

The prevalence of infections among non-hospitalized inmates in Belgian prisons

by

Moens G^{1,2}, Haenen R¹, Van Mol F³, Van Oost J⁴,
De Schryver A¹, Jacques P.^{1,2}

Abstract

To assess the prevalence of infections in non-hospitalized Belgian inmates a cross-sectional study was set up with a proportional random sample of 893 subjects (14% of all inmates) from 13 penitentiaries. Information on the type of infection, the duration of imprisonment and other relevant variables was collected from medical records. Severe infections among hospitalized inmates were not included in this survey.

Of the inmates 12,1% was reported to have at least one infection (95% CL: 10.0-14.2). The most common infections were those of the lower respiratory tract (prevalence: 3.1%), infectious skin disorders (2.9%) and sexually transmitted diseases (2.2%). Among the latter HIV seroprevalence was the most common (0.84% among males and 1.68% among females). Clinically apparent viral hepatitis was reported

Address Correspondence to: Dr. G. Moens, IDEWE Occupational Health Services, Interleuvenlaan 58, B-3001 Leuven Heverlee.

¹ IDEWE Occupation Health Services, Leuven, Belgium.

² Department of Occupational Medicine, University of Leuven, Belgium.

³ Medical Service of the Prisons, Department of Justice, Brussels, Belgium.

⁴ Studies and General Affairs Division, Department of Justice, Brussels, Belgium.

in 1.6%. The infection rate was found to be associated with age, the type of punishment, the type of prison and the use of antibacterial drugs. An age-standardized comparison with Belgian psychiatric institutions showed significantly higher prevalences for genital infections and viral hepatitis in penitentiaries. However, our results can only be regarded as exploratory because of the potential role of ascertainment bias. Finally the possible implications for the protection of the prison personnel against infectious occupational hazards are discussed.

Key-words

Prevalence, infections, HIV, hepatitis, inmates, Belgium.

Introduction

Studies have documented a high prevalence of viral hepatitis markers (1-3) and HIV infection (4-6) among inmates. However, very few studies have been done to determine the prevalence of other infections. In Belgium, little information is available on the prevalence of infections among inmates and only recently a study on some infections has been performed in one prison (3).

In order to fill this void, and to estimate the occupational hazard for the personnel, a cross-sectional study was performed with the following aims: 1) to measure the prevalence of selected infections in Belgian prisons and 2) to assess the association with selected variables.

Methods and materials

Sampling

At the beginning of 1992 a prevalence study of infections in Belgian prisons was set up in collaboration with the Medical Service of the Department of Justice. The following sampling criteria were applied: 1) obtaining a proportionally similar distribution of heavy and light punishments as in the total population of detainees; 2) obtaining the same sex distribution as in a former prevalence study in Belgian psychiatric institutions (7). Although the sample of psychiatric inpa-

tients is not a real reference group, a comparison can help in interpreting our results, particularly concerning the possible occupational risk. The sampling procedure has to yield a representative sample according to the type of punishment, but not to the sex distribution. The size of every stratum of sex and type of punishment was then determined. Within each stratum however the choice of the inmates occurred on a random basis by the register of the court's office.

Our study only included non-hospitalized inmates, because inmates with diseases necessitating an hospitalization are transferred to the Medical and Surgical Centre of the prisons, and were not available for our study. In order to meet the sampling criteria mentioned above, and more specifically to have enough female prisoners in the sample, the Department of Justice indicated 13 penitentiaries for the study. In our sample 893 persons across 13 penitentiaries were screened which was 13.7% of all detainees (618 males and 316 females on 15 May 1992).

