

# Evolution of the main diagnoses of hospital discharges amongst the prison population in Valencia, 2000-2009

I Abad-Pérez<sup>1</sup>, E Carbonell-Franco<sup>2</sup>, D Navarro-García<sup>1</sup>,  
FJ Roig-Sena<sup>3</sup>, A Salazar<sup>3</sup>

<sup>1</sup> Unitat de Documentació Clínica i Admissió. Consorci Hospital General Universitat de València

<sup>2</sup> Secció Promoció de la Salut. CSP-València

<sup>3</sup> Secció d'Epidemiologia. CSP-València

## ABSTRACT

The aim of our study was to quantify the hospital demand originating from prisons and describe the main diagnoses as a measure of prevalence, as well as communicable diseases and their evolution during the period 2000-2009.

Using the discharge records of the University General Hospital under the terms of an agreement that meets the demand for hospitals from prisons in the province of Valencia, we carried out a cross-sectional study of the frequency distribution of diagnoses and their distribution according to personal characteristics.

More than 2415 discharges were recovered, which, after the removal of inconsistencies, provided 2332 episodes of hospitalization. The average age of the subject ranged from 32.8 to 39.5 years. The most common grouped primary and secondary diagnoses (Table 2) were: 1. HIV (34.05%), 2. Hepatitis C (14.67%), 3. Drug dependence (10.25%), 4. Pneumonia (8.58%), 5. TBC (7.46%).

In the last decade there has been a change in the patterns of infection in the prison population. This may be related to: the relative aging of the prison population, the replacement of intravenous use by other non-invasive means, the change of nationality of prisoners and therapeutic advances in the treatment of HIV infection.

**Key words:** prisons; prisoners; prevalence; Spain; infection; hospitalization; drug dependence; HIV; Hepatitis C

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## INTRODUCTION

The imprisoned population assigned to a specific assistance network and depending from a different entity than healthcare authorities has seldom been analyzed by epidemiology units, so that currently there is a lack of studies depicting such population.

In our country, the most common approach to health within the imprisoned population comes from governmental resources<sup>1,2</sup>, specially related to studies on the Acquired immunodeficiency syndrome (AIDS)<sup>3,4</sup> and Tuberculosis (TB)<sup>5</sup>.

In general, TB, the infection by the human immunodeficiency virus (HIV) and both Hepatitis B and C, have been subject to quantification studies and related to social and national variables as well as to drug abuse not only in Spain, but in many countries<sup>6,7</sup>.

Nonetheless, as time goes by, changes can occur as far as the age structure of the imprisoned population or social patterns determining the effects of infections or their chronicity are concerned. This would entail a changing prevalence pattern which we believe should be verified. On the other hand, in our opinion, the studies on imprisoned population and such population itself, suffer from an excessive bias towards pathologies derived from injecting drug abuse.

The aim of our report has been to quantify the hospital demand from a penitentiary origin and characterize the main diagnoses as a prevalence measure, referring not only to the main diagnosis but to accompanying diseases. Moreover, the discovery of communicable diseases and their evolution throughout the period are subject to Public Health Surveillance studies.

### MATERIAL AND METHOD

After discharge records from the University General Hospital of Valencia, which assists by agreement the hospital demand of prisons in the province of Valencia, a descriptive study was carried out for the period 2000-2009 on the discharge causes of the imprisoned population. The features of the subjects and their discharge diagnoses were analyzed, as well as the prevalence of pattern variations in the last decade and the weight of the demand- defined as the proportion of diagnoses found. Neither subjects nor diagnoses are duplicated; still, as it is a discharge study, one subject can have several discharge records during the study period; therefore, we took into consideration the new diagnoses.

The diagnoses (ICD-9)-main diagnosis and 2 secondary- are categorized in order to reduce dispersion, by grouping them into diagnostic categories which summarize different presentation forms with the same etiological basis; for example the category “fractures and contusions” includes trauma occurred in different localizations such as shoulder, nose, jaw,...

Since we describe the prevalence of the period, distribution variables are personal characteristics of subjects: age and gender. Therefore, distribution frequencies concerning diagnoses and their distribution are shown in accordance with personal characteristics.

In order to enable the comparison of results with previously published records, we established the crite-

tion of “Prevalent Infectious Complex” defined as the diagnostic coincidence throughout the same hospitalization process of one or more of the following diagnoses: infection by HIV, infection by Hepatitis C and active TB infection. Hence, diagnoses were ordered depending on whether only one of the major infections were detected (HIV, Hepatitis C, TB), or any of them combined within the first, second or third diagnosis.

