Study of Patterns of Drugs of Abuse in New Territories East Cluster Drug of Abuse Clinic Using Conventional and New Technologies

24 May 2010

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Part I: Project overview

Time-line and events

Month/Year	Events
Jan 2007	• Installation of UPLC-TOF/MS
Apr 2007	• Approval of Beat Drug Fund
May – Aug 2007	• Ethics Approval of Research Protocol • Preparation of subject recruitment • Recruitment of Medical Laboratory Technician II (MLT II) • Recruitment of study subjects starts in Jul 2007
Sep 2007	• Submitted 1st Progress report to Research Advisory Group • MLT II reported duty
Nov 2007	• Submitted 2nd Progress report to Research Advisory Group • Applied for extension of duration of study and revision of budget plan
Mar 2008	• Submitted 3rd Progress report to Research Advisory Group • Submission of revised study proposal of original study (Project 1) and budget plan in collaboration of another study project (Project 2)

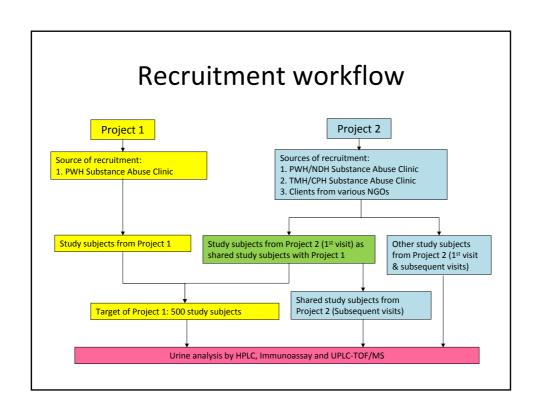| Month/Year	Events
May 2008	• Approval of revised study proposal and extension of Project 1 from Jun 2008 to Mar 2009
Jun 2008	• Submitted 4th Progress report to Research Advisory Group • Recruitment of Project 2 started
Oct 2008	• Submitted 5th Progress report to Research Advisory Group • Presentation on the progress of Project 1 to Research Advisory Group on 9 Oct 2008 • Submission and approval of revised budget plan
Dec 2008	• Submitted 6th Progress report to Research Advisory Group
Apr 2009	• Submitted 7th Progress report to Research Advisory Group • Submission of proposal of extension of Project 1 with revised study protocol and budget plan
Jul 2009	• Approval of revised budget plan and proposal (Honorarium of $100 for each recruited subjects)
Nov 2009	• Applications for ethics approval for revised study protocol (expansion of recruitment sources)

Month/Year	Events
Jan 2010	• Submitted 8th Progress report to Research Advisory Group • Submission of proposal of further extension of Project 1 to Dec 2010
Mar 2010	• Ethics approval of revised study protocol by the Joint CUHK-NTEC CREC • Application of ethics approval in NTWC
Apr 2010	• Ethics approval of study protocol by NTWC CREC • Submitted Semi-final report to Research Advisory Group • Recruitment of study subjects in NTWC Substance Abuse Clinic started since late Apr 2010
May 2010	• Presentation on the progress of Project 1 to Research Advisory Group on 24 May 2008

Subject recruitment

Month/Year	Cumulative no. of subjects	% of target recruitment
Sep 2007	23	4.6%
Nov 2007	37	7.4%
Mar 2008	51	10.2%
Jun 2008	56	11.2%

Expanding recruitment source

- Collaboration with a second project "Socioeconomic and Health Impacts of Substance Abuse in Hong Kong – A Longitudinal Study"
  - granted by the Beat Drugs Fund Association
  - leaded by Professor Kenneth Lee, 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
- Department of Chemical Pathology, CUHK, as one of the collaborating institutions, primarily provides the analytical services for this project
- Relevant data obtained from this second project including the urine analysis result and information from questionnaire can be used by our first project for data analysis