Data collection

Data were collected during the same week (1-5/06/1992) in all institutions for all selected inmates. Information was based on clinical observation by the physician and/or nurse in charge, supplemented by data in the medical record of each inmate (e.g. results of laboratory tests), when available. The registration form was analogous to the form for infections among psychiatric inpatients (7). Information was collected about age, sex, term of stay in the prison, the presence of infections, the use of antibacterial medication and the use of urinary or intravenous catheters. The criteria for infections were drawn up according to the definitions of the «Centers for Disease Control» (CDC) of 1988 (8), where the specific methods involved in the diagnosis of the infections are listed. The sole deviation from the CDC-criteria was made for the ascertainment of skin disorders, as non-infectious skin disorders were also registered. Due to financial constraints, no systematic standardized diagnostic tests or examinations were performed for the purpose of this study, but available results in the medical record were used. Laboratory test results were only available when the physician had filed them for diagnostic purposes, with the exception of HIV testing which is done systematically at initial admission to the penitentiary. All HIV-1 infections were serologically con-

firmed. Because the form was completed anonymously and the study was performed before the promulgation of the "Privacy Act" of 8 December 1992, no permission of the inmates to enter the study had to be obtained. As the forms were filled in during the same week in all institutions for all the selected inmates, this procedure allows an estimation of the point prevalence, calculated as the percentage of infected persons (resp. infections) among the investigated inmates.

Differences were tested for their significance by means of the chi-square test (9). For the respective infections point prevalences with their 95% confidence limits (9) were calculated.

Results

A total of 593 men (9.6% of all male detainees) and 297 females (94% of all female detainees) were screened. The mean age in the sample was 31 years, the median age was 29 years. A strong representation of the younger age groups was apparent in the age distribution. Of the detainees 90% was held in preventive custody or were sentenced to a light (<5 years) punishment.

Table 1 shows the distribution and the point prevalence of the different types of infections. Of the detainees 12.1% was reported to

TABLE 1
Relative frequency distribution and point prevalence of the various infection types (with 95% confidence limits = 95% CL)

Type of infection	Number	Relative frequency (%)	Point prevalence (%)	(95% CL)
Surgical wound(s)	3	2.4	0.34	*
Lower respiratory tract	28	22.1	3.14	(1.99-4.28)
Urinary tract	2	1.6	0.22	*
Conjunctivitis	6	4.7	0.67	(0.13-1.21)
Burn wound(s)	4	3.2	0.45	*
Gastro-enteritis	8	6.3	0.90	(0.28-1.51)
Viral hepatitis	14	11.0	1.57	(0.75-2.38)
Oral cavity	16	12.6	1.79	(0.92-2.66)
Infectious skin disease	26	20.5	2.91	(1.81-4.01)
Genital infection	20	15.8	2.24	(1.27-3.21)
Number of infections	127	100.0	14.23	(11.93-16.51)
Number of detainees with an infection	108		12.10	(9.96-14.23)

* Because of the small number of observations 95% CL could not be calculated.

have an infection. On average an infected person had 1.17 infections, which brings the infection prevalence to 14.2%. The most frequently occurring were infections of the lower respiratory tract, followed by infectious skin disorders, genital and sexually transmitted diseases and infections of the oral cavity. Of the 14 detainees with viral hepatitis seven had hepatitis B, two hepatitis C, and five had a non-specified type of hepatitis.

Seven persons underwent surgical intervention one month prior to the study. Three of them had an infection of the surgery wounds. 5.8% of the detainees were treated with antibacterial medication on the day of the study. The type of medication administered most frequently was penicillins, followed by tetracyclines and the group "other antibiotics". This group mostly consisted of anti-viral medication such as zidovudine and aciclovir.

From Table 2 it appears that acute bronchitis is the most common infection of the lower respiratory tract. Of the infectious skin disorders mycoses were most frequently present ($n=8$); among the non-infectious skin disorders acne was the most prevalent ($n=15$). Among the genital and sexually transmitted diseases the most prevalent was HIV seropositivity ($n=10$), followed by candidiasis ($n=7$).

