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Study of the use of antibiotics in respiratory infections within the prison setting

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ABSTRACT

A descriptive study of antibiotic treatments prescribed for respiratory infections was conducted in the prison setting. The evolution of these infections and the diagnostic techniques were also investigated. 14 clinicians from different prisons representing various types of centres all over Spain were asked to fill in a questionnaire specifically designed for this study. Clinicians were selected following the sentinel network methodology.

Our results show that penicillins and macrolids are used in 98,5% of treated upper respiratory tract infections, in 84% of treated lower respiratory tract infections and in 33,3% of treated pneumonias. Finally we have observed that the use of antibiotics agrees with the established primary health care guidelines.

Key Words: Antibiotics, therapeutic use, respiratory tract infections, prisons.

INTRODUCTION

We have observed that within the prison setting, the incidence/prevalence of infectious diseases [1-6] such as tuberculosis, HIV infection, viral hepatitis, etc. is much higher than in the extrapenitenciary setting.

This is due to some of the prisons' characteristics such as overcrowding, marginalization of most of its population, high prevalence of immigrants from poor countries, high frequency of risk behaviours associated with communicable infections, and usual lack of health care before entering prison. On the other hand, penitenciary centres are provided with limited diagnostic equipment [7]. Many of them do not have radiodiagnostic devices or are located away from their reference hospitals, and that is the cause for respiratory infections diagnosis to be based only on clinical patterns and examination, and for antibiotic treatments to be empirical.

We have not found any publications describing the profile of respiratory infections diagnosed in the prison setting, nor the antibiotic guidelines used for their treatments. The objectives of this study are to conduct a description of antibiotic treatments used for respiratory infections in the prison setting, the means used for their diagnosis and evolution.

MATERIAL AND METHODS

This is a prospective observational study. 14 clinicians from different prisons all over Spain and selected following the sentinel network methodology in order to represent various types of centres (preventive, criminal, mixed, inside and outside cities, big and small) were asked to fill in a questionnaire for each and every patient treated during the month of October 2004 who presented some of the following respiratory infection clinical patterns : flu symptoms, upper respiratory tract infection, lower respiratory tract infection, re-worsening of chronic obstructive

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pulmonary disease (COPD), bacterial pneumonia, SARS, opportunistic pneumonia and other respiratory infections. Clinicians were provided with a case definition for each clinical pattern.

The variables collected were: age, sex, HIV infection —in that case, the last count of lymphoid subpopulations known as well as the anti-retroviral treatment given to the patient were collected—, records of tuberculosis disease and latent tuberculosis infection, chronic obstructive pulmonary disease (COPD), other records of pulmonary diseases, current clinical patterns presented according to the case definitions mentioned, diagnostic technique used (clinical, radiology or others) taking into account that all the methods used include the previous ones, place where the diagnosis was made (hospital or prison), antibiotics used in the treatment and duration in number of days, whether the patient was refered to hospital or his follow-up was no further available, and evolution of the disease. If the same symptoms appeared again in the following 14 days, we considered it as a recidivist respiratory infection. If they appeared again after 14 days or different symptoms appeared in the same patient, it was considered as a different respiratory infection.

When symptoms showed no improvement, treatment was extended for 14 more days and were then considered chronic disease.

If a case of recidivist infection arose, we have also collected its treatment as well as its duration. In some cases, variables were collected by means of the clinical record, and for the rest of cases by means of the anamnesis and examination during the diagnostic process.

In order to describe qualitative variables, we have used absolute and relative frequencies. In order to obtain the type of distribution for quantitative variables, we have carried out the Kolmogorov-Smirnov test. When their distribution was parametric, median and standard deviation were used for their description, and when their distribution was not parametric median and minimum and maximum values were used.

The ANOVA test was conducted in order to compare quantitative variables whose distribution was parametric and the Kruskal-Wallis test in the case of a non parametric distribution.

