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Mortality Risk for Cocaine Abusers in Relation to Heroin Use: A Follow-Up Study

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Cohort study on 471 subjects resident in the metropolitan area of Bologna who had visited a public treatment center for problems due to the abuse of cocaine from January 1, 1988 to December 31, 2009. Two user typologies were created: cocaine users (no heroin) and heroin and cocaine users. Crude mortality rates and standardized mortality ratios were calculated. We performed a regression analysis using the Poisson method. The study results show a higher mortality risk for those injecting substances and for subjects who took both heroin and cocaine. They appear to have different characteristics from their counterparts who do not use heroin. Future studies should be oriented to this aspect.

Keywords cohort study, mortality, heroin, cocaine, public treatment service, injecting, socially integrated drug users

INTRODUCTION

In Europe, the number of patients treated for primary cocaine abuse at a public treatment center for drug addiction (SERT) increased of 83.3% from 2004–2009, a fact that can be explained both by problems caused by elevated or prolonged consumption as by those arising from injecting cocaine or its use in combination with other drugs (Gfroerer & Brodsky, 1993). Cocaine was cited as the main reason for entering treatment by 15% of all reported drug users entering treatment in 2010, the proportion of primary cocaine users (CUs) was higher (21%) (European Monitoring Centre for Drugs and Drug Addiction [EMCDDA], 2012).

It should be recognized that although many CUs tend to be reluctant to seek treatment at public treatment centers (considered indicative of socially marginal subjects and heroin addicts) unless afflicted by serious disturbances, in recent years the types of cocaine addicts seeking treatment have changed, so in addition to subjects who inject cocaine and heroin (Davoli, Pasqualini, Belleudi, Bargagli,

& Perucci, 2007; Siliquini, Morra, Versino, & Renga, 2005), we also see CUs who do not use heroin (Gossop, Griffiths, Powis, & Strang, 1994; Pavarin, 2008; Prinzleve et al., 2004).

Cohort studies of problematic cocaine use suggest that this drug increases the risk of premature death, morbidity, and disability. Regular cocaine use is associated with a range of adverse consequences that potentially increase mortality (Chen & Anthony, 2004; Chen, Storr, & Anthony, 2009; Degenhardt, Singleton, et al., 2011; Devlin & Henry, 2008; Ferri & Gossop, 1999; Gossop et al., 1994; O'Brien & Anthony, 2005; Riezzo et al., 2012; Wagner & Anthony, 2002; Wagner & Anthony, 2007).

Cocaine-related health consequences are difficult to observe, especially in use trajectories that include heroin and the literature divides CUs into two different groups: socially integrated users who use powdered cocaine (most often snorted) but do not use heroin, and socially marginalized users who use cocaine (often injected) or crack cocaine in conjunction with opiates. The latter also includes heroin addicts in treatment, making it difficult to identify the primary substance of abuse and to identify which problems are specifically related to cocaine use (Decorte, 2001; Gossop et al., 1994; Leri, Bruneau, & Stewart, 2001; Pavarin et al., 2011; Prinzleve et al., 2004; Van der Poel, Rodenburg, Dijkstra, Stoele, & van de Mheen, 2009).

Socially integrated drug users mainly use cocaine in recreational contexts; they also use cannabis, while nearly one-third have never used cocaine regularly (Decorte, 2001; Gossop et al., 1994; Leri et al., 2001; Prinzleve et al., 2004; Van der Poel et al., 2009), they have paid less for cocaine, have medium-high financial resources (at least for the Italian context) and have a greater understanding of the market (Boys, Marsden, Griffiths, & Strang, 2000; Brunt, van Laar, Niesink, & van den Brink, 2010; Pavarin, Berardi, & Consonni, 2012). The objective of this study, which targeted residents of the metropolitan

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area of Bologna who were treated at a public treatment center following problems due to cocaine use, was to study mortality risk in relation to heroin abuse.

The metropolitan area of Bologna is a densely populated territory in the region called Emilia Romagna, in north-eastern Italy. It is made up of 50 municipalities over an area of around 3,000 km^2, with a population of more than 850,000 inhabitants. The consumption of cocaine, above all snorted, is slowly replacing that of heroin, which is dropping sharply. This has occurred in relation to an increased availability and a fall in the prices on the local market, akin to what has been observed in the national territory (Dipartimento Politiche Antidroga [DPA], 2012; EMCDDA, 2012; United Nations Office on Drugs and Crime [UNODC], 2012). The local sales network is characterized by the presence of dealers who sell any kind of substance (multidealers) and by occasional nonprofessional dealers who invest in this sector for the high profit margins.

