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CONTENTS

The frequency of deaths resulting from the use of drugs and chemicals in Los Angeles County

R. D. BUDD, D. M. LINDSTROM, E. C. GRIESEMER and T. T. NOGUCHI
Los Angeles County Chief Medical Examiner-Coroner, Los Angeles, California, United States of America

ABSTRACT

A study of the frequency of deaths resulting from the use of drugs and chemicals in Los Angeles County in the period 1947–1980 indicated that there was a substantial increase in the number of such deaths in 1968/69. This trend continued until 1976/77 when the number of deaths decreased, and the declining trend continued until 1979/80. An additional study in the period 1974–1981, based on the analyses of 35 drugs in biological samples taken in autopsies, showed that those drugs were more often present in overdose cases of death than in drug-related cases of death where drugs were not directly responsible for the occurrence of death. Ethanol and phencyclidine were, however, more frequently found in drug-related cases of death.

Introduction

Drug abuse has been a social problem for many years; but over the past 15 years it has become a serious problem in the United States of America, especially in urban areas such as Los Angeles County.

Two studies on drug use trends among methadone maintenance patients and probationers in Los Angeles County, covering the period 1975–1980, have been published [1, 2]. The scope of those studies was, however, too narrow to get an overall picture. This paper presents the results of two broader-based studies carried out in Los Angeles County with the aim of supplementing the results obtained in the two earlier studies.

Method

The first of the studies was undertaken in order to examine the frequency of death as a result of the use of drugs and chemicals in Los Angeles County during the period 1974–1980.

The second study analysed the relationship of drugs and death over the period 1974 – 1981. It covered both overdose cases of death, and drug-related cases in which drugs were not directly responsible for the occurrence of death. The study focused on the frequency of occurrence of 35 of the drugs most commonly found in biological samples taken from the victims, and does not indicate whether or not they were a factor in death. The pathologists who performed autopsies in both overdose cases of death and drug-related cases of death requested analyses of the drugs involved. Human biological samples were analysed for drugs and poisons by procedures adopted from other authors [3 – 15]. Gas chromatography was the primary analysis tool, while complementary analyses were performed using gas chromatography/mass spectrometry, thin-layer chromatography, colorimetry, ultraviolet spectrometry, and radioimmunoassay. These methods have been found quite capable of measuring drug concentrations in biological samples with accuracy and precision [16].

Results and discussion

Frequency of death as a result of the use of drugs and chemicals in Los Angeles County 1947 – 1980

Table 1 shows both the number of deaths as the result of the use of drugs and chemicals and the rates per 100,000 population in Los Angeles County during the period 1947 – 1980. There was a slight overall increase from 1947/48 to 1967/68. Then, a substantial increase (66 per cent) occurred in 1968/69 compared with the previous fiscal year. This increase may reflect the beginning of the drug culture which developed on the college campuses in the late 1960s and the early 1970s. A substantial decrease in the number of deaths began in 1976/77 and the declining trend continued in subsequent years. These findings parallel the results obtained in a study indicating a decrease in drug use among the Los Angeles County probationers in the period 1976 – 1979 [2]. The reasons for the decrease are not clear, although the decreasing popularity of drugs and the increasing popularity of alcohol occurring in the county might, at least to a certain extent, account for such a decrease.

Analyses of drugs in biological samples taken during autopsies of cases of death 1974 – 1981

The frequency of occurrence of the 35 most commonly found drugs was studied in biological samples of drug overdose cases of death and drug-related cases of death in the period 1974 – 1981 (table 2). It should be noted that the occurrence of a given drug in the biological samples of the victim as