Finally, the Chi square test was carried out in order to study the relationship between qualitative variables.
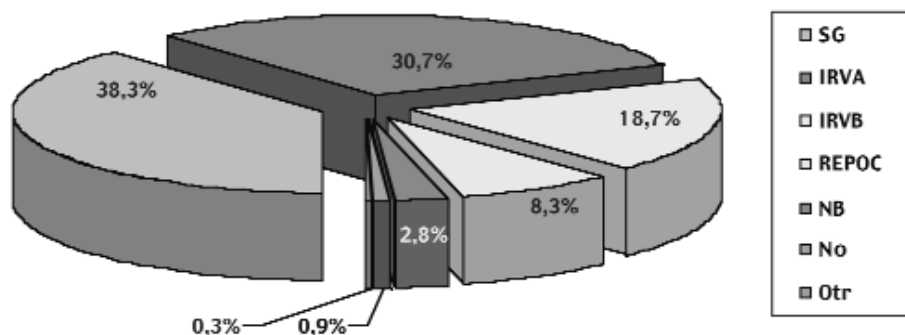
RESULTS

10 out of the 14 professionals asked for information provided us with data. They reported 326 respiratory infections, among which 172 (52,76%) were treated with antibiotics. The median number of respiratory infections per doctors was 39, with a minimum of 8 and a maximum of 45.

Out of the 326 respiratory infections collected, 289 (88,7%) corresponded to men and 37 (11,3%) corresponded to women. The median age for patients with respiratory infection was 36 years old (ranging from 18 to 78 years old). Figure 1 shows the clinical patterns description as well as their frequency. The median age for patients treated with antibiotics was 36 years old (ranging from 21 to 78 years old), they were men in 147 cases (85,5%) and women in 25 (14,5%). Antibiotics were prescribed to 3,2% of patients with flu symptoms (4 cases out of 125), to 67% of patients with upper respiratory tract infections (67 cases out of 100), and in 100% for the rest of respiratory infections. Table1 shows the antibiotics used as first choice medicine in the cases treated. In 165 cases only one antibiotic was prescribed, in 5 cases two were prescribed, in 1 three were prescribed and one patient was prescribed one antibiotic together with four tuberculostatics. A multiple antibiotic treatment was used on seven occasions, on 3 it was accompanied by cotrimoxazole, on 2 by levofloxacin, on 1 by cefuroxim, on 1 by cefonicid and as tuberculostatics isoniazid, rifampizin, pyrazinamide and ethambutol, which were used for a pulmonary tuberculosis together with azitromicin.

Antibiotics	n	%
No antibiotic treatment	154	47,2
Amoxicillin	18	5,5
Amoxicillin-clavulanate	47	14,4
Azitromicin	25	7,7
Cefaclor	1	0,3
Cefixim	1	0,3
Ceftriaxone	5	1,5
Cefuroxim	1	0,3
Ciprofloxacin	2	0,6
Claritromicin	52	15,9
Cotrimoxazole	3	0,9
Midecamycin diacetate	1	0,3
Erythromycin	4	1,2
Levofloxacion	9	2,8
Moxifloxacin	1	0,3
Penicillin G	1	0,3
Piperacillin-tazobactam	1	0,3
TOTAL	326	100

Tabla I. Antibiotics prescribed in the respiratory infections analysed.

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SG: síndrome gripal; IRVA: infección respiratoria de vías altas; IRVB: infección respiratoria de vías bajas; REPOC: reagudización de EPOC;
NT: neumonía bacteriana; NO: neumonía oportunista; Otr: otros.

Figura I. Distribución de los casos con infección respiratoria según cuadro clínico.

When combining antibiotics, we observed that in 37,7% of cases the first antibiotic used belonged to the penicillins group, in 45,8% to the macrolids, in 7,8% to the quinolons, in 5,6% to the cephalosporins, and in 3,4% to the sulfamids. Table II shows the different groups of antibiotics prescribed according to clinical patterns.

The duration of the treatment was stated in 162 cases (94,19%), and its median length corresponded to 7 days (ranging from 3 to 20 days). Excluding the cases treated with azitromicin whose standard length of treatment is shorter, the median was 7 days ranging from 5 to 20 days. When combining diseases, we can observe statistically significative differences regarding length of treatments (p<0,01), except for those using azitromicin, thus upper respiratory tract infections had a median length of 7 days (ranging from 5 to 10 days), lower respiratory tract infections had a median length of 7 days (ranging from 5 to 12 days) and pneumonias had a median length of 10 days (ranging from 5 to 20 days).