Recruitment workflow

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  ┌──────────────┐                        ┌──────────────┐
  │  Project 1   │                        │  Project 2   │
  └──────┬───────┘                        └──────┬───────┘
         │                                        │
┌────────▼─────────────┐      ┌────────────────────▼──────────────┐
│ Source of recruitment:│      │ Sources of recruitment:           │
│ 1. PWH Substance      │      │ 1. PWH/NDH Substance Abuse Clinic  │
│    Abuse Clinic       │      │ 2. TMH/CPH Substance Abuse Clinic  │
└────────┬─────────────┘       │ 3. Clients from various NGOs       │
         │                     └──────────────┬────────────────────┘
         │                                    │
         │                        ┌───────────┴─────────────┐
         │                        │                         │
┌────────▼──────────┐  ┌──────────▼──────────────┐  ┌───────▼────────────┐
│ Study subjects    │  │ Study subjects from     │  │ Other study subjects│
│ from Project 1    │  │ Project 2 (1st visit)   │  │ from Project 2 (1st │
└────────┬──────────┘  │ as shared study subjects│  │ visit & subsequent │
         │             │ with Project 1          │  │ visits)            │
         │             └──────────┬──────────────┘  └────────┬──────────┘
         │                        │                          │
         │            ┌───────────▼─────────────┐            │
         │            │ Shared study subjects    │            │
┌────────▼──────────┐ │ from Project 2           │            │
│ Target of Project │ │ (Subsequent visits)      │            │
│ 1: 500 study      │ └───────────┬─────────────┘            │
│ subjects          │             │                          │
└────────┬──────────┘             │                          │
         │                        │                          │
┌────────▼────────────────────────▼──────────────────────────▼──────┐
│   Urine analysis by HPLC, Immunoassay and UPLC-TOF/MS             │
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Pre-numbered questionnaire, urine collection bottle and lab request form

Subject recruitment

Month/Year	Cumulative no. of subjects	% of target recruitment
Sep 2007	23	4.6%
Nov 2007	37	7.4%
Mar 2008	51	10.2%
Jun 2008	56	11.2%
Oct 2008	81	16.2%
Dec 2008	107	21.4%
Apr 2009	134	26.8%
Jan 2010	222	44.4%
Mar 2010	226	45.2%

Study of Patterns of Drugs of Abuse in New Territories East and West Clusters Drug of Abuse Clinic Using Conventional and New Technologies

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Part II: Interim findings

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

Semi-Final Report Submitted To

The Research Advisory Group of The Beat Drugs Fund Association

By Research Team

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Data analysis

- Subjects recruited from July 2007 to March 2010
- Total: 226 subjects (excluding eight follow-up cases of our collaborated project)
- Male : Female = 143 : 83
- Age: 14 - 63 years
- NTEC : NTWC = 161 : 65
- New case : Old case = 55 : 161

Major findings

- Survey results
  - Demographics
  - History of previous drug use
  - History of last drug use
  - Other information
- Results of urine analysis
  - Comparison of conventional and new techniques
  - Overall results
- Comparison of survey and urine analysis results
  - Patterns of substance abuse
  - Comparison of urine analysis results with history of last drug use

Demographics

- Young age (< 40 yrs, range from 14 to 63 yrs)
- Single
- Junior secondary education (up to F.2 / F.3)
- High unemployment rate
- No or low monthly personal income

Age and Sex

Age group (years)	Female	Male	Total	
10-19	24	17	41	(18%)
20-29	28	45	73	(32%)
30-39	23	60	83	(37%)
40-49	6	11	17	(8%)
50-59	1	9	10	(4%)
60-70	1	1	2	(1%)
Grand Total	**83**	**143**	**226**	**(100%)**

*Age of the recruited subjects range from 14 to 63 years.

*87% of 226 subjects are < 40 years.

Marital Status

Marital status	Female	Male	Total	
Never married	49	87	136	(60.2%)
Co-habitant	3	2	5	(2.2%)
Married	15	33	48	(21.2%)
Divorced	8	7	15	(6.6%)
Separated	1	4	5	(2.2%)
Widowed	1		1	(0.4%)
Not specified	6	10	16	(7.1%)
Grand Total	**83**	**143**	**226**	**(100%)**

Education level by sex

Education level	Female	Male	Total	
Primary education	7	16	23	(10%)
Secondary education	75	110	185	(82%)
Tertiary education		5	5	(2%)
Not specified	1	12	13	(6%)
Grand Total	**83**	**143**	**226**	**(100%)**

Education level by age group

Education level	Age group (Years)						Total
	10-19	**20-29**	**30-39**	**40-49**	**50-59**	**60-70**	
Primary education	1	2	3	9	7	1	23
Secondary education	36	66	73	8	2		185
Tertiary education		3	1			1	5
Not specified	4	2	6		1		13
Grand Total	**41**	**73**	**83**	**17**	**10**	**2**	**226**

- 185 (82%) of the 226 recruited subjects attained secondary education level.
- 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.