The prevalence of cocaine consumption, higher in the wealthier areas of northern Italy, after an initial period characterized by strong consumption, is declining, both as a result of the economic crisis and the higher number of confiscations.

The local SERTs are national health system facilities dealing with providing care and treatment for people with addictions involving illegal drugs and alcohol and are mostly oriented to the needs of opioid users.

In recent years, in collaboration with social and therapeutic communities, new services have been offered addressed to people with cocaine addiction, which ensure a more flexible organization of the locations and timing to better meet the needs of the patient and guarantee discretion.

METHODS

We selected subjects resident in the metropolitan area of Bologna, who had visited a public treatment center for problems due to the use/abuse of cocaine in the period from January 1, 1988 to December 31, 2009.

Patients were selected from the SERT's computerized archives (10 centers) treated for primary cocaine abuse during the period considered.

Only voluntary admissions were considered; we excluded subjects who were involuntarily admitted and body packers.

Variables were used related to date of birth, gender, birth nation, city of residence, other substances of abuse, hepatitis C status, HIV status, modality of use, level of education, professional condition, date of first and last contact with the SERTs. Only the information from the first contact was used. Information about the setting of the injection was not collected.

Life status was verified at the municipality of the subject's last place of residence. The mortality archives at the local health authority of residence verified the cause of death using ICD-IX codes.

The subjects who were lost to follow up were included in calculating person-years until the date they moved from their last known residence. Information was collected until July 2012.

Regarding the abuse substance, in view of the fact that in a few cases both heroin and cocaine were indicated; and it was not possible to identify which was the primary substance of abuse, two user typologies were created: CUs (no heroin), heroin and cocaine users (HCU).

Continuous and categorical variables were analyzed with the Student t and chi-squared tests, respectively.

Crude mortality rates (CMRs) per thousand person years were calculated for gender, injecting, and substance of abuse.

To compare the mortality rates of drug users with those of the general population, we calculated the standardized mortality ratios (SMRs) and relative confidence intervals (CI) at 95% specifically for cause and gender (Standard: Bologna Province). The SMR, adjusted for age and calendar year, was calculated overall and for all specific causes represented.

To evaluate the association between the variables and general mortality risk, we performed a regression analysis using the Poisson method (Clayton & Hills, 1993; Selvin, 2003).

Data analyses were performed using the statistical software program STATA 10.0.

RESULTS

The cohort was made up of 471 subjects, 15.3% female, 5.1% nonnative, with an average age of 30.8 years.

Follow-up continued until December 31, 2009 for 95.3% of the subjects or until the date of death (22 subjects were lost to follow up); there were 3,188 at-risk person years (459 female, 2729 male), 35 deaths, the first of which occurred in 1996.

A 27.4% subjects had a high school degree (the level of education degree is known in 98% of cases), 70.1% were employed, 11.3% were hepatitis C positive, and 3% were HIV positive.

Modalities of cocaine use were known for 82% of the subjects (24.4% injected, 8.7% smoked, 56.5% snorted).

The average follow-up period was 6.8 years, the average period of contact with SERT was 3.6 years, and the average time spent since the last contact with the SERT at the end of the follow-up was 3.2 years. The average period of contact with SERT was 7.3 years for HCUs and 2 years for CUs ($p < .0001$).

Three hundred thirty subjects were only cocaine abusers (follow-up completed for 95.8%, 1,747 person years, 6 deaths), 141 were cocaine and heroin abusers (follow-up completed for 94.4%, 1,441 person years, 29 deaths).