TABLE 2
Overview of the infections of the lower respiratory tract (n = 28 detainees)

Infection	Number	Relative frequency (%)	Point prevalence (%)	(95% CL)
Influenza	4	14.3	0.45	*
Acute episode of chronic bronchitis	5	17.9	0.56	(0.07-1.05)
Acute bronchitis	9	32.1	1.01	(0.36-1.66)
Other	7	25.0	0.78	(0.21-1.36)
Not specified	3	10.7	0.34	*
Total	28	100.0	3.14	(1.99-4.28)

* Because of the small number of observations 95% CL could not be calculated.

Statistically significant differences in infection prevalence ($p < 0.05$) were found according to the type of sentence — detainees with a short term of imprisonment had more infections than those with a long sentence —, the use of antibiotics and the institution. Even though it did not reach statistical significance the infection prevalence was higher at younger ages (up to 34 years). Viral hepatitis and non-

infectious skin disorders were significantly more common among men than women. Sexually transmitted diseases on the other hand appeared to be more common among women than men, particularly the HIV prevalence which amounted to 1.68% among women compared to 0.84% among men. It is further notable that among persons with a heavy sentence no HIV cases were recorded, and that the highest prevalence was found in the 25 to 34 year age group.

Discussion

Of all the detainees 12.1% was reported to have at least one infection. The infection prevalence varied with age and the type of punishment: the young displayed a higher infection prevalence than the elder detainees, and those with a shorter sentence had more infections than persons with a long sentence. According to the impression of the medical officer of the prisons, these variables are intercorrelated: persons with a light sentence are younger and in a poor general hygienic condition, whereas older detainees overall have long sentences and care for themselves better physically. The infection prevalence differed among the institutions. Here too the type of punishment can largely explain these differences. The institution with the highest score mostly held people in preventive custody, whereas the institution with the lowest score hosted prisoners with heavy sentences.

Infections of the lower respiratory tract occurred most frequently, especially acute bronchitis. The absence of tuberculosis is due to the fact that contaminated convicts are referred to the Medical-Surgical Centre of the prisons. Infectious skin diseases occupied the second place, and within this group the mycoses were most numerous. In third place came the genital and sexually transmitted diseases.

The reported prevalences were compared to the age-standardized prevalence rates of infections in Belgian psychiatric institutions (see Table 3). This study was done during the period 4-8/05/1992, using the same methodology as in the present study (7). The total infection prevalence was significantly higher in penitentiaries than in psychiatric institutions (17.3 versus 12.7%). The same applies to genital and sexually transmitted diseases and to viral hepatitis. No statistically significant differences were found for infections of the lower respiratory tract, infectious skin disorders and conjunctivitis.

TABLE 3

Prevalence of patients with an infection in Belgian psychiatric institutions and penitentiaries, indirectly standardized for age and sex (with 95% confidence limits CL) (standard prevalence rates = prevalence rates in the combined population)

Type of infection	Prevalence in standard population (%)	Prevalence in psychiatry (%) (95% CL)	Prevalence in penitentiaries (%) (95% CL)
Lower respiratory tract	3.93	3.83 (3.42-4.24)	5.81 (3.66-7.96)
Genital	0.54	0.38 (0.24-0.51)	1.70 (0.96-2.44)
Dermatological	4.58	4.60 (4.15-5.04)	4.89 (3.05-6.74)
Conjunctivitis	1.68	1.69 (1.42-1.95)	1.56 (0.31-2.81)
Oral cavity	0.14	0.13 (0.09-0.14)	0.20 (0.10-0.30)
Viral hepatitis	0.32	0.18 (0.09-0.27)	1.48 (0.70-2.26)
Urinary tract	1.05	1.08 (0.91-1.24)	0.02 *
All infection types	13.04	12.74 (11.99-13.49)	17.30 (14.03-20.06)

* Because of the small number of observations 95% CL could not be calculated.

