STUDY OF PATTERNS OF DRUGS OF ABUSE IN NEW TERRITORIES EAST AND WEST CLUSTERS DRUG OF ABUSE CLINIC USING CONVENTIONAL AND NEW TECHNOLOGIES

Final Report Submitted To

The Research Advisory Group of The Beat Drugs Fund Association

By Research Team

Teresa KC TSUI[1], Alan TANG[2], Ming LAM[3], CS HO[1], Eric LK LAW[1], Christopher WK LAM[1], YK WING[2], Helen FK CHIU[2], Michael HM CHAN[1]

Departments of Chemical Pathology[1] and Psychiatry[2], Prince of Wales Hospital and The Chinese University of Hong Kong, Shatin, Hong Kong
Department of General Adult Psychiatry, Castle Peak Hospital

29 July 2011

CONTENTS

1 Introduction

1.1 Background

The rapidly changing pattern and increasing prevalence of abusing conventional and novel psychotropic substances in Hong Kong have resulted in a community-wide growth of concerns for better detection and control of the drug abuse problem. The purpose of developing accurate drug detection methods is to provide clinicians, therapists, and other parties that related to drug of abuse problems, an objective mean for diagnosis of illicit drug use and for treatment and monitoring of substance dependence.

Traditionally, a wide variety of drugs can be detected in urine specimens qualitatively by laboratory methods such as Immunoassay and High-Performance Liquid Chromatography with Ultraviolet Detector (HPLC-UV). However, these conventional methods of drug of abuse screening have many limitations including lack of sensitivity, specificity, and the requirement of a known drug library or pure standards for novel drugs detection that hinders the investigation, leading to mis-diagnosis and under-reporting of the problem.

A new technique was developed, namely, Ultra-Performance Liquid Chromatography Time-Of-Flight Mass Spectrometry (UPLC-TOF/MS), which allowed target screening and confirmation of conventional as well as novel drugs based on a combination of retention time, exact mass and fragmentation patterns of a drug molecule. This exact mass approach has the advantages of creating theoretical drug libraries from the molecular formula without the need of pure standard and of improving the sensitivity and specificity of compound identification that will greatly enhance the detection rate of conventional and novel drugs.

The Department of Chemical Pathology of the Chinese University of Hong Kong (CUHK), Prince of Wales Hospital (PWH) has newly installed such advanced equipment. With the collaboration of the Department of Chemical Pathology and the Department of Psychiatry of CUHK, PWH, a

study was conducted in the Drug of Abuse Clinic in PWH to investigate the pattern of drugs of abuse in the New Territories East (NTE) region of Hong Kong and to compare the difference between the conventional and the new techniques for the detection of illicit drugs in urine specimens.

1.2 Objectives

The primary objectives of our study are to validate the use of UPLC-TOF-MS by demonstrating the accuracy and reproducibility of drug detection through comparison of use of the conventional and new laboratory techniques and to develop prevalence data on current pattern of psychotropic substance abuse in the locality. In addition, comparing the drug abuse history obtained from subjects with respect to their corresponding urine analytical result to look for possible impurities and contaminants.

With the diagnostic utility of UPLC-TOF-MS, its use in clinical practice may help to guide the treatment of substance abuse. Effective preventive measures and specific treatment program targeting the problem may also be developed from the local data on preference of substances of abuse.

1.3 Study Design

In our study, we recruited patients attending the Drugs of Abuse Clinics of the PWH anonymously. Patients who were not willing to answer the questionnaire and/or to provide their urine samples were excluded from our study.

Sets of pre-numbered questionnaire (see section 7.1) and temperature-sensitive urine bottles were prepared for the anonymous recruitment of study subjects. The questionnaire focused on the demographics, socio-behavioural characteristics and the information of previous and last drug use of the recruited subjects. Twenty mL spot urine sample was collected from each subject and was aliquoted for measuring urine creatinine concentration and a panel of drugs of abuse using conventional immunoassay, HPLC-UV, and the latest UPLC-TOF/MS techniques.

1.4 Data collection

Due to the potential legal issue arisen if a positive urine result is obtained from subject who is under probation by law, the study subjects were recruited anonymously. All data collected from the recruited subjects was identified by a unique number generated by the laboratory and was kept confidential.

1.5 Difficulties encountered

- Subject Recruitment

Response rate of subject recruitment was unexpectedly low ranging from 0 to 5 subjects per clinic session and thus the total recruitment was 52 subjects during the first year of our study. Despite the suboptimal response rate, the number of potential new cases recruited from the Drug of Abuse Clinic in PWH was also limited. Possibility of recruiting subjects from psychiatric in-patient wards or emergency department settings within the NTE cluster hospitals had been explored but was withdrawn due to the logistic difficulties.

To expand the source of recruitment, we collaborated with another project granted by the Beat Drugs Fund Association, "Socioeconomic and Health Impacts of Substance Abuse in Hong Kong – A Longitudinal Study", leaded by Professor Kenneth Lee from School of Pharmacy, CUHK. One of the objectives of this project is to study the acute toxicity in a group of drug abusers admitted or referred to a public hospital by performing a quality and reliable analysis on the urine specimens for toxicology screening. The Department of Chemical Pathology, CUHK, as one of the collaborating institutions, primarily provides the analytical services with both conventional technologies (HPLC & Immunoassay) and new technology (UPLC-TOF/MS). Relevant data obtained from the second project including the urine analysis result and information from questionnaire can be used by our first project for data analysis. The revised study protocol was approved and subsequent subject recruitment started since June 2008. With the expanded sources of subject recruitment from new cases of the Castle Peak Hospital (CPH) Substance Abuse Clinic (SAC) and various non-government organizations

(NGOs), the number of participants increased significantly.

Other measures to increase the recruitment include adoption of paying honorarium for subject recruitment and to recruit also the old cases of the SACs in the New Territories East (NTEC) and West (NTWC) Clusters Hospitals. The revised study protocol was approved by the Joint CUHK-NTEC Cluster Clinical & Research Ethics committee (CREC) and NTW CREC in April 2010, and the subject recruitment in the Substance Abuse Clinic (SAC)s of CPH and NDH was proceeded

1.6 Revised study protocol

Revised sources of recruitment for both our original study and the collaborated study include patients attending the Substance Abuse Clinics (SACs) at PWH and other hospitals in the New Territories, namely North District Hospital (NDH) and Castle Peak Hospital (CPH); and clients with history of substance abuse from various non-governmental organizations (NGOs) in the New Territories.

Collection of data remained the same as our original study design except that subjects who completed the questionnaire and the urine collection would be paid with an honorarium. With the expanded sources of recruitment to the NTW, our study title is approved to be revised as “STUDY OF PATTERNS OF DRUGS OF ABUSE IN NEW TERRITORIES EAST AND WEST CLUSTER DRUG OF ABUSE CLINIC USING CONVENTIONAL AND NEW TECHNOLOGIES”.

1.7 Recruitment

Subject recruitment started from July 2007 to March 2011. A total of 454 subjects were recruited. Among the 454 subjects, 275 subjects were male and 179 subjects were female with age ranged from 14 to 66 years.

2 Major Findings

2.1 Survey results

2.1.1 Demographic data

2.1.1.1 Age and sex distribution

- All subjects

Age group (years)	Female	Male	Total	(N=454)
10-19	30	20	50	(11%)
20-29	48	70	118	(26%)
30-39	49	110	159	(35%)
40-49	34	48	82	(18.1%)
50-59	16	25	41	(9%)
60-70	2	2	4	(0.9%)
Grand Total	**179**	**275**	**454**	**(100%)**

*Age of the recruited subjects range from 14 to 66 years.
*Majority (72%) of the subjects is in the age groups below 40 years of age.

- Comparing NTEC and NTWC

Age group (years)	NTEC (N=200)		NTWC	(N=254)	Total	(N=454)
10-19	34	(17%)	16	(6.3%)	50	(11%)
20-29	63	(31.5%)	55	(21.7%)	118	(26%)
30-39	70	(35%)	89	(35%)	159	(35%)
40-49	23	(11.5%)	59	(23.2%)	82	(18.1%)
50-59	9	(4.5%)	32	(12.6%)	41	(9%)
60-70	1	(0.5%)	3	(1.2%)	4	(0.9%)
Grand Total	**200**	**(100%)**	**254**	**(100%)**	**454**	**(100%)**

*Proportion of subjects with age of 40 years or above in NTWC (37%) is greater than that in NTEC (16.5%).

2.1.1.2 Marital Status

Marital status	Female (N=179)		Male	(N=275)	Total	(N=454)
Never married	88	(49.2%)	151	(54.9%)	239	(52.6%)
Co-habitant	4	(2.2%)	2	(0.7%)	6	(1.3%)
Married	43	(24%)	78	(28.4%)	121	(26.7%)
Divorced	33	(18.4%)	28	(10.2%)	61	(13.4%)
Separated	3	(1.7%)	4	(1.5%)	7	(1.5%)
Widowed	2	(1.1%)	2	(0.7%)	4	(0.9%)
Not specified	6	(3.4%)	10	(3.6%)	16	(3.5%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

*Majority of the subjects are single.

*A significant proportion of subjects is divorced.

2.1.1.3 Education attainment

- Overall education level (by sex)

Education level	Female (N=179)		Male (N=275)		Total	(N=454)
Primary education	24	(13.4%)	43	(15.6%)	67	(14.8%)
Secondary education	150	(83.8%)	210	(76.4%)	360	(79.3%)
Tertiary education	3	(1.7%)	9	(3.3%)	12	(2.6%)
Not specified	2	(1.1%)	13	(4.7%)	15	(3.3%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

- Primary education level (by sex)

Primary education up to	Female	Male	Total	(N=67)
P.1		1	1	(1.5%)
P.2	3	3	6	(9%)
P.3	2	4	6	(9%)
P.4	3	2	5	(7.5%)
P.5	3	7	10	(14.9%)
P.6	13	26	39	(58.2%)
Grand Total	**24**	**43**	**67**	**(100%)**

- Secondary education level (by sex)

Secondary education up to	Female	Male	Total	(N=360)
F.1	19	39	58	(16.1%)
F.2	25	50	75	(20.8%)
F.3	46	70	116	(32.2%)
F.4	15	11	26	(7.2%)
F.5	40	36	76	(21.1%)
F.6	1	2	3	(0.8%)
F.7	3	2	5	(1.4%)
Not specified	1	0	1	(0.3%)
Grand Total	**150**	**210**	**360**	**(100%)**

- Tertiary education

Tertiary education	Total
Post-graduate (Master degree)	1
Undergraduate / Bachelor degree	5
Diploma	1
Not specified	5
Grand Total	**12**

- Overall education level (by age)

Education level	Age group (Years)						Total
	10-19	20-29	30-39	40-49	50-59	60-70	
Primary education	1	2	7	27	27	3	67
Secondary education	45	109	141	54	11		360
Tertiary education		5	4	1	1	1	12
Not specified	4	2	7		2		15
Grand Total	**50**	**118**	**159**	**82**	**41**	**4**	**454**

- Primary education level (by age)

Primary education	Age group (Years)						Total
up to	10-19	20-29	30-39	40-49	50-59	60-70	
P.1					1		1
P.2	1			1	4		6
P.3				4	2		6
P.4				3	1	1	5
P.5			1	3	5	1	10
P.6		2	6	16	14	1	39
Grand Total	**1**	**2**	**7**	**27**	**27**	**3**	**67**

- Secondary education level (by age)

Secondary education	Age group (Years)						Total
up to	10-19	20-29	30-39	40-49	50-59	60-70	
F.1	5	9	28	15	1		58
F.2	9	20	34	10	2		75
F.3	9	34	51	20	2		116
F.4	8	9	7	2			26
F.5	14	32	20	6	4		76
F.6		1	1		1		3
F.7		3		1	1		5
Not specified		1					**1**
Grand Total	**45**	**109**	**141**	**54**	**11**	**0**	**360**

- Tertiary level (by age)

Tertiary education	Age group (Years)						Total
up to	10-19	20-29	30-39	40-49	50-59	60-70	
Postgraudate (Master)			1				1
Undergraduate / Bachelor		2	1	1	1		5
Diploma			1				1
Not specified		3	1			1	5
Grand Total		**5**	**4**	**1**	**1**	**1**	**12**

*Majority (360 subjects, 79.3% of total) of the subjects attained secondary education level. Among these 360 subjects, 249 (69.1%) subjects attained junior secondary education level only.

*These data is compatible with a general trend of increase in education level among the youngster population due to the provision of 9-year free education by the government since 1970s.