Modalities of cocaine or heroin use were known for 90.6% of the subjects, and 82 subjects (17.4%) were injecting (DJ follow-up completed for 93%, 842 person years, 14 deaths) and 340 were not injecting (NDJ follow-up completed for 96.1%, 2,346 person years, 21 deaths)

TABLE 1. Period 1988/2009: characteristics of the subjects included in the study separately for heroin use and injecting

		Only cocaine (CU) 330	Cocaine and heroin (HCU) 141	Injecting (DJ) 82	Not injecting (NDJ) 340	Total cocaine 471
Age	Mean age	30.8	30.4	30.9	31.0	30.7
Year of first contact	% <2000	16.1	65.2	59.8	18.8	30.8
	% 2000/2004	33.6	25.5	30.5	31.8	31.2
	% 2005/2009	50.3	9.2	9.8	49.4	38.0
	% Females	13.0	19.1	19.5	14.7	15.3
Nationality	% Nonnatives	4.2	7.1	8.5	4.7	5.1
Professional condition	% Employed	73.0	58.2	54.9	73.2	68.6
	% Not employed	27.0	41.8	45.1	26.8	31.4
Educational degree	% University/high school diploma	67.3	76.6	19.5	31.0	70.1
	% Primary/secondary school	29.1	23.4	80.5	69.9	27.4
Hepatitis C status	% Positive	1.5	34.0	40.2	5.6	11.3
HIV status	% Positive	0.6	8.5	8.5	1.8	3.0
Other substances	% Alcohol	19.4	19.9	19.5	18.8	19.5
	% Cannabis	23.3	36.2	19.5	27.1	27.2
	% Ecstasy	5.8	4.3	2.4	4.4	5.3
	% Heroin	–	100.0	75.6	23.2	29.9

Table 1 shows the characteristics of the subjects included in the study separately for heroin use, injecting, males and females. Half of the CU entered treatment after 2004, 75% of the HCU before 2000.

The CUs tended on average to be older (not statistically significant $p = .56$), with a lower percentage of nonnatives ($p = .198$), of not employed ($p = .001$), of women ($p = .128$), of hepatitis C positive ($p < .0001$), and HIV positive ($p < .0001$) but with a higher level of education ($p = .136$).

In HCU subjects, there was a higher proportion of cannabis users ($p = .004$) and lower of ecstasy users ($p = .505$).

As regards the methods of cocaine use, in CUs there was a higher statistically significant proportion ($p \leq .0001$) smoked (CUs 68.8%, HCUs 27.7%) and snorted cocaine (CUs 10.3%, HCUs 5%), and a lower proportion of injected cocaine (CUs 6.1%, HCUs 67.4%).

Since 2005 the number of injecting subjects has increased and the proportion of those not injecting has decreased ($p \leq .0001$). While the average age was similar in both groups, among those injecting there is a higher percentage of women ($p = .456$), nonnatives ($p = .217$), unemployed ($p \leq .0001$), heroin users ($p \leq .0001$), hepatitis C positive patients ($p \leq .0001$), and HIV positive ($p = .005$), and those with a lower level of education ($p = .075$).

In the noninjecting subjects there was a higher proportion of cannabis users ($p = .003$) and of ecstasy users ($p \leq 0.0001$).

By the end of the follow-up, 46% of the HCUs had a therapeutic program in progress, 28% had previously completed the treatment, 26% had previously given up; 18% of the CUs had a therapeutic program in progress, 50% had previously completed the treatment, 32% had previously given up.

All SERT clients had been submitted to medical health checkups and benefited from socioeducational support services, 52% of the HCUs had been undergoing treatment with protracted integrated methadone, 48% had been submitted to psychological interviews/assessment, and 33% had been admitted to residential structures, 13% were undertaking psychotherapy; 48% of the CUs had been submitted to psychological assessment, 19% had been treated with pharmacological therapies, 15% had been admitted to residential structures, and 10% were undertaking psychotherapy.

Twenty-nine deaths were observed during the follow-up period, 23 among men and 6 among women. Among the men, 17% of the deaths were due to AIDS, and 14% from opiate overdose, 14% from circulatory disease, 10% from cirrhosis, 7% from viral hepatitis, 7% from traffic accidents, 3% from all cancers, and 3% from homicide.

Of the deaths reported among women, 33% were due to opiate overdose, 17% to diseases of the cardiocirculatory system, 17% to cirrhosis, 17% to homicide.

Twenty-nine deaths were observed among HCUs, 6 among CUs (all males), 14 among DJs, 18 among NDJs. Table 2 reports deaths by substance abused, injecting, and by gender.

