

EBM Conference on Emergency Medicine

Hyperbaric Oxygen for Carbon Monoxide Poisoning in Hong Kong

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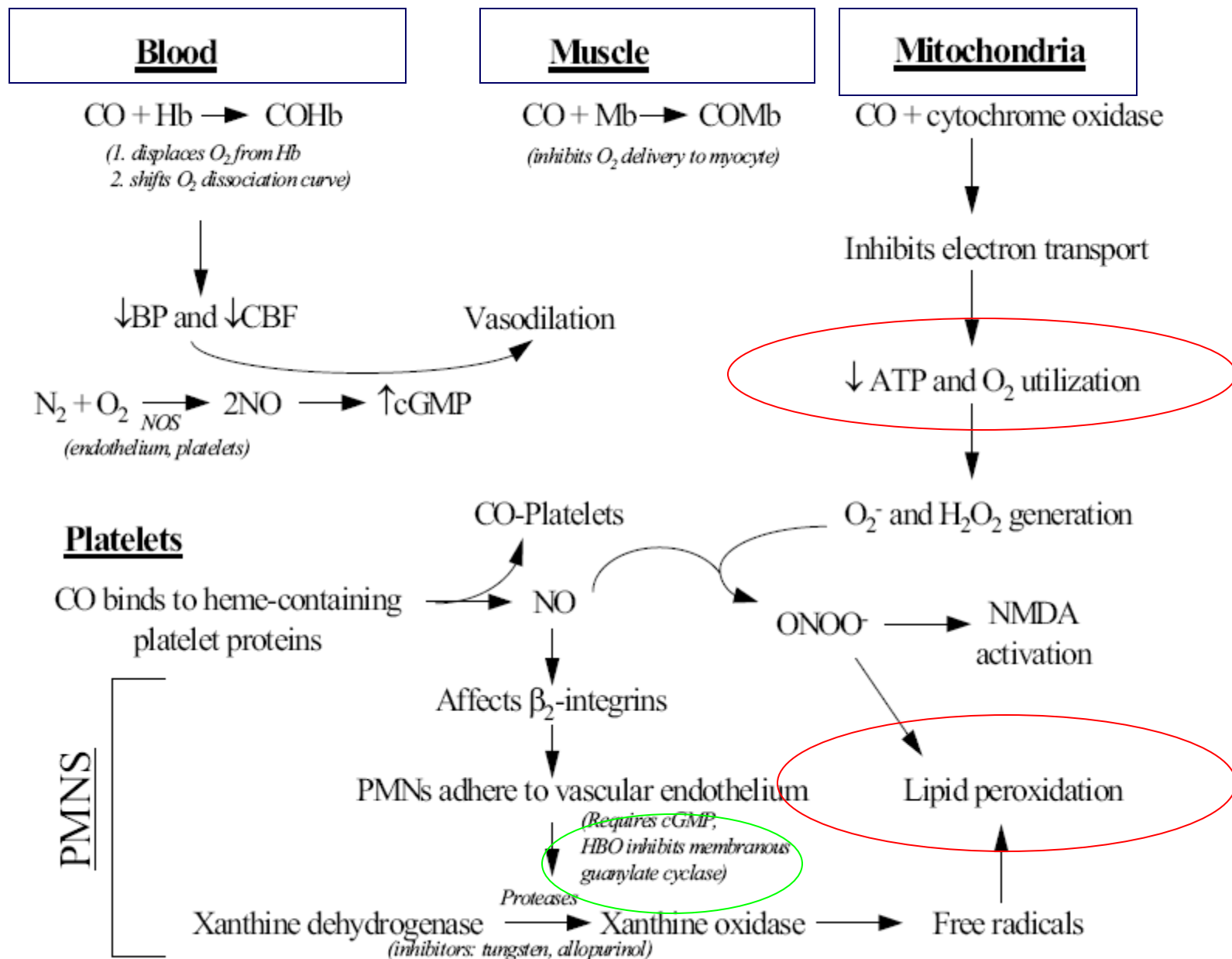
Hong Kong Poison Information Centre

12th Feb 2010



Outline

- General Information on CO poisoning
- CO poisoning & HBO situation in Hong Kong
- HKPIC Data 2006-2009