2.1.1.4 Current employment

- Employment status (by sex)

Employment status	Female	Male	Total	(N=454)
Unemployed	121	166	287	(63.2%)
Full-time	23	56	79	(17.4%)
Part-time	11	33	44	(9.7%)
Student	9	12	21	(4.6%)
Housewife	13		13	(2.9%)
Retired	1	3	4	(0.9%)
Not specified	1	5	6	(1.3%)
Grand Total	**179**	**275**	**454**	(100%)

- Employment status (by age)

Secondary education	Age group (Years)						Total
up to	10-19	20-29	30-39	40-49	50-59	60-70	
Unemployed	22	63	101	68	33		287
Full-time	7	38	26	6	2		79
Part-time	3	9	26	5		1	44
Student	16	5					21
Housewife		2	4	3	4		13
Retired					1	3	4
Not specified	2	1	2		1		6
Grand Total	**50**	**118**	**159**	**82**	**41**	**4**	**454**

- Occupation reported among the 123 subjects currently under employment

Occupation			
Customer service	24	Engineering	3
Manual labour	21	Management	1
Food/Catering	11	Banking	1
Transport/Driver	10	Others	5
Healthcare	4	Not specified	43
Total: 123 subjects			

*A total of 287 (63.2%) subjects are currently unemployed. This high overall unemployment rate among our study population is 18-fold greater than the unemployment rate of the general population. [Source: According to the latest labor force statistics released by the Census and Statistics Department (C&SD) of the Hong Kong Special Administrative Region Government, Hong Kong's seasonally adjusted unemployment rate was provisional 3.5% in February - April 2011.]

*High unemployment rates among the younger age groups, 53.4% and 63.5% in the 20-29 years and 30-39 years age groups respectively, as shown by our data, are particularly of significance as people of these age groups are supposed to be the major workforce of the society. In the 40-49 years and 50-59 years age groups, the unemployment rates are even higher to over 80% in the corresponding age group. (Note: Percentages are calculated based on the subjects of the corresponding age group.)

2.1.1.5 Monthly personal income and expenditure on drugs

- Monthly personal income (by sex)

Employment status	Female	Male	Total	(N=454)
No income	142	172	314	(69.2%)
< $1,000	5	4	9	(2%)
$1,000 to $2,999	4	10	14	(3.1%)
$3,000 to $4,999	7	15	22	(4.8%)
$5,000 to 6,999	8	11	19	(4.2%)
$7,000 to $8,999	3	20	23	(5.1%)
$9,000 to $10,999	4	13	17	(3.7%)
>$11,000	5	23	28	(6.2%)
Not specified	1	7	8	(1.8%)
Grand Total	**179**	**275**	**454**	**(100%)**

*With the high unemployment rate among our study population, majority of subjects have no monthly personal income. Among the 314 subjects who have no income, 209 subjects (66.6% of 314 subjects) reported to be receiving financial assistance from the government.

- Monthly expenditure on drugs (by sex)

Expenditure	Female	Male	Total	(N=454)
Nil	80	132	212	(46.7%)
<$100	7	8	15	(3.3%)
$100 to $299	15	20	35	(7.7%)
$300 to $499	12	15	27	(5.9%)
$500 to $699	9	8	17	(3.7%)
$700 to $899	5	4	9	(2%)
$900 to $1,099	12	6	18	(4%)
>$1,100	38	75	113	(24.9%)
Not specified	1	7	8	(1.8%)
Grand Total	**179**	**275**	**454**	**(100%)**

- Monthly expenditure on drugs by income

Expenditure	No income	Monthly income			Not specified
		<$5000	$5000 to $10,999	>$11,000	
	(N=314)	(N=45)	(N=59)	(N=28)	(N=8)
Nil	150 (47.8%)	24 (53.3%)	28 (47.5%)	8 (28.6%)	2 (25%)
<$100	11 (3.5%)	2 (4.4%)	1 (1.7%)	1 (3.6%)	
$100 to $299	24 (7.6%)	7 (15.6%)	2 (3.4%)	2 (7.1%)	
$300 to $499	20 (6.4%)	4 (8.9%)	2 (3.4%)	1 (3.6%)	
$500 to $699	11 (3.5%)	2 (4.4%)	3 (5.1%)	1 (3.6%)	
$700 to $899	8 (2.5%)	1 (2.2%)			
$900 to $1,099	16 (5.1%)	1 (2.2%)		1 (3.6%)	
>$1,100	71 (22.6%)	4 (8.9%)	23 (39%)	14 (50%)	1 (12.5%)
Not specified	3 (1%)				5 (62.5%)
Grand Total	**314 (100%)**	**45 (100%)**	**59 (100%)**	**28 (100%)**	**8 (100%)**

*As unemployment could be a source of stress to the drug abusers that promotes their continuation of substance abuse behavior, 161 (51.3%) of 314 subjects who have no income reported to have monthly expenditure on drugs ranging from <$100 to >$1,100. Among these 161 subjects, 111 of them were receiving financial assistance from government.

*However, for those who are employed and have monthly income >$5,000, 42.5% (37 of 87) of subjects reported to have monthly expenditure on drugs of >$1,100.

2.1.2 Information of previous drug use

2.1.2.1 Age first started and duration of drug abuse

- Age first started drug abuse (by sex)

Age group	Female		Male		Total	
	N	%	N	%	N	%
10-14	38	(21.2%)	52	(18.9%)	90	(19.8%)
15-19	74	(41.3%)	127	(46.2%)	201	(44.3%)
20-24	24	(13.4%)	47	(17.1%)	71	(15.6%)
25-29	10	(5.6%)	15	(5.5%)	25	(5.5%)
30-34	11	(6.1%)	12	(4.4%)	23	(5.1%)
35-39	9	(5.0%)	3	(1.1%)	12	(2.6%)
40-44	6	(3.4%)	1	(0.4%)	7	(1.5%)
45-49	3	(1.7%)	1	(0.4%)	4	(0.9%)
50-54	1	(0.6%)	4	(1.5%)	5	(1.1%)
55-60	1	(0.6%)	1	(0.4%)	2	(0.4%)
Not specified	2	(1.1%)	12	(4.4%)	14	(3.1%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

*Age first started drug abuse in our study population was reported to be ranged from 10 to 57 years.

*Pattern of age of first started drug abuse is quite similar in both sex with majority of subjects first started drug abuse at age between 15 and 19 years and a significant proportion of subjects reported an even earlier age of starting drug abuse between 10 to 14 years. This finding is coherent with the findings of other studies that drug of abuse problem is now a major issue among our youngsters.

➢ Duration of drug abuse

Duration (Years)	Age group (Years)												Total	
	10-19		20-29		30-39		40-49		50-59		60-69			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
< 1 year	1	(2%)	1	(0.8%)									2	(0.4%)
1-5 years	44	(88%)	28	(23.7%)	5	(3.1%)	6	(7.3%)	5	(12.2%)			88	(19.4%)
6-10 years	4	(8%)	56	(47.5%)	22	(13.8%)	8	(9.8%)	3	(7.3%)	2	(50%)	95	(20.9%)
11-15 years			23	(19.5%)	32	(20.1%)	7	(8.5%)	2	(4.9%)			64	(14.1%)
16-20 years			6	(5.1%)	74	(46.5%)	15	(18.3%)	6	(14.6%)			101	(22.2%)
21-25 years					18	(11.3%)	11	(13.4%)	1	(2.4%)	1	(25%)	31	(6.8%)
26-30 years					1	(0.6%)	30	(36.6%)	6	(14.6%)			37	(8.1%)
31-35 years							5	(6.1%)	8	(19.5%)	1	(25%)	14	(3.1%)
36-40 years									6	(14.6%)			6	(1.3%)
41-45 years									2	(4.9%)			2	(0.4%)
Not specified	1	(2%)	4	(3.4%)	7	(4.4%)			2	(4.9%)			14	(3.1%)
Grand Total	**50**	**(100%)**	**118**	**(100%)**	**159**	**(100%)**	**82**	**(100%)**	**41**	**(100%)**	**4**	**(100%)**	**454**	**(100%)**

*Duration of drug abuse was calculated by subtracting the age first started drug abuse from the current age reported.

*Percentage is calculated based on the number (N) of each age group and the total number of recruited subjects.

*For those 59 subjects who have drug abuse for more than 25 years, 46 (78%) of them still have positive drug detection in their urine samples. Opiates (24 samples), hypnotics (17 samples), benzodiazepines (11 samples), cough medicine (11 samples), amphetamines (4 samples), cannabis (1 sample) and barbiturate (1 sample) were detected. (Note: One or more drug items were detected in individual urine sample.)

➢ Duration of follow up in SAC

Duration of follow up (Years)	Female		Male		Total	
	N	%	N	%	N	%
New case	23	(12.8%)	35	(12.7%)	58	(12.8%)
< 1 year	30	(16.8%)	32	(11.6%)	62	(13.7%)
1-5 years	55	(30.7%)	87	(31.6%)	142	(31.3%)
6-10 years	25	(14%)	42	(15.3%)	67	(14.8%)
> 10 years	4	(2.2%)	11	(4%)	15	(3.3%)
Not specified	42	(23.5%)	68	(24.7%)	110	(24.2%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

*Note: SACs in PWH and CPH started service since 1995.

*For old cases, the reported duration of follow up in SAC ranged from 2 weeks to 16 years.

2.1.2.2 Groups of drug items ever tried

- Number of groups of drug items ever tried (by sex)

Number of groups of drug items	Female		Male		Total	
	N	%	N	%	N	%
1	48	(26.8%)	55	(20.0%)	103	(22.7%)
2	23	(12.8%)	36	(13.1%)	59	(13.0%)
3	18	(10.1%)	41	(14.9%)	59	(13.0%)
4	20	(11.2%)	34	(12.4%)	54	(11.9%)
5	28	(15.6%)	39	(14.2%)	67	(14.8%)
6	12	(6.7%)	17	(6.2%)	29	(6.4%)
7	12	(6.7%)	18	(6.5%)	30	(6.6%)
8	13	(7.3%)	12	(4.4%)	25	(5.5%)
9	4	(2.2%)	13	(4.7%)	17	(3.7%)
10	1	(0.6%)	5	(1.8%)	6	(1.3%)
Not specified			5	(1.8%)	5	(1.1%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

*Note: Drug items ever tried by individual subject since his/her first start to the time of the survey were counted.

*Number of drug items ever tried by individual subject ranged from 1 to 10.

*Percentage is calculated based on the number (N) of corresponding sex and the total number of recruited subjects.

*Only 22.7% of the 454 subjects reported to be single drug users all along while 76.2% reported to have tried more than one group of drugs in the past.

*Both sex showed similar pattern.

- Number of groups of drug items ever tried (by age)

Number of groups of drug items	Age group (Years)						Total	
	10-19	20-29	30-39	40-49	50-59	60-70		(N=454)
1	11	24	26	23	16	3	103	(22.7%)
2	8	12	19	14	6		59	(13.0%)
3	7	14	20	14	4		59	(13.0%)
4	8	17	21	3	5		54	(11.9%)
5	10	21	20	11	4	1	67	(14.8%)
6	3	10	9	6	1		29	(6.4%)
7	2	8	15	4	1		30	(6.6%)
8		7	14	2	2		25	(5.5%)
9		3	10	3	1		17	(3.7%)
10		1	3	2			6	(1.3%)
Not specified	1	1	2		1		5	(1.1%)
Grand Total	**50**	**118**	**159**	**82**	**41**	**4**	**454**	**(100%)**

*Proportion of multiple drug users is the greatest among the 30-39 years age group. Of which, 57.9% subjects reported to have tried 4 or more drugs.

- Summary of group of drug item ever tried (by sex)

Group of drug item	Female (N=179)		Male (N=275)		Total (N=454)	
		%		%		%
Ketamine	102	57.0%	148	53.8%	250	55.1%
Cannabis	82	45.8%	154	56.0%	236	52.0%
Amphetamines	98	54.7%	137	49.8%	235	51.8%
Hypnotics	86	48.0%	96	34.9%	182	40.1%
Opiates	61	34.1%	111	40.4%	172	37.9%
Benzodiazepines	69	38.5%	101	36.7%	170	37.4%
MDMA (Ecstasy)	61	34.1%	106	38.5%	167	36.8%
Cough medicine	42	23.5%	115	41.8%	157	34.6%
Cocaine	59	33.0%	66	24.0%	125	27.5%
Mandrax	14	7.8%	27	9.8%	41	9.0%
Others	2	1.1%	5	1.8%	7	1.5%
Thinner/Organic solvent	1	0.6%	6	2.2%	7	1.5%
Grand Total	**677**		**1072**		**1749**	

*Data shown in descending order of the overall popularity.

*Note: Groups of drug items ever tried by individual subject since his/her first start to the time of the survey are counted. An individual subject can reported one or more groups of drug items tried. Figures are presented as the number of counts reported and the percentage is calculated based on the number (N) of corresponding sex and the total number of recruited subjects.

*Ketamine was the most popular group of drug that was ever tried by our study population (55.1% of 454 subjects).