Regarding mortality rate per thousand person years, CMRs were higher among females (13.07; 95% CI, 5.87–29.09) than males (10.63; 95% CI, 7.38–15.29), among HCUs (20.12; 95% CI, 13.98–28.95) than CUs (3.43; 95% CI, 1.54–7.65), and among DJs (16.62; 95% CI, 9.84–28.06) than NDJs (8.95; 95% CI, 5.84–13.73).

Table 3, broken down according to substance abused, injecting, and gender, reports SMRs and 95% CIs. Excess of mortality was observed for all causes in both genders in the cohort compared with the general population, where

TABLE 2. Deaths by substance, injecting, and gender: proportional mortality

		Only cocaine (CU)		Cocaine and heroin (HCU)		Injecting (DJ)		Not injecting (NDJ)		Total cocaine	
		Females 0	Males 6	Females 6	Males 23	Females 3	Males 11	Females 3	Males 18	Females 6	Males 29
Infectious and parasitic diseases	001–139				2 (8.7%)		1 (9.1%)		1 (5.6%)		2 (6.9%)
All cancers	140–239				1 (4.3%)				1 (5.6%)		1 (3.4%)
AIDS	279		1 (16.7%)		4 (17.4%)		3 (27.3%)		2 (11.1%)		5 (17.2%)
Overdose	304			2 (33.3%)	4 (17.4%)	2 (66.7%)	2 (18.2%)		2 (11.1%)	2 (33.3%)	4 (13.8%)
Cerebral edema	348				1 (4.3%)		1 (9.1%)				1 (3.4%)
Cardiocirculatory diseases	390–459			1 (16.7%)	4 (17.4%)	1 (33.3%)			4 (22.2%)	1 (16.7%)	4 (13.8%)
Unspecified bronchopneumonia	485			1 (16.7%)				1 (33.3%)			
Cirrhosis	571			1 (16.7%)	3 (13.0%)		2 (18.2%)	1 (33.3%)	1 (5.6%)	1 (16.7%)	3 (10.3%)
Unknown causes	799		2 (33.3%)		2 (8.7%)		1 (9.1%)		3 (16.7%)		4 (13.8%)
Violent causes	E 800–E999		3 (50.0%)	1 (16.7%)	2 (8.7%)		1 (9.1%)	1 (33.3%)	4 (22.2%)	1 (16.7%)	5 (17.2%)
Road accidents	E810–E819		3 (50.0%)				1 (9.1%)		1 (5.6%)		2 (6.9%)
Homicide	E960–E969			1 (16.7%)				1 (33.3%)		1 (16.7%)	

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TABLE 3. SMR by substance, injecting, and gender

Cause	Code	Only cocaine (CU) Males SMR	95% CI	Cocaine and heroin (HCU) Females SMR	95% CI	Cocaine and heroin (HCU) Males SMR	95% CI	Total cocaine Females SMR	95% CI	Total cocaine Males SMR	95% CI
All Causes				43.57	19.58–96.99	3.73	1.68–8.31	25.41	11.42–56.56	8.93	6.21–12.85
Infectious and parasitic diseases	001–139					73.18	18.30–292.61			37.24	9.31–148.90
AIDS	279	19.11	2.69–135.64			32.72	12.28–87.17			28.64	11.92–68.80
Overdose	304			1456.52	364.25–5823.42	62.91	23.61–167.61	1296.29	324.20–5183.15	44.01	16.52–117.27
Cardiocirculatory diseases	390–459			73.89	10.41–524.58	16.73	6.28–44.59	42.14	5.94–299.16	8.84	3.32–23.55
Cirrhosis	571			1810.45	255.03–12852.52	29.07	94.84–911.79	1496.80	210.84–10625.86	218.19	70.37–676.52
Violent causes	E800–E999	4.90	1.58–15.19	35.68	5.03–253.31	3.91	0.98–15.65	20.37	2.87–144.61	4.45	1.85–10.69
Road accidents	E810–E819	5.93	1.48–23.73							3.34	0.84–13.37
Homicide	E960–E969			544.24	76.66–3863.57			281.34	39.63–1997.28		