Education level

Secondary education up to	Female	Male	Total	
F.1	7	18	25	(13.5%)
F.2	15	29	44	(23.8%)
F.3	21	35	56	(30.3%)
F.4	8	7	15	(8.1%)
F.5	23	21	44	(23.8%)
Not specified	1		1	(0.5%)
Grand Total	**75**	**110**	**185**	**(100%)**

Employment status by sex

Employment status	Female	Male	Total	
Unemployed	51	77	128	(56.6%)
Full-time	12	32	44	(19.5%)
Part-time	4	17	21	(9.3%)
Student	8	11	19	(8.4%)
Housewife	7		7	(3.1%)
Retired		1	1	(0.4%)
Others	1	5	6	(2.7%)
Grand Total	**83**	**143**	**226**	**(100%)**

Employment status by age

Secondary education up to	Age group (Years)						Total
	10-19	20-29	30-39	40-49	50-59	60-70	
Unemployed	19	37	49	15	6	2	128
Full-time	3	25	14	1	1		44
Part-time	3	3	15				21
Student	14	5					19
Housewife		2	3	1	1		7
Retired					1		1
Others	2	1	2		1		6
Grand Total	**41**	**73**	**83**	**17**	**10**	**2**	**226**

Monthly personal income by sex

Employment status	Female	Male	Total	
No income	63	82	145	(64%)
< $1,000	3	1	4	(2%)
$1,000 to $2,999	3	5	8	(4%)
$3,000 to $4,999	4	9	13	(6%)
$5,000 to 6,999	3	6	9	(4%)
$7,000 to $8,999	1	9	10	(4%)
$9,000 to $10,999	3	10	13	(6%)
>$11,000	3	16	19	(8%)
Not specified	0	5	5	(2%)
Grand Total	**83**	**143**	**226**	**(100%)**

* Most of the subjects have no income or low income.

Monthly expenditure on drugs by sex

Expenditure	Female	Male	Total	
Nil	30	69	99	(44%)
<$100	4	4	8	(4%)
$100 to $299	7	6	13	(6%)
$300 to $499	6	6	12	(5%)
$500 to $699	5	4	9	(4%)
$700 to $899	1	2	3	(1%)
$900 to $1,099	7	1	8	(4%)
>$1,100	22	44	66	(29%)
Not specified	1	7	8	(4%)
Grand Total	**83**	**143**	**226**	**(100%)**

Monthly expenditure on drugs by income

Expenditure	No income	Monthly income		
		<$5000	$5000 to $10,999	>$11,000
Nil	68 (47%)	13 (52%)	13 (41%)	5 (26%)
<$100	6 (4%)	1 (4%)		1 (5%)
$100 to $299	10 (7%)	3 (12%)		
$300 to $499	8 (6%)	2 (8%)	2 (6%)	
$500 to $699	5 (3%)	2 (8%)	1 (3%)	1 (5%)
$700 to $899	3 (2%)			
$900 to $1,099	6 (4%)	1 (4%)		1 (5%)
>$1,100	36 (25%)	3 (12%)	16 (50%)	11 (58%)
Not specified	3 (2%)			
Grand Total	**145 (100%)**	**25 (100%)**	**32 (100%)**	**19 (100%)**

*Among 145 subjects who have no income, 74 of them still have expenditure on drugs (36 subjects reported to have monthly expenditure on drugs of > $1,100).

History of previous drug use

- First try at young age
  - < 25 yrs, majority 15-19 yrs
- Try multiple drugs
  - Higher tendency of multiple drug use in younger age groups
- Pattern of drug use
  - <40 yrs: Ketamine and Amphetamines
  - >= 40 yrs: Hypnotics and Heroin
- Reasons for drug use
  - Recreational and peer influence
- Subjective complications from drug
  - 50% Yes, 40% No

Age first started drug abuse by sex

Age group	Female	Male	Total	
			N	%
10-14	20	27	47	(20.8%)
15-19	39	63	102	(45.1%)
20-24	12	23	35	(15.5%)
25-29	6	9	15	(6.6%)
30-34	1	5	6	(2.7%)
35-39	2	3	5	(2.2%)
45-49	1	1	2	(0.9%)
50-54		3	3	(1.3%)
55-60	1		1	(0.4%)
Not specified	1	9	10	(4.4%)
Grand Total	**83**	**143**	**226**	**(100%)**

*Age first started drug abuse was reported to be ranged from 10 to 55 years.

Number of groups of drug items ever tried by sex

Number of groups of drug items	Female		Male		Total	
	N	%	N	%	N	%
1	26	(31%)	42	(29%)	68	(30%)
2	14	(17%)	20	(14%)	34	(15%)
3	9	(11%)	22	(15%)	31	(14%)
4	13	(16%)	16	(11%)	29	(13%)
5	10	(12%)	16	(11%)	26	(12%)
6	5	(6%)	11	(8%)	16	(7%)
7	3	(4%)	4	(3%)	7	(3%)
8	3	(4%)	2	(1%)	5	(2%)
9			5	(3%)	5	(2%)
Not specified			5	(3%)	5	(2%)
Grand Total	**83**	**(100%)**	**143**	**(100%)**	**226**	**(100%)**

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	
1	11	23	21	7	5	1	68
2	7	10	13	3	1		34
3	6	11	11	2	1		31
4	8	8	11	1	1		29
5	5	10	8	1	1	1	26
6	2	7	6	1			16
7	1	2	3	1			7
8		1	3	1			5
9			5				5
Not specified	1	1	2		1		5
Grand Total	41	73	83	17	10	2	226

*Proportion of multiple drug users is greater than that of single drug users among the younger age groups.