Clinical Features

- Acute Features (2° to hypoxia)
 - CNS
 - CVS
 - Metabolic

- Delayed Neuropsychiatric Sequelae (DNS)
 - Typical 2 weeks to 2 months
 - 12%*
 - Syncope / Age

DNS

Table 3 Delayed neurological sequelae of carbon monoxide poisoning

Chronic headaches
Cognitive deficits
Personality disorders
Aphasia
Apraxia
Cortical blindness

Neurological deficits
Movement disorders
Parkinson's disease
Psychosis
Gait disturbances

Assessment

- Clinical features
 - Syncope
- Carboxyhaemoglobin level
- ECG / Cardiac enzymes
- Imaging (MRI/CT)
- Biomarker

Management

- Remove from exposure
- 100% O₂
- Supportive measures
- HBO

HBO in CO poisoning

- Decreases $T_{1/2}$ of CO-Hb

FIO ₂	COHb t _{1/2}
Room air (21%)	2-7 hours (Mean 4 hours)
100% at 1 ATM	90 minutes
100% at 3 ATM	23 minutes

- Displaces CO from myoglobin & cytochrome
- Increases O₂ content of blood
- Decreases lipid peroxidation

Indications for HBO in CO poisoning

- Significant Clinical Toxicity
 - CNS (Syncope, Coma, Seizure,)
 - CVS (Myocardial ischemia, Arrhythmia)

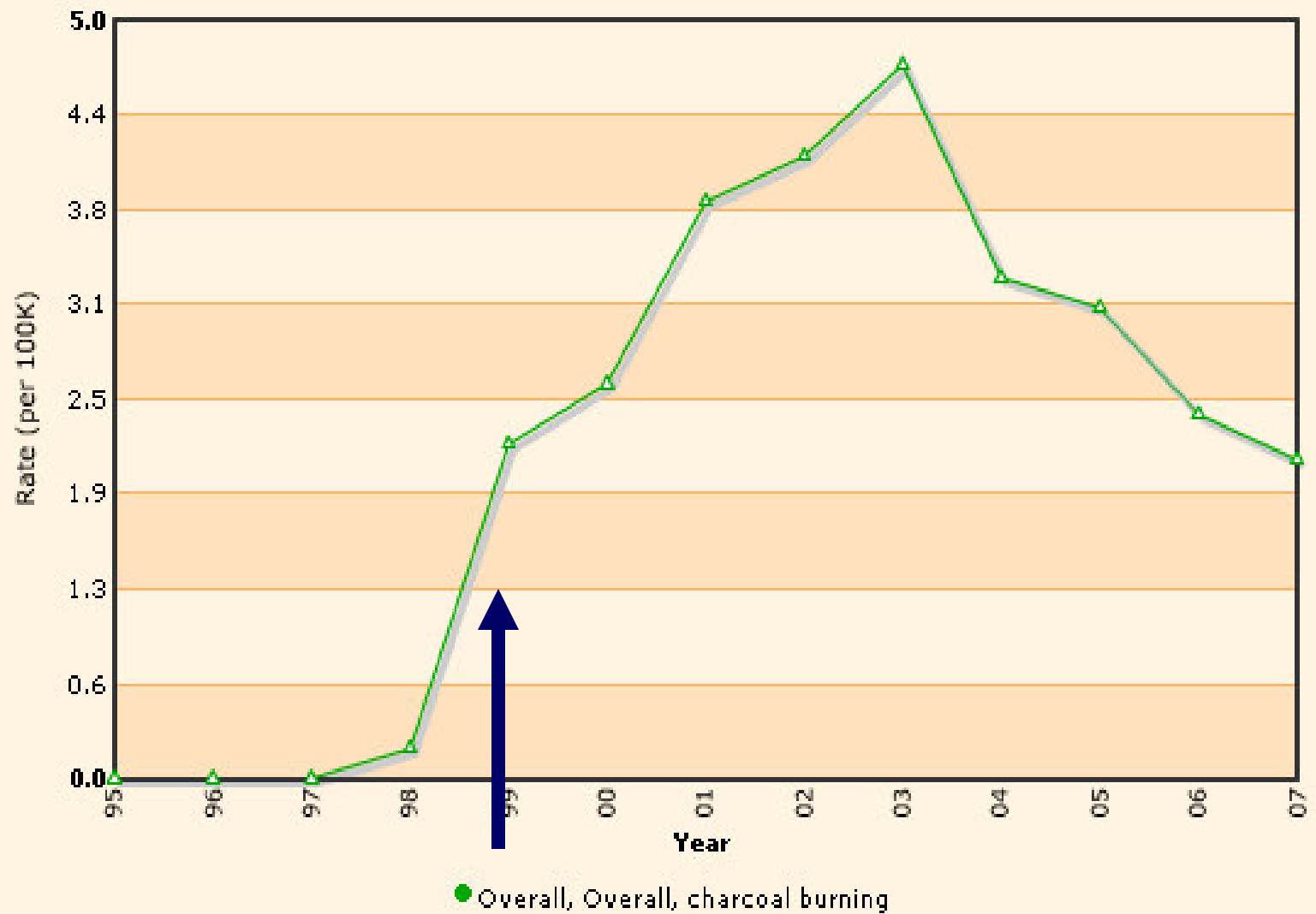
- CO-Hb Level (Arbitrary)
 - >25%
 - >15-20% (Pregnancy)