Table 1

Deaths due to drugs and chemicals in Los Angeles County, 1947–1980

Year	*County population*	*Number of deaths as the result of the use of drugs and chemicals*	*Death rate per 100 000 population*
1947/48	3 747 000	297	7.9
1948/49	3 952 000	347	8.8
1949/50	4 090 000	280	6.9
1950/51	4 172 220	311	7.5
1951/52	4 302 415	328	7.6
1952/53	4 511 737	333	7.4
1953/54	4 676 863	320	6.8
1954/55	4 890 567	398	8.1
1955/56	5 085 864	393	7.7
1956/57	5 290 246	417	7.9
1957/58	5 507 429	384	7.0
1958/59	5 709 011	395	6.9
1959/60	5 919 368	453	7.7
1960/61	6 068 148	396	6.5
1961/62	6 337 000	491	7.8
1962/63	6 469 000	605	9.4
1963/64	6 604 000	634	9.6
1964/65	6 723 000	629	9.4
1965/66	6 814 000	558	8.2
1966/67	6 880 000	507	7.4
1967/68	6 941 000	630	9.1
1968/69	7 001 000	1 044	14.9
1969/70	7 044 721	1 139	16.2
1970/71	7 032 075	1 359	19.3
1971/72	7 090 452	1 152	16.3
1972/73	7 098 826	1 045	14.7
1973/74	7 000 679	1 060	15.1
1974/75	6 992 299	1 080	15.4
1975/76	7 018 603	1 195	17.0
1976/77	7 042 538	943	13.4
1977/78	7 083 431	846	11.9
1978/79	7 146 500	696	9.7
1979/80	7 441 302	501	6.7

recorded in this study does not mean that the drug found was necessarily a causative factor of death. For example, some fatal overdose cases were the result of drug combinations. In some overdose cases several drugs had been taken, therapeutically or otherwise, but only one in sufficient quantity to be called an overdose. In still other overdose cases, an additional drug such as lidocaine might have been administered in attempts to revive the victim or to counteract the effects of the drug taken in overdose. It should also be noted that some of the drugs detected and indicated in table 2 may be metabolities of other drugs taken before death. Similar considerations apply in drug-related cases of death.

Table 2

Frequency of the occurrence of 35 analysed drugs in biological samples taken during autopsies of death cases[a], Los Angeles County, 1974 – 1981

	Drugs found in overdose cases of death								*Drugs found in drug-related cases of death*							
Drug	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*
Morphine	450	567	387	127	120	85	72	165	53	43	44	56	49	41	40	42
Codeine	82	87	99	119	119	90	120	166	4	5	6	35	34	39	36	34
Methadone	12	19	16	14	16	25	20	27	3	0	1	9	7	4	7	6
Propoxyphene	70	83	71	97	66	35	39	45	10	8	10	16	10	7	5	8
Meperidine	1	9	4	15	4	2	2	5	0	2	4	3	1	1	0	1
Pentozocine	3	7	7	13	7	2	3	1	0	0	1	2	1	0	0	3
Phencyclidine	0	0	5	13	19	26	11	16	0	0	14	49	102	63	93	122
Cocaine	1	7	11	10	11	16	23	24	0	0	0	3	6	5	9	11
Lidocaine	7	8	9	8	5	8	17	21	0	12	31	2	11	6	16	8
Amphetamine	10	4	3	3	2	4	1	1	5	0	2	1	0	0	2	1
Caffeine	0	21	29	33	23	20	18	27	0	5	67	6	5	4	4	3
Diphenhydramine	3	9	9	12	4	1	4	11	0	0	6	4	2	2	3	8
Doxepin	12	13	20	3	25	26	18	19	3	5	2	9	1	5	5	3
Imipramine	15	9	20	11	15	15	11	6	1	2	2	2	0	0	1	2
Desipramine	0	0	0	12	8	1	15	7	0	0	0	2	0	0	0	0

Amitriptyline	36	73	82	70	73	54	39	66	2	9	10	19	13	11	8	5
Nortriptyline	0	0	0	8	13	6	10	7	0	0	0	0	0	0	0	0
Salicylate	8	12	14	16	10	15	20	20	2	0	2	1	3	4	4	0
Phenacetin	2	8	13	27	25	9	15	11	0	0	2	8	1	1	3	1
Acetaminophen	0	0	0	10	18	14	18	38	0	0	0	0	4	5	6	2
Barbiturates	476	527	462	416	334	235	230	209	340	189	221	260	152	131	129	83
Diazepam	101	98	45	88	74	23	18	36	14	17	7	25	27	9	11	13
Chlordiazepoxide	7	20	11	7	6	2	6	1	1	3	2	1	3	0	0	0
Flurazepam	3	6	7	12	12	5	14	10	0	0	1	0	0	3	2	2
Ethanol	355	522	367	256	182	167	166	193	1 206	1 068	1 210	1 381	1 590	1 714	1 903	2 295
Dilantin	9	16	12	9	4	0	2	4	6	11	5	10	7	4	9	2
Glutethimide	17	14	21	19	21	11	15	30	2	4	2	3	3	0	0	4
Meprobamate	25	31	23	23	28	13	11	15	6	10	6	4	1	7	3	2
Carisoprodol	3	8	1	4	5	2	4	1	0	2	2	1	0	0	0	0
Methaqualone	15	14	10	17	23	14	6	14	1	1	12	9	10	6	6	13
Thioridazine	12	26	18	17	10	9	7	0	11	9	5	17	5	1	4	0
Chlorpromazine	10	17	7	14	7	3	9	2	3	1	5	5	2	0	0	0
Ethclorvynol	27	23	58	30	54	33	11	21	5	2	14	8	5	5	5	4
Chloral Hydrate	28	49	41	25	26	23	29	21	5	2	5	4	9	1	5	9
Methyprylon	18	24	13	9	7	9	3	2	2	2	0	1	2	1	0	1

