Description of the first three notified outbreaks of influenza A (H1N1) in Spanish prisons

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ABSTRACT

Aim: This study describes three reported outbreaks of influenza H1N1 2009 in Spanish prisons between July and September 2009.

Methods: An outbreak was defined as the appearance of three or more cases with influenza symptoms and with an epidemiological link in the same module of a prison. The outbreaks were reported using a specific questionnaire. The analysis, which used variables of gender, age, date of notification, duration of outbreak, risk factors and clinical features are presented as absolute numbers, percentages and attack rates, while study of the diffusion of the illness is expressed as epidemic curves.

Results: Three outbreaks were reported at the prisons of Alcala-Meco (85 affected males), Pamplona (18 affected males) and Jaen (12 affected females) with an overall attack rate that ranged from 7.1% to 17.9%. Duration of the outbreaks was between 8 and 35 days, and the average duration of the illness itself was 3 days. Only 4 inmates were admitted who were later given discharged for recovery. The men were younger ($p<0.001$). The epidemic curves of the outbreaks did not show any clear propagation patterns.

Discussion: The attack rates are highly variable although they are lower than other community outbreaks. Symptoms were slight and lethality was zero. The women's age was significantly greater than that of the men, although it is practically the same amongst the prison population. Low morbidity was very probably the cause of the reduction in consultations of the persons affected and the consequent underestimation of the rates.

Key words: Prisons; Influenza A Virus, H1N1 Subtype; Pandemic; Risk Factors; Comorbidity; Gender Identity; Population Surveillance, Epidemiology.

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INTRODUCTION

Since the first cases of human infection by the virus of influenza A (H1N1) were firstly reported in Mexico and United States of America[1, 2, 3] at the end of April 2009, the Spanish Secretary General of Penitentiary Institutions set off a pandemic response General Plan. A commission for the monitoring of the situation was created; with representatives from the Regime Area, Workplace Health Services, General Sub-directorate for Inspections and Health Coordination Services and they drew up the document "Action Guidelines in prisons for suspected and confirmed cases of influenza A (H1N1) 2009"[4, 5], where all measures which should be implemented in prisons as a response to isolated cases or outbreaks of influenza A (H1N1) are gathered.

Firstly, the main aim was to prevent and control the disease by strictly monitoring each case and its contacts. Since the WHO declared, on June 11th 2009, phase 6 of pandemic alert it was no longer required to monitor nor identify the contacts of a case. All action then led to identifying cases and treating them avoiding, as far as possible, the transmission of the virus by properly assessing basic hygiene measures and both respiratory and contact isolation of cases in their own cells leading to module or whole facility isolation if outbreaks were to appear.

The Secretary General of Penitentiary Facilities is responsible for 69 facilities all of which are included within the Spanish state except those located in the Autonomous Community of Cataluña, whose competences have been transferred. The prison population is about 60,200 inmates; it is mainly a male population (92.3%), young (34% between 31 and 40 years old) and Spanish (64%) although the percentage of foreign inmates raises every year exceeding in over 10 points the percentage of foreigners among the general population[6].

As far as the health situation is concerned, the main problems observed are those related to risk behaviors, mainly injecting drug abuse. The cross sectional study carried out in 2006[7], revealed that 10.5% of inmates upon admittance declared to be injecting drug users, while only 1.2% of those inmates who were already in prison admitted being so. The most prevalent infectious diseases in 2008 were: Hepatitis C (27% of inmates presented markers), HIV/AIDS (8% were HIV +) and tuberculosis (2.4 for each 1000 inmates)[8, 9].

The main aim of this article is to describe the first three outbreaks which were reported in three different Spanish prisons between July and September 2009 and to estimate the impact of the influenza A virus (H1N1) due to its incidence, clinical features and duration of the symptoms.

METHODS

An outbreak was defined as the appearance of three or more cases with influenza symptoms and with an epidemiological link in the same prison module 5, 11, 12, 13. Outbreaks are reported to the Prison Health Coordination (PHC) department by the prison medical staff by means of a specific questionnaire including personal variables (age, gender, case symptoms, risk factors and laboratory results), space variables (penitentiary facility and module) and time variables (beginning of the symptoms, admittance date if necessary and duration of the disease and of the isolation).