Carbon Monoxide Poisoning in Hong Kong

In 1998

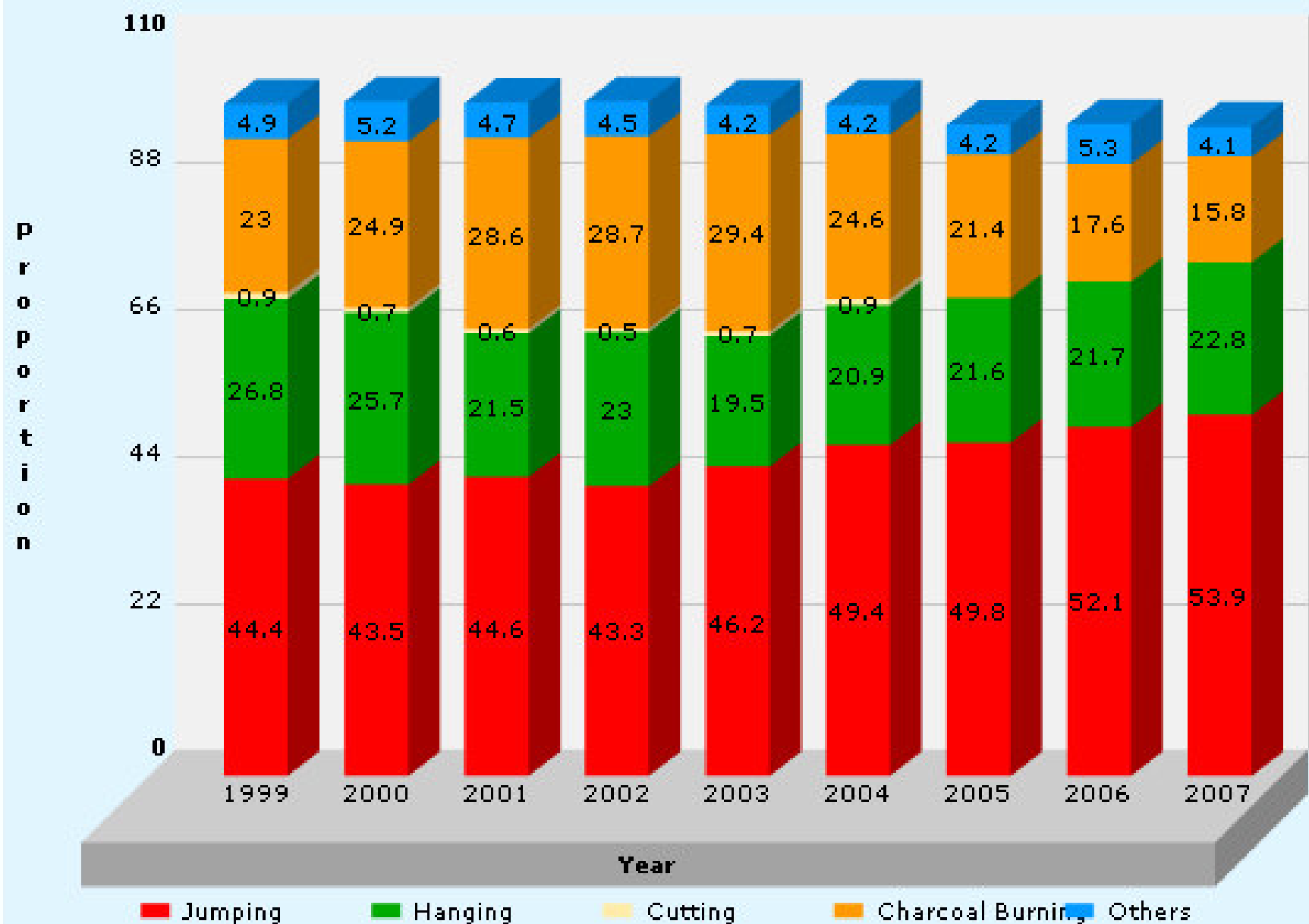


Completed Suicide in Rate (per 100K) (Year:1995-2007)