With respect to the clinical records of the 326 patients analysed, 45 presented COPD (13,8%) and 80 (24,5%) were infected with HIV. Within these last, 43 (53,8%) were receiving antiretroviral treatment. The frequency of the different respiratory infections varies depending on whether patients are infected with HIV, pneumonias are predominant within HIV patients (table III). However, we have not found statistically significative differences regarding the frequency of different respiratory infections within patients receiving antiretroviral treatment and those who were not. Out of the 80 HIV positive patients, 61 were given antibiotic treatment (76,25%). 12 patients with flu symptoms and 7 with upper respiratory tract infection were not given antibiotic treatment. In comparison to the 246 HIV negative patients, 111

(45,12%) were given treatment, but 109 with flu symptoms and 26 with upper respiratory tract infection were not. Table IV shows the standards of antibiotics use according to clinical groups and HIV infection. With respect to tuberculosis record, we observed statistically significative differences in the frequency of current type of respiratory infection. Thus, within the 16 patients with a tuberculosis record, 37,5% presented upper respiratory tract infection, 43,8% presented lower respiratory tract infection and 18,8% presented pulmonary parenchyma infection, compared with 70,6%, 26,1% and 4% of the 310 patients without a tuberculosis record (p<0,001). Latent tuberculosis infection was present in 72 cases (38,9%). We have recorded only 44 cases (66,1%) in which treatment had been given. In 16 cases (36,4%), this treatment lasted less than 6 months (mean length in days: 87,8, DS: 46,2), in 21 cases (47,7%) it lasted between 6 and 9 months (mean length in days: 187,6, DS: 10,7) and in 7 cases (15,9%) it lasted more than 9 months (mean length in days: 352,6, DS: 33,8).

With respect to latent tuberculosis infection, we have not found statistically significative differences in the different clinical patterns.

Respiratory infections were diagnosed in 323 cases (90,1%) within the prison itself and in 3 cases (0,9%) in hospital. If we analyse the diagnostic method according to different clinical patterns, 289 cases (88,7%) were diagnosed exclusively by means of clinical examination, 35 cases (10,7%) by means of radiology and in 2 cases (0,6%) other hospital means have been used. Table V shows the distribution of respiratory infections according to the diagnostic means used. In 9 cases, patients were taken to hospital. In one case, with lower respiratory tract infection in an HIV positive patient with 399 CD4 without anti-

Clinical pattern	Penicillins n (%)	Macrolids n (%)	Quinolons n (%)	Cephalosp. n (%)	Sulf.TB n (%)	No treat. n (%)	Total n (%)
Flu symptoms	3 (2,4)	-	-	-	1 (0,8)	121 (96,8)	125 (100)
Upper resp. tract infection	36 (36)	30 (30)		1 (1)	-	33 (33)	100 (100)
Lower resp. tract infection	17 (27,9)	36 (59)	4 (6,6)	4 (6,6)	-	-	61 (100)
Re-worsening of COPD	9 (33,3)	12 (44,4)	4 (14,8)	1 (3,7)	1 (3,7)	-	27 (100)
Bacterial Pneumonia	1 (11,1)	2 (22,2)	4 (44,4)	2 (22,2)		-	9 (100)
Sars	-	-	-	-	-	-	-
Opportunistic Pneumonia	1 (33,3)	1 (33,3)	-	-	1 (33,3)	-	3 (100)
Others	-	1 (100)	-	-	-	-	1 (100)
Total:	67 (20,6)	82 (25,2)	12 (3,7)	8 (2,4)	3 (0,9)	154 (47,2)	326 (100)

The patient with pulmonary TB was also treated with azitromicin, and this medicine was recorded as first antibiotic.

Tabla II. Antibiotics prescribed according to therapeutic group and clinical patterns.

Clinical pattern	HIV (-)		HIV (+)		p
	n	%	n	%	
Upper respiratory tract infection	193	78,5	32	40,0	
Lower respiratory tract infection	50	20,3	38	47,5	<0,001
Pneumonias	3	1,2	10	12,5	
Total	246	100,0	80	100,0	

Tabla III. Distribution of cases with respiratory infections according to patient's condition regarding the HIV infection.