Summary of group of drug item ever tried by sex

Group of drug item	Female (N=83)		Male (N=143)		Total (N=226)	
		%		%		%
Ketamine	52	63%	82	57%	134	59.3%
Amphetamines (Ice)	41	49%	61	43%	102	45.1%
Cannabis	26	31%	61	43%	87	38.5%
MDMA (Ecstasy)	28	34%	48	34%	76	33.6%
Benzodiazepines	24	29%	37	26%	61	27.0%
Hypnotics	25	30%	35	24%	60	26.5%
Cocaine	27	33%	30	21%	57	25.2%
Cough medicine	21	25%	36	25%	57	25.2%
Opiates	9	11%	48	34%	57	25.2%
Mandrax	6	7%	9	6%	15	6.6%
Thinner / Organic solvent			1	1%	1	0.4%
Others (e.g. Analgesics)			2	1%	2	0.9%
Grand Total	259		450		709	

Summary of group of drug item ever tried by age

Group of drug item	Age group (Years)												Total	
	10-19 (N=41)		20-29 (N=73)		30-39 (N=83)		40-49 (N=17)		50-59 (N=10)		60-70 (N=2)		(N=226)	
Ketamine	34	83%	59	81%	35	42%	4	24%	2	20%			134	59.3%
Amphetamines (Ice)	22	54%	26	36%	45	54%	8	47%	1	10%			102	45.1%
Cannabis	13	32%	29	40%	39	47%	5	29%			1	50%	87	38.5%
MDMA (Ecstasy)	15	37%	31	42%	25	30%	4	24%	1	10%			76	33.6%
Benzodiazepines	8	20%	16	22%	26	31%	7	41%	3	30%	1	50%	61	27.0%
Hypnotics	3	7%	13	18%	28	34%	7	41%	7	70%	2	100%	60	26.5%
Cocaine	14	34%	22	30%	17	20%	3	18%			1	50%	57	25.2%
Cough medicine	4	10%	12	16%	37	45%	4	24%					57	25.2%
Opiates (Heroin)	2	5%	9	12%	33	40%	7	41%	5	50%	1	50%	57	25.2%
Mandrax	5	12%	5	7%	5	6%							15	6.6%
Thinner / Organic solvent			1	1%									1	0.9%
Others (e.g. Analgesics)					2	2%							2	0.4%
Grand Total	120		223		292		49		19		6		709	

Reason of drug abuse

Reason of drug abuse	Female N=83		Male N=143		Total N=226	
		%		%		%
Recreational	44	53%	71	50%	115	51%
Peers Influence	22	27%	44	31%	66	29%
Experimental	5	6%	15	10%	20	9%
Dependence	11	13%	8	6%	19	8%
Others	14	17%	18	13%	32	14%
Grand Total	96		156		252	

Subjective complications of drug abuse

Presence of complications	Female		Male		Total	
	N	**%**	**N**	**%**	**N**	**%**
Yes	39	(47%)	73	(51%)	112	(50%)
No	38	(46%)	52	(36%)	90	(40%)
Not specified	6	(7%)	18	(13%)	24	(11%)
Grand Total	**83**	**(100%)**	**143**	**(100%)**	**226**	**(100%)**

History of last drug use

- Within 1 month
- Reported only single drug use
- Ketamine, amphetamines, hypnotics, cough medicine and heroin are the five most popular groups of drug items
- Got drugs from friends
- Taken drugs at home

Estimated time of last use

When was last drug use?	Female	Male	Total
Less than 1 day	11	16	27 (12%)
1 day to less than or equal to 1 week	31	52	83 (37%)
Above 1 week to less than or equal to 1 month	16	21	37 (16%)
Above 1 month to less than or equal to 1 year	16	36	52 (23%)
Above 1 year	7	9	16 (7%)
Not specified	2	9	11 (5%)
Grand Total	**83**	**143**	**226**

Number of drug item last used by sex

Number of drug item last used	Female	Male	Total	
1	66	118	184	(81%)
2	11	16	27	(12%)
3	2		2	(1%)
4	3	1	4	(2%)
Not specified	1	8	9	(4%)
Grand Total	**83**	**143**	**226**	**(100%)**

*Note: Individual subject could report more than one drug item during his/her last use.
*Most (81%) subjects reported only one drug item used.

