A capture-recapture study of the prevalence and implications of opiate use in Dublin

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Background: To date there have been no studies estimating the hidden prevalence of opiate use in Dublin. Methods: A multisource enumeration followed by the application of the capture-recapture method with log-linear modelling including age and gender stratification to remove heterogeneity was implemented to provide an estimate of the unknown size of the opiate-using population. Two medical and one legal data sources were used. Results: It was found that the ratio of known to unknown opiate users was 1:1.15 with a total of 13,460 (95% CI: 12,037-15,306) users estimated in Dublin in 1996. Conclusion: The findings of this study have important ramifications for service delivery.

Keywords: capture-recapture, opiates, prevalence

The connection between injecting drug use and blood-borne infections has particular public health importance In Ireland. While ranked eleventh in terms of AIDS incidence in the European Union in 1996 Ireland was filth in drug-related AIDS incidence.[1] A study in 1994 showed a high level of unsafe injecting and sexual behaviour in attenders at a needle exchange in Dublin. Must injecting drug use ill Ireland la believed to take place in Dublin and there has been a pro-active policy of recruitment to methadone programmes since 1992. We report the results of the first study to estimate the prevalence of opiate use in Dublin.

METHODS

The capture-recapture method was applied. This method is an indirect method which generates a prevalence estimate based on the degree of overlap between two or more separate samples of the population under study. In addition, the method allows the confidence intervals of the population estimate to he calculated. Baileys improved Peterson formula is used for the two sample estimates in *tables 1* and *2* and log-linear modelling with GLIM is used to derived the three sample estimates.[3]

Three sources of information on drug users in Dublin were used. First, the Central Methadone Treatment List (Methadone), second, the national database on hospital discharges (hospital) and, third, the police database (Police) for opiate-related arrests in 1996. We found that 3,170 individuals were in receipt of methadone in Dublin in 1996. The mean age of those receiving methadone in 1996 was found to he 27.24 years, with a standard deviation of 6.67 years and a range of 15-60 years. There were 2,225 (70,2%) males, 920 (29.0%) females and, for 25 (0.8%) clients, their sex was unknown. The hospital database records all discharges from Irish hospitals and the primary and secondary diagnoses of those discharged patients. Those patients who used opiates were identified from ICD-9 classification code 304.0 which is opioid-type dependence, code 304.7 which is combinations of opioid-type drug with any other and code 305.5 which is opioid abuse. Of the 545 patients identified, 353 (64.77%) were male and 192 (35,23%) were female. Four thousand one hundred and five individuals were identified within the police database. The majority of these were male, unemployed and living at home. Males, accounted for 3,467 (84.46%) cases and females

accounted for 638 (15.54%) cases. Eighty percent were in the 15-30 year age group, with the youngest user being 12 years and the eldest being 60 years.

RESULTS

In order to obtain a valid prevalence estimate of opiate drug use we adopted several approaches to the data.

First, three estimates were obtained by using different combinations of two of the three data sources. The results from this analysis arc provided in *table 1.*

Table 1 Estimated prevalence of opiate use in specific populations in Dublin in 1996

Data source	Known number	Estimated hidden number	Ratio of Known To hidden	Estimated total	95% CI for the total estimate	Estimated prevalence per 1,000 population
Methadone and hospital	3,436	2,746	1 : 0.80	6,182	5,668-6,696	9.7
Methadone and police	6,386	8,240	1 : 1.29	14,626	13,794-15458	23.0
Police and hospital	4,457	7,096	1 : 1.59	11,553	10,889-12,212	18.2