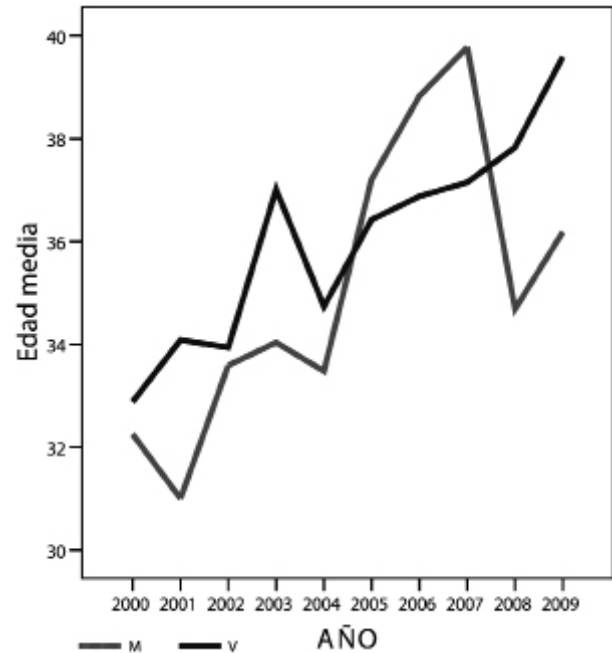


Figure 1. Average age of prisoners discharged in Valencia; 2000-2009.

YEAR	WOMEN					MEN				
	Average Age	N	Typ. Dev.	Min. Age	Max. Age	Average Age	N	Typ. Dev.	Min. Age	Max. Age
2000	32.25	20	9.54	21	67	32.88	198	9.00	17	69
2001	31.00	27	5.82	21	47	34.08	228	9.99	17	74
2002	33.59	17	7.09	24	49	33.94	271	9.61	18	73
2003	34.04	28	12.50	20	73	37.01	292	11.01	19	74
2004	33.48	23	9.36	18	58	34.74	267	9.04	17	70
2005	37.21	29	10.01	24	67	36.42	234	10.66	16	74
2006	38.83	35	11.34	20	68	36.88	197	10.04	18	74
2007	39.78	18	10.37	20	62	37.15	121	9.24	22	63
2008	34.68	19	5.50	25	45	37.83	124	9.63	22	73
2009	36.19	27	12.27	21	72	39.59	157	10.59	22	73
Total	35.25	243	10.13			35.78	2089	10.11		

Linearity coefficient: 0.357

Linearity coefficient: 0.046; Pearson R: 0.165

Table 1. Average, Min and Max Age of prisoners discharged; Valencia 2000-2009

Data processed by means of Access was treated with SPSS+ v17. The gender based observed- to-expected ratio was estimated by means of a proportional adjustment model for those diagnoses which grouped 10 or more discharge records. Last, the evolution of the average age throughout the period was contrasted by means of the linearity coefficient.

## RESULTS

2415 discharges were recovered, which, after the removal of inconsistencies, provided 2332 episodes of hospitalization.

89.6% were male prisoners, without any age-based difference according to their gender (see Table 1). The average age of individuals evolved from 32.8 to 39.5 throughout the period (F: 8.98;  $p < 0.001$ ) (see Figure 1). Nevertheless, this evolution takes place differently in men and women. So, the average age among male prisoners follows a crescent linear evolution, both in the arithmetic and geometric mean, whose values evolve from 32 to 39 years. On the other hand, female prisoners' age variations do not follow a significant linearity coefficient and range between 32 and 36 years.

The most usual main discharge diagnoses (see Table 2) were: infection by and/or evolution of HIV with 27.7% of discharges; this included both cases of HIV with or without significant development of AIDS; the infection by Hepatitis C with 7.72% of cases and the ingestion of "foreign bodies", with 5.15%.

The most common grouped primary and secondary diagnoses (see Table 2) were: 1. HIV (34.05%); 2. Hepatitis C (14.67%); 3. Drug Dependence (10.25%); 4. Pneumonia (8.58%) and 5. TB (7.46%).