Gender:Overall, Age Group:Overall, Suicide Method:charcoal burning



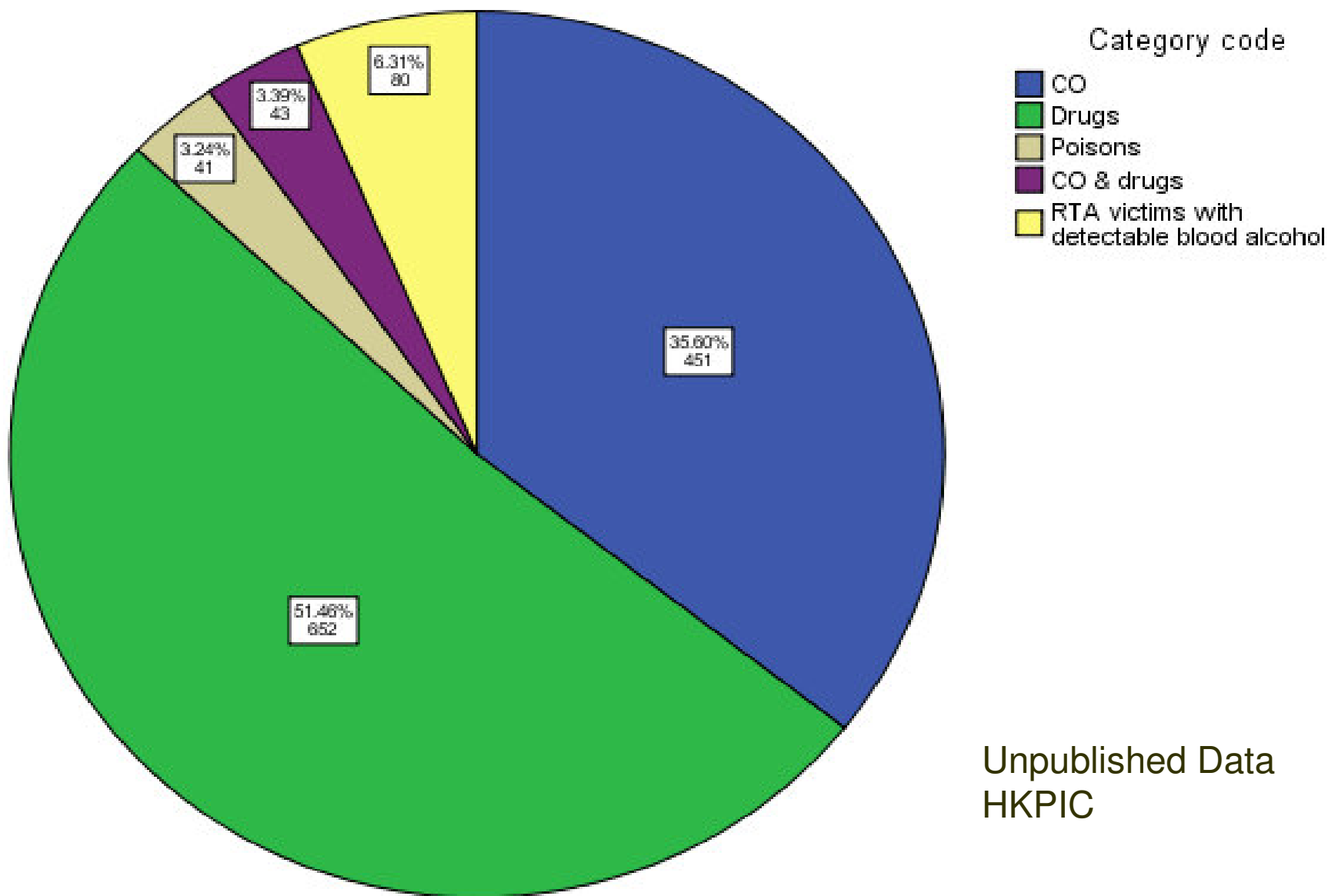
Source: HKJC Centre for Suicide Research and Prevention, HKU

