ORIGINAL RESEARCH

Drug Abuse-Related Emergency Calls: A Metropolis-Wide Study

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Abbreviations:
BLS = basic life support
EKAB = Hellenic National Center for Emergency Care
EMS = emergency medical services
MICU = mobile intensive care unit

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Abstract

Introduction: Drug abuse is an important sociomedical problem in large metropolitan areas. Drug addicts represent a group with particularities, since they hesitate to seek medical care and often refuse hospitalization. Therefore, there is a scarcity of data on drug abuse-related calls. The burden imposed by such calls on emergency health services has not been evaluated in detail.

Objectives: The objectives of this study are to: (1) assess the profile of drug abuse-related calls in a large European metropolis, including the spatiotemporal distribution, as well as the frequency and variability of cancellations; and (2) evaluate the mobilization of emergency prehospital care services in response to the calls.

Methods: In 2005, the Hellenic National Centre for Emergency Care received 5,836 emergency drug abuse-related calls pertaining to the metropolitan area of Athens, Greece. The analysis focused on: (1) spatiotemporal features of calls/cases; (2) step-by-step cancellation rates in the mobilization of ambulances or other means (mobile intensive care units, specially equipped motorcycles, and super-mini city cars); and (3) response time of the mobilized means. Pearson's chi-square, goodness-of-fit chi-square, and the Kruskal-Wallis tests were used as appropriate.

Results: Drug abuse-related calls represented 2% of all emergency calls. Only one-third of these cases were transported to the Accident and Emergency Departments of area hospitals. A total of 9% of the calls were cancelled before transportation arrived; another 20% of victims could not be found when authorities arrived on-scene, and 36% of patients refused transport to the hospital. The cancellation rate is significantly higher in the evening and at night, as well as in summer and autumn. The major burden is imposed on the municipality of Athens (67% of all calls).

Conclusions: Drug abuse-related calls represent a significant load for emergency medical services in metropolitan Athens. However, a relatively small percentage of the drug addicts finally are transported to the hospital. Appropriately equipped motorcycles seem to be an effective means for the prehospital management of drug-abuse cases.

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Introduction

Illicit substance use is a problem of utmost sociomedical importance in developed countries.[1] Although currently, the prevalence of substance use in Greece is one of the lowest in Europe,[2] there has been a three-fold increase from 1984 to 1998.[3] Given the overall lifetime prevalence for ever using an illegal substance of 12.2% (18.8% among men and 6.0% among women),[3] illicit substance use represents a potentially significant source of morbidity and co-morbidity for the Greek population.

In Greece, >70% of the population seeking treatment due to illicit drug use is seeking treatment for heroin problems.[2,4] According to the latest national report (2005), the estimated number of problem heroin users (injecting or

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long duration/regular users) was 19,151, which also included the "hidden population", (i.e., those who did not contact any treatment services).[4] The total population of Greece is approximately 11 million persons.

A particularly affected area is the metropolitan area of Athens (Attica), the capital of Greece. In 2005, 46.8% of all deaths due to drug abuse occurred within this area of 3,000 square kilometers with four million inhabitants.[4] Thus, the illicit drug addicts could impose a significant burden on Health Services in general and, more specifically, on prehospital emergency medical services.

The Hellenic National Centre for Emergency Care (EKAB) is the state institution responsible for all emergency transports in the metropolitan area; it responds to approximately 320,000 emergency calls annually.

Although studies have begun to note the significance of the use of ambulance data for drug abuse issues,[5–7] there is a scarcity of data worldwide about the burden imposed on emergency prehospital care by illicit substance users. In addition, no studies have defined the magnitude of the problem in Athens, Greece. The aim of the present study is to shed light on this socially crucial issue, focusing on the operational scheme: (1) ambulance mobilization; (2) arrival of the ambulance on-scene; (3) patient transport; and (4) arrival at hospital, including the cancellation rates at each operational phase.

Methods

The Hellenic National Center for Emergency Care (EKAB) is the nationwide state institution responsible for prehospital emergency care in Greece. In 2005, the Operational Center of the EKAB in Athens received a total of 317,388 emergency calls. The Operational Center Dispatcher has a choice of four options when responding to a drug abuse-related call: (1) 12 mobile intensive care units (MICUs); (2) four specially-equipped motorcycles; (3) two specially-equipped super-mini city cars; and (4) 70–90 daily, on-service basic life support (BLS) ambulances. The crew of the MICUs, motorcycles, and super-mini cars includes a medical doctor, together with two paramedics (one on motorcycle), whereas the BLS ambulance crew consists of only two paramedics (personnel who received two-year special training in prehospital care)

All of the drug abuse-related calls in the electronic archive of EKAB for 2005 (5,836 calls) were analyzed retrospectively. *Call* is defined as determined by dispatch (i.e., both cancelled and non-cancelled calls). For each call, the following parameters have been recorded: (1) date, time, and place of the event; (2) sex of the patient; (3) reason for the call; (4) ambulance response time intervals (ambulance mobilization, arrival on-scene, patient transport, arrival at hospital); (5) reasons for cancellation of response; and (6) means used for transport.

