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The presence of licit and illicit drugs in police stations and their implications for workplace drug testing

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ABSTRACT

The presence of licit and illicit drug residues on surfaces was studied in 10 police stations and a central drug evidence store in New South Wales, Australia, with the results compared to similar surfaces in four public buildings (to establish a community baseline). The results of almost 850 workplace surface swabs were also compared to the outcome of drug analysis in urine and hair samples volunteered by police officers. Surfaces were swabbed with alcohol and the swabs were extracted and analysed by LC–MS/MS. Low level concentrations of the more commonly used drugs were detected at four public sites and one restricted access police office facility. Surface swabs taken in 10 city and country police stations yielded positive results for a broader suite of drugs than at background sites however 75–93% of the positive drug results detected in police stations were below 40 ng, which is only slightly greater than the largest background result measured in the current study. This study indicates that contamination issues are more likely to be focussed in higher risk areas in police stations, such as counters and balances in charge areas, and surfaces within drug safes although front reception counters also returned surface contamination. All 64 urine samples collected in this study were negative, while only 2 of the 11 hair samples collected from donors resulted in trace concentrations for cocaine, but not its metabolite benzoylecgonine. Positive hair samples were only obtained from police donors in very high risk jobs, indicating that the exposure risk is low. Minor changes to the materials used as work surfaces, and some procedural changes in police stations and large evidence stores are suggested to decrease the likelihood of drugs contaminating work surfaces, thereby reducing the potential exposure of police officers to drugs in the workplace.

1. Introduction

Licit and illicit drugs are commonplace in modern society and may be encountered by people worldwide on a daily basis while performing the most routine of tasks. Drug residues and degradates have achieved greater attention recently as environmental pollutants and have been targeted in waste water, undoubtedly stemming from an increased global need to recycle black water for human and agricultural use [1–4]. Drugs of abuse have also been detected as airborne pollutants on particulates in Spain [5,6] and Italy [7] at concentrations of less than 1 ng/m^3, and are presumably a result of high population densities. Banknotes have also been reported as a source of drugs, predominantly cocaine, in the European Union [8], the United States [9,10] and Canada [11], possibly from direct links to some form of criminal activity, due to their widespread circulation, or from direct contact with drugs while in the possession of drug users or from contact with their sweat. However, banknotes directly involved in large-scale drug activity are more likely to have drugs levels 50–1000 times background levels of 10 ng cocaine [11], and as high as 600,000 ng cocaine per bill [10]. Other common public surfaces that have tested positive for cocaine include ATMs, grocery store shopping carts, doors and door handles, and fuel pump buttons [10]. However, the amount of drugs on public surfaces and in air tend to be quite low. For example, the average amount of cocaine on US bills was reported at 2.3 ng/bill, with an 83% likelihood that a bill would have less than 20 ng of cocaine contamination [9].

The majority of studies involving environmental exposure to drugs do not focus on police workplace exposure to drugs. Rather,

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they focus on children who have been removed by police and child services from houses in which drugs are being grown, manufactured, processed, sold or used. These studies generally report drug test results without accompanying data on the levels of surface contamination to which the children were exposed. A study of 149 children who had parents involved in a methadone programme resulted in 114 positive tests for drugs in hair including methadone, amphetamine, cocaine, heroin and diazepam [12]. A study involving 75 children from houses where cannabis was being grown (80% of children) or other drug production occurred, showed the hair of 24 of 72 of the children tested were positive for cannabinoids, cocaine, MDMA and/or methamphetamine [13]. Another study involving 19 children of people who used cocaine in their houses around their children aged <1–16 years showed cocaine and its primary metabolite, benzoylecgonine, in the hair of children <1 and 1–6 years old, but not 6–16 years old [14]. The results from these studies demonstrate that positive drug test results were possible from environmental exposure, with the latter study demonstrating that infants have a disproportionately greater risk, presumably due to a tendency to place foreign and possibly contaminated objects in their mouths, combined with an inability to take any responsibility for personal hygiene. Additionally, the lack of drug metabolites such as benzoylecgonine from cocaine, or 6-monoacetylmorphine from morphine, tend to indicate the contamination in the hair is stemming from external contamination from drug laden smoke or contact with contaminated parental hands, rather than oral intake from contaminated objects [12]. Likewise, studies in New Zealand [15] and the US [16,17] on children in houses where drugs such as cocaine, methamphetamine and amphetamine are present, more than three quarters of the children hair tested showed positive drug tests for one or more drugs, supporting the results of the previous studies. Single child studies in Spain [18] and Italy [19,20] where parents were drug users, showed the present of cocaine and its metabolite [18,19] or morphine and its metabolite [20] in the child's hair, sometimes at similar concentrations to their parents [18], indicating ingestion or inhalation of cocaine or morphine rather than direct external exposure to the hair.