Apart from reporting to the PHC the outbreak must also be reported to the health representatives from the Autonomous Community were the prison is located. The indication, collection and analysis of microbiological confirmation samples are made by means of the epidemiologic surveillance services of the relevant Autonomous Community. On the whole, the analysis of two or three samples was considered enough to confirm or refute the outbreak.

The description of the cases has been made by means of the aforementioned variables and as a frequency measure, global attack rates per each prison and specific age and module rates have been used.

In Alcalá Meco, in order to work out the global rate, the average population was used as the denominator while the outbreak took place because all of them (men) could have been exposed. As far as Pamplona is concerned only the male population has been taken into account because the outbreak only affected men and the female module is independent. As for Jaen, it is the opposite case, only the average female population has been considered because only them, independently from the rest, have been affected by the outbreak.

In order to calculate the specific age and module rates the average population of each module has been considered as the denominator.

Epidemic curves were designed for each outbreak to show time distribution of the cases.

The software used for the database was an EXCEL application specifically developed by the PHC for this record.

The comparison between averages and significance tests has been made by Anova and Student t for independent samples with SPSS.

All the three facilities involved implemented control measures during the described outbreak in accordance with the "Action guidelines in prisons for suspected and confirmed cases of influenza A (H1N1) 2009" including immediate respiratory isolation of the inmate affected in his/her own cell every time a new case appeared. If there were over three cases in the same module the whole module was isolated therefore restraining both entrances and exits from it. Finally if over three modules were involved, the whole facility was isolated avoiding new admittances and inmates' departures as far as possible. The recommended duration of isolation for both the module and the facility was up to 7 days after the end of the symptoms of the last case diagnosed.

Health care of those cases with low complication risks was provided in each prison's infirmary, which count upon a permanent primary care service including at least a family physician, nurses, auxiliary nurses and a pharmacist [10] with the appropriate pharmaceutical supplies (antiviral therapy, antipyretics and others) to lessen influenza symptoms. Serious cases or those with a high complication risk were transferred to their reference hospital where the need of admittance was determined.

Next you will find the results obtained through the reported outbreaks that took place in penitentiary facilities up to October 9th 2009.

RESULTS

The three described outbreaks were reported between July and September 2009 in Alcalá-Meco (Madrid), Pamplona (Navarra) and Jaén (Andalucía).

The outbreak in Alcalá-Meco, which is a facility for men, began in July 18th 2009 and ended in August 22nd 2009 (35 days). 85 men were affected, with an average age of 26±8.2 years (table 1); rank (18-56). The disease affected younger inmates, the higher rate (11.3%) being among those younger than 21. Among inmates older than 60 no cases were reported (table 2). Those affected took up 9 out of the 15 modules of the prison and the population exposed included 953 inmates with a global attack rate of 8.9%. As table 3 depicts, the attack rate per modules has been very varying. The most affected module was module 9 with 31.4% of inmates affected (33/105). Module number 9 along with 1, 11 and 12 are those from which more inmates are supplied for kitchen, laundry and workshop tasks and therefore they have more freedom of movement through all the facility.

The most frequent symptom (100%) was fever, followed by general discomfort (92.9%), sore throat (77.6%) and headache (69.4%). Other less frequent symptoms were cough and myalgia. The length of symptoms was 3.4 (SD 2) days with a median of 3. The duration of isolation was 6.9 (SD 1.9) days with a median and a mode of 7: the minimum recommended in prison at the time for all suspected or confirmed cases.

Only one inmate required hospital admittance (11 days), he was diagnosed from transverse myelitis due to viral infection upon discharge as a result of improvement.

Only three inmates, who were HIV positive, had complication risks and none of them was prescribed antiviral therapy.

The virus was confirmed in the six samples (7.1% of the cases) that were collected and sent for analysis by representatives from the epidemiologic area where the prison is located.

As the epidemic curves below (figure1) portray, the cases of the outbreak in Alcalá-Meco didn't follow a clear transmission pattern. Only in module 9, where more cases were found, the distribution is similar to a single source epidemic curve with the cases ranged within the incubation period.