The prevalence of an infectious pattern is similar for both genders (see Table 3) without any significant differences between men and women as far as HIV and Hepatitis C are concerned, although the later is slightly more common among women (proportional ratio: 110.41% in women vs. 98.70% in men). The proportional ratio related to drug abuse is equally consistent, which could explain the relationship between the infectious pathology observed and the transmission routes.

The prevalence of HIV and Hepatitis C suffer reduction trends throughout the decade (see Figure 2); and the 2002 peak in the evolution of Hepatitis C is a consequence of the introduction of molecular diagnostic techniques in the hospitals of the Autonomous Community of Valencia, as a consequence of renown legal proceedings. All the same, the diagnostic evolu-

tion of TB initiates an ascending trend between 2008 and 2009 after a severe fall experienced since 2000.

The prevalence of HIV shows no differences between genders (women: 33.3%; men: 34.13%). Hepatitis C proved more prevalent in women (17.28% vs. 14.36%) as well as psychiatric disorders (9.8% vs. 6.27%). Fractures and injuries were over 3 times more frequent in men.

The following non-communicable diagnoses (see Table 3) are worth outlining: self-injuries among the female imprisoned population, by means of "poisoning", and the ingestion of foreign bodies, among men.

Psychiatric disorders are not assessed in this report due to the proximity of a Penitentiary Psychiatric Hospital in the Community of Valencia.

We observed that the infectious prevalent complex (see Table 4) which prevailed throughout the period 2000-09 was the infection by HIV, which represented up to 34% of discharges. As a primary diagnosis, HIV represented 24.36% of discharges. Hepatitis C and TB either as primary or secondary diagnoses represented 14.67% and 6.56% respectively.

## DISCUSSION

The observations after hospital discharge records, despite their thoroughness and both geographical and temporal accuracy, do not offer data on the rates' denominator (population exposed). Therefore our observation has been limited to describing the basic characteristics of the population and temporal evolution of the diagnoses.

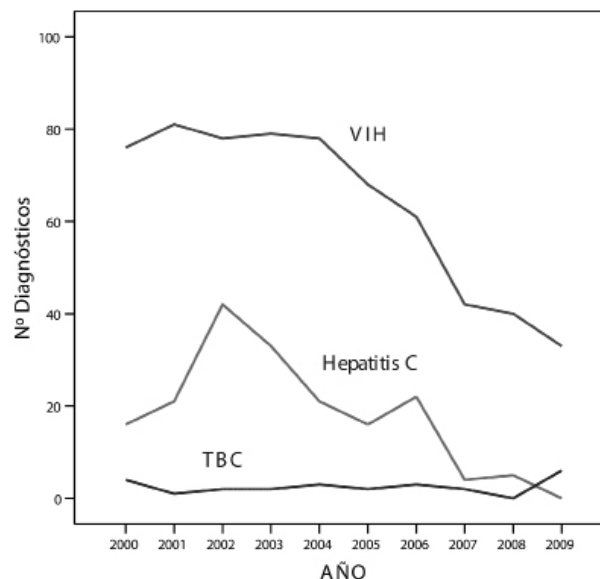


Figure 2: HIV, Hepatitis C and TB diagnoses; Valencia, 2000-2009

	PRIMARY DIAGNOSIS		SECOND DIAGNOSIS		THIRD DIAGNOSIS		Cases	Cases/ Discharges
	Discharges	Percentage	Discharges	Percentage	Discharges	Percentages		
HIV	636	27.27	110	4.72	48	2.06	794	0.34
HEPATITIS C	180	7.72	76	3.26	86	3.69	342	0.15
FRACTURES/ CONTUSIONS	58	2.49	60	2.57	17	0.73	135	0.06
FOREIGN BODY	120	5.15	7	0.30	3	0.13	130	0.06
POISONING	45	1.93	19	0.81	11	0.47	75	0.03
TB	25	1.07	92	4.20	51	2.19	174	0.07
OPEN INJURIES	64	2.74	23	0.99	10	0.43	97	0.04
CHRON.HEP/CIRRHOSIS	42	1.80	36	1.54	19	0.81	97	0.04
PSYCHIATRIC DISORDERS	73	3.13	44	1.89	32	1.37	149	0.06
MALIGN. NEOPLASM	91	3.90	33	1.42	16	0.69	140	0.06
INGUINAL HERNIA	52	2.23	4	0.17			56	0.02
PNEUMONIA	27	1.16	143	6.13	30	1.29	200	0.09
DRUG DEPENDENCE	11	0.47	72	3.09	156	6.69	239	0.10
Total	1424	61.06	725	31.09	479	20.54		
Other diagnoses	908	38.94	1607	68.91	1853	79.46		
Total Addition	2332	100	2332	100	2332	100		