The analysis focused on: (1) spatiotemporal features of calls-cases; (2) step-by-step cancellation rates in the mobilization of ambulances or other teams (mobile intensive care units, specially-equipped motorcycles, and super-mini city cars); and (3) response time of the dispatched vehicle and crew. Pearson's chi-square, goodness-of-fit chi-square, Kruskal-Wallis tests were used where appropriate. The statistical processing was performed using STATA 8.0 statistical package (StataCorp LP, College Station, TX).

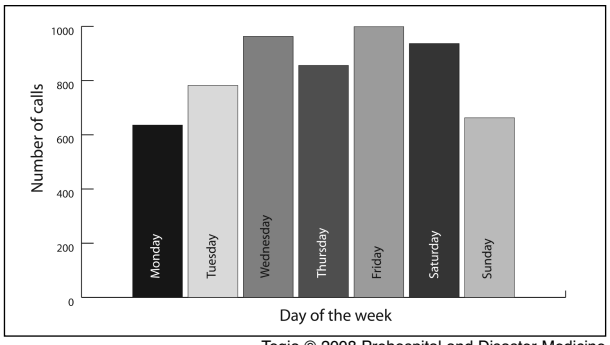
Results

A total of 5,836 drug abuse-related calls were recorded in 2005. Of all of the calls, males comprised 81.8% and females 18.2%. The within-day, within-week, and month-by-month distribution of drug abuse-related calls are grouped in Figures 1, 2, and 3, respectively. The within-day and within-week variability in the number of calls was statistically significant (p <0.001 for both within-day and within week variability; goodness-of-fit Chi-square); similarly, the observed between-month variability was statistically significant (p <0.001; drug abuse-related calls vs. the rest of calls for the respective month, Pearson's Chi-square test). Detailed information concerning the graph contents is provided in the respective legends.

The cancellation rates at various stages of the operational scheme are in Figure 4. The overall cancellation rate was 66% of the total cases; more specifically, 9% of calls were cancelled before the arrival of the mobilized unit, 20% of victims could not be found on-scene, and 36% refused transport to a hospital. Moreover, the overall cancellation rate differed significantly by the season in which they occurred (p <0.001, Pearson's Chi-square); 69.9% (1,078/1,543) of drug abuse-related calls were cancelled in autumn, 68.9% (1,237/1,795) in summer, 61.9% (748/1,208) in winter and 61.9% (798/1,290) in spring. Similarly, there was statistically significant within-day variability in the overall cancellation rate (p <0.001, Pearson's Chi-square); 56.7% (532/938) of drug abuse-related calls were cancelled at 00:00–6:00 hours (h), 65.6% (617/940) at 06:00–12:00 h, 70.0% (1,358/1,939) within the 12:00–18:00 h interval, and 67.0% (1,337/1,995) between 18:00–24:00 h. There were no statistically significant differences in between-day variability. The highest numbers of calls came from the center-municipality of Athens and the center of Piraeus (the port of Athens).

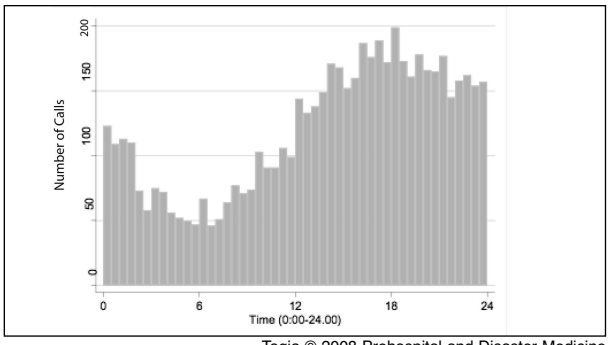
The performance of each option used for response is listed in Table 1. There was significant variability between the types of vehicles and teams at the scene (p = 0.0001; Kruskal-Wallis test) in the time needed for the emergency services to arrive. The average time needed for a motorcycle to arrive was significantly shorter (p <0.0001; Mann-Whitney-Wilcoxon test for independent samples, motorcycles vs. all other means) than for any of the other modalities. In contrast, the time needed for a BLS ambulance to arrive was significantly longer (p <0.0001; Mann-Whitney-Wilcoxon test for independent samples, BLS vs. all other means). Similarly, the variability of the stay time was statistically significant between the four means (p = 0.0001; Kruskal-Wallis test). The stay of BLS ambulances was significantly shorter in comparison to that of the other means (p <0.0001; Mann-Whitney-Wilcoxon test for independent samples). Finally, BLS ambulances needed significantly more time to arrive at the hospital (p <0.0001; Mann-Whitney-Wilcoxon test for independent samples, 24.3 ±13.3 minutes for BLS ambulances vs. 21.8 ±12.5 minutes for mobile ICUs). The frequency of transport refusal was higher after the mobilization of motorcycles or super-mini city cars: 58% (205/353)

