reason chest X ray was redone earlier than guidelines suggest (after two weeks, in two patients). *Co-amoksicillin* (in 51,5% patients) was the most commonly used antibiotic, macrolides (15,2%), fluoroquinolones (12,1%) and cephalosporins (9,1%). Dual therapy was used in 12.1% patients with severe clinical symptoms.

In comparison study, performed in Turkey, empirical antibiotic treatment was applied for hospitalized patients with CAP. Initial treatment with beta lactam antibiotic, beta lactam+macrolide, fluoroquinolones and beta lactam+fluoroquinolones was followed. It was concluded, that in patients treated in the hospitals, use of the any of the four antibiotics wasn't connected with their survival¹¹. Dual therapy which was used after diagnosing and pneumonia severity estimation, proved to be efficient in our patients.

Study conducted in Emergency care in Spain¹², showed that wrong antibiotic choice was connected with higher mortality rate in the hospital ($p = 0.004$) and first thirty days ($p = 0.008$). They also found that early use of antibiotics was connected with lower mortality (31,7% : 15,3%); although it didn't reach statistical significance, there was still significant effect. In a study with 780 hospitalized patients with CAP, Dambrava et al¹³ confirmed that there is a difference in mortality depending on whether the recommended antibiotic protocols for CAP were followed in their facilities (3% : 10,6%). Data confirm, early, appropriate antibiotic use for the better pneumonia prognosis.

Average antibiotic use in the course of treatment in our patients was 14 days. According to research, meta analysis comparing treatments, which lasted 7 days or less, as compared to treatments of 8 days or longer didn't show differences in outcomes¹⁴. All the same, doctors have gradually increased treatment duration from 10 to 14 days^{15,16}.

According to literature, a huge number of patients unfortunately uses therapy which differs from the guidelines, so an agreement between clinical practice and guidelines still remains a challenge⁴.

Conclusion

In our trial 93.93% of patients were treated in outpatient clinics, which is along the lines of recommendations. Patients 65 or older, with 3 or more comorbidities and score 2 must

be hospitalized. The same goes for patients 18-65 years of age, score 2 and inadequate inflammation parameters fall and complications. A change in SR proved to be reliable parameter for pneumonia follow up, but also for efficacy estimation of applied therapy. Dual therapy proved to be more efficient.

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Ванболничке пнеумоније

Кључне речи:

ванболничке пнеумоније,
фактори ризика,
терапија

Сажетак

Увод. Ванболничка пнеумонија је и данас, као и пре неколико деценија, актуелан медицински проблем с обзиром на инциденцију и стопу смртности популације, упркос доступности нових и моћних антимикуробних средстава и ефикасности вакцина.

Циљ рада. Анализа ванболничких дијагностикованих пнеумонија, ефикасност процене тежине пнеумонија, утврђивање најчешћих фактора ризика за њихов настанак, анализа успешности амбулантног лечења као и појаве компликација.

Метод. Испитивањем је анализирано 38 пацијената. Сваки случај је биран на основу раније припремљеног протокола, а укључује пацијенте са респираторним симптомима и инфективним синдромом, позитивним аускултаторним налазом на плућима, који су даље радиолошки потврђени и обрађени лабораторијски (*SE*, *Le*, ККС, првог и после десетог дана терапије). Демографски подаци и придружене болести, као и процена тежине болести рађени су при првом прегледу и сумњи на пнеумонију.

Резултати. У периоду од 01.11.2014. до 01.05.2015. године потврђене су 33 дијагноте пнеумоније. Придружене болести у популацији старијој од 65 година су биле заступљене у 92,85% пацијената, али су поједини имали два или три коморбидитета заједно. *Тест за процену тежине пнеумоније - CRB65* показао се као добар параметар за обе групе. Примењена антибиотска терапија је била ефикасна код 80% пацијената. Не постоји значајна разлика у заступљености пнеумонија у односу на доба и пол. У обради података коришћени су методи дескриптивне статистике и непараметарски χ^2 -тест за процену статистичке значајности.

Закључак. Све болеснике са јасним индикацијама требало би хоспитализовати, међутим, велики број пацијената може бити лечен амбулантно уз добру сарадњу. Такође, вакцинације као доступан ресурс, чини се да нису добиле значајно место у нашој средини.