Since the outbreak was firstly diagnosed, modules 9 and 10 were isolated since they were the first to be affected. Therefore new inmates were not admitted to this module and only strictly necessary exits were allowed. If due to sanitary conditions any inmate had to leave the module he did so wearing a surgery mask. Since July 22nd, when suspected cases had already been reported in over three modules, the whole prison was isolated, therefore restricting both entrances and departures from it. This isolation lasted for two weeks. From that moment on, new reported cases were moved to one of the two modules specifically prepared for it. In both of them, inmates had to wear surgery masks and departures were strictly restricted. Entrances were restricted as far as possible and only the prison officers were able to do so.

The outbreak in the prison of Pamplona kicked off on 16th July 2009 and finished on 10th August 2009 (25 days). This prison counts upon two male modules (adult and young offenders) and a female module. The outbreak only affected the two male modules implying 18 inmates and an attack rate per module of 6.1%% (10/164) in the adult module and 9.1% (8/88) in the juvenile module (table 2). The average age of those affected was 28.6±8.1 years. Age rates (%) are very varying and difficult to appreciate due to the low number of inmates affected (table1) although just like

Table 1: Influenza A (H1N1) outbreaks during 2009 in penitentiary facilities. Age and gender distribution.

AGE

	N	Average	Standard deviation	95% Confidence interval for the average: Standard error	Lower limit	Upper limit	Minimum	Maximum
Men in Alcalá-Meco	85	25.9647	8.16999	0.88616	24.2025	27.7269	18.00	56.00
Women in Jaén	12	36.5833	8.29522	2.39462	31.3128	41.8539	21.00	46.00
Men in Pamplona	18	28.5556	8.14011	1.91864	24.5076	32.6035	20.00	48.00
Total	115	27.4783	8.73624	0.81466	25.8644	29.0921	18.00	56.00

ANOVA AGE

	Quadratic addition	gl	Quadratic average	F	Sig.
Inter groups*	1210.440	2	605.220	9.050	.000
Intra groups	7490.255	112	66.877		
Total	8700.696	114			

*men/women

T Test
Group statistics

	GENDER	N	Average	Standard deviation	Average standard error
AGE	1.00	103	26.4175	8.18478	0.80657
	2.00	12	36.5833	8.29522	2.39462

Independent samples test

		T –Test for equivalent averages: Sig. (bilateral)	Difference between averages	Difference standard error	95% Confidence interval for the difference: Lower	Upper
AGE	Equal variances have been assumed	.000	-10.16586	2.49989	-15.11858	-5.21313
	Equal variances have not been assumed	.001	-10.16586	2.52678	-15.59956	-4.73216

Tabla 2. Brotes de gripe A (H1N1) 2009 en centros penitenciarios Distribución por centro.

Centro penitenciario		Nº de Internos	Nº casos	Tasa % internos	Nº (%) Ingresados
Alcalá-Meco		953	85	8,9	1 (1,2)
edad	< 21	213	24	11,3	
	21-40	535	56	10,5	1 (1,8)
	41-60	186	5	2,7	
	> 60	19	0	0,0	
Pamplona*		252	18	7,1	1 (5,6)
edad	< 21	4	1	25,0	
	21-40	157	14	8,9	
	41-60	69	3	4,3	1 (33,3)
	> 60	5	0	0,0	
Jaén**		67	12	17,9	2 (11,1)
edad	< 21	2	0	0,0	
	21-40	41	6	14,6	1 (25,0)
	41-60	24	6	25,0	1 (16,7)
	> 60	0	0	0,0	
Total		1020	115	11,3	4 (3,5)

* Sólo se consideran los dos módulos de hombres que son los afectados por el brote
** Sólo se considera el módulo de mujeres que es el afectado por el brote

Tabla 3. Brotes de gripe A (H1N1) 2009 en centros penitenciarios. Distribución por módulo. Nº de casos y tasas de ataque.