Method used in completed suicides in HK 1999-2007



Source: HKJC Centre for Suicide Research and Prevention, HKU

Causes of poisoning-related death 2006-2008



HBO in Hong Kong

Availability

■ Public

- Recompression Treatment Centre (Stonecutter's Island)
- Burn Unit / PWH / CUHK

■ Private

- Hong Kong Diving Medicine & Hyperbaric Medicine Centre

<http://www.hkhyperbaric.com/>

Recompression Treatment Centre

Table 2. Use of the Recompression Treatment Centre from April 1994 to December 1997

Year	No. of patients	Total No. of treatment sessions
1994	5	9
1995	9	58
1996	16	113
1997	10	116
Total	39*	295

* One patient was admitted in 1995 and again in 1996

HKMJ 2000;6:108-12

Table 3. Causes of admission to and treatment at the Recompression Treatment Centre from April 1994 to December 1997

	Diagnosis				Total
	DCI* or suspected DCI	Carbon monoxide poisoning	Radionecrosis	Other	
Patients (No. [%])	25 (64)	7 (18)	5 (13)	2 (5)	39
Treatment session (No. [%])	35 (12)	19 (6)	172 (58)	69 (23)	295

* DCI = decompression illness

Risk of HBO

- Barotraumas
- Oxygen toxicity
- Decompression illness
- Ophthalmic concerns
- Claustrophobia