Second, an in-depth analysis of the three data sources was performed with the data stratified by age and sex. This involved applying the capture-recapture method with log-linear modelling. The basic two-sample model above involves four assumptions: i) that the population is closed. ii) that individuals can be matched from capture to recapture, iii) that capture in the second sample is independent of capture in the first sample and iv) that the capture probabilities are homogeneous across all individuals in the population. Log-linear modelling allows one to rest for independence while stratification on the basis of sex and age helps to reduce any heterogenetiy which might arise in the data due to these factors. The initial models applied to the unstratified full data set were ill filling and no overall estimates of prevalence could be obtained. Following an age by gender stratification the models fitted well and estimates were obtained for the six different age and gender groups. In addition, within each of the six stratifications we found that the models which fitted best were those which cook dependence between the hospital and methadone data into account. A summary of the results of this second analysis is provided in *table 2.*

Table 2 Estimated prevalence of opiate use in specific- populations in Dublin in 1996

Known number	Estimated hidden number	Ratio of known to hidden	Estimated total		95% CI for the total estimate	Known Prevalence Per1,000 population	Estimated Prevalence per 1,000 population
Males (years)							
15-24	2,469	2,935	1 : 1.19	5,404	4,980-5,891	25	56
25-34[a]	1,874	1,638	1 : 0.87	3,512	3,376-3,778	22	42
35-54	534	893	1 : 1,67	1,427	1,175-1,773	4	11
Females(years)							
15-24[a]	755	1,023	1 : 1.35	1,778	1,525-2,108	8	18
25-34	506	533	1 : 1.05	1,039	875-1,265	6	11
35-54	126	174	1 : 1.38	300	206-491	1	2
Total	6,264	7,196	1 : 1.15	13,460	12,037-15,306	10	21

[a]; A pool fitting model and, hence, an unreliable estimate.

It is evident from the raw data prevalence and estimated prevalence in *table 2* that males in the 15-24 years age group represent the single largest group of opiate users. Pooling the three raw data sources we see that the prevalence in this group is 25 per 1,000 population or, alternatively, it may be stated that a minimum of 2.5% of all males in this age group are known co be using opiates.

Looking at the ratio of known population to hidden population users we see chat males between 35 and 54 years are the most hidden user group. We may interpret this as the group least likely to come into contact with medical or legal services. Perhaps this age group is likely to be involved in criminal activity or less likely to overdose. Those most likely to come into contact with services, that is the most visible or accessible group, are males between the ages of 25 and 34 years. Perhaps this age group is more likely to be targeted by police services. With females the same phenomenon is seen within the same age groups.

DISCUSSION

As most applications of the capture-recapture method in estimating the prevalence of opiate use in Western Europe have been three-sample studies we take the estimate of 21.0/1,000 as the best estimate. This would appear to be relatively high but must he interpreted in light of the disparate nature of the raw data sources and of the varying definition of an opiate user from these sources. Three comparable studies in Setubal, Dundee and Rome were carried out on 1996 data. In Setubal, Portugal the prevalence was estimated at 18.2/1000 (personal communication. Dr. G. Hay, University of Glasgow) and in Dundee a prevalence of 30/1,000 was estimated.[4] In Rome an estimate of 8.6/1,000 was derived using three medical data sources.[5] It is interesting to note that this prevalence rate is similar to the estimate of 9.7/1,000 derived from the two Irish medical data sources.

Opiate use is an illicit activity and, as such, difficult to measure and impossible to measure precisely. Therefore, the findings of this study have important ramifications for service delivery. There are currently (March 1999) just over 3,600 drug users in receipt of methadone treatment in Dublin. The shortfall in the number of opiate users thought to be prevalent in 1996 and not receiving methadone treatment currently ranges from 8,500 to 11,700. It would not be appropriate for all these opiate users to receive methadone. However, the number not receiving methadone treatment who might benefit is certainly in the thousands. While there has been a reduction in HIV seroprevalence in successive cohorts of injecting drug users, the seroprevalence of hepatitis C in treatment centres varies between 70 and 80%.[6] Policies to limit HIV transmission will not necessarily be effective in limiting hepatitis C transmission. The results of this research on opiate use should act as a stimulus to redouble efforts to bring opiate users into the health care system in Dublin.

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