Módulo afectado	Nº de internos	Nº de casos	Tasa de ataque (%)
Alcalá-Meco	953	85	8,9
1	99	12	12,0
2	101	6	5,9
4	98	5	5,1
8	52	5	9,6
9	105	33	31,4
10	95	5	5,3
11	50	11	22,0
12	90	8	8,9
Otros módulos	263	0	0,0
Pamplona	252	18	7,1
Adultos	164	10	6,1
Jóvenes	88	8	9,0
Jaén	67	12	17,9
mujeres	67	12	17,9

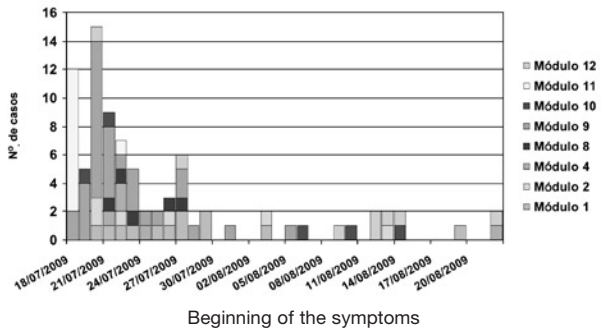

Figure1. Epidemic curve of the influenza A (H1N1) outbreak in 2009 in the prison of Alcalá- Meco as of the date of the onset of the symptoms of the cases (n=85).

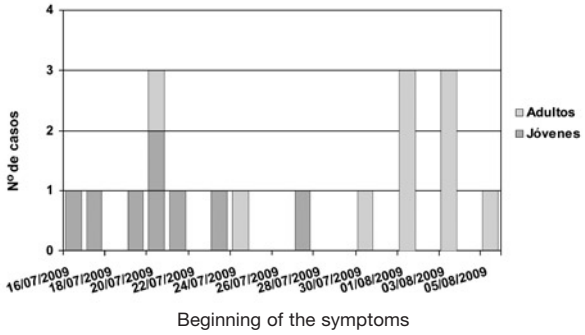

Figure 2: Epidemic curve of the influenza A (H1N1) outbreak in 2009 in the prison of Pamplona as of the date of the onset of the symptoms of the cases (n=18).

in Alcalá-Meco, no cases were reported among inmates older than 60 years old.

The most repeated symptoms were cough (100%), sore throat (60%), fever and general discomfort (33% of cases). The length of the symptoms was 2.5 days (SD 1.3). The extent of the isolation was 5.6 days (SD 2.5) with median and mode results of 6, which is under 7 days (the minimum recommended at the time in prisons for suspected and confirmed cases).

Three inmates presented complication risk factors: one with obstructive sleep apnea (OSA) and smoking, another with bronchial asthma and the last with remitting Hodgkin's lymphoma. The inmate with OSA was admitted in the reference hospital during one night until the virus of influenza A (H1N1) was serologically confirmed and later discharged upon improvement. He was prescribed antiviral therapy.

Three samples were collected out of which two were positive (11.1% of cases) and one negative thus the outbreak was confirmed by symptoms and epidemiologic link.

Figure 2 portrays the outbreak in Pamplona and shows how the cases first started in the juvenile module and later in the adult one. In both cases the curve depicts a person to person transmission.

As for the control measures, the isolation of the juvenile module was set up on 20th July and on 1st August the adult module was too, therefore almost the whole prison was isolated until 10th August, when the outbreak was concluded.

The outbreak in Jaén began on 31st August 2009 and was concluded on 8th September 2009 (8 days). This facility counts upon an average population of 750 inmates (91% are men). Out of the 11 modules of the prison only one is for women. As of the date of the beginning of the outbreak such module hosted 67 female inmates (exposed population). 12 cases were reported, so the attack rate was 17.9% (12/67). In the rest of the facility only 6 isolated cases were reported in different modules. Such cases haven´t been considered in this analysis because the female module is completely independent from the others and they have no contact between them. The average age of the inmates affected was 36.6±8.3 years. The age group with a higher rate was the one of ages ranged between 41 and 60 (table 1).

All the inmates affected had fever, coughed, had a headache, myalgia and general discomfort and 50% had rhinorrhea and a sore throat. The length of the symptoms and the isolation was the same in this case: 3.2 days (SD 0.9), with a median and mode result of 3 days, which is under seven, the minimum recommended at the time in prisons for suspected and confirmed cases).