- Summary of group of drug item ever tried by age

Group of drug item	Age group (Years)												Total	
	10-19 (N=50)		20-29 (N=118)		30-39 (N=159)		40-49 (N=82)		50-59 (N=41)		60-70 (N=4)		(N=454)	
Ketamine	43	(86%)	101	(85.6%)	83	(52.2%)	16	(19.5%)	7	(17.1%)			250	(55.1%)
Cannabis	19	(38%)	67	(56.8%)	98	(61.6%)	38	(46.3%)	13	(31.7%)	1	(25%)	236	(52%)
Amphetamines	29	(58%)	63	(53.4%)	99	(62.3%)	35	(42.7%)	9	(22%)			235	(51.8%)
Hypnotics	4	(8%)	29	(24.6%)	67	(42.1%)	50	(61%)	29	(70.7%)	3	(75%)	182	(40.1%)
Opiates	3	(6%)	18	(15.3%)	81	(50.9%)	44	(53.7%)	24	(58.5%)	2	(50%)	172	(37.9%)
Benzodiazepines	10	(20%)	41	(34.7%)	59	(37.1%)	40	(48.8%)	19	(46.3%)	1	(25%)	170	(37.4%)
MDMA (Ecstasy)	21	(42%)	66	(55.9%)	61	(38.4%)	14	(17.1%)	5	(12.2%)			167	(36.8%)
Cough medicine	6	(12%)	30	(25.4%)	89	(56%)	28	(34.1%)	4	(9.8%)			157	(34.6%)
Cocaine	21	(42%)	48	(40.7%)	43	(27%)	10	(12.2%)	2	(4.9%)	1	(25%)	125	(27.5%)
Mandrax	5	(10%)	8	(6.8%)	15	(9.4%)	7	(8.5%)	6	(14.6%)			41	(9%)
Thinner/Organic solvent			4	(3.4%)	1	(0.6%)	2	(2.4%)					7	(1.5%)
Others	1	(2%)			4	(2.5%)	2	(2.4%)					7	(1.5%)
Grand Total	**162**		**475**		**700**		**286**		**118**		**8**		**1749**	

*Data shown in descending order of the overall popularity.

*Note: Groups of drug items ever tried by individual subject from his/her first attempt to the time of the survey are counted. An individual subject can reported one or more groups of drug items tried. Figures are presented as the number of counts reported. Percentage is calculated based on the total number (N) of subjects of the corresponding age groups.

*Comparing the pattern of drug ever tried across different age groups, different popularity of drug use was shown.

*In 10-29 year group, ketamine was the most popular drug.

*In 30-39 year group, amphetamine was the most popular drug.

*In 40-70 year group, hypnotics was the most popular drug.

*Overall, ketamine, cannabis and amphetamines were the three most common drugs being abused in our study population.

*The reported usage of cough medicine was relatively low except that in the 30-39 years age group comparing with the high frequency of detection in the urine samples.

2.1.2.3 Reason of drug abuse

Reason of drug abuse	Female (N=179)		Male (N=275)		Total (N=454)	
		%		%		%
Peer influence	70	(39.1%)	131	(47.6%)	201	(44.3%)
Recreational	52	(29.1%)	81	(29.5%)	133	(29.3%)
Experimental	25	(14.0%)	52	(18.9%)	77	(17.0%)
Insomnia	28	(15.6%)	7	(2.5%)	35	(7.7%)
Dependence	13	(7.3%)	9	(3.3%)	22	(4.8%)
Unhappiness/Stress	12	(6.7%)	8	(2.9%)	20	(4.4%)
Family/Marriage/Relationship Affairs	11	(6.1%)	2	(0.7%)	13	(2.9%)
Cough/Asthma	1	(0.6%)	4	(1.5%)	5	(1.1%)
Weight reduction	2	(1.1%)			2	(0.4%)
Not specified	4	(2.2%)	4	(1.5%)	8	(1.8%)
Grand Total	**218**		**298**		**516**	

*Note: Subject can report one or more reasons of drug abuse. Figures are presented as the number of counts reported. Percentage is calculated based on the total number (N) of subjects of the corresponding sex.

*Peer influence and recreational are the two major reasons of drug abuse reported in our study population.

2.1.2.4 Subjective complications of drug abuse

Presence of complications	Female		Male		Total	
	N	%	N	%	N	%
Yes	129	(72.1%)	191	(69.5%)	320	(70.5%)
No	44	(24.6%)	66	(24%)	110	(24.2%)
Not specified	6	(3.4%)	18	(6.5%)	24	(5.3%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

*Most (70.5%) of the subjects reported to have experienced complications of drug abuse subjectively.

*Physical complications that were most frequently reported include tiredness/weakness, hand tremor, dental caries, urinary frequency/ketamine-induced cystitis, loss of appetite, withdrawal symptoms, epigastric pain and hepatitis. Serious physical complications such as infective endocarditis, heart failure, deep vein thrombosis, loss of consciousness due to drug overdose were also reported.

*Psychiatric complications that were most frequently reported include impaired memory, depression, psychosis, hallucination, anxiety, irritability, insomnia, slow response and suicidal idea/attempt.

2.1.3 Information of last drug use

2.1.3.1 Estimated time of last use

When was last drug use?	Female	Male	Total	(N=454)
Less than 1 day	41	55	96	(21.1%)
1 day to less than or equal to 1 week	49	82	131	(28.9%)
Above 1 week to less than or equal to 1 month	27	31	58	(12.8%)
Above 1 month to less than or equal to 1 year	39	69	108	(23.8%)
Above 1 year	21	23	44	(9.7%)
Quitted for unspecified period of time		2	2	(0.4%)
Not specified	2	13	15	(3.3%)
Grand Total	**179**	**275**	**454**	**(100%)**

*A total of 227 (50%) subjects reported his/her last drug use to be within 1 week's time with regard to the time of the survey and urine collection, in which, 96 (21.1%) subjects admitted that they had active drug use even less than 24 hours before the clinic follow up.

*A total of 152 (33.5%) subjects reported a drug-free period of above 1 month, in which, only 44 (9.7%) subjects reported his/her last drug use to be above 1 year of time.

2.1.3.2 Drug items of last use

- Number of drug item last used

Number of drug item last used	Female	Male	Total	(N=454)
1	156	241	397	87.4%
2	15	19	34	7.5%
3	3	1	4	0.9%
4	3	1	4	0.9%
Not specified	2	13	15	3.3%
Grand Total	**179**	**275**	**454**	**(100%)**

*Most (87.4%) subjects reported using one drug item only.

- Summary of group of drug item last used by sex
  (Data shown in descending order of the overall popularity)

Group of drug item last used	Female (N=179)		Male (N=275)		Total (N=454)	
		%		%		%
Ketamine	44	(24.6%)	69	(25.1%)	113	(24.9%)
Hypnotics	48	(26.8%)	35	(12.7%)	83	(18.3%)
Opiates	29	(16.2%)	53	(19.3%)	82	(18.1%)
Cough medicine	14	(7.8%)	64	(23.3%)	78	(17.2%)
Amphetamines	43	(24%)	29	(10.5%)	72	(15.9%)
Benzodiazepines	15	(8.4%)	10	(3.6%)	25	(5.5%)
Cannabis	2	(1.1%)	12	(4.4%)	14	(3.1%)
Cocaine	7	(3.9%)	6	(2.2%)	13	(2.9%)
MDMA (Ecstasy)	2	(1.1%)	4	(1.5%)	6	(1.3%)
Mandrax	3	(1.7%)			3	(0.7%)
Others (e.g. LSD, analgesics)			2	(0.7%)	2	(0.4%)
Not specified	2	(1.1%)	13	(4.7%)	15	(3.3%)
Grand Total	**209**		**297**		**506**	

*Note: Individual subject could report more than one drug item during his/her last use. Figures are presented as the number of counts reported. Percentage is calculated based on the total number (N) of subjects of the corresponding sex.

*Hypnotics reported include zopiclone, zolpidem and unknown hypnotics bought over-the-counter.

*Benzodiazepines reported include diazepam, midazolam, nimetazepam and others.

*Ketamine, hypnotics, opiates (heroin), cough medicine and amphetamines are the five most popular groups of drug items that were reported by our study subjects during their last drug use.

*Cough medicine is the second most popular group of drug item reported in male subjects while its use is less popular in female subjects.

2.1.3.3 Source of drugs of abuse

- Source of drugs from Hong Kong region

18 Districts of Hong Kong					
New Territories (Subtotal: 298)		**Kowloon (Subtotal: 116)**		**Hong Kong Island (Subtotal: 7)**	
Yuen Long	121	Yau Tsim Mong	88	Central & Western	3
Tuen Mun	86	Kwun Tong	14	Eastern	2
Shatin	43	Sham Shui Po	9	Wan Chai	1
North	28	Kowloon City	4	Southern	1
Tai Po	12	Wong Tai Sin	1		
Tsuen Wan	4				
Islands	2				
Sai Kung	2				
Kwai Ching	0				
(Grand Total: 421)					

- Source of drugs outside Hong Kong region

Outside Hong Kong	
Shenzhen	16
Mainland China (not specified)	2
(Grand Total: 18)	

*Note: Individual subject could report more than one district or region for the source of drug obtained. Some subjects did not report the source of drugs. Figures are presented as the number of counts reported.

*Most of the study subjects obtained drugs in Hong Kong, particularly in Yuen Long, Tuen Mun and Yau Tsim Mong districts.

- Channels to obtain drugs

Channels	Total	(N = 454)
Friends	199	(43.8%)
Pharmacy	142	(31.3%)
Others	85	(18.7%)
Not specified	33	(7.3%)
Grand Total	**459**	**(100%)**

*Note: Individual subject could report more than one channel. Figures are presented as the number of counts reported. Percentage is calculated based on the total number (N) of all subjects.

*Friends are reported as common sources of ketamine and amphetamines

* Pharmacy is reported as a common source of hypnotics and cough medicine.

2.1.3.4 Location of drug use

Location of drug use	Female (N=179)		Male (N=275)		Total (N=454)	
		%		%		%
Home	117	(65.4%)	124	(45.1%)	241	(53.1%)
Friend's Apartment	39	(21.8%)	34	(12.4%)	73	(16.1%)
Street/Public toilet/Park	11	(6.1%)	60	(21.8%)	71	(15.6%)
Disco	5	(2.8%)	22	(8%)	27	(5.9%)
Pharmacy	2	(1.1%)	24	(8.7%)	26	(5.7%)
Video Game Centre			6	(2.2%)	6	(1.3%)
Karaoke	3	(1.7%)	3	(1.1%)	6	(1.3%)
Bar	2	(1.1%)	3	(1.1%)	5	(1.1%)
Hotel			1	(0.4%)	1	(0.2%)
Workplace			1	(0.4%)	1	(0.2%)
Not specified	3	(1.7%)	10	(3.6%)	13	(2.9%)
Grand Total	**182**		**288**		**470**	

*Note: Individual subject could report more than one location of drug use. Figures are presented as the number of counts reported. Percentage is calculated based on the total number (N) of subjects of the corresponding sex.

*Majority of subjects reported to use drugs at home or friend's apartment.

*Location of drug use reported in female and male subjects has slightly different patterns.

2.1.4 Other data

2.1.4.1 Current drug history

- Currently on therapeutic drugs

On therapeutic drug therapy	Female	Male	Total	(N=454)
Yes	128	170	298	(65.6%)
No	50	96	146	(32.2%)
Not specified	1	9	10	(2.2%)
Grand Total	**179**	**275**	**454**	**(100%)**

*Note: Therapeutic drug items used by the study subjects are mainly psychiatric medications prescribed from drug of abuse clinic. However, detail description of individual's therapeutic drug regime is unavailable.

2.1.4.2 Smoking and drinking history

- Smoking history

Smoking history	Female	Male	Total	(N=454)
Smoker	137	245	382	(84.1%)
Ex-smoker	7	10	17	(3.7%)
Non-smoker	30	12	42	(9.3%)
Not specified	5	8	13	(2.9%)
Grand Total	**179**	**275**	**454**	**(100%)**

- Drinking history

Smoking history	Female	Male	Total	(N=454)
Drinker	56	121	177	(39%)
Ex-drinker	28	30	58	(12.8%)
Non-drinker	91	112	203	(44.7%)
Not specified	4	12	16	(3.5%)
Grand Total	**179**	**275**	**454**	**(100%)**

*Most (84.1%) study subjects reported to be smokers.

*Overall proportion of drinkers and non-drinkers among our study population is similar.

2.1.4.3 Forensic history

- Forensic history by sex

Forensic history	Female		Male		Total	
	N	%	N	%	N	%
Yes	79	(44.1%)	197	(71.6%)	276	(60.8%)
No	96	(53.6%)	68	(24.7%)	164	(36.1%)
Not specified	4	(2.2%)	10	(3.6%)	14	(3.1%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

*A total of 276 (60.8%) study subjects reported to have previous forensic history.

*Proportion of male subjects reported to have forensic history is higher than that of female subjects.

- Summary of forensic history

Drug-related forensic history	**Subtotal: 178**
Drug possession	129
Drug trafficking	36
Drug abusing	13
Non-drug-related forensic history	**Subtotal: 153**
Theft	64
Assault	45
Robbery	24
Others	20
Not specified	**Subtotal: 52**
	Grand Total: 383

*Note: Individual subject could report more than one item. Others include money laundering , uttering/forgery, blackmail, attacking police, possession of offensive weapon, destruction of property, drug-driving, driving without license, child abuse and other unspecified crime.