Summary of group of drug item last used by sex

Group of drug item last used	Female (N=83)		Male (N=143)		Total (N=226)	
		%		%		%
Ketamine	31	30%	50	31%	81	31%
Amphetamines (Ice)	24	24%	18	11%	42	16%
Hypnotics	18	18%	18	11%	36	14%
Cough medicine	2	2%	30	19%	32	12%
Opiates (Heroin)	11	11%	15	9%	26	10%
Benzodiazepines	8	8%	7	4%	15	6%
Cocaine	4	4%	4	2%	8	3%
MDMA (Ecstasy)	2	2%	5	3%	7	3%
Cannabis	1	1%	3	2%	4	2%
LSD			1	1%	1	0%
Others (e.g. analgesics)			2	1%	2	1%
Not specified	1	1%	8	5%	9	3%
Grand Total	**102**		**161**		**263**	

Source of drugs

18 Districts of Hong Kong					
New Territories (Subtotal: 118)		**Kowloon (Subtotal: 80)**		**Hong Kong Island (Subtotal: 3)**	
Sha Tin	41	Mong Kok	61	Central & Western	1
Yuen Long	30	Kwun Tong	9	Eastern	1
Tuen Mun	26	Sham Shui Po	7	Wan Chai	1
Tai Po	9	Kowloon City	2	Southern	0
North	5	Wong Tai Sin	1		
Tsuen Wan	3				
Islands	2				
Sai Kung	2	**Outside Hong Kong**			
Kwai Ching	0	Shenzhen			
(Grand Total: 221)		**(Grand Total: 12)**			

Channels to obtain drugs

Channels	Total	%
Friends	116	51.3%
Pharmacy	56	24.8%
Others	25	11.1%
Not specified	29	12.8%
Grand Total	**226**	**100.0%**

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

Location of drug use

Location of drug use	Female (N=83)		Male (N=143)		Total (N=226)	
		%		%		%
Home	52	63%	62	43%	114	50.4%
Friend's apartment	21	25%	19	13%	40	17.7%
Street	5	6%	23	16%	28	12.4%
Disco	4	5%	17	12%	21	9.3%
Pharmacy			13	9%	13	5.8%
Video Game Centre			3	2%	3	1.3%
Karaoke	1	1%	1	1%	2	0.9%
Bar	1	1%	1	1%	2	0.9%
Park			1	1%	1	0.4%
Not specified	2	2%	9	6%	11	4.9%
Grand Total	**86**		**149**		**235**	

Currently on therapeutic drugs by sex

On therapeutic drug therapy	Female	Male	Total
Yes	43	60	103
No	39	74	113
Not specified	1	9	10
Grand Total	**83**	**143**	**226**

*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.

Smoking & drinking history by sex

Smoking history	Female	Male	Total
Smoker	63	124	187
Ex-smoker	2	5	7
Non-smoker	13	6	19
Not specified	5	8	13
Grand Total	**83**	**143**	**226**

Drinking history	Female	Male	Total
Drinker	26	63	89
Ex-drinker	12	10	22
Non-drinker	41	59	100
Not specified	4	11	15
Grand Total	**83**	**143**	**226**

Forensic history by sex

Forensic history	Female	Male	Total
Yes	30 (36%)	94 (66%)	124 (55%)
No	49 (59%)	39 (27%)	88 (39%)
Not specified	4 (5%)	10 (7%)	14 (6%)
Grand Total	**83 (100%)**	**143 (100%)**	**226 (100%)**

Summary of forensic history

Drug-related forensic history	Subtotal: 54
Drug trafficking	21
Drug possession	28
Drug abusing	5
Non-drug-related forensic history	**Subtotal: 37**
Theft	15
Assault	9
Robbery	9
Attacking police	2
Money laundering	1
Driving without license	1
Not specified	**Subtotal: 52**
	Grand Total: 143

Comparison of conventional (HPLC-UV/ immunoassays) and new (UPLC-TOF/MS) techniques

- 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.
- 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.
- Determine the ratio of C/N of each urine sample.
- 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

- Compare the identified drugs between the New and Conventional techniques.
- For drugs identified by the Conventional technique but not the New, add +1 point to Deficiency score (D) for each drug.
- For drugs identified by the New technique but not the Conventional, add +1 point to Improvement score (I) for each drug.
- 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.