While police officers are not subject to the same problems as children in houses where parents are using, dealing or producing drugs, they are routinely exposed to drugs and environments in which drugs have been present. Due to practical considerations, police officers are not able to wear the type of personal protective equipment (PPE) that would normally be worn in a laboratory setting when handling chemicals of this nature. Consequently, officers may be at risk of exposure to drugs, resulting in their unintentional entry into the human body by ingestion, skin absorption, or inhalation of dust or vapour during seizure, processing and storage of drugs in police stations. Frequent and large drug sample seizure may result in the transfer of drug residues to working surfaces in police stations, resulting in their accumulation, and providing a concentrated source for ongoing human exposure.

Surface sampling in the workplace of police officers has tended to focus on clandestine laboratories responsible for drugs such as amphetamine, methamphetamine and MDMA [21] as well as cannabis growing houses [22–24]. Handling of drug exhibits in Israeli police analytical laboratories has also been investigated due to health complaints by staff, but yielded no drugs in weekly urine samples. Surface sampling was conducted in a vault used by Kentucky police to store drug exhibits [25]. Methamphetamine, cocaine, oxycodone and THC were found at various locations in the drug vault and an associated office, with detected concentrations for the four drugs as high as 79, 2.6, 7300 and 41 ng/100 cm^2, respectively. Hair testing of police officers who have jobs that have elevated risk of drug exposure can be undertaken, effectively using police as passive samplers to identify potential risk to officers. Undercover narcotics officers and evidence room clerks were hair tested for cocaine, with most of the 40 participants showing low cocaine levels in the hair wash, indicating external contamination to the hair [26]. Only one hair sample provided a positive for cocaine, suggesting radial diffusion of cocaine towards the core of the hair after external contamination, unintentional ingestion or absorption through the skin, and the authors of the work assumed the volunteer's claim they had not used cocaine was true. In another study where a French police officer and clerk were believed to be reselling seized heroin, hair samples were taken from both people, as well as from 11 other police officers working in the same police station [27]. All 11 additional police officers tested negative leading to a conclusion that external contamination was not possible, while the two suspects tested positive for heroin and its primary metabolite, 6-monoacetylmorphine (6-MAM), leading to a conclusion that both were casual users of heroin. While 6-MAM is a by-product during synthesis and occurs in black tar heroin [28], the presumption of guilt seemed to lie heavily with the 11 hair samples negative for heroin and 6-MAM.

As a result of the lack of information regarding surface contamination in police stations, a survey must be conducted to allow estimation of drug residues on work surfaces. Once high risk areas are identified, changes to the workflows and the work environment itself can be implemented to limit human exposure to drugs. The following study reports swab sampling of common work surfaces in police stations located in New South Wales (NSW), Australia, to estimate the amount and type of drugs present. The work identifies the type of locations in both secure and public areas to determine whether work practices influence the results, and what changes to workflow or environment can be made to limit accumulation of drugs on work surfaces.

2. Materials and methods

2.1. Work flows in police stations

Once a person of interest is taken into custody by NSW police, they are subject to an immediate search before being transported (by vehicle or on foot) to the nearest police station. The person enters the charge area, which contains the holding cells. The suspect is searched again and their possessions placed on the charge counter. Any suspected drugs are seized and weighed in front of the suspect, prior to being placed into an evidence bag for logging into the exhibit system. Evidence bags are then transferred to drug safes for storage and/or transported to larger facilities for longer term storage. If cannabis plants are seized they are placed in large paper bags for logging into the exhibit system. Routine audits of stored evidence are undertaken until a destruction order is issued by a court of law, at which point the plastic evidence bags are transported to an authorised facility for destruction. Paper cannabis bags are sent to the same licensed centre if stored at a suburban police station, but can be destroyed locally if discovered in a regional area of NSW. Police officers may be exposed to contact contamination during all of these processes, and therefore may unintentionally absorb, ingest or inhale powders or vapours. One duty of officers in police stations is to work at the service counter at the front of the police station. This may involve interacting with general members of the community, but also involves bail reporting, whereby a person who has been charged with an offence may be released on their own recognisance (bail) until their formal hearing regarding the offence. They may be required to attend a police station daily or weekly to demonstrate they have not absconded.

2.2. Sampled areas and surfaces within sites

Surfaces were sampled at each field site based on observation of workflow in each environment and the types of surfaces available