2.2 Results of urine analysis

2.2.1 Overall results

2.2.1.1 Overview of urine analysis

A total of 454 urine samples were collected from July 2007 to March 2011.

All urine samples were collected using the temperature-sensitive urine bottles and were aliquoted for urine creatinine measurement to ensure the validity of the urine specimens. Twenty-one (4.6%) of the 454 urine samples were found to have urine creatinine level below 1.8 mmol/L that were regarded as abnormally diluted urine, yet drugs/metabolites were still detectable in these urine samples.

All urine samples were subjected to a comprehensive drug screening by UPLC-TOF-MS (Waters UPLC-LCT Premier XE) and a panel of drug of abuse screening using Immunoassay (Abbott AxSym® System). Selected urine samples were also analyzed by HPLC-UV (REMEDi HS drug profiling system) for the comparison study.

- UPLC-TOF-MS

UPLC-TOF-MS can be used for broad toxicological screening based on the exact mass determination with the advantage of generation of theoretical exact mass libraries from the molecular formula for drug identification without the need of reference materials. The UPLC-TOF-MS method used in our study has been validated and published in a peer review journal. Utility and overall performance of the UPLC-TOF-MS method were assessed by the analysis of 30 authentic urine samples by both UPLC-TOF-MS (Waters UPLC-LCT Premier XE) and HPLC-UV (REMEDi HS drug profiling system). The study showed that the UPLC-TOF-MS detected twice as many as drugs as the HPLC-UV. The authentic urine samples have been sent to Sweden and UK for further comparison using other conventional screening techniques including, high performance liquid chromatography-diode array detector (HPLC-DAD), liquid chromatography tandem mass spectrometry (LC-MS/MS) and gas chromatography mass spectrometry (GC-MS). These additional methods confirmed no false positive detected by the UPLC-TOF-MS method. Within-instrument precisions for retention time and signal responses (peak area) were satisfactory; coefficients of variation (CV) were 0.29% and 11.3%, respectively. Lower detection

limit ranged from 1 to 125 ng/mL. The detail of the materials, instrumentation, experimental studies and validation data were published. [HK Lee *et al*. Anal Chim Acta (2009) 649:80-90]

Advanced software systems, ChromaLynx™ and QuanLynx™ (Waters), were used for broad-spectrum drug screening and targeted analysis respectively for detection of drugs by the UPLC-TOF-MS system. The software provides an automated identification of component peaks using spectral deconvolution techniques followed by comparison of the underlying mass spectra with the entries in the drug libraries containing more than 300 common drugs and metabolites.

Positive detection of a drug or metabolite by UPLC-TOF-MS was defined by a combination of criteria, including an average spectral match factor (which was based on the nominal mass spectra acquired under low and high fragmentation conditions of each candidate comparing against the respective entries in the libraries) $\geq$ 500, retention time within 10% of expected, accurate mass measurement < 5 parts per million (ppm) and compatible elemental composition and isotopic pattern (I-fit).

- HPLC-UV

The REMEDi HS drug profiling system is a broad spectrum drug identification system using liquid chromatography with on-line sample cleanup and isocratic multicolumn separation with full-scan UV detection.

For sample processing, the samples are diluted with an internal standard mixture and centrifuged. The internal standards are used to monitor the chromatographic behavior of the separation cartridges. Upon injection, the prepared sample is combined with a buffer and passed through four cartridges. All reagents used with the Remedi were supplied by Bio-Rad; however, the composition of the mobile phase and other reagents and the exact characteristics of the stationary phase of the cartridges were not disclosed.

Drug identification is performed by a multi-wavelength UV detector coupled with a sophisticated computer algorithm. As each drug enters the detector, a UV scan from 200 nm to 300 nm is made. Sample spectra are then automatically compared with the library of known drug spectra stored in memory. This, in conjunction with chromatographic data, results in the identification of the drug.

- Immunoassay

The Abbott AxSym® System utilizes Fluorescence Polarization Immunoassay (FPIA) technology for detection of drugs and metabolites in urine specimen. A panel of immunoassays covering the seven common groups of drug of abuse was performed in each urine specimen and the following criteria are applied for positive drug detection.

Panel of Immunoassay (Abbott AxSym® System)	Cut-off for positive drug detection	Lowest detection limit
Amphetamines	≥1000 ng/mL	100.00 ng/mL
Barbiturates	≥200 ng/mL	60.00 ng/mL
Benzodiazepines	≥200 ng/mL	40.00 ng/mL
Cannabinoids	≥50 ng/mL	13.00 ng/mL
Cocaine	≥300 ng/mL	30.00 ng/mL
Methadone	≥250 ng/mL	100.00 ng/mL
Opiates	≥300 ng/mL	50.00 ng/mL

*Signals above the lowest detection limit but below the cut-off value for the corresponding assay are regarded as negative results.

2.2.1.2 Summary of drug items detected in all urine samples by UPLC-TOF-MS

Drug category	Drug item detected	Drug category	Drug item detected	
Amphetamines	Methamphetamine /Amphetamine	***Therapeutic drugs***	Amisulpride	Ofloxacin
Analgesics	Tramadol		Amitriptyline	Olanzapine
Barbiturates	Barbiturates		Atenolol	Perindopril
Benzodiazepines	Diazepam		Atropine	Propranolol
	Flunitrazepam		Benzhexol	Quetiapine
	Midazolam		Carbamazepine	Ranitidine
	Nitrazepam		Chlorpromazine	Risperidone
Cannabis	Cannabinoids		Cimetidine	Sertraline
Cocaine	Cocaine		Citalopram	Sildenafil
Cough medicine	Brompheniramine		Clarithromycin	Sulpiride
	Cetirizine		Clozapine	Trazodone
	Chlorpheniramine		Desipramine	Trifluoperazine
	Codeine		Diphenhydramine	Trimipramine
	Dextromethorphan		Dothiepin	Venlafaxine
	Dihydrocodeine		Doxepin	Zuclopenthixol
	Hydrocodone		Etoricoxib	
	Hydromorphone		Famotidine	
	Methylephedrine		Fluconazole	
	Promethazine		Fluoxetine	
	Propoxyphene		Glibenclamide	
	Pseudoephedrine/Ephedrine		Gliclazide	
Hypnotics	Zolpidem		Haloperidol	
	Zopiclone		Lidocaine	
Opiates	Heroin		Metoclopramide	
Ketamine	Ketamine		Metoprolol	
MDMA	HMMA		Metronidazole	
	MDA		Mianserin	
	MDMA		Mirtazapine	
Methadone	Methadone		Nortriptyline	
	Subtotal: 29		**Subtotal: 44**	

*A total of 73 drug items (including both drugs of abuse or therapeutic agents) were identified from 2,783 parent drugs and metabolites detected by UPLC-TOF-MS in 454 urine samples.

2.2.1.3 Summary of number of drug of abuse items detected in urine

- Number of groups of drug of abuse items detected in urine (by sex)

Number of groups of drug of abuse items	Female		Male		Total	
	N	%	N	%	N	%
0	59	(33%)	79	(28.7%)	138	(30.4%)
1	74	(41.3%)	122	(44.4%)	196	(43.2%)
2	40	(22.3%)	52	(18.9%)	92	(20.3%)
3	5	(2.8%)	16	(5.8%)	21	(4.6%)
4	1	(0.6%)	6	(2.2%)	7	(1.5%)
Grand Total	**179**	**(100%)**	**275**	**(100%)**	**454**	**(100%)**

- Number of groups of drug of abuse items detected in urine (by age)

Number of groups of drug of abuse items	Age group (Years)						Total	%
	10-19	20-29	30-39	40-49	50-59	60-70	N	
0	30	39	40	20	9		138	(30.4%)
1	14	56	65	35	23	3	196	(43.2%)
2	3	21	39	24	4	1	92	(20.3%)
3	2	2	9	3	5		21	(4.6%)
4	1		6				7	(1.5%)
Grand Total	**50**	**118**	**159**	**82**	**41**	**4**	**454**	**(100%)**

*Note: Drug items under the category of therapeutic drugs and methadone are not included in this table.

*Number of group of drug item detected in individual urine sample ranged from 0 to 4.

*Proportion of clean urine (i.e. no drug of abuse item detected) within an individual age-group decreased among increasing age. [60% in 10-19 years, 33.1% in 20-21 years, 25.2% in 30-39 years, 24.4% in 40-49 years, 22% in 50-59 years and 0% in 60-70 years.]

2.2.1.4 Patterns of group of drug of abuse item detected

- Summary of group of drug of abuse item detected in urine (by sex)
  (Data shown in descending order of the frequency detected)

Group of drug item	Female (N=179)		Male (N=275)		Total (N=454)	
		%		%		%
Cough medicine	37	(20.7%)	84	(30.5%)	121	(26.7%)
Hypnotics	43	(24%)	40	(14.5%)	83	(18.3%)
Ketamine	30	(16.8%)	44	(16%)	74	(16.3%)
Opiates	25	(14%)	46	(16.7%)	71	(15.6%)
Benzo	22	(12.3%)	39	(14.2%)	61	(13.4%)
Amphe	10	(5.6%)	33	(12%)	43	(9.5%)
Cocaine	4	(2.2%)	1	(0.4%)	5	(1.1%)
Cannabis			4	(1.5%)	4	(0.9%)
MDMA	1	(0.6%)	1	(0.4%)	2	(0.4%)
Barbiturates			1	(0.4%)	1	(0.2%)
Analgesic			1	(0.4%)	1	(0.2%)
Grand Total	**172**		**294**		**466**	

*Note: Methadone was not counted as drug of abuse category in this table.

*Percentage is calculated based on the total number (N) of subjects of the corresponding sex and the total number of recruited subjects.

*Cough medicine was the most frequent group of drug of abuse detected in the urine of our study population. Hypnotics was the second most frequent group of drug of abuse detected, followed by ketamine, opiates and benzodiazepines.

*Higher frequency of hypnotics was detected in urine of female subjects, but higher frequency of cough medicine was detected in male subjects.

- Summary of group of drug of abuse item detected in urine (by age)
  (Data shown in descending order of the frequency detected)

Groups of drug items	Age group (Years)												Grand Total (N=454)	
	10-19 (N=50)		20-29 (N=118)		30-39 (N=159)		40-49 (N=82)		50-59 (N=41)		60-70 (N=4)			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Cough medicine	6	(12%)	24	(20.3%)	64	(40.3%)	20	(24.4%)	6	(14.6%)	1	(25%)	121	(26.7%)
Hypnotics	2	(4%)	11	(9.3%)	31	(19.5%)	23	(28%)	13	(31.7%)	3	(75%)	83	(18.3%)
Ketamine	11	(22%)	48	(40.7%)	15	(9.4%)							74	(16.3%)
Opiates			3	(2.5%)	27	(17%)	23	(28%)	17	(41.5%)	1	(25%)	71	(15.6%)
Benzo	1	(2%)	7	(5.9%)	27	(17%)	17	(20.7%)	8	(19.5%)	1	(25%)	61	(13.4%)
Amphe	4	(8%)	9	(7.6%)	20	(12.6%)	9	(11%)	1	(2.4%)			43	(9.5%)
Cocaine	2	(4%)	2	(1.7%)	1	(0.6%)							5	(1.1%)
Cannabis					3	(1.9%)	1	(1.2%)					4	(0.9%)
MDMA	2	(4%)											2	(0.4%)
Barbiturates									1	(2.4%)			1	(0.2%)
Analgesic					1	(0.6%)							1	(0.2%)
Grand Total	**28**		**104**		**189**		**93**		**46**		**6**		**466**	

*Note: One or more groups of drug items were detected in individual urine sample. Figures are presented as the frequency of a particular drug item detected in corresponding age group. Percentage is calculated based on the total number (N) of subjects of the corresponding age group and the total number of recruited subjects.

*Patterns of drugs detected were different in different age groups. Cough medicine and ketamine were detected in the younger age groups more frequently while opiates and hypnotics were detected in the older age groups more frequently.

- Common ingredients of cough medicine detected
  (Data shown in descending order of the frequency detected)

Ingredients of cough medicine detected in urine	Grand Total (N=121)	
		%
Pseudoephedrine/Ephedrine	89	73.6%
Promethazine	88	72.7%
Codeine	67	55.4%
Hydrocodone	48	39.7%
Chlorpheniramine	46	38%
Dextromethorphan	24	19.8%
Propoxyphene	23	19%
Brompheniramine	16	13.2%
Dihydrocodeine	5	4.1%
Diphenhydramine	3	2.5%
Methylephedrine	2	1.7%
Cetirizine	1	0.8%
Hydromorphone	1	0.8%
Grand Total	**413**	

*Note: Urine samples with detection of two or more cough medicine ingredients were counted as positive detection for cough medicine except the detection of pseudoephedrine/ephedrine or codeine alone would also be counted as positive.

*Note: One or more ingredients of cough medicine could be detected in the same urine sample. Percentage is calculated based on the total number (N) of urine samples with positive detection of cough medicine.