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

Improvement of drug detection by new technique

- Ketamine
  - 9 of 67 urine samples detected ketamine by UPLC-TOF-MS, HPLC-UV missed 3 urine samples

- Zopiclone and Zolpidem
  - 11 of 67 urine samples detected zopiclone by UPLC-TOF-MS, HPLC-UV missed 2 urine samples
  - 5 of 67 urine samples detected zolpidem by UPLC-TOF-MS, HPLC-UV missed all

Deficiency of drug detection by new technique

- UPLC-TOF-MS missed 10 urine samples that benzodiazepine was detected by Immunoassay
- Known deficiency of UPLC-TOF-MS

- Solutions:
  - Supplementary use of immunoassay for benzodiazepine detection
  - Modified UPLC-TOF-MS method with enzyme digestion to detect the conjugates of benzodiazepines

Overall urine analysis results

- 56 drug items (including both drugs of abuse or therapeutic agents) were identified from over 1,200 parent drugs and metabolites detected in 226 study subjects.
- Novel drug or impurities are not detected by UPLC-TOF-MS
- Cough mixture is the most common drug of abuse item detected

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Summary of drug items detected in all urine samples

Drug category	Drug item detected	Drug category	Drug item detected
Amphetamines	Amphetamine	*Therapeutic drugs*	Amisulpride
	Methamphetamine		Amitriptyline
Analgesics	Tramadol		Atenolol
Barbiturates	Barbiturates		Atropine
Benzodiazepines	Diazepam		Benzhexol
	Flunitrazepam		Chlorpromazine
	Midazolam		Citalopram
	Nitrazepam		Desipramine
Cannabis	Cannabinoids		Dothiepin
Cocaine	Cocaine		Etoricoxib
Cough medicine	Brompheniramine		Famotidine
	Cetirizine		Fluoxetine
	Chlorpheniramine		Metoclopramide
	Codeine		Nortriptyline
	Dextromethorphan		Ofloxacin
	Dihydrocodeine		Olanzapine
	Hydrocodone		Propranolol
	Hydromorphone		Quetiapine
	Methylephedrine		Ranitidine
	Promethazine		Risperidone
	Propoxyphene		Sertraline
	Pseudoephedrine/Ephedrine		Sulpiride
Hypnotics	Zolpidem		Trazodone
	Zopiclone		Trifluoperazine
Opiates	Heroin		Venlafaxine
	Morphine		
Ketamine	Ketamine		
MDMA	HMMA		
	MDA		
	MDMA		
Methadone	Methadone		
	Subtotal: 31		**Subtotal: 25**

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	100%	N	100%
0	26	31%	32	22%	58	25.7%
1	24	29%	62	43%	86	38.1%
2	24	29%	30	21%	54	23.9%
3	8	10%	14	10%	22	9.7%
4			5	3%	5	2.2%
5	1	1%			1	0.4%
Grand Total	83	100%	143	100%	226	100%

*More than 1 drug (2 – 4 drugs) detected in 59 urine samples among the 184 subjects who reported single drug use during last use.

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	
0	19	18	14	4	3		58
1	15	34	28	6	2	1	86
2	4	17	26	2	4	1	54
3	2	4	10	5	1		22
4			5				5
5	1						1
Grand Total	41	73	83	17	10	2	226

Summary of group of drug of abuse item detected in urine by sex

Group of drug item	Female (N=83)	%	Male (N=143)	%	Total (N=226)	%
Cough medicine	36	43%	70	49%	106	46.9%
Ketamine	21	25%	32	22%	53	23.5%
Hypnotics	19	23%	18	13%	37	16.4%
Benzodiazepines	9	11%	24	17%	33	14.6%
Amphetamines	5	6%	20	14%	25	11.1%
Opiates	5	6%	15	10%	20	8.8%
Cocaine	4	5%	1	1%	5	2.2%
Analgesics	1	1%	1	1%	2	0.9%
MDMA	1	1%	1	1%	2	0.9%
Cannabis			1	1%	1	0.4%
Barbiturates			1	1%	1	0.4%
Grand Total	**101**		**184**		**285**	

Summary of group of drug of abuse item detected in urine by age

Groups of drug items	10-19 (N=41) N	%	20-29 (N=73) N	%	30-39 (N=83) N	%	40-49 (N=17) N	%	50-59 (N=10) N	%	60-70 (N=2) N	%	Grand Total (N=226) N	%
Cough medicine	12	29%	24	33%	54	65%	9	53%	6	60%	1	50%	106	46.9%
Ketamine	11	27%	34	47%	8	10%							53	23.5%
Hypnotics	2	5%	7	10%	22	27%	3	18%	2	20%	1	50%	37	16.4%
Benzodiazepines	1	2%	6	8%	20	24%	5	29%			1	50%	33	14.6%
Amphetamines	4	10%	5	7%	14	17%	2	12%					25	11.1%
Opiates			1	1%	9	11%	6	35%	4	40%			20	8.8%
Cocaine	2	5%	2	3%	1	1%							5	2.2%
Analgesics			1	1%	1	1%							2	0.9%
MDMA	2	5%											2	0.9%
Cannabis					1	1%							1	0.4%
Barbiturates									1	10%			1	0.4%
Grand Total	**34**		**80**		**130**		**25**		**13**		**3**		**285**	