- Fire and explosion hazards

Additional Constraints for HBO in HK

- Risk of transfer
- Occupational hazards for HCW
- Manpower concern

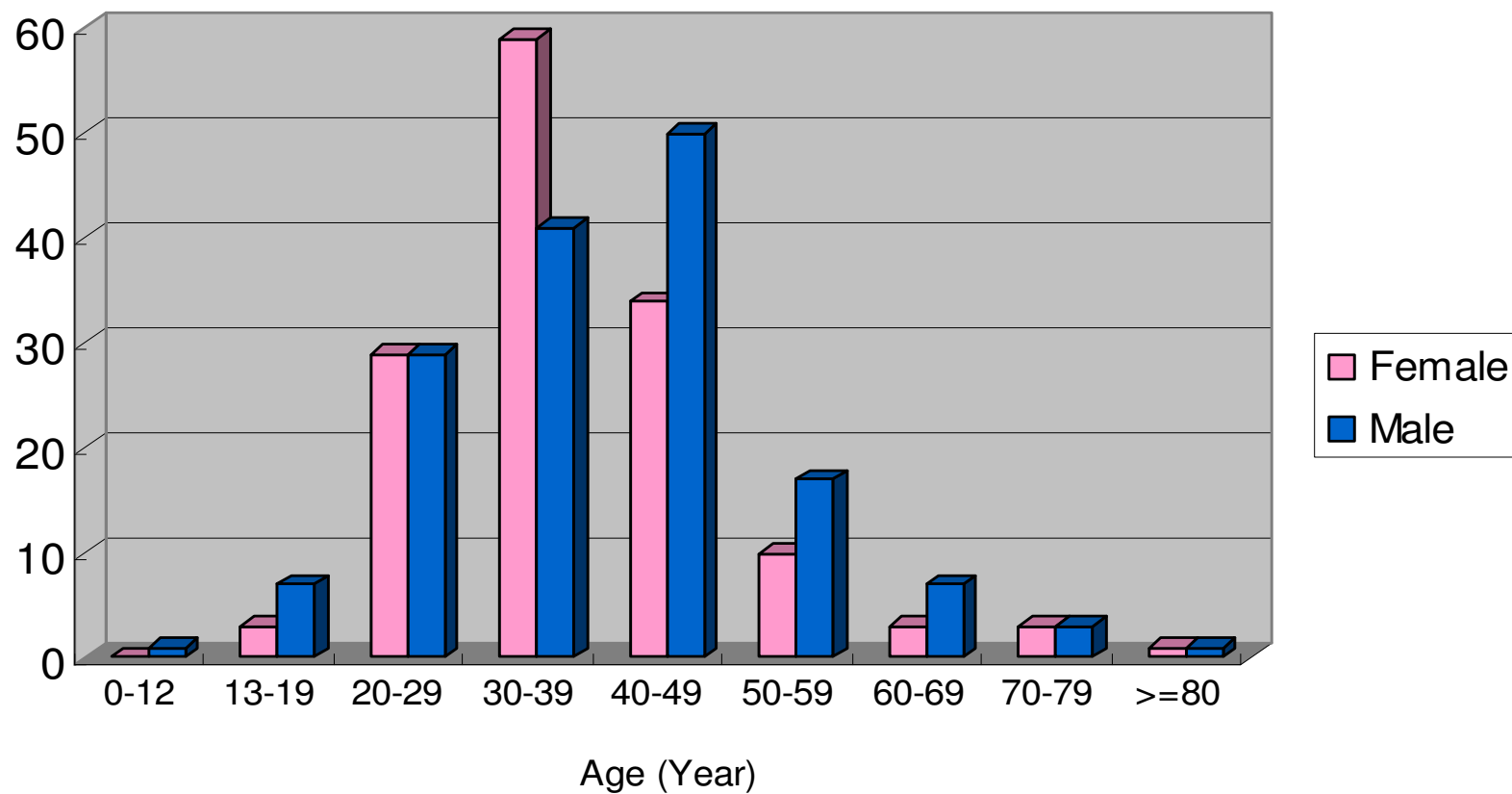
HKPIC Data

HKPIC Data – CO Poisoning

Year	2006	2007	2008	2009	TOTAL
Poisoning Case *	2,555	2,842	4,029	4,342	13,768
CO Case (%)	53 (2.1%)	63 (2.2%)	92 (2.3%)	95 (2.2%)	303 (2.2%)

** Sources - Consultation Service & Reporting System*

Age & Sex



Reason of Exposure

Reason	No of cases (%)
Suicidal	290 (95.7)
Non-suicidal	5 (1.6)
Undetermined	8 (2.6)
<i>TOTAL</i>	<i>303 (100)</i>

Outcome

Outcome	No of cases (%)
Death	19 (6.3) #
Major	39 (12.9)
Moderate	70 (23.1)
Mild	145 (47.9)
No effect	25 (8.3)
Undetermined	5 (1.6)
<i>TOTAL</i>	<i>303 (100)</i>

majority was dead in AED (2 were dead after ICU admission)

Use of HBO

HBO Indications	No of cases (%)	HBO given (%)
Present #	59 (19.5)	4 (1.3) [4/59 (6.8)]
Absent	244 (80.5)	0 (0)
TOTAL	303 (100)	4 (1.3)

Syncope, coma, seizure, cardiac ischemia/arrhythmia or CO-Hb>25%

HBO Cases

	Sex/Age	Indication for HBO	HBO Rx	Outcome
08-50833	F/21	Syncope Myocardial Injury	X 3 sessions	d/c after 2 months hospitalization Still FU for chronic pain
08-51425	M/36	COHb 42%	X 3 sessions	DAMA
09-51825	M/28	Coma Myocardial Injury	X 3 sessions	FU once in 2 months No documented DNS
09-52805	M/29	Syncope	X 2 sessions	Defaulted FU

Summary from HKPIC Data

- Most CO poisoning are suicidal
- Case per year
 - 150 death
 - 100 Hospital / AED attendance
 - 1/3 moderate or major outcome
- HBO Rx is rarely used
 - 1 % of all case, 7% of indicated case
 - Efficacy is unable to assess

HBO or not HBO

HKPIC “Reply”

- Present evidence suggested that any benefit if present is mild reduction of neurological deficit.
- Any possible benefit has to be balanced against the risk of transfer, the unavailability of intensive care support in the hyperbaric chambers and the occupational hazards of the accompanying medical personnel.
- For unstable patients and patients on life supports, the lack of medical facility and the remote location of the hyperbaric chamber in Hong Kong probably outweigh any possible benefit.
- However, for stable patients without need of close monitoring who develop persistent or delayed neurological deficit, this treatment option may still be individually considered.

THANK YOU