Cause	Code	Injecting (DJ) Females SMR	95% CI	Injecting (DJ) Males SMR	95% CI	Not injecting (NDJ) Females SMR	95% CI	Not injecting (NDJ) Males SMR	95% CI
All Causes		25.46	8.21–78.93	12.43	6.88–22.44	25.36	8.18–78.63	7.62	4.80–12.09
Infectious and parasitic diseases	001–139			66.94	9.43–475.23			25.79	3.63–185.11
AIDS	279			43.48	14.02–134.80			18.94	4.74–75.73
Overdose	304	1645.07	411.43–6577.71	56.50	14.13–225.90			36.05	9.02–144.14
Cardiocirculatory diseases	390–459	84.38	11.89–599					12.28	4.61–37.71
Cirrhosis	571			338.62	84.69–1353.93	8614.69	1213.49–61156.27	127.5	17.96–905.15
Violent causes	E800–E999			3.53	0.50–25.03	35.18	4.96–249.73	4.76	1.79–12.69
Road accidents	E810–E819			6.88	0.97–48.82			2.21	0.31–15.69
Homicide	E960–E969					449.84	63.37–3193.45		

Note: Standardized for age and calendar year, specifically for cause and gender (Standard: Bologna Province).

the SMR was at least 9 times higher among males and 25 times higher among females.

The highest and most statistically significant SMRs for males were from cirrhosis, opiate overdose, parasitic infectious diseases, AIDS, diseases of the cardiocirculatory system diseases, and road accidents; for females they were from cirrhosis, opiate overdose, homicide, and circulatory system diseases.

Cocaine (no heroin)—among CUs, where all deaths were among males, 50% of the deaths were from road accidents (Table 2).

As regards the mortality rate per thousand person years, CMRs among males were 3.91 (95% CI, 1.76–8.70).

As regards comparisons with the general population, among males, there is a statistically significant excess for all causes; the highest and most statistically significant SMRs were from AIDS (only 1 case) and road accidents (Table 3).

Cocaine and heroin—of the deaths reported among HCUs, 21% were due to opiate overdose, 17% to diseases of the cardiocirculatory system, 14% to AIDS, and 14% to cirrhosis (Table 2).

Among the females, 33% of the deaths were from opiate overdose; among the males, 17% from opiate overdose, 17% from AIDS, and 17% from cardiocirculatory system.

Regarding the mortality rate per thousand person years, CMRs were higher among females (24.29; 95% CI, 10.91–54.07) than males (19.26; 95% CI, 12.80–28.98).

In addition, elevated and statistically significant SMRs were found in both genders (Table 3). The highest and most statistically significant SMRs for males were from parasitic infectious diseases, opiate overdose, AIDS, cirrhosis, diseases of the cardiocirculatory system, and violent causes; for females, they were from cirrhosis, opiate overdose, homicide, and circulatory system diseases.

Those not injecting — among female NDJs, two-thirds of the deaths were from opiate overdose; among males, 27% were from cardiocirculatory system, 27% from violent causes, 13% from opiate overdose (Table 2).

Regarding the mortality rate per thousand person years, CMRs were higher among females (10.67; 95% CI, 3.44–33.09) than males (8.72; 95% CI, 5.49–13.84).

As regards comparisons with the general population, elevated and statistically significant SMRs were found in both genders (Table 3). Among males, the highest and most statistically significant SMRs were from cirrhosis (just 1 case), parasitic infectious diseases (1 case), opiate overdose, AIDS (1e case), cardiocirculatory system, and violent causes; for females, they were from cirrhosis (1 case) and from homicide (1 case).

Injecting—among females DJs, two-thirds of the deaths were from opiate overdose; among the males, 27% were from AIDS, 18% from opiate overdose, and 18% from cirrhosis (Table 2).

As regards the mortality rate per thousand person years, CMRs were similar in both sexes: females (16.85; 95% CI, 5.44–52.25), males (16.56; 95% CI, 9.17–29.90).

In addition, elevated and statistically significant SMRs were found in both genders (Table 3). The highest and

most statistically significant SMRs for males were from cirrhosis, AIDS, parasitic infectious diseases (1 case) and opiate overdose; for females, they were from opiate overdose and as a result of the cardiocirculatory system (1 case).

To evaluate the association between sociodemographic variables and general mortality risk, a regression analysis was performed using the Poisson method. The variables inserted in the model were gender, country of birth (native, nonnative), year ($<2000, >= 2000$), age at first visit (<35 years, $>= 35$ years), duration of follow-up ($>= 5$ years, <5 years), professional condition (employed, not employed), level of education (university/high school diploma, primary/secondary school), cocaine injected (no, yes), and substance abuse (cocaine-no heroin, cocaine and heroin).