Common ingredients of cough medicine detected

Ingredients of cough medicine detected in urine	Female (N=36)		Male (N=70)		Grand Total (N=106)	
		%		%		%
Promethazine	14	39%	38	54%	52	49.1%
Codeine	8	22%	43	61%	51	48.1%
Pseudoephedrine/Ephedrine	6	17%	39	56%	45	42.5%
Chlorpheniramine	14	39%	26	37%	40	37.7%
Hydrocodone	3	8%	21	30%	24	22.6%
Brompheniramine	6	17%	10	14%	16	15.1%
Propoxyphene	11	31%	4	6%	15	14.2%
Dextromethorphan	1	3%	10	14%	11	10.4%
Dihydrocodeine	1	3%	3	4%	4	3.8%
Cetirizine	3	8%			3	2.8%
Methylephedrine	1	3%	1	1%	2	1.9%
Hydromorphone			1	1%	1	0.9%
Grand Total	**68**		**196**		**264**	

Novel drugs or impurities

- No unidentified peak of unknown substances was detected in the 226 urine samples so far.

- However, unexpectedly high prevalence of cough medicine was detected in urine of our study subjects. Ingredients of cough medicine were detected in 106 urine samples (47% of 226 subjects).

- 194 (86%) of 226 subjects did not report cough medicine in their last use, of which, 77 subjects (40% of 194 subjects) turned out to have positive findings of ingredients of cough medicine in their urine.
  - Of these 77 subjects, the five most frequently reported drug items in their last use were ketamine (22 subject, 29%), heroin (19 subjects, 25%), hypnotics (19 subjects, 25%), amphetamines (13 subjects, 17%) and benzodiazepines (10 subjects, 13%).

Five most common drug of abuse items reported or detected in our study population (N = 226)

Results of survey			Results of urine analysis		
	N	%		N	%
Ketamine	81	31%	Cough medicine	106	46.9%
Amphetamines (Ice)	42	16%	Ketamine	53	23.5%
Hypnotics	36	14%	Hypnotics	37	16.4%
Cough medicine	32	12%	Benzodiazepines	33	14.6%
Opiates (Heroin)	26	10%	Amphetamines (Ice)	25	11.1%

Five most common drug of abuse items in female (N = 83)

Results of survey			Results of urine analysis		
	N	%		N	%
Ketamine	31	30%	Cough medicine	36	43%
Amphetamines (Ice)	24	24%	Ketamine	21	25%
Hypnotics	18	18%	Hypnotics	19	23%
Opiates (Heroin)	11	11%	Benzodiazepines	9	11%
Benzodiazepines	8	8%	Amphetamines (Ice)	5	6%
			Opiates	5	6%

Five most common drug of abuse items in male (N = 143)

Results of survey			Results of urine analysis		
	N	%		N	%
Ketamine	50	31%	Cough medicine	70	49%
Amphetamines (Ice)	18	11%	Ketamine	32	22%
Hypnotics	18	11%	Hypnotics	18	13%
Cough medicine	30	19%	Benzodiazepines	24	17%
Opiates (Heroin)	15	9%	Amphetamines (Ice)	20	14%

Age of 10 – 19 years (N = 41)

Drug items detected in urine		%
Cough medicine	12	29%
Ketamine	11	27%
Amphetamines	4	10%
MDMA	2	5%
Non-benzodiazepine hypnotics	2	5%
Cocaine	2	5%
Benzodiazepines	1	2%
Grand Total	34	

Age of 20 – 29 years (N = 73)

Drug items detected in urine		%
Ketamine	34	47%
Cough medicine	24	33%
Non-benzodiazepine hypnotics	7	10%
Benzodiazepines	6	8%
Amphetamines	5	7%
Cocaine	2	3%
Opiates	1	1%
Analgesics	1	1%
Grand Total	**80**	

Age of 30 – 39 years (N = 83)

Drug items detected in urine		%
Cough medicine	54	65%
Non-benzodiazepine hypnotics	22	27%
Benzodiazepines	20	24%
Amphetamines	14	17%
Opiates	9	11%
Ketamine	8	10%
Analgesics	1	1%
Cannabis	1	1%
Cocaine	1	1%
Grand Total	**130**	

Age of 40 – 49 years (N = 17)

Drug items detected in urine		%
Cough medicine	9	36%
Opiates	6	24%
Benzodiazepines	5	20%
Non-benzodiazepine hypnotics	3	12%
Amphetamines	2	8%
Grand Total	**25**	

Age of 50 – 59 years (N = 10)

Drug items detected in urine		%
Cough medicine	6	60%
Opiates	4	40%
Non-benzodiazepine hypnotics	2	20%
Barbiturates	1	10%
Grand Total	**13**	

Age of 60 – 70 years (N = 2)

Drug items detected in urine		%
Benzodiazepines	1	50%
Non-benzodiazepine hypnotics	1	50%
Cough medicine	1	50%
Grand Total	**3**	