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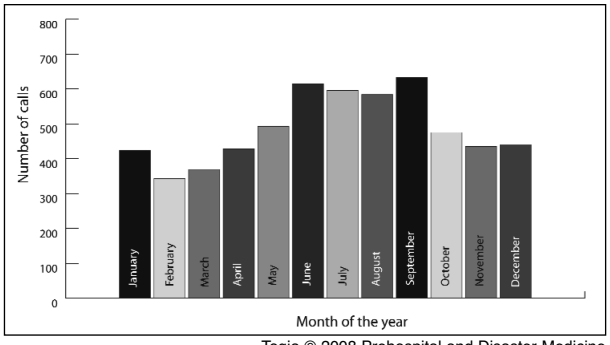
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Figure 1—Number of drug abuse-related calls, by weekday



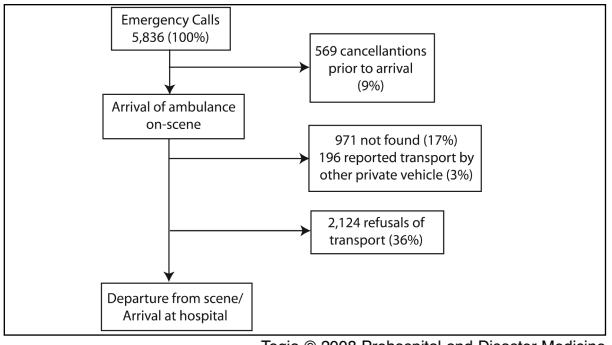
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Figure 2—Within-day distribution of drug abuse-related calls. Each bar represents the number of calls within the 48 successive 30-minute intervals, between 00:00 and 24:00 hours.



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Figure 3—Number of drug abuse-related calls by month



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Figure 4—Cancellation rates at the successive stages of the operational scheme

vs. 35% (1,919/5,483) after the mobilization of BLS ambulances and MICUs grouped together; (p <0.001, Pearson's chi-square).

Discussion

Traditionally, drug addicts have been regarded as patients "who resist any medical treatment".[8] Thus, it would seem rational to postulate that drug addicts are not a major issue for emergency medical services (EMS). However, this is not the case. Drug abuse-related calls are a significant cause of ambulance mobilization in Athens, Greece, representing almost 2% of all calls. Most interestingly, in two-thirds of cases, this mobilization does not lead to the transport of the addict to the on-call hospitals. This may imply that the situation is similar in other European capitals, although the extent of this health-resources consuming problem has not become apparent.

Due to fear of arrest, prior exposure to the police, or perceived ineffectiveness of ambulance services,[9–10] drug addicts may hesitate to call EMS. In the case of heroin users, reluctance has been demonstrated to inhibit the call for medical assistance nearly in half of the cases, even following overdoses.[11] Certainly, given the design of the present study, the extent of underestimation of true cases (i.e., cases not leading to calls) cannot be calculated. However, this study demonstrates that considerable hesitation also is present in later stages of ambulance mobilization. The reluctance of drug addicts to come into contact with health services is reflected in the considerable cancellation rate.

Cancellations begin well before the arrival of the ambulance. During this phase, nearly 10% of calls are cancelled, either by the addict or by bystanders. Similarly, in another 20% of cases, the ambulance crew arrives to discover the victims have disappeared.

The most crucial step, however, seems to be the refusal of transport to the on-call hospital. At this point, 36% of the initial calls (i.e., 50% of the found addicts) refuse transport, irrespective of the level of assistance offered by EMS personnel. A smaller study in 1993 that focused on intoxications performed in Oslo was the first to indicate that drug addicts occasionally refuse hospitalization and further observation.[12] It is stressed that the present study, which focused on the overall burden imposed by drug users, does not focus only on severe intoxication cases. Less severe cases also are represented, when victims perceive themselves as not severely impaired, and thus, avoid being transported to a hospital.