Table 2: Grouped discharge diagnoses of the imprisoned population assisted; Valencia, 2000-2009

	WOMEN	MEN	TOTAL	O/E RATIO	
				WOMEN	MEN
HIV	81	713	794	91.72%	101.04%
HEPATITIS C	42	300	342	110.41%	98.70%
FRACTURES/CONTUSIONS	5	130	135	33.30%	108.35%
FOREIGN BODY	5	125	130	34.58%	108.19%
POISONING	14	61	75	167.82%	91.51%
TB	17	157	174	87.84%	101.52%
OPEN INJURIES	3	94	97	27.81%	109.04%
CHRON.HEP/CIRRHOSIS.	15	82	97	139.03%	95.12%
PSYCH. DISORDERS	18	131	149	108.61%	98.92%
MALIGN. NEOPLASM	14	126	140	89.90%	101.26%
INGUINAL HERNIA/ OTHERS	4	52	56	64.22%	104.48%
PNEUMONIA	14	186	200	62.93%	104.64%
DRUG DEPENDENCE	26	213	239	97.80%	100.28%

O/E Ratio: Observed / Expected Ratio

Table 3: Primary and secondary diagnoses according to gender; province of Valencia 2000-2009

INFECTIOUS PREVALENT COMPLEX		
	Discharges	%
HIV (sole diagnosis)	568	24.36
HEPATITIS C (sole diagnosis)	229	9.82
HIV+TB	115	4.93
HIV+HCV	104	4.46
TB (sole diagnosis)	29	1.24
HIV+HCV+TB	7	0.30
HCV+TB	2	0.09
OTHER PROCESSES	1278	54.80
TOTAL	2332	100.00

Table 4: Prisoner discharges, Valencia 2000-2009

We have tried to overcome the limitations derived from a lack of denominators by means of an extended period of time and the accuracy of hospital diagnoses. Despite this, we are hoping to obtain stable denominators as to establish the population impact of the pathology described.

We consider the following aspects remarkable as to the approach to the imprisoned population: the progressive increase of the average age, the high prevalence of HIV and its accompanying pathologies, which still represent the greatest demand factor among the imprisoned population, and the increase of TB in the last two studied years.

The average age does not differ from that concluded in other studies carried out in Spain<sup>9</sup> although we have not been able to establish any coincidence as far as the evolution of the average age among prisoners is concerned. However, it is worth noting that the imprisoned population at the beginning of the 90s was younger than at the beginning of the study period<sup>10</sup>.

The high prevalence of HIV diagnoses observed corresponds to other incidence and seroprevalence estimations made in other prisons<sup>4, 5, 9, 10</sup>. Yet, probabilistic estimations<sup>1</sup> are significantly higher than our observation, in spite of considering hospitalized imprisoned population.

Likewise, our observation as far as Hepatitis C coincides with the aforementioned authors and Giuseppe La Torre's<sup>6</sup> most recent observation in Italy as of 2007.

The prevalence of TB shows no differences with the observations<sup>5, 9</sup> throughout the period. Yet the increase observed during the last two years does not

seem to be explained by HIV coinfection, since this diagnosis has experienced a significant decrease.

In general, the evolution of age and the efficiency of medical treatments seem to modify this pattern, which could explain its proportional decrease. Last, it is also remarkable, the lack of gender based differences as far as the observed prevalence is concerned. This constitutes a first approach to data which will be continued by means of a more accurate analysis, completed with other supplementary resources.

Regardless of future population based approaches to the imprisoned population, it seems that throughout this decade an important change in the infectious pattern of prisoners has taken place. As a hypothesis, we can consider that this is related to: the relative aging of the imprisoned population, the replacement of the intravenous use by other non-invasive means, a relative change as to the nationality of prisoners which entails new behaviors and therapeutic advances concerning the treatment of the HIV infection<sup>2, 3, 6, 11</sup>.

## CORRESPONDENCE

Dra. Empar Carbonell Franco  
Técnico Superior de Promoción de la Salud  
Centro Salud Pública de Valencia  
Tel. 936 184 866  
Address: C/San Vicente, 83-85  
46007 Valencia  
Email: carbonell\_emp@gva.es

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