Antibiotic	Upper respiratory tract infections		Lower respiratory tract infections		Pneumonias	
	HIV + n (%)	HIV - n (%)	HIV + n (%)	HIV - n (%)	HIV + n (%)	HIV - n (%)
Penicillins	6 (18,8)	33 (17,1)	10 (26,3)	16 (32,0)	2 (20,0)	-
Macrolids	5 (15,6)	25 (13,0)	18 (47,4)	30 (60,0)	4 (40,0)	-
Quinolons	-	-	5 (13,2)	3 (6,0)	3 (30,0)	1 (33,3)
Cephalosporins	1 (3,1)	-	5 (13,2)	-	-	2 (66,7)
Sulfamids/TB	1 (3,1)	-	-	1 (2,0)	1 (10,0)	-
No treatment	19 (59,4)	135 (69,9)	-	-	-	-
Total	32 (100,0)	193 (100,0)	38 (100,0)	50 (100,0)	10 (100,0)	3 (100,0)

Tabla IV. Distribution of cases with respiratory infection according to group of antibiotics prescribed, clinical patterns and patient's condition regarding the HIV infection.

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Clinical patterns	Hospital		H+Radiology		H+R+Others	
	n	%	n	%	n	%
Flu symptoms	125	100,0	-	-	-	-
Upper respiratory tract infection	100	100,0	-	-	-	-
Lower respiratory tract infection	42	68,9	19	31,1	-	-
Re-worsening of COPD	21	77,8	6	22,2	-	-
Bacterial pneumonia	1	11,1	8	88,9	-	-
Opportunistic pneumonia	-	-	1	33,3	2	66,7
Others (TB)	-	-	1	100,0	-	-

Tabla V. Distribution of respiratory infection cases according to clinical patterns and diagnostic means.

retroviral treatment and with pneumonia records, five with bacterial pneumonia, three of them in HIV positive patients, and three with opportunistic pneumonia in HIV positive patients. The evolution of the 326 cases analysed was going toward improvement in 313 cases (96,0%), 1 became chronic (0,3%), another died (0,3%) and 11 (3,4%) presented the same diagnoses. The patient who died was suffering from opportunistic pneumonia and was HIV positive classified as C2. The sign which became chronic was a lower respiratory tract infection in an HIV positive patient with CD4<200.

DISCUSSION

The design of this study was carried out in order to evaluate the standards of antibiotics use in respiratory infections thus the data collected do not evaluate the prevalence of communicable respiratory diseases in the prison setting. On the other hand, the fact that the study was conducted in October, month usually used for vaccination campaigns since it corresponds to the beginning of a period of high incidence in some diseases, may have had an influence, in some centres, on the number of cases collected, which was lower than expected. The sample under study allows though the analysis of the standards of antibiotics use in respiratory infections treated within the prison setting.

Antibiotics prescription in respiratory infections, and especially in upper tract infections, usually show a great variability within any medical care setting, and this variability is even greater in primary health care. This is due, above all, to factors such as diagnostic uncertainty, as well as to the influence of some factors like inadequate training for doctors regarding antibiotics use, pressure from pharmaceutical companies and many more, including those psychological, re-

sulting in clinical variability 9 often associated with bad care quality. We have not observed a great variability regarding antibiotics prescription in this study since, even though 16 different types of antibiotics were used in the 172 cases in which treatment was prescribed, only 4 antibiotics (claritromicin, amoxicillin clavulanate, azitromocin and amoxicillin) amount to 82,5% of first line antibiotic prescriptions. In addition, penicillins and macrolids are used in 98,5% of treated upper respiratory tract infections, in 84% of treated lower respiratory tract infections and in 33,3% of treated pneumonias.

On the other hand, the use of antibiotics agrees with the established primary health care guidelines 10. Thus, we have found that 79,1% of upper respiratory tract infections are treated with medication these guidelines recommend for pharyngotonsillitis (medication recommended or its 2 first alternatives). With respect to lower respiratory tract infections, a macrolid was used in 59% of cases (recommended in the guidelines), and regarding re-worsening of COPD, recommended medication was used in 70,1% of cases. In pneumonias, 77,7% of prescriptions coincide with what was defined as first choice medication.