*Note: Promethazine is a first-generation H1 receptor antagonist of the phenothiazine chemical class. It has a strong sedative effect, as well as anti-motion-sickness, anti-emetic, and anti-cholinergic effects. Fifteen urine samples with detection of promethazine with or without other therapeutic drugs were not counted in the above table as it can be a prescribed hypnotic in SAC for therapeutic use.

*A total of 13 drug items in the category of cough medicine were detected in our study population

*Pseudoephedrine/ephedrine, promethazine, codeine, hydrocodone and chlorpheniramine are the five most common ingredients of cough medicine detected.

2.2.1.5 Unexpected substances detected in urine samples

- Novel drugs or impurities

*No unidentified peak of unknown substances was detected in the 454 urine samples so far.

*High prevalence of cough medicine was detected in urine of our study subjects. Ingredients of cough medicine were detected in 121 urine samples (26.7% of 454 subjects).

*However, a total of 376 (82.8%) of 454 subjects did not report cough medicine in their last use, of which, 64 subjects (17% of 376 subjects) turned out to have positive findings of ingredients of cough medicine in their urine.

*Of these 64 subjects, the six most frequently reported drug items in their last drug use were hypnotics (24 subject, 37.5%), ketamine (14 subjects, 21.9%), opiates (14 subjects, 21.9%), amphetamines (8 subjects, 12.5%) and benzodiazepines (5 subjects, 7.8%). [Note: Percentage was calculated based on number of subjects who have negative history but positive detection of cough medicine, i.e. N=64. Subjects could report more than one drug item during their last use.]

2.2.2 Comparison of conventional and new techniques

2.2.2.1 Scoring system

- Compare the efficiency between conventional (HPLC-UV/ immunoassays) and new (UPLC-TOF/MS) techniques

1. Other than drugs caffeine, nicotine and cotinine, count the number of drugs identified in each urine sample by both conventional (C) and new (N) techniques.
2. Number of drugs identified by conventional techniques (C) is defined as the number of drugs identified by HPLC-UV and number of additional drugs identified by immunoassay.
3. Determine the ratio of C/N of each urine sample.
4. The presence of drugs in both libraries should not be considered.
5. Calculate the mean C/N ratio. If the mean ratio is <1, the new technique identifies more drugs than conventional technique. If the mean ratio is >1, the conventional technique identifies more drugs than the new technique.

- Performance of the New for replacement of Conventional technique

1. Compare the identified drugs between the New and Conventional techniques.
2. For drugs identified by the Conventional technique but not the New, add +1 point to Deficiency score (D) for each drug.
3. For drugs identified by the New technique but not the Conventional, add +1 point to Improvement score (I) for each drug.
4. Calculate the D/I ratio. If the D/I ratio is <1, the New technique has better overall performance than the Conventional technique in terms of identification of drug item by detection of either parent drug or metabolites. If the D/I ratio is >1, the Conventional technique has better performance and the New technique has missed drugs that are identified by the Conventional technique.

2.2.2.2 Results of the comparison data

Summary of performance of new and conventional techniques	
Number of urine sample analyzed by both techniques	67
Total number of drug items identified by new technique (sum of N)	171
Total number of drug items identified by conventional technique (sum of C)	147
Mean C/N ratio	0.77
Deficiency score (D)	22
Improvement score (I)	46
D/I ratio	0.48

2.2.2.3 Summary of the comparison data

Sixty-seven urine samples were analyzed by both of the new (UPLC-TOF-MS) and conventional (HPLC-UV + Immunoassay) techniques. The total number of drug items identified by the new technique is greater than that of the conventional technique. Both the mean C/N ratio and the D/I ratio are less than one. From our current data, the new technique was able to enhance the drug detection when compared with the conventional method. Therefore, the urine analysis results generated by UPLC-TOF-MS provide us useful and reliable information for the investigation of the pattern of substance abuse among our study population.

2.3 Comparison of survey and urine analysis results

2.3.1 Patterns of substance abuse

- Five most common drug of abuse items reported (last drug use) or detected in our study population (N = 454)

Results of survey			Results of urine analysis		
	N	%		N	%
Ketamine	113	(24.9%)	Cough medicine	121	(26.7%)
Hypnotics	83	(18.3%)	Hypnotics	83	(18.3%)
Opiates	82	(18.1%)	Ketamine	74	(16.3%)
Cough medicine	78	(17.2%)	Opiates	71	(15.6%)
Amphetamines	72	(15.9%)	Benzodiazepines	61	(13.4%)

- Five most common drug of abuse items in female (N = 179)

Results of survey			Results of urine analysis		
	N	%		N	%
Hypnotics	48	(26.8%)	Hypnotics	43	(24%)
Ketamine	44	(24.6%)	Cough medicine	37	(20.7%)
Amphetamines	43	(24%)	Ketamine	30	(16.8%)
Opiates	29	(16.2%)	Opiates	25	(14.0%)
Benzodiazepines	15	(8.4%)	Benzodiazepines	22	(12.3%)

- Five most common drug of abuse items in male (N = 275)

Results of survey			Results of urine analysis		
	N	%		N	%
Ketamine	69	(25.1%)	Cough medicine	84	(30.5%)
Cough medicine	64	(23.3%)	Opiates	46	(16.7%)
Opiates	53	(19.3%)	Ketamine	44	(16.0%)
Hypnotics	35	(12.7%)	Hypnotics	40	(14.5%)
Amphetamines	29	(10.5%)	Benzodiazepines	39	(14.2%)

- Pattern of drug of abuse items reported (last drug use) and detected in urine of subjects by different age group
  (Data shown in descending order of the frequency detected)

*Note: One or more groups of drug items were detected in individual urine sample. Figures are presented as the frequency of a particular drug item detected and percentage is calculated based on the number (N) of subjects in a particular age group.

*Different prevalence of drug use is shown in the following tables.

(1) Age of 10 – 19 years (N = 50)

Results of survey			**Results of urine analysis**		
	N	**%**		**N**	**%**
Ketamine	27	(54%)	Ketamine	11	(22%)
Amphetamines	19	(38%)	Cough medicine	6	(12%)
Cocaine	5	(10%)	Amphetamines	4	(8%)
Benzodiazepines	2	(4%)	Hypnotics	2	(4%)
Mandrax	2	(4%)	Cocaine	2	(4%)
Not specified	2	(4%)	MDMA	2	(4%)

(2) Age of 20 – 29 years (N = 118)

Results of survey			**Results of urine analysis**		
	N	**%**		**N**	**%**
Ketamine	69	(58.5%)	Ketamine	48	(40.7%)
Amphetamines	23	(19.5%)	Cough medicine	24	(20.3%)
Cough medicine	13	(11%)	Hypnotics	11	(9.3%)
Hypnotics	8	(6.8%)	Amphetamines	9	(7.6%)
Opiates	6	(5.1%)	Benzodiazepines	7	(5.9%)

(3) Age of 30 – 39 years (N = 159)

Results of survey			Results of urine analysis		
	N	%		N	%
Cough medicine	52	(32.7%)	Cough medicine	64	(40.3%)
Opiates	36	(22.6%)	Hypnotics	31	(19.5%)
Amphetamines	22	(13.8%)	Opiates	27	(17%)
Hypnotics	18	(11.3%)	Benzodiazepines	27	(17%)
Ketamine	16	(10.1%)	Amphetamines	20	(12.6%)

(4) Age of 40 – 49 years (N = 82)

Results of survey			Results of urine analysis		
	N	%		N	%
Hypnotics	33	(40.2%)	Hypnotics	23	(28%)
Opiates	24	(29.3%)	Opiates	23	(28%)
Cough medicine	11	(13.4%)	Cough medicine	20	(24.4%)
Cannabis	9	(11%)	Benzodiazepines	17	(20.7%)
Amphetamines	8	(9.8%)	Amphetamines	9	(11%)

(5) Age of 50 – 59 years (N = 41)

Results of survey			Results of urine analysis		
	N	%		N	%
Hypnotics	21	(51.2%)	Opiates	17	(41.5%)
Opiates	14	(34.1%)	Hypnotics	13	(31.7%)
Benzodiazepines	4	(9.8%)	Benzodiazepines	8	(19.5%)
Cannabis	2	(4.9%)	Cough medicine	6	(14.6%)
Cough medicine	1	(2.4%)	Amphetamines	1	(2.4%)
			Barbiturates	1	(2.4%)

(6) Age of 60 – 70 years (N = 4)

Results of survey			**Results of urine analysis**		
	N	**%**		**N**	**%**
Hypnotics	2	(50%)	Hypnotics	3	(75%)
Opiates	2	(50%)	Cough medicine	1	(25%)
			Opiates	1	(25%)
			Benzodiazepines	1	(25%)

- Pattern of drug of abuse items detected in study subjects recruited from different regions of the new territories

  (Data shown in descending order of the frequency detected of the grand total.)

  *Note: One or more groups of drug items were detected in individual urine sample. Figures are presented as the frequency of a particular drug item detected and percentages are calculated based on the number (N) of subjects of the corresponding sex and corresponding cluster.

(1) Subjects recruited from NTEC

Drug items detected in urine	**Female (N=73)**		**Male (N=127)**		**Total (N=200)**	
		%		**%**		**%**
Cough medicine	11	(15.1%)	40	(31.5%)	51	(25.5%)
Ketamine	16	(21.9%)	23	(18.1%)	39	(19.5%)
Hypnotics	16	(21.9%)	22	(17.3%)	38	(19%)
Benzodiazepines	10	(13.7%)	24	(18.9%)	34	(17%)
Opiates	8	(11%)	16	(12.6%)	24	(12%)
Amphetamines	6	(8.2%)	15	(11.8%)	21	(10.5%)
Cocaine	4	(5.5%)	1	(0.8%)	5	(2.5%)
MDMA	1	(1.4%)	1	(0.8%)	2	(1%)
Grand Total	**72**		**142**		**214**	

(2) Subjects recruited from NTWC

Drug items detected in urine	**Female (N=106)**		**Male (N=148)**		**Total (N=254)**	
		%		**%**		**%**
Cough medicine	26	(24.5%)	43	(29.1%)	69	(27.2%)
Hypnotics	29	(27.4%)	18	(12.2%)	47	(18.5%)
Opiates	17	(16%)	29	(19.6%)	46	(18.1%)
Ketamine	15	(14.2%)	19	(12.8%)	34	(13.4%)
Benzodiazepines	12	(11.3%)	14	(9.5%)	26	(10.2%)
Amphetamines	5	(4.7%)	18	(12.2%)	23	(9.1%)
Cannabis			4	(2.7%)	4	(1.6%)
MDMA			1	(0.7%)	1	(0.4%)
Barbiturates			1	(0.7%)	1	(0.4%)
Analgesic			1	(0.7%)	1	(0.4%)
Grand Total	**104**		**148**		**252**	

(3) Comparing the five most common drug of abuse items detected in subjects recruited from NTEC and NTWC

NTEC	**(N=200)**		**NTWC**	**(N=254)**	
	N	%		N	%
Cough medicine	51	(25.5%)	Cough medicine	69	(27.2%)
Ketamine	39	(19.5%)	Hypnotics	47	(18.5%)
Hypnotics	38	(19%)	Opiates	46	(18.1%)
Benzodiazepines	34	(17%)	Ketamine	34	(13.4%)
Opiates	24	(12%)	Benzodiazepines	26	(10.2%)

*The five most common items detected in urine were same but with different prevalence in the two subgroups of study subjects recruited from different regions of the new territories.

2.3.2 Comparison of urine analysis results with history of last drug use

- Number of drug use reported and number of drug detected in urine with reference to the timing of last drug use

Time of last drug use	No. of drug item last used reported					No. of group of drug detected in urine					Total (N=454)	
	NS	1	2	3	4	0	1	2	3	4		
< 1 Day		88	7		1	3	51	30	9	3	96	(21.1%)
1 day to <= 1 week	1	116	11	1	2	9	74	37	8	3	131	(28.9%)
> 1 week to <= 1 month	1	54	3			23	25	6	3	1	58	(12.8%)
> 1 month to <= 1 year		93	12	2	1	69	23	15	1		108	(23.8%)
> 1 year	1	42		1		28	14	2			44	(9.7%)
Not specified	10	4	1			5	8	2			15	(3.3%)
Quitted	2					1	1				2	(0.4%)
Grand Total	**15**	**397**	**34**	**4**	**4**	**138**	**196**	**92**	**21**	**7**	**454**	**(100%)**

*Note: NS = Not specified from the history

*From the survey result, most subjects reported using one drug only during their last use.

*Out of 454 subjects, 227 subjects reported to have last drug use within 1 week's time. In this group, when comparing the history to the urine results in general, 204 (89.9%) of 227 subjects reported single drug use only and 22 (9.7%) of 227 subjects reported multiple drug use while 125 (55.1%) of these 227 urine samples detected one drug of abuse item and 90 (39.6%) of these 227 urine samples detected two or more drug of abuse items. This observation suggested an underreporting of the number of drug abused which may be intentional (i.e. the subject deliberately hide the genuine drug-using habit) or incidental (i.e. the subject did not know the impurities in the substances he/she took).