Cancellations exhibited within-day and within-year variability. Cancellations are frequent particularly in the afternoon and during the night. The observed within-day variability might reflect the severity of cases; in the context of daylight (i.e., in the morning and at noon), the less severe cases might hesitate under the fear of disclosure. This is in line with the negative peak that occurred during the morning; the cases are less numerous, but might be more severe, representing a true need for health services. However, at night, the calls seem to be more spontaneous and consequently, are cancelled. Similarly, cancellations are

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	BLS ambulance	Mobile ICU	Motorcycle	Super-mini city car
Time needed (minutes)				
Call for help-->arrival on-scene	24.5 ±21.0	17.0±15.7	15.5 ±12.9	21.5 ±18.4
Stay on-scene	11.3 ±9.3	15.9 ±13.9	16.7 ±12.8	18.5 ±16.7
Departure from scene-->arrival at hospital	24.3 ±13.3	21.8 ±12.5		
Cancellation rates	n (%)			
Cancellation prior to arrival	293 (8.7%)	231 (10.9%)	34 (10.5%)	3 (10.0%)
Victim not found/having left by private vehicle	710 (21.1%)	382 (18.0%)	70 (21.7%)	5 (16.7%)
Refusal of transport	918 (27.3%)	1,001(47.3%)	187(57.9%)[a]	18 (60.0%)[a]
Total cancellation rate	1,921 (57.1%)	1,614(76.2%)	291 (90.1%)	26 (86.7%)

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Table 1—Performance of mobilized emergency means (ALS = advanced life support; BLS = basic life support; ICU = intensive care unit)
[a]refusal of a BLS ambulance, responsible for the transport to the hospital

more frequent in summer/autumn; this may be due to better weather conditions, making the homeless drug addicts feel more self-confident and refuse transport to the hospital.

Significant differences concerning the speed of the means of transportation have been documented. Use of motorcycles seems to be more efficient in the context of a densely populated metropolis, as the response interval is significantly shorter. On the contrary, BLS ambulances need the longest time to arrive on-scene. However, BLS ambulances stay on-scene for a shorter interval, as, contrary to motorcycles, MICUs, and super-mini city cars, they are unable to provide advanced medical care. The higher rate of transport refusal subsequent to motorcycle or super-mini car mobilization may reflect the prompt medical care offered on-scene.

The crew of BLS ambulances consists of two paramedics. In Greece, paramedics can provide the standard basic life support treatment, but they are not qualified to perform more advanced procedures, such as intubation, intravenous drug administration (naloxone, flumazenil, occasionally diazepam, etc.), and manual defibrillation. On the contrary, these advanced techniques can be applied by MICUs, motorcycle and super-mini car personnel, as their crew includes a medical doctor in addition to one or two paramedics.

This study also sheds light on the temporal, spatial, and demographic features of illicit drug abuse cases leading to ambulance mobilization in metropolitan Athens. In line with the national data,[4] the vast majority of cases are male (4:1 male:female ratio). The problem is aggravated, particularly within the center of Athens and Piraeus. This is not surprising, as these areas mainly are commercial districts surrounded by low-cost residential neighborhoods.

Regarding the temporal distribution, the majority of drug abuse-related calls occur after mid-day, which is in line with other studies.[13] However, a considerable portion of cases also present around midnight, reflecting the overall lifestyle of the Greek population associated with nightlife. The prevailing days are Wednesday, Friday, and Saturday, days associated with increased nightlife activities. Similarly, the peak months are the warmer months (June to September). In accordance, June–September is a vacation period for the Greek population, in which a host of social factors and attitudes, such as abundant free time, less restrained behavior, and outdoor entertainment available until early morning hours, may represent favorable conditions for illicit substance abuse.

Limitations

Given that the electronic archive of the Hellenic National Centre for Emergency Care recently has come into operation (a legacy of the Athens 2004 Olympic Games) and has not yet reached its optimal data collection capacity, further details about the coexisting conditions (injuries, etc.), the local conditions (public place or private residence), the type and level of prehospital care provided, and the fatality rate are not available for all calls.

Conclusions

Drug abuse-related calls represent a considerable portion of emergency calls, imposing a substantial burden on emergency medical services. As they exhibit various particularities, such as a significantly high cancellation rate, they necessitate careful planning. The use of motorcycles as first response vehicles may be a valuable tool for optimal prehospital management.

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