The multivariate analysis showed a higher mortality risk, statistically significant at 95%, within 5 years of first contact for females, a low level of education, and subjects who inject cocaine (Table 4).

Mortality risk for people who took both heroin and cocaine was at least four times that found in cocaine-only users.

DISCUSSION

The study results confirm what has been reported in the literature concerning the greater mortality risk connected

TABLE 4. Incidence rate ratios for general mortality and 95% confidence limits for the variables inserted in the Poisson regression model

	IRR	95% CI
Gender		
Male	1	
Female	1.62	1.25–2.12
Nationality		
Native	1	
Non native	1.25	0.78–1.99
Age at visit		
<35 years	1	
>= 35 years	1.05	0.83–1.32
Latency		
>5 years	1	
<= 5 years	4.26	3.32–5.47
Time period		
>= 2000	1	
<2000	2.25	1.76–2.87
Professional condition		
Employed	1	
Not employed	0.80	0.64–1.00
Education		
University/ High school diploma	1	
Primary/secondary school	2.34	1.67–3.30
Cocaine injected		
No	1	
Yes	1.75	1.24–2.47
Substance		
Cocaine - no heroin (CU)	1	
Cocaine and heroin (HCU)	4.45	2.91–6.81

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to heroin and cocaine abuse and show a higher mortality risk for subjects who took both heroin and cocaine, who seem to have different characteristics than their counterparts who do not use heroin (cocaine-only users). Furthermore, a higher risk emerged for those injecting.

This study presents some limits that reduce the generalizability of the results and require additional research with specifically targeted studies.

The data used are those available from the files available at the SERTs of the metropolitan area of Bologna. It has not been possible to consider data concerning the age at the first use, average consumption variations over time, and the use of other substances, because they were not retrieved in a uniform manner by the operators.

Despite these limits, several interesting aspects have emerged in identifying the vital statistics and mortality risks relating to different substances abused, heroin in particular, and the identification of the specific causes of death.

Staring from 2000, as reported by other studies (Davoli et al., 2007; EMCDDA, 2012; Pavarin, 2008; Pavarin et al., 2012; Siliquini et al., 2005), the type of cocaine addict requiring treatment at a public health center has changed, where the subjects with concomitant heroin abuse have decreased and those who use cocaine, snorted or smoked, have increased. These are people born in Italy, mainly males, with stable employment, where there is a very low percentage of hepatitis C and HIV positives.

On the contrary, the characteristics of the subjects with concomitant heroine abuse tend to be substantially similar to those of other heroin addicts undergoing treatment: injecting drug users, unemployed people, low education level, with a high proportion of people positive to hepatitis C and HIV.

The characteristics of the two types are reflected in the different mortality rates, where CMRs were higher among HCUs than CUs.

Regarding comparisons with the general population, the SMR was at least four times higher among male CUs, 24 times higher among male HCUs, and 43 times higher among female HCUs, akin to what is reported in mortality studies on cohorts of cocaine (Arendt, Munk-Jørgensen, Sher, & Jensen, 2011; Barrio et al., 2013; Merrall, Bird, & Hutchinson, 2012; Pavarin, 2008; Ribeiro, Dunn, Laranjeira, & Sesso, 2004; Ribeiro, Dunn, Sesso, Dias, & Laranjeira, 2006) and heroin abusers (Clausen, Anchersen, & Waal, 2008; Degenhardt et al., 2009; Degenhardt, Bucello, et al., 2011; Evans et al. 2012; Fugelstad, Agren, & Romelsjö, 1998; Merrall et al., 2012; Risser et al., 2001).

A review of mortality rates from cohort studies of CUs found that CMRs ranged from 5.3 to 61.6 per 1000 person years (Degenhardt, Singleton, et al., 2011). SMRs reported in various studies suggested that mortality was four to eight times higher among CUs than in their same age and sex peers in the general population.

The different mortality between the two types is also reflected in the single causes of death, where among male CUs there is a statistically significant SMR from road accidents; among male HCUs from parasitic infectious dis-

eases, opiate overdose, AIDS, cirrhosis, diseases of the cardiocirculatory system, and violent causes; for female HCUs from cirrhosis, opiate overdose, homicide, and diseases of the circulatory system.