*Out of 454 subjects, 210 subjects reported to have last drug use greater than one week's time. Because of the limitation of the urine analysis for sample taken after one week of the last use, no drug of abuse item should be detected in these urine samples and any presence of drug of abuse items in urine could signify recent drug use less than 1 week. In this group of subjects, 120 (57.1%) of 210 subjects have negative urine result while 90 (42.9%) of 210 subjects have positive urine results. Twenty-eight (31.1%) of the 90 subjects who have positive urine results even have two or more drug of abuse items detected in their urine samples.

* Forty-four subjects reported no drug use for one or more years (up to 10 years), 16 (36.4%) of which still have positive urine results. Cough medicine (5 samples), hypnotics (4 samples), opiates (4 samples), benzodiazepines (4 samples) and amphetamines (1 sample) were detected in this 16 urine samples.

- Concordance of individual's history of last use and corresponding urine result

Six commonly reported/detected drugs are analyzed.

The results are tabulated as below.

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	**Negative**	**Grand Total**
Positive	A	B	**A + B**
Negative	C	D	**C + D**
Grand Total	**A + C**	**B + D**	**454**

*Note:

A = Number of subjects who reported to have positive drug use and had positive urine result

B = Number of subjects who reported to have positive drug use but had negative urine result

C = Number of subjects who reported no drug use but had positive urine result

D = Number of subjects who reported no drug use and had negative urine result

A + B = Number of subjects who had positive drug use history

A + C = Number of subjects who had positive urine drug detection

*A and D signify that the history and urine result are concordant.

*B and C signify that the history and urine result are discordant.

(1) Ketamine

➢ All subjects

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	**Negative**	**Grand Total**
Positive	66	47	**113**
Negative	8	333	**341**
Grand Total	**74**	**380**	**454**

*A + D = 399 (Concordance rate = 87.9%)

➢ Subjects reported last drug use of ≤ one week

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	**Negative**	**Grand Total**
Positive	55	3	**58**
Negative	6	163	**169**
Grand Total	**61**	**166**	**227**

*A + D = 218 (Concordance rate = 96%)

*If one week is taken as the window period of ketamine detection in urine, the positive detection rate by UPLC-TOF-MS in subjects with positive history of ketamine use is 94.8% (55 of 58 subjects). Of the 113 subjects who reported ketamine in their last use, 58 subjects reported their last use within one week's time. Fifty-five of the 58 urine samples detected ketamine. Of the three urine samples negative for ketamine, cough medicine instead of ketamine was detected in one urine sample while the other two urine samples did not detect any drug.

*Forty-seven of 113 subjects who reported ketamine in their last use have negative urine finding for ketamine. Forty-three of 47 subjects reported their use of greater than one week's time, 1 reported less than one day, 2 reported one week or less and 1 subject did not specified the time of his/her last use. Among these 43 subjects, 28 subjects have no drug detected in their urine samples, 2 subjects have therapeutic drugs detected and 1 subject has methadone detected, Six of the 43 subjects have one drug of abuse item detected and cough medicine was detected in five of these six urine samples.

*Seventy-four (16.3%) of 454 urine samples have positive findings of ketamine. Ten (13.5%) of the 74 urine samples also had positive findings of cough medicine.

*Eight (1.8%) of 454 subjects who were under-reporting their ketamine abuse in their last use were discovered by the positive urine findings.

(2) Amphetamines

➢ All subjects

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	22	50	**72**
Negative	21	361	**382**
Grand Total	**43**	**411**	**454**

*A + D = 383 (Concordance rate = 84.4%)

➢ Subjects reported last drug use of ≤ one week

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	14	5	**19**
Negative	16	192	**208**
Grand Total	**30**	**197**	**227**

*A + D = 206 (Concordance rate = 90.7%)

*If one week is taken as the window period of amphetamines detection in urine, the positive detection rate by UPLC-TOF-MS in subjects with positive history of amphetamines use is 73.7%% (14 of 19 subjects). Of the 72 subjects who reported amphetamines in their last use, 19 subjects reported their last use within one week's time. Fourteen of the 19 urine samples detected amphetamines and all of these 14 urine samples were collected within 4 days of the reported last use. Of the 5 urine samples negative for amphetamines, 3 were collected 7 days after the reported last use and 1 was collected 4 days after. For the one negative urine sample that was collected 1 day after the reported last use, benzodiazepine and cough medicine instead of amphetamines were detected in this urine sample. If the urine samples are taken within 4 days of last use, the positive drug detection rate by UPLC-TOF-MS is 87.5% (14 of 16 subjects). The detection rate would be

increased to 92.3% (12 of 13 subjects) if 3 days is taken as a cut-off time for the urine sampling.

*Fifty of 72 subjects who reported amphetamines in their last use have negative urine finding for amphetamines. Forty-five of 50 subjects reported their use of greater than one week's time, of which, 11 subjects reported greater than one week but less than one month, 26 subjects reported greater than one month but less than one year, 6 subjects reported greater than one year's time and 2 subjects did not specified the time of their last use. Thirty-five of 45 subjects have no drug of abuse items detected in their urine sample. Ten (22.2%) of 45 subjects have one or more drug of abuse items detected and cough medicine and hypnotics were detected in 4 of these 10 urine samples. Other drugs of abuse detected include opiates (in 2 urine samples) and benzodiazepines (in 2 urine samples).

* Forty-three (9.5%) of 454 urine samples have positive findings of amphetamines. Overall, 21 subjects (4.6% of total 454 subjects; 48.8% of 43 subjects with positive urine findings) who were under-reporting their amphetamines abuse in their last use were discovered by the positive urine findings.

(3) Hypnotics

➢ All subjects

History of last use	**Urine detection by UPLC-TOF-MS**		
	Positive	**Negative**	**Grand Total**
Positive	47	36	**83**
Negative	36	335	**371**
Grand Total	**83**	**371**	**454**

*A + D = 382 (Concordance rate = 84.1%)

➢ Subjects reported last drug use of ≤ one week

History of last use	**Urine detection by UPLC-TOF-MS**		
	Positive	**Negative**	**Grand Total**
Positive	43	17	**60**
Negative	23	144	**167**
Grand Total	**66**	**161**	**227**

*A + D = 187 (Concordance rate = 82.4%)

*If one week is taken as the window period of hypnotics (e.g. zopiclone and zolpidem) detection in urine, the positive detection rate by UPLC-TOF-MS in subjects with positive history of hypnotics use is 71.7% (43 of 60 subjects). Of the 83 subjects who reported hypnotics in their last use, 60 subjects reported their last use within one week's time. Forty subjects of the 43 subjects with positive urine results reported their last use of one day or less, 2 subjects reported two days and 1 subject reported five days.

*Thirty-six of 83 subjects who reported hypnotics in their last use have negative urine finding for hypnotics. Eighteen of the 36 subjects reported their last use of greater than one week's time and one subject did not specified the time of last drug use. Fourteen (77.8%) of the 18 subjects had positive urine results for other drugs, such as benzodiazepines (in 9 samples), cough medicine (in 4 samples) and opiates (in 1 sample).

*Eighty-three of 454 urine samples from 43 females and 40 males have positive findings of hypnotics. Seventy-three urine samples detected zopiclone while 10 urine samples detected zolpidem. Majority, 31 (37.3%) and 23 (27.7%) of the 83 subjects, were in the age groups of 30-39 years and 40-49 years respectively. Sixty-three (75.9%) of the 83 subjects reported either physical or psychiatric complications from hypnotics use. Most commonly complained psychiatry complications include impairment of memory (in 41 subjects), depression (in 29 subjects), psychosis (in 16 subjects) and hallucination (in 15 subjects). Four subjects with chronic hypnotics use reported history of suicidal attempt. . Physical complications reported were non-specific or related to withdrawal symptoms of chronic hypnotics use.

*Thirty-six subjects (7.9% of total 454 subjects; 43.4% of 83 subjects with positive urine findings; 11 females and 25 males) who were under-reporting their hypnotics abuse in their last use were discovered by the positive urine findings. Of the 36 subjects, 19 (52.7%) subjects were in the age group of 30-39 years.

(4) Cough medicine

➢ All subjects

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	57	21	**78**
Negative	64	312	**376**
Grand Total	**121**	**333**	**454**

*A + D = 369 (Concordance rate = 81.3%)

➢ Subjects reported last drug use of ≤ one week

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	45	4	**49**
Negative	35	143	**178**
Grand Total	**80**	**147**	**227**

*A + D = 188 (Concordance rate = 82.8%)

*If one week is taken as the window period of cough medicine detection in urine, the positive detection rate by UPLC-TOF-MS in subjects with positive history of ketamine use is 91.8% (45 of 49 subjects). Of the 78 subjects who reported cough medicine in their last use, 49 subjects reported their last use within one week's time.

*Twenty-one of 78 subjects who reported cough medicine in their last use have negative urine finding for cough medicine. Four subjects reported their last use of greater than one year, 10 subjects reported greater than one month, 3 subjects reported greater than one week and 4 subjects reported less than one week. Hypnotics and benzodiazepines were detected in 2 of the 4 subjects who reported last use of cough medicine within one week but have negative detection for cough medicine in urine.

*One hundred and twenty-one of 454 urine samples have positive findings of cough medicine. High unreported rate, 64 (14.1%) of total (52.9% of 121 subjects with positive urine findings) was discovered by the positive urine findings. Of the 64 subjects, 35 (54.7%) reported their last use of drugs within one week's time. Of the 35 urine samples, 30 (85.7%) detected multiple drug of abuse items despite cough medicine. Seventeen and 18 subjects were female and male, respectively. Of the 35 subjects, 22

(62.9%) were in the young age groups of less than 40 years (12 subjects in 30-39 years; 8 subjects in 20-29 years; 2 subjects in 10-19 years).

(5) Opiates (Heroin)

➢ All subjects

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	52	30	**82**
Negative	19	353	**372**
Grand Total	**71**	**383**	**454**

*A + D = 405 (Concordance rate = 89.2%)

Subjects reported last drug use of ≤ one week

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	41	2	**43**
Negative	11	173	**184**
Grand Total	**52**	**175**	**227**

*A + D = 214 (Concordance rate = 94.3%)

*If one week is taken as the window period of opiates [Heroin] detection in urine, the positive detection rate by UPLC-TOF-MS in subjects with positive history of heroin use is 95.3% (41 of 43 subjects). Of the 82 subjects who reported heroin in their last use, 43 subjects reported their last use within one week's time. Of the 43 urine samples, 41 detected Heroin and/or its metabolites (6-O-monoacetylmorphine, morphine and desmethylmorphine). The two urine samples negative for heroin showed positive detection of cough medicine and methadone. One of the two urine samples also detected midazolam and zopiclone.

(Note: As morphine can also be a metabolite of codeine, detection of morphine will be counted as positive findings for opiates (heroin) if the signal of morphine detected was greater than that of codeine. In that case, the detection of codeine and codeine metabolites will not be counted as positive findings for cough medicine.)

*Of 82 subjects who reported heroin in their last use, 30 have negative urine finding for opiates. Of the 82 subjects, 14 subjects reported last use of greater than one year, 16 subjects reported greater than one month but less than one year, 8 subjected reported greater than one week but less than one month and 1 subject did not specified the time of last use. Of the 30 urine samples, 14 of which had no drug or only therapeutic drugs detected, 5 samples were positive for methadone, 7 samples were positive for cough medicine and few samples also detected benzodiazepines, amphetamines and hypnotics.

*Seventy-one (15.6%) of 454 urine samples have positive findings of opiates. Nineteen subjects (4.2% of total; 26.8% of 71 subjects with positive urine findings) who were under-reporting their opiates abuse in their last use were discovered by the positive urine findings.

(6) Benzodiazepines

➢ All subjects

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	9	16	**25**
Negative	52	377	**429**
Grand Total	**61**	**393**	**454**

*A + D = 386 (Concordance rate = 85%)

➢ Subjects reported last drug use of ≤ one week

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	7	2	**9**
Negative	26	192	**218**
Grand Total	**33**	**194**	**227**

*A + D = 199 (Concordance rate = 87.7%)

*If one week is taken as the window period of benzodiazepines detection in urine, the positive detection rate by UPLC-TOF-MS in subjects with positive history of benzodiazepines use is 77.8% (7 of 9 subjects). However, the number of subjects with positive urine detection and with positive history of recent use of benzodiazepines of one week or less is too small for any conclusive remark. Of

the 25 subjects who reported benzodiazepines in their last use, 9 subjects reported their last use within one week's time. Two of the 9 urine samples were negative for benzodiazepines but were positive for ketamine, cough medicine and opiates.

*Of 25 subjects who reported benzodiazepines in their last use, 16 have negative urine finding for benzodiazepines. Of the 16 subjects, 14 reported last use of greater than one week. Seven of these 14 urine samples were positive for opiates (in 4 samples), cough medicine (in 3 samples) and amphetamines (in 1 sample).