Subjects recruited from NTEC

Drug items detected in urine	Female (N=57)		Male (N=85)		Grand Total (N=142)	
		%		%		%
Cough medicine	27	47%	45	53%	72	50.7%
Benzodiazepines	9	16%	20	24%	29	20.4%
Non-benzodiazepine hypnotics	10	18%	16	19%	26	18.3%
Ketamine	12	21%	14	16%	26	18.3%
Opiates	5	9%	11	13%	16	11.3%
Amphetamines	4	7%	12	14%	16	11.3%
Cocaine	4	7%	1	1%	5	3.5%
MDMA	1	2%			1	0.7%
Analgesics	1	2%			1	0.7%
Grand Total	**73**		**119**		**192**	

Subjects recruited from NTWC

Drug items detected in urine	Female (N=26)		Male (N=53)		Grand Total (N=79)	
		%		%		%
Cough medicine	9	35%	23	43%	32	40.5%
Ketamine	9	35%	16	30%	25	31.6%
Non-benzodiazepine hypnotics	9	35%	2	4%	11	13.9%
Amphetamines	1	4%	7	13%	8	10.1%
Opiates			3	6%	3	3.8%
Benzodiazepines			3	6%	3	3.8%
MDMA			1	2%	1	1.3%
Analgesics			1	2%	1	1.3%
Barbiturates			1	2%	1	1.3%
Cannabis			1	2%	1	1.3%
Grand Total	**28**		**58**		**86**	

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						Grand Total
	NS	1	2	3	4	0	1	2	3	4	5	
< 1 Day		23	3		1		9	12	4	1	1	27
1 day to <= 1 week	1	69	11		2	7	38	23	12	3		83
> 1 week to <= 1 month	1	33	3			11	18	5	2	1		37
> 1 month to <= 1 year		42	8	1	1	27	14	8	3			52
> 1 year		14	1	1		10	2	3	1			16
Not specified	7	3	1			3	5	3				11
Grand Total	**9**	**184**	**27**	**2**	**4**	**58**	**86**	**54**	**22**	**5**	**1**	**226**

*Note: NS = Not specified from the history

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

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	226

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.

Ketamine

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	47	34	81
Negative	6	139	165
Grand Total	53	173	226

Amphetamines

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	15	27	42
Negative	10	174	184
Grand Total	25	201	226

Cough medicine

History of last use	Urine detection by UPLC-TOF-MS		
	Positive	Negative	Grand Total
Positive	29	3	32
Negative	77	117	194
Grand Total	106	120	226

Part III: Current update

Subject recruitment

Month/Year	Cumulative no. of subjects	% of target recruitment
Sep 2007	23	4.6%
Nov 2007	37	7.4%
Mar 2008	51	10.2%
Jun 2008	56	11.2%
Oct 2008	81	16.2%
Dec 2008	107	21.4%
Apr 2009	134	26.8%
Jan 2010	222	44.4%
Mar 2010	226	45.2%
May 2010	291	58.2%

Current update

- Revised study protocol (to expand recruitment source in NTWC) was approved by the Joint-CUHK-NTEC Clinical & Research Ethics Committee (CREC) on 16 March 2010
- Research protocol was approved by NTWC CREC on 14 April 2010
- Subject recruitment in CPH started since 22 April 2010
- Current recruitment from CPH: 62 subjects up to 18 May 2010
- Recruitment from both projects in NTEC and NTWC
  – Project 1: 153 subjects (30.6%)
  – Project 2: 138 subjects (27.6%)
  – Total: 291 subjects (58.2%)

Factors affecting subject recruitment

- Improving factors:
  – More clinic sessions per week in CPH
  – Larger pool of potential subjects
  – Adoption of paying honorarium

- Hindering factors:
  – Limited active cases in clinic
  – High default rate (30 – 50% per clinic session)
  – Unsuitable subjects (e.g. too psychotic, criminal cases, etc.)
  – Variable response rate (0 – 25%)

Achieving the target

- Target recruitment: 500 subjects
- From July 2007 to March 2010 (33 months):
  - 226 subjects recruited (45.2% of target)
- From April 2010 to May 2010 (1 month):
  - 62 subjects recruited (12.4% of target)
  - Up to May 2010, 291 subjects recruited (58.2% of target)

- No. of subjects to be recruited: ~200
- Estimated recruitment: ~10 subjects per week
- Estimated time to achieve our target: 5-6 months (by Dec 2010)

Other usage of UPLC-TOF-MS in detection of substance abuse

- Potential use of salivary specimen for analysis
  - Assessing the sensitivity and specificity of a commercial kit for ketamine using spot salivary sample

Part IV: Discussions

Thank you!

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