More than a third of the genital and sexually transmitted diseases concerned HIV seropositives. A systematic screening occurs at the initial admission to the penitentiary. An explanation for this high prevalence is that many detainees display a behaviour that put them at risk. Judging by the HIV positivity of 0.84% among men and 1.68% among females we can estimate that approximately 57 seropositives (95% CL: 43-72) remain daily in Belgian penitentiaries. Although not statistically significant, these infections were more frequent among women than among men. A higher prevalence among women than among men has been found in other studies (5, 10). A possible explanation can be that women who come into contact with justice, according to the impression of the medical officer, hail more often than men from a drug environment and prostitution where they are at greater risk for contamination. The country of origin can play a role too. At the time of the study 5.6% of the female detainees were descendant from an African endemic country as opposed to 2.6% of the male

detainees. Because the country of origin was not recorded in our study we cannot assess the association between nationality and HIV positivity on an individual level.

The figures for HIV seropositivity in other studies differ greatly according to the location of the study. In England (10) a figure of 4.9% was reported among ex-detainees. In Californian prisons 2.5% positives was identified among male, and 3.1% among female detainees (4). In New York on the other hand these percentages were respectively 16.1% for men and 25.8% for female inmates (5, 6). According to American literature an estimated 5 to 10% of the HIV-seropositive population of New York lives in penitentiaries (6). Judging by the known number of seropositives in Belgium at the time of the study (1992) (11) and the expected number in penitentiaries, this proportion should amount to 0.9% in Belgium. One could draw the tentative conclusion that seropositives in Belgium are less represented in the criminal environment than in the United States of America. This is presumably associated with the phenomenon that the intravenous drug use in Belgium only increased exponentially at the end of the eighties (12) — i.e. after the HIV starting years —, while this same increase dates from earlier in the United States and coincided with the explosive appearance of the HIV epidemic.

Infections of the mouth were also common. This is probably due to the poor hygienic condition in which many detainees, especially drug addicts, find themselves at the moment of confinement.

Remarkable was also the high prevalence of viral hepatitis. It was much higher than in psychiatric institutions, where the risk for hepatitis B is recognized as an occupational hazard and vaccination is provided free of charge (13). In the general population in Belgium, the incidence of suspected and confirmed hepatitis was estimated to be 76 per 100 000 per year and 30 per 100 000 per year respectively, in the period 1991-1992 (14). Most other studies on hepatitis are seroprevalence studies. In a study of 1993-1994 in a selected sample of outpatients, matched to the age and sex structure of the Flemish population of Belgium, the prevalence of serological markers for hepatitis A, B and C was 51.3%, 7.4% and 0.87% respectively (15). Other studies report a high prevalence of hepatitis markers. In a Nordic study it was found that the prevalence of anti-HAV among drug abusers and detainees was much higher than among the general population of the same age (43 versus 5%). A correlation was also

found between the presence of antibodies against hepatitis A and the presence of hepatitis B markers (1).

In a recent review the prevalence of HBV markers among inmates in different prisons in Europe varied between 25 and 78% (3), with 21.1% in inmates in Antwerp, Belgium (3). In a Massachusetts House of Correction HBV-markers were detected among 43% of the inmates and 8% of the staff (2). However, all those studies were seroprevalence studies and thus a comparison with our findings has to be made with care.

Considering the limitations of this study, we have first to mention the possible presence of observation bias. Differences in the application of the definition criteria may have biased the results. Moreover, it was unfeasible for practical reasons to standardize the diagnostic procedures in the participating institutions. This could lead to an ascertainment bias. Our results thus can only be regarded as exploratory and more in-depth studies with stricter control over diagnostic procedures have to be set up. Finally there could be problems with the external validity when extrapolating these results to all detainees. The purpose of the sample selection was to approximate a stratified random sample. Furthermore the male/female ratio was not representative for the total group. This should be taken into consideration when interpreting non-sex-specific prevalences.