*Sixty-one (13.4%) of 454 urine samples have positive findings of benzodiazepines. Fifty-two subjects (11.5% of total; 85.2% of 61 subjects with positive urine findings) who were under-reporting their benzodiazepines use in their last use were discovered by the positive urine findings.

*Note: Benzodiazepines could be prescribed for therapeutic use. The number of urine samples with positive benzodiazepines was reported irrespective of the intention use as limited information of therapeutic drug history could be obtained from the study subjects.

3 Discussion

Our study recruited 454 subjects from the substance abuse clinics or non-government organizations in NTEC or NTWC. About 50 to 60 patients are arranged for follow up in each clinic session but the default rate could be high up to 30%. Our recruitment rate ranged from 0% to 33% per clinic session but in average it was less than 5%. More male (275 subjects, 60.6% of total) were recruited when comparing with female (179 subjects, 39.4% of total).

Age of study subjects ranged from 14 to 66 years. Most of the study subjects are in the younger age group of 20-29 years (118 subjects, 26% of total) and 30-39 years (159 subjects, 35% of total). However, a significant number of subject recruited (50 subjects, 11% of total) is in the teenage group. The age distribution of the study subjects has shown a prevalence of drug abusers in the younger age groups signifying a serious social problem in our locality.

Our data showed that most subjects (360 subjects, 79.3% of total) in our study population attained secondary education level, in which most of them (249 subjects, 69.1% of 360 subjects) reached junior secondary education level only. Of 454 subjects, 362 (79.7%) reported their age of first started drug abuse were below 25 years of age (Of which, 90 subjects, 19.8% of total, in 10-14 years; 201 subjects, 44.3% of total, in 15-19 years; and 71 subjects, 15.6% of total, in 20-24 years). These figures showed the importance of primary prevention of drug abuse targeting on the school-age teenagers and children (the lowest reported age of first started drug abuse was 10 years old).

In addition, long duration of drug abuse among our study subjects is observed. The longer the duration of drug abuse, the more the difficulty to achieve complete abstinence of drugs and the more the damaging effects to the subjects would be expected. These would project to a tremendously increase in the need of psychiatric services in terms of acute treatment as well as the long-term rehabilitation for substance abusers.

Irrespective of the education level attained by our study subjects, a very high unemployment rate (287 subjects, 63.2% of total) was noted in the study population.

This rate is of 18-fold higher than the unemployment rate of the general population quoted from the latest labor force statistics released by the government. Among the unemployed group, 53.4% and 63.5% of subjects are in the 20-29 years and 30-39 years age groups which should be the major workforce in the society.

Out of the total, 314 (69.2%) subjects reported to have no monthly personal income. Two hundred and nine of the 314 subjects were currently receiving financial assistance from the government. Of the 314 subjects, 161 (51.3%) reported their monthly expenditure on drugs ranging from less than $100 to greater than $1,100. One hundred and eleven (68.9%) of these 161 subjects were receiving financial assistance from the government. Among the 132 subjects who reported to have monthly income, 104 (78.8%) % of them have monthly income of less than or equal to $11,000 (34.1% of these 132 subjects even have monthly income below $5,000). Of the 132 subjects, 72 (54.5%) reported to have expenditure on drugs. Forty-one (56.9%) of these 72 subjects reported their monthly expenditure on drugs of greater than >$1,100.

These data suggested that high unemployment rate among the drug abusers would pose a significant financial burden to the society in terms of supporting their daily-living as well as their healthcare need or even part of their expenditure on continuous drug use. Measures to enhance the employment status and monthly income of the drug abusers may improve their self-esteem and personal satisfactoriness and these may reduce their attempt of continuation of drug abuse behavior for relieving their stress. Among the employed group, continuous psychosocial counseling on tackling stress from the working environment may also be important and helpful in reducing their potential of drug use. Surveillance of continuous drug abuse behavior particularly in the group receiving social security allowance is also an important measure to promote their abstinence of drugs and as a safeguard mechanism to justify the use of our public financial resources.

Concerning the pattern of drug of abuse in our study group, discrepancy of number of drug items reported and number of drug items detected in urine was noted. Most of the subjects actually under-reported their number of drug use which can be revealed by their urine analysis results. These data may suggest that performing survey or monitoring of drug use behavior in the format of questionnaire would under-estimate the actual situation of the drug abuse problem. On the contrary, analysis of biological samples could provide an additional objective evidence of individual's drug of abuse practice and this could be helpful in the surveillance of

the drug of abuse problem globally for planning of the drug-beating strategy and individually for formulating a better clinical management.

Drug abuse is regarded as a private matter that most people would like to hide away from others by under-reporting the issue. Even though urine analysis may have limitations in the window period of detection of different drugs or drug abusers can adulterate their urine samples to create false negative results, different measures can be implemented to ensure the reliability of the sample collection and to enhance the sensitivity and specificity of drug detection in biological samples. Our data showed that the number of drug items detected in urine was much higher than that reported voluntarily by the subjects. Besides, urine analysis could help to monitor the absolute abstinence of drug abuse and to detect any change of pattern of drug abuse. More recently, hair analysis for detection of chronic drug abuse is of a hot-topic issue under evaluation of its potential clinical use by multiple centers worldwide. By using a biological sample that could allow us to detect the metabolites of abused drug remaining in the body, a longer window of detection could be achieved and a higher drug detection rate would be obtained in those who have negative urine findings.

UPLC-TOF-MS is one of the state of the art technology commonly used in toxicology screening and confirmation based on a set of stringent criteria of matching of the accurate mass and fragmentation pattern of the molecule with the data of the drug library. For the comparison of the efficacy of drug detection by the new (UPLC-TOF-MS) and conventional (HPLC-UV and Immunoassay) techniques, our current data showed that the new technique is able to detect more drugs than the conventional techniques. Our finding together with the previous published data [HK Lee *et al*. Anal Chim Acta (2009) 649:80-90] supported the use of UPLC-TOF-MS for clinical urine toxicology services. Applications of this technology in other matrices, such as oral fluid and hair, shown promising by published data from literature and preliminary data of our group, require further evaluation.

Regarding to the findings of our urine analysis, cough medicine is the most frequently drug item detected in our study population. Several reasons could be postulated from our findings. The easy accessibility from local pharmacy and cheaper cost of cough medicine could be the reasons for the use of cough medicine by chronic drug abusers as a milder substitute of their original drug use or during their detoxification process.

Besides, the unexpected finding of cough medicine in our study subjects who did not reported history of cough medicine use may suggest that ingredients of cough medicine may be frequently added to the commonly abused drugs. Whether the addition of cough medicine is intentional for the synergistic sedative effect or for minimizing some of the unwanted effects of the abused drugs, or unintentional as contaminants, further study and investigation is required. From our observation, 10 of the 74 urine samples positive for ketamine also had positive findings of cough medicine (such as promethazine, chlorpheniramine, brompheniramine, pseudoephedrine/ephedrine, dextromethorphan, propoxyphene, codeine, cetirizine and diphenhydramine). Ketamine is a well-known dissociative anaesthetics with short half-life of 2.5 to 3 hours. Promethazine, one of the most commonly detected cough medicine ingredient in our study population, is an anti-histamine with potent sedative effect and also anti-emetic, anti-motion-sickness and anti-cholinergic effects. Clinically, the combined use of ketamine and promethazine has been described in paediatric dental use for sedative purpose as promethazine can help to reduce the emetic side-effect from ketamine while the sedative effects are good.

Although cough mixture has been noted as an emerging psychiatric problem in Hong Kong since 1990s, the potential toxic effects of cough medicine are unnoticed by the general public. Previous local study showed that acute organic brain syndrome, schizophreniform psychosis and affective episode were the main psychiatric presentations which appeared to be associated with the pharmacological activities of opiates, antihistamines and sympathomimetics, the main ingredients of most cough mixtures. Despite psychiatric complications caused by cough medicine, metabolic changes, such as severe hypokalaemia and metabolic acidosis that potentially leads to fatal arrhythmia, had been reported in the literature. A local study also demonstrated cough mixture abuse as a novel cause of folate deficiency and reported a case of cerebellar degeneration and folate deficiency due to cough mixture abuse.

Social pressure from peers, family problems, ease of access, and unawareness of the consequence of cough medicine misuse had been reported as the primary factors accounting for adolescent cough medicine abuse. Our findings provide further evidence to the commonness of the cough medicine use among our youngsters which is currently under-reported and under-recognized in our locality.

Non-benzodiazepine hypnotics such as zopiclone and zolpidem were of growing popularity in our locality which were also observed in our findings. Zopiclone, a benzodiazepine-like drug with half-life of about 6 hours, believed to have less dependence problem than benzodiazepines, is in fact having a greater additive potential than traditional benzodiazepines. Zopiclone is usually recommended for short-term use. However, because of the easy accessibility of non-benzodiazepines hypnotics from local pharmacy and the ignorance to the potential dependence and withdrawal symptoms with long-term use, many people who have insomnia due to stress or night-shift duties would buy these drugs over-the-counter and become chronic users of hypnotics. Chronic zopiclone users reported withdrawal symptoms like anxiety, tachycardia, sweating, palpitations and tremor frequently and also further insomnia despite the use of high dosage of hypnotics. Unusual haematological complications like haemolytic anaemia and methaemoglobinaemia had been reported locally. Delirium and convulsions due to withdrawal of zopiclone, and fatal cases due to severe zopiclone overdose have been reported in the literature. The damaging effects of chronic hypnotics misuse are seriously under-recognized in our locality.

Ketamine has remained the most common psychotropic substance of abuse among youngster in Hong Kong since 2001. According to the data reported by the Central Registry of Drug Abuse (CRDA), 85.4% of the reported young drug abusers aged under 21 abused ketamine in 2008 and the latest figure was 78.2% in 2010. The increasing concern of ketamine use in the society is not only because of its growing popularity among the teenagers, but also a significant rising trend of traffic accidents caused by driving under the influence of drugs (DUID). Driving under the effect of ketamine would significantly impair the driving performance putting the drug drivers at an unrecognized risk of personal harm as well as a tremendous danger to other road users.

According to the data collected by the Hospital Authority Hong Kong Poison Information Centre (HKPIC), ketamine abusers represented 16% of all drug abusers attending accident and emergency departments (AEDs) in the period of 1 July 2005 to 31 December 2005, and the proportion rose significantly to 40% in the period of 1 January 2008 to 30 June 2008. In a retrospective review of the acute clinical presentations of ketamine abusers in fifteen accident and emergency departments in Hong Kong, most ketamine abusers in the series were young (84% being 13-29 years old), male, and presented with impaired consciousness, abdominal pain, or dizziness. In their series of ketamine users, up to 21% and 16% of cases presented

with abdominal pain and abnormal liver function test results respectively. In another local study, ketamine abusers were noted to have upper gastrointestinal symptoms frequently, the commonest of which is epigastric pain.

In our study, 113 subjects reported ketamine in their last drug use, of which, 80 of them did not specify any physical complication. Seven (21.2%) of the 33 subjects who had physical complications reported epigastric pain as one of their complaints. Six of these seven ketamine abusers also complained urinary problems. These subjects are young, aged between 23 to 36 years, 4 are males and 3 are females.

Recent local observations also suggested that long-term ketamine usage can cause biliary abnormalities resulting in recurrent epigastric pain and elevated ductal enzymes. In a case report, the maximal diameter of the dilated common bile duct can be up to 17mm which is about five- to six-fold of the usual dimension (about 3mm) in normal young adults and can be misdiagnosed as another biliary tree abnormality, namely choledochal cyst, that may lead to unnecessary investigations or even an operation. Therefore, apart from the growing alertness of the ketamine-induced cystitis and urinary tract problems, the general public should be made aware of this ketamine-related epigastric/abdominal pain and hepatobiliary problems.

Similar drug of abuse items were detected in the subgroups of NTEC and NTWC, differing by the order of frequency. Cough medicine and hypnotics were the two most commonly detected drug items in our study population. This pattern is different from the usual pattern reported by the CRDA. The physical and psychological dependence, as well as the psychiatric complications caused by cough medicine and hypnotics that are commonly encountered in patients of SACs are currently overlooked by the community. Education to the general public on the harmful effects of these two benign-looking therapeutic medications would be helpful in reducing the number of new cough medicine and hypnotics abusers who try them by ignorance. More stringent policy on monitoring local pharmacies on the selling of unprescribed cough medicine and hypnotics could also be considered by the government.

4 Conclusions

Our report has presented the findings of the survey and urine analysis conducted in 454 subjects from the substance abuse clinics or non-government organizations in NTEC or NTWC during the period of July 2007 to March 2011.

The demographic characteristics of our study population with their continuing substance abuse habit and long-term psychiatric problems created a huge social, financial and healthcare burden to the society. While primary prevention of substance abuse is of paramount importance to avoid these potential problems from happening in all generations, effort and resources on tackling the existing drug abusers in terms of stopping and monitoring their drug misuse habit, treating their physical and psychiatric illnesses, and ultimately helping them to return to the society with public acceptance, cannot be neglected.