[a] The number indicating the frequency of the occurrence of a given drug does not necessarily indicate the number of cases of death as more than one drug could be found in one case of death.

An example is the case of a victim who was taking amitriptyline for depression, codeine for a cough, alcohol with dinner, and then took an overdose of methaqualone when committing suicide. Even though methaqualone was the drug that caused death, the presence of codeine, morphine, amitriptyline, nortriptyline and ethanol were recorded in table 2.

The analyses of drugs in overdose cases showed that the frequency of occurrence of the following drugs decreased substantially during the period 1974–1981: barbiturates, diazepam, ethanol, meprobamate, morphine (heroin), methaqualone, amphetamine, propoxyphene, imipramine, thioridazine, chlorpromazine, chloral hydrate and methyprylon. In contrast, the frequency of the occurrence of the following drugs increased: flurazepam, codeine, cocaine, phencyclidine and methadone.

In drug-related cases of death, the frequency of the occurrence of barbiturates decreased, while ethanol, codeine and phencyclidine increased.

A comparison of the data in the two cases showed that most drugs were more commonly found in overdose cases than in drug-related cases of death. In contrast, ethanol and phencyclidine were found much more frequently in drug-related cases than in overdose cases of death. It should be noted that there was a growing popularity of ethanol and phencyclidine in the same period. While lidocaine has increasingly been used as a drug of treatment in attempts to revive victims [17], it was not implicated as a cause of death in any of the cases studied.

Table 3 shows that most overdose deaths occurred in the 20–39 age group. The death rate for teenagers decreased from 1970 to 1980, while that for persons in their thirties increased. One possible explanation is that persons in their twenties when the drug culture peaked in the early 1970s were in their thirties at the time of the survey.

Table 3

Overdose cases of death in 1970, 1976 and 1980: Breakdown by age

(Percentage)

	Age							
Year	*9 or below*	*10–19*	*20–29*	*30–39*	*40–49*	*50–59*	*60–69*	*70 or over*
1970	0.3	11	32	16	14	12	8	6
1976	0.6	5	36	23	15	11	5	4
1980	0.6	3	32	29	15	9	6	5

The percentage of overdose deaths occurring among males were similar to those among females except in 1975, when it was considerably higher among males than females (see table 4).

Table 4
Overdose cases of death in 1970, 1975, 1977 and 1980: Breakdown by sex
(Percentage)

Year	Male	Female
1970	50.9	49.1
1975	60.5	39.5
1977	54.5	45.5
1980	52.0	48.0

The number of overdose deaths that occurred in accidents increased over the period 1960–1980 (see table 5) with a slightly reversed trend at the end of the survey. The number of overdose deaths occurring in suicides during the same period showed a variation between the years studied but in general there was a decreasing tendency.

Table 5
Overdose cases of death by mode of death in 1960, 1970, 1976 and 1980: Breakdown by mode of death
(Percentage)

Year	*Accident*	*Suicide*	*Undetermined*
1960	20	79	1
1970	31	60	9
1976	64	35	1
1980	52	46	2

The percentages of overdose deaths among blacks and whites were greater than expected on the basis of their relative number in the country population. For Hispanics and Asians the percentages were lower (table 6).

Table 6
Overdose cases of death in 1970, 1975 and 1980: Breakdown by race and ethnic origin
(Percentage)

Year	*White*	*Black*	*Hispanic*	*Asian*
1970	75	15	8	1
1975	69	15	15	1
1980	74	20	5	2
Proportion of racial or ethnic group in the county population	55–67	11–13	18–30	3–5

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