In conclusion we can state that some infections appear more frequently in penitentiary institutions than in psychiatric institutions. Of course the characteristics of the two populations play a major role. Penitentiaries are to a great extent inhabited by people with various risk behaviour. Often their state of hygiene at the moment of admission leaves much to be desired and render them more susceptible to various kinds of infections. The high prevalence of hepatitis B and of HIV seropositivity appeals for the strict application of standard hygienic rules for the personnel and systematic vaccination against hepatitis B of all personnel has been implemented since 1995, organized and financed by the Ministry of Justice (16).

Acknowledgements

The authors would like to thank Mrs Vandesteene, Director of the Studies and General Affairs Division of the Department of Justice, the documentation service and the secretariat of IDEWE for their valuable

cooperation, N. Essop for the editorial assistance. Special thanks also to all the nurses and physicians working at the penitentiary institutions for completing the questionnaires and without whose help this study would never have been possible.

Références

1. HOLTER E, SIEBKE J C. Hepatitis A in young Norwegian drug addicts and prison inmates. *Infection* 1988; 16: 91-4.
2. BARRY M A, GLEAVY D, HERD K, SCHWINGL P J, WERNER B G. Prevalence of markers for hepatitis B and hepatitis D in a Municipal House of Correction. *Am J Public Health* 1990; 80: 471-3.
3. MATHEÏ C, VAN DAMME P, MEHEUS A. Hepatitis B: an occupational hazard for prison officers? *Arch Public Health* 1995; 53: 521-35.
4. SINGLETON J A, PERKINGS C I, TRACHTENBERG A I, HUGHES M, KIZER K, et al. HIV antibody seroprevalence among prisoners entering the California correctional system. *The Western Journal of Medicine* 1991; 153: 394-9.
5. WEISFUSE I, GREENBERG B, BACK S, MAKKI H, THOMAS P, et al. HIV-1 infection among New York City inmates. *AIDS* 1991; 5: 1133-8.
6. MORSE D, TRUMAN B, HANRAHAN J, et al. AIDS behind bars. *New York State Journal of Medicine* 1990; 90: 133-8.
7. HAENEN R, MOENS G, JACQUES P. The prevalence of infections in psychiatric institutions in Belgium. *J Hosp Infect* 1997; 37: 273-280.
8. GARNER J S, JARVIS W R, EMORI T G, HORAN T C, HUGHES J M. CDC definitions for nosocomial infections. *Am J Inf Control* 1988; 16: 128-40.
9. KIRKWOOD B R. *Essentials of medical statistics*. London: Blackwell Scientific Publ., 1988.
10. TURNBULL P, STIMSON G, DOLAN K. Prevalence of HIV infection among ex-prisoners in England. *BMJ* 1992; 304: 90-1.
11. Institute for Hygiene and Epidemiology. *De epidemiologie van AIDS en HIV-infectie in België*. Brussels: Institute for Hygiene and Epidemiology, 1992.
12. LAUWERS N, VAN MOL F. *La politique pénitentiaire face aux détenus toxicomanes*. Internal note. Brussels: Université Libre de Bruxelles, 1991.
13. QUINA J, HEULENS L, BANDE J, ROOSELS D. Fonds voor de beroepsziekten; Statistiek van de beroepsziekten. In: Lahaye D, ed. *Sociale zekerheid in beweging*. Antwerpen/Apeldoorn: Maklu Uitgevers, 1993; 395-435.
14. DEVROEY D, VAN CASTEREN V, VRANCKX R. Changing patterns in acute viral hepatitis encountered by general practitioners. *Eurosurveillance* 1997; 2: 53-5.
15. BEUTELS M, et al. Prevalence of hepatitis A, B and C in the Flemish population. *Eur J Epidemiol* 1997; 13: 275-80.
16. Omzendbrief betreffende het welzijn op het werk in de overheidsdiensten. *Belgisch Staatsblad* 27.04.1995; 11208-11217.