Differences in age revealed a different prevalence of drug abuse pattern in the locality. Though the most commonly detected drug of abuse items in NTEC and NTWC were similar, the differences in the frequency of detection of individual drug items can be explained by the different age components among the regional subgroups. More young subjects in NTEC showed a higher prevalence of ketamine abuse while more old subjects in NTWC showed a higher prevalence of opiates abuse. Nevertheless, the commonness of cough medicine (26.7% of total) and hypnotics (18.3% of total) misuse among patients followed up in SACs across the new territories gives an important message to the community that their potential harmful effects should not be overlooked.

Advanced technology in drug testing is useful in diagnosing and monitoring substance abuse habit, as well as in discovering unusual pattern and novel or contaminated substances being misused, though cost and window of detection would be its limitations.

5 References

References on drug testing

Ojanperä L, Pelander A, Laks S, Gergov M, Vuori E, Witt M. Application of accurate mass measurement to urine drug screening. J Anal Toxicol. 2005 Jan-Feb;29(1):34-40.

Nordgren HK, Holmgren P, Liljeberg P, Eriksson N, Beck O. Application of direct urine LC-MS-MS analysis for screening of novel substances in drug abusers. J Anal Toxicol. 2005 May-Jun;29(4):234-9.

Lee HK, Ho CS, Iu YP, Lai PS, Shek CC, Lo YC, Klinke HB, Wood M. Development of a broad toxicological screening technique for urine using ultra-performance liquid chromatography and time-of-flight mass spectrometry. Anal Chim Acta. 2009 Sep 1;649(1):80-90. Epub 2009 Jul 28.

Tabernero MJ, Felli ML, Bermejo AM, Chiarotti M. Determination of ketamine and amphetamines in hair by LC/MS/MS. Anal Bioanal Chem. 2009 Dec;395(8):2547-57. Epub 2009 Oct 6.

Nielsen MK, Johansen SS, Dalsgaard PW, Linnet K. Simultaneous screening and quantification of 52 common pharmaceuticals and drugs of abuse in hair using UPLC-TOF-MS. Forensic Sci Int. 2010 Mar 20;196(1-3):85-92. Epub 2010 Jan 12.

W.C. Cheng, K.M. Ng, K.K. Chan, V.K. Mok and B.K. Cheung. Roadside detection of impairment under the influence of ketamine. Forensic Sci Int. 170:51-58 (2007)

W.M. Bosker and M.A. Huestis. Oral fluid testing for drugs of abuse. Clin Chem. 55:1910-1031 (2009).

References on cough medicine abuse

Lam LC, Lee DT, Shum PP, Chen CN. Cough mixture misuse in Hong Kong--an emerging psychiatric problem? Addiction. 1996 Sep;91(9):1375-8.

Shek DT, Lam CM. Adolescent cough medicine abuse in Hong Kong: implications for the design of positive youth development programs in Hong Kong. Int J Adolesc Med Health. 2006 Jul-Sep;18(3):493-503.

Wong KM, Chak WL, Cheung CY, Chan YH, Choi KS, Chau KF, Li CS. Hypokalemic metabolic acidosis attributed to cough mixture abuse. Am J Kidney Dis. 2001 Aug;38(2):390-4.

Au WY, Tsang J, Cheng TS, Chow WS, Woo YC, Ma SK, Tam S. Cough mixture abuse as a novel cause of megaloblastic anaemia and peripheral neuropathy. Br J Haematol. 2003 Dec;123(5):956-8.

Au WY, Tsang SK, Cheung BK, Siu TS, Ma ES, Tam S. Cough mixture abuse as a novel cause of folate deficiency: a prospective, community-based, controlled study. Haematologica. 2007 Apr;92(4):562-3.

Au WY, Cheng TS, Siu TS, Tam S. Cerebellar degeneration and folate deficiency due to cough mixture abuse. Haematologica. 2005 Nov;90 Suppl:ECR28.

References on hypnotics abuse

Wong CP, Chiu PK, Chu LW. Zopiclone withdrawal: an unusual cause of delirium in the elderly. Age Ageing. 2005 Sep;34(5):526-7.

Fung HT, Lai CH, Wong OF, Lam KK, Kam CW. Two cases of methemoglobinemia following zopiclone ingestion. Clin Toxicol (Phila). 2008 Feb;46(2):167-70.

Fung HT, Lai CH, Wong OF, Lam SK, Lam KK. Hemolytic anemia after zopiclone overdose. Clin Toxicol (Phila). 2009 Nov;47(9):902-3.

Aranko K, Henriksson M, Hublin C, Seppäläinen AM . Misuse of zopiclone and convulsions during withdrawal. Pharmacopsychiatry. 1991 Jul;24(4):138-40.

Flynn A, Cox D. Dependence on zopiclone. Addiction. 2006 Jun;101(6):898.

Hajak G, Müller WE, Wittchen HU, Pittrow D, Kirch W. Abuse and dependence potential for the non-benzodiazepine hypnotics zolpidem and zopiclone: a review of case reports and epidemiological data. Addiction. 2003 Oct;98(10):1371-8.

References on ketamine abuse

K. Wolff and A.R. Winstock. Ketamine: from medicine to misuse. CNS Drugs. 20:199-218 (2006).

K. Joe-Laidler and G. Hunt. Sit Down to Float: The Cultural Meaning of Ketamine Use in Hong Kong. Addict Res Theory. 16:259-271 (2008).

S.H. Ng, M.L. Tse, H.W. Ng and F.L. Lau. Emergency department presentation of ketamine abusers in Hong Kong. Hong Kong Med J. 16:6-11 (2010).

Chu PS, Kwok SC, Lam KM, Chu TY, Chan SW, Man CW, Ma WK, Chui KL, Yiu MK, Chan YC, Tse ML, Lau FL. 'Street ketamine'-associated bladder dysfunction: a report of ten cases. Hong Kong Med J. 2007 Aug;13(4):311-3. Epub 2007 Jun 21.

Chu PS, Ma WK, Wong SC, Chu RW, Cheng CH, Wong S, Tse JM, Lau FL, Yiu MK, Man CW. The destruction of the lower urinary tract by ketamine abuse: a new syndrome? BJU Int. 2008 Dec;102(11):1616-22. Epub 2008 Aug 1.

Poon TL, Wong KF, Chan MY, Fung KW, Chu SK, Man CW, Yiu MK, Leung SK. Upper gastrointestinal problems in inhalational ketamine abusers. J Dig Dis. 2010 Apr;11(2):106-10.

Wong SW, Lee KF, Wong J, Ng WW, Cheung YS, Lai PB. Dilated common bile ducts mimicking choledochal cysts in ketamine abusers. Hong Kong Med J. 2009 Feb;15(1):53-6.

Seto WK, Ng M, Chan P, Ng IO, Cheung SC, Hung IF, Yuen MF, Lai CL. Ketamine-induced cholangiopathy: a case report. Am J Gastroenterol. 2011 May;106(5):1004-5.

Other references

Central Registry of Drug Abuse, Narcotics Division, Security Bureau, HKSAR Government. Table 3, www.nd.gov.hk/statistics_list/doc/en/t3.pdf (December 2010)

General Household Survey conducted by the Census and Statistics Department. Press release on May 19, 2011 (Unemployment and underemployment statistics for February - April 2011). http://www.censtatd.gov.hk/press_release/press_releases_on_statistics/index.jsp?sID=2742&sSUBID=18445&displayMode=D

Legislative Council Panel on Transport. Initial Proposals to Combat Drug Driving. www.legco.gov.hk/yr09-10/english/panels/tp/papers/tp0723cb1-2587-1-e.pdf (July 2010)

6 Acknowledgement

The Research Team is grateful to the following parties for their generous support in the recruitment of subjects for the study:

*Department of Psychiatry, Prince of Wales Hospital, CUHK

*Department of General Adult Psychiatry, Castle Peak Hospital

*HKLSS Cheer Lutheran Centre, Hong Kong Lutheran Social Service, the Lutheran Church - Hong Kong Synod Limited

In the course of our study, we faced many difficulties in recruiting the study subjects. Special thanks are expressed to Professor Kenneth Lee from School of Pharmacy, CUHK and Professor W K Tang from the Department of Psychiatry, CUHK, who leaded the "Socioeconomic and Health Impacts of Substance Abuse in Hong Kong – A Longitudinal Study" which was also funded by the Beat Drugs Fund Association, providing us an important source of recruitment. Gratitude is also to their research assistants, particularly, Ms Iris Ko, for conducting the survey and collecting the urine samples from the patients. Sincere thanks and appreciations are expressed to the whole team of the Substance Abuse Clinic of the Castle Peak Hospital, particularly to Mr Patrick Hon and Ms LY Lau, who contributed a lot in the recruitment of subjects in the NTWC so that we can complete the whole project after four years effort.

Thanks are owed to the Research Advisory Group of The Narcotics Division of the Security Bureau for their invaluable advice and suggestions on our study. We also appreciate the efforts made by the staff of the Beat Drugs Fund Association to facilitate the financial and various aspects of the administration of our study.

Last but not least, we would like to thank Mr Emmett Law, Mr Vincent Leung, Mr Patrick Tin and Ms Sammy Lau for their valuable technical assistance to our study.

7 Appendix

7.1 Questionnaire

Part I: Demographic Data

Sex ☐ Male / ☐ Female

Age or DOB _____ year-old or ___/___/_____ (DD/MM/YY)

Marital Status ☐Single / ☐Co-habitant / ☐Married / ☐Separated / ☐Divorced / ☐Widowed

Educational Attainment

☐ No formal education

☐ Pre-Primary education

☐ Primary education (Complete / Incomplete: up to Primary ___)

☐ Secondary education (Complete / Incomplete: up to Form ___)

☐ Tertiary education: IVE / Diploma / Higher-diploma / Associates / University

☐ Others (please specify: _____)

Current Employment

☐ Occupation: _____ (☐Full-time / ☐Part-time; For _____ weeks / months / years)

☐ Unemployed (For _____ weeks / months / years, previously worked as: _____)

☐ Student (☐Full-time / ☐Part-time, please specify: _____)

Monthly Personal Income

☐ No income (Did you receive any social security allowance? ☐ Yes / ☐ No)

☐ Less than $1,000

☐ $1,000 to $2,999

☐ $3,000 to $4,999

☐ $5,000 to $6,999

☐ $7,000 to $8,999

☐ $9,000 to $10,999

☐ >$11,000

Monthly Expenditure on Drugs

☐ Nil ☐ Less than $100

☐ $100 to $299

☐ $300 to $499

☐ $500 to $699

☐ $700 to $899

☐ $900 to $1,099

☐ >$1,100

Part II: Information on Drug Use

Is this your first visit to CPH Substance Abuse Clinic? ☐ Yes / ☐ No
If No, when did you first visit this clinic? ____/____ (MM/YY)

When did you first try the drug(s)?
Age _____ / Year __

What drugs have you tried?
Narcotics Analgesics
☐ Opiates / Heroin (海洛英/白粉)
(Mode of Administration: oral / smoking / chasing dragon / iv injection)
Tranquillizers
☐ Benzodiazepine / Midazolam (Dormicum 藍精靈) / Diazepam (Valium) / Others
☐ Hypnotics / Zopiclone (白瓜子)
Stimulants
☐ Amphetamine / Methylamphetamine (冰)
☐ MDMA (Ecstasy / 搖頭丸)
☐ Cocaine (可卡因)
Hallucinogens
☐ Cannabis (大麻 / 草)
☐ Cannabis resin
☐ LSD
Depressants
☐ Methaqualone (Mandrax 忽得)
Others
☐ Ketamine
☐ Cough Medicine
☐ Thinner / Organic Solvent
☐ Others, please specify:
☐ Not known
Why did you try the drug(s)?
Experimental / Recreational / Dependence / Peer Influence / Others (Please specify: _____)
Did you suffer from any complications?
☐ Yes, (Physical: _____ ;
Psychiatric: Psychosis / Depression / Impaired memory / Others: _____)
☐ No

When did you take the drugs lastly?

Exact Date _____/_____/_____ (DD/MM/YY)

Estimated Time _____ hours / days / weeks / months / years ago

What drugs have you taken lastly?

Please specify: _____

Where and how did you get the drug(s)?

District (in Hong Kong), please specify: _____ (e.g. Tsim Sha Tsui)

City in Mainland China, please specify: _____ (e.g. Shenzhen)

City in other country, please specify: _____

From: Pharmacy / Friends / Others, please specify: _____

Where did you take the drug(s)?

Disco / Bar / Karaoke / Video Game Centre / Pharmacy / Home / Friend's Apartment / Street

Others, please specify: _____

Are you taking any regular medications now?

☐ Yes. (Please specify: _____)

☐ No

Smoking and Drinking History:

☐ Smoker ☐ Ex-Smoker ☐ Non-Smoker

☐ Drinker (Regular/Social) ☐ Ex-Drinker ☐ Non-Drinker

Forensic History:

☐ Nil

☐ Yes (Please specify: robbery / theft / assault / drug trafficking / drug possession / others)

Currently on Probation: ☐ Yes ☐ No

~ End of Questionnaire ~