Three inmates presented complication risk factors: 2 with morbid obesity and another with treated tuberculosis. Two were admitted in hospital (morbid obesity and tuberculosis) and in both cases the diagnosis was confirmed and an antiviral therapy was prescribed. Both were discharged upon improvement. The other inmate with morbid obesity was treated in the prison's infirmary where the antiviral therapy was also prescribed.

Four samples were collected (33.3% of the cases), two from the inmates admitted in hospital and two from the facility and the four of them were positive.

Figure 3 portrays the epidemic curve of the outbreak in Jaén and it seems to depict a person to person transmission although limited.

In this case only the female affected module was isolated.

In all the three facilities posters were placed and brochures given out with information on the basic hygiene measures (hand washing, use of masks and

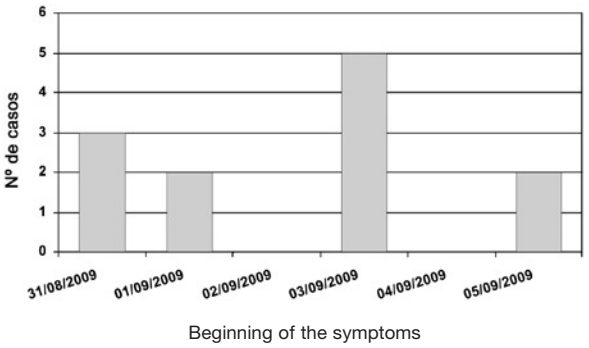

Figure 3. Epidemic curve of the influenza A (H1N1) outbreak in 2009 in the prison of Jaén as of the date of the onset of the symptoms of the cases (n=12).

disposable tissues, etc.) and the staff prepared at least one speech per work shift to report to officers on basic measures which should be implemented to avoid the transmission of the disease.

DISCUSSION

Three outbreaks in three different prisons have been taken into account , one in a male prison (Alcalá-Meco) and two in mixed prisons, in one of which only male modules were affected (Pamplona) and in the other only the female module was affected (Jaén). Global attack rates were similar among prisons with male inmates affected while the rate among female inmates was twice as higher. The assessment of this result is difficult due to the limited number of women affected, something which results in unstable rates.

The rates observed in the three outbreaks are under those provided by the Health Emergency and Alert Coordination Centre of the Spanish Department of Health and Social Policies in outbreaks in summer camps and other communities, where the average attack rate was 21.2%[14].

On the whole, influenza A (H1N1) cases reported throughout 2009 in the outbreaks considered, show light/moderate symptoms which have mainly required only symptomatic treatment within the prison. Although the median value for isolation has been 6 days, the clinical duration has been short (3 days) and it has positively evolved both in minor and serious or complicated cases.

The restraint observed in attack rates is possibly due to the fact that because the disease was quite light in some inmates, with minor symptoms, some decided not to attend the consultation in order to avoid the isolation. The implementation of control measures, specially module isolation, has also avoided the transmission of the disease.

Only four inmates have required hospital admittance due to complications, none of them in intensive care units (ICUs) and all of them were discharged upon improvement. The median duration of those cases was 6 days while among the general population at the time the median duration of hospital admittance of serious cases in non ICU units was 9 days[15].

The number of laboratory confirmed cases among the total reported cases in the three outbreaks has been 10.4% (12/115, the rest of which have been confirmed by epidemiological link. Among other outbreaks observed in Spain at the time laboratory confirmed rates were about 23.1% 14. This difference is probably due to the fact that the collection of samples was determined by Public Health representatives of the Autonomous Community where the facility is located, who generally considered that two positive samples, along with flu symptoms and epidemiological link were enough to confirm the diagnosis of influenza A virus (H1N1) 2009.

The age of female inmates was significantly older than that of men although this can be due to the low number of women affected. Nevertheless, if by the end of the season we can count upon a larger number of women affected it would be interesting to analyze whether this difference lives on and its cause, since the average age of imprisoned men and women is similar (36.5 in women and 36.4 in men)[16].

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