As debatable aspects, we have observed that on four occasions (3,2%) in which a patient presented flu symptoms an antibiotic was used in his treatment, in one case because the patient was HIV positive and no other tests had been done to confirm the diagnosis, and on the other three occasions this was due to the treatment with cotrimoxazole established in inmunodepressed patients. We have also found that 67% of cases with upper respiratory tract infections were treated with antibiotics. When combining it with flu symptoms as well as lower respiratory tract infections, we have found that the difference between the percentage of HIV positive patients treated compared with those HIV negative amounted to only 10%

(40,1% vs 30,1%), therefore, the fact that they are preventive treatments in inmunodepressed patients does not account for the high rate of treatments. This high rate of antibiotic treatments, in many cases not recommended, could be due to the high percentage of diagnoses made within prison (99,1%) and to the high percentage of diagnoses made without additional tests that could confirm them, or at least that could discard severe processes. If we take into account that some intravenous antibiotics are prescribed and that the prison population shows characteristics that could lead to bad treatment adherence [11,12] and early withdrawal, the duration of treatment agrees with the established guidelines.

In conclusion, we must point out that a good training in respiratory infections and empirical treatments is necessary for prison clinicians, since most diagnoses are made without additional tests, and therefore, without exact knowledge of the etiological agent which could determine the ideal antimicrobian. This training would result in a better use of antibiotics and a better infections control, avoiding resistance and recidivism.

REFERENCIAS BIBLIOGRAFICAS

1. Marco A. Problemática psicosocial en VIH: Especificidades del paciente ingresado en prisión. Programa Psicosocial para Prisiones: Módulo 3. Madrid: SCM, 2004.

2. Añón C, Del Olmo JA, Llovet F, Serra MA, Gilabert S, Rodríguez F, et al. Virus C de la hepatitis entre población penitenciaria de Valencia. Rev Esp Enferm Dig 1995; 87: 505-8.

3. Pérez-Agudo F, Alonso FJ, Urbina J. Prevalencia de infección por el virus de la inmunodeficiencia humana tipo 1 y de *Mycobacterium tuberculosis* en una población reclusa entre los años 1989 y 1995. Med Clin (Barc) 1998; 110: 167-70.

4. Grupo del Noroeste para el estudio de la Hepatitis por Virus C en el medio penitenciario. Seroprevalencia de infección por virus C de la hepatitis en población reclusa del noroeste de España a su ingreso en prisión. Rev Esp Salud Pública 1998; 72: 43-48.

5. Estudio Transversal (junio de 1998) sobre la Sanidad Penitenciaria Española. Subdirección General de Sanidad Penitenciaria. Observatorio español sobre drogas: informe 3 (1999). Población Penitenciaria: Indicadores de prisiones. Plan Nacional sobre Drogas. [Consultado 23/12/03]. URL disponible en: http://www.mir.es/pnd/observa/htlm/penint.htm.

6. Saiz de la Hoya P, Bedía M, Murcia J, Cebriá J, Sánchez-Payá J, Portilla J. Factores predictivos de infección por el VIH, VHC y coinfección en la población reclusa de una prisión española. Enferm Infecc Microbiol Clin 2005; 23(2): 53-7.

7. Saiz de la Hoya P, Viciana P. CAPRI, Calidad Asistencial en Prisiones, Ed. SCM, Madrid 2002.

8. Zurriaga Llorens O, Peñalver Herrero J. Los sistemas centinela como herramienta para la vigilancia de la gripe y conocimiento de sus características. Vacunas 2002; 3 (Supl 1): 14-5.

9. Yagüe A. Variabilidad en la prescripción de antibióticos. Enferm Infecc Microbiol Clin 2002; 20: 78-84.

10. Anónimo. Sociedad Española de Medicina Familiar y Comunitaria (SEMFYC). Recomendaciones sobre el uso de antimicrobianos en atención primaria. [consultado: 11/01/2005]. Disponible en: http://www.scmfic.org/antimicrobians/html/frameesquemes.htm

11. Saiz de la Hoya P, Marco A. Variables que afectan a la adherencia en población general y en el colectivo penitenciario. En: Manual de Formación. Adherencia al Tratamiento con Fármacos Antirretrovirales dentro y fuera de Prisión. Madrid: Doyma, 1999.

12. Marco A, Humet V, Guerrero R, Saiz de la Hoya P, Gallego C. La realidad sobre el VIH en las cárceles españolas. JANO SIDA y HUMANIDADES 2000; 2: 5-9.

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