The multivariate analysis, where the mortality risk for people who took both heroin and cocaine was at least four times that found in only-CUs, confirms these results and showed a higher mortality risk for females, a low educational level and subjects who inject cocaine.

Regarding the use of heroin by cocaine abusers, mortality studies on cohorts of cocaine abusers that separate results based on heroin use reported different rates in the two groups, higher among HIV positive intravenous drug users (Degenhardt, Singleton, et al., 2011).

As regards the injecting drug use, the studies reported in the literature confirm a higher risk of death for these subjects, also in relation to the low age at the start of drug taking, high dosages, consumption intensity, duration of the addiction, high age of initial contact with the health care services and for the subjects with a history of incarceration, low education levels, jobless, use of alcohol and other drugs, high levels of ill-health, risk behavior, social exclusion, and marginalization (Arendt, 2011; Gossop, Griffiths, Powis, Williamson, & Strang, 1996; Hickman et al., 2003; Kertesz et al 2012).

Variability in cocaine abusers seeking treatment has been a long-recognized feature of this population (Carroll, Nich, & Rounsaville, 1997), and the results of the study, on the grounds of the concomitant use of heroin, show two distinct populations with differing socioeconomic, age characteristics, consumption styles, health status, death risks, and death causes.

While the mortality of cocaine and heroin abusers is similar to that of heroin addicts, with the reasonable doubt that it is the same population, that of the cocaine-only abusers instead seems to stem from particular styles of life connected to risky and reckless behaviors, oriented to obtaining immediate gratifications, with no concern for the future consequences (Levin, 2007; Vergara-Moragues et al., 2011).

It is important to clarify these important aspects by means of future studies that distinguish the population of cocaine addicts on the grounds of the possible use of heroin, also taking into consideration the abuse of other substances.

Declaration of Interest

The author reports no conflicts of interest. The author alone is responsible for the content and writing of the article.

RÉSUMÉ

Risque de mortalité auprès les cocaïnomanes en ce qui concerne la consommation d'héroïne: étude de suivi

Étude de cohorte sur 471 consommateurs de cocaïne (1-seule cocaïne, pas d'héroïne, 2- héroïne et cocaïne) résidents de la région métropolitaine de

Bologne, qui se sont adressés à un service public (01/01/1988–31/12/2009).

Ont été calculés les Taux Bruts de Mortalité et les taux standardisés de mortalité. Il a été effectuée une analyse multivariée en utilisant la méthode de Poisson.

Les résultats montrent un risque de mortalité plus élevé parmi les sujets utilisant l' intraveineuse ainsi que pour ceux qui consommaient soit l'héroïne que la cocaïne, qui semblent avoir des caractéristiques différentes de celles des consommateurs de seule cocaïne.

RESUMEN

Riesgo de mortalidad para los consumidores de cocaína en relación con el consumo de heroína: un estudio de cohorte.

Estudio de cohorte de 471 consumidores de cocaína (cocaína sola - no heroína; heroína y cocaína)

residentes en el área metropolitana de Bolonia, que se pusieron en contacto con un servicio público (período comprendido 01/01/1988- 31/12/2009).

Se calcularon las tasas brutas de mortalidad y las tasas estandarizadas de mortalidad. Se realizó un análisis multivariada (Poisson).

Los resultados de este estudio muestran un mayor riesgo de mortalidad para los sujetos que utilizan la vía intravenosa y para aquellos que utilizan tanto la heroína que la cocaína, que parecen tener características diferentes a los consumidores de cocaína sola.

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GLOSSARY

Follow-up: In the majority of longitudinal studies, individuals are followed for different length of time. An individual's period of observation (follow-up time) starts when they join the study and stops when they experience the outcome (death), is lost to follow up, or the follow-up period ends. This period is also called period at risk, often measured in years (person years at risk).

Socially integrated drug users: Socially integrated drug users mainly use in recreational contexts, they also use cannabis, and they have medium-high financial resources and a greater understanding of the market,

whereas nearly one-third have never used regularly. The use involves not only young people and contexts of nighttime recreation, but also a wide section of adults that crosses social class, age, and gender: they work, they study, many live with their families, and conduct a normal life.

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