Poisonings and ingestions; Accident or abuse?

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VFPMS Seminar 2018
Why is toxicology important to forensic paediatricians?

- The intentional covert administration of prescription or illicit substances to a child = **child abuse**
  - Factitious illness by proxy (medical child abuse)
  - Malicious administration/ ‘poisoning’
    - corrupting behaviours (emotional maltreatment)
    - to facilitate ‘parenting’

- The accidental ingestion of substances by a child
  - Typically toddlers, up to 8% PICU admissions, exploratory behaviour, accident or **supervisory neglect**

- Unintentional exposure to drugs from environment, ante-natal exposure = **Child abuse? physical neglect? Corrupting behaviours?**

- Drug-facilitated sexual assault = **crime**
Children living with drug abuse

- Methamphetamine – crystal meth, ice, speed
  - Up to 5% of pregnancies in USA
  - Clandestine home labs
  - Burns, ingestions, neglect, exposure to sexual exploitation/pornography, weapons, violence

- Marijuana – pot, weed, hash
  - Rarely fatal, may increase child’s later use during adolescence

- Cocaine
  - Harmful to fetus

- Opiates – heroin, morphine, methadone
  - Often fatal in OD

- Direct physical effects of exposure, effects on care of child, emotional effects
How can toxicology help us?

• Appropriate and timely specimen testing might give us helpful information in relation to:
  • Drugs ingested/exposed to
  • Amount ingested
  • Time ingested
  • Mechanism – abuse or accident

• Need a meticulous Hx, physical examination, knowledge of drug effect, specimen and testing method in order to interpret toxicology findings

• Need to understand limitations of toxicology testing
  • Cut-offs
  • Quantification and ‘read-backs’
  • Hair analysis
  • Pharmacokinetics in vivo and in vitro

• Used for criminal and/or protective purposes
What specimens might we use and when?

- **Blood**
  - Excellent, needs preservative in tube
  - Information about RECENT drug ingestion – 24-48 hours
  - Depends on pharmacokinetics
  - Can allow quantification – dose and timing

- **Urine**
  - Information about ingestion over LAST FEW DAYS
  - Drug/metabolite may be present for prolonged period eg marijuana
  - Cannot quantify and cannot perform ‘read-back’ calculations re dose or timing

- **Hair**
  - For long-term exposure – grows approximately 1cm per month
  - Cannot discriminate between ingestion and environmental exposure well
  - Cannot quantify
  - May be excellent for one-off exposure at defined time eg DFSA, intentional administration

- **Meconium**
  - Exposure during trimester 2 and 3
  - Overcomes fact that mother may desist from use in days preceding birth

- **Sweat/saliva/post mortem**
Timing of specimen collection

- If exposure reported to have occurred within 48-72 hours take BLOOD and URINE
- If exposure reported to have occurred within 5 days take URINE
- If exposure is historical take HAIR
- If antenatal exposure suspected take BLOOD, URINE and consider MECONIUM and HAIR from baby as well as BLOOD, URINE and possible HAIR from mother

- Remember that presence of metabolites are also important
- Take forensic specimens as soon as is feasible – interpretation is easier
How do we collect forensic toxicology specimens, where do we send them and why?

- **Hospital labs**
  - limited range of substances
  - cut-offs
  - no chain of custody
  - Good for clinical care

- **Forensic labs**
  - Wider range of substance including novel psychoactives, GHB
  - No cut-offs or very low
  - Chain of custody documented

- In Victoria use VIFM kit
- Police to transport – needs refrigeration
- Give complete information to allow targeted testing
- Discussions good – Tox@vifm.org

- **Hair**
  - Cut NOT pulled
  - Close to scalp as possible, nape of neck
  - Wrap in silver foil
  - Label ends clearly
CASE EXAMPLES – FORENSIC TOXICOLOGY IN PRACTICE
• Intentional administration uncommon (about 45 per year USA)
• High fatality rates – 30X that of accidental ingestion
• Motivation
  • Sedation – over the counter meds, alcohol, opiates
  • Direct injury/pain
  • Punishment
  • Psychological gain – factitious illness by proxy
  • Homicide
• Red flags
  • Young child with large amounts
  • Conflicting or confusing stories
  • Repeated exposures, siblings also affected
  • Poisoning with unusual substance to which a child would not usually have access
  • “Accidental” poisoning in older child/teenager
  • Unexplained death in family
  • Presence of other injuries – 17%

Malicious use of non-pharmaceuticals in children Yin et al 2011 Child Abuse & Neglect
Case 3 - Environmental exposure

• Meth labs
• Parental drug use
• Ante-natal exposure

• Neglect?
• Physical harm?
• Victorian legislation – caring for a child while under the influence of alcohol or other drugs constitutes child abuse and may necessitate protective measures
DFSA – “date rape”

- DFSA – subject to non-consensual acts while incapacitated or unconscious due to effects of alcohol or drugs
- You cannot consent to sex if you are asleep, unconscious, drug affected or drunk
- Mainly voluntary ingestion – alcohol
- Tasteless, colourless, odourless, rapid onset
- Drugs that render victim;
  - Unconscious, passive, powerless to resist
  - Incapable of rational thinking with little or no memory of event
  - Still able to participate in sex/to act without inhibition “helpless slave to desire”
Summary & learning points – forensic toxicology

• May help inform clinical care, protective risk and criminal matters
• Needs the right samples at the right time in the right manner
• Needs accurate interpretation in context and with understanding of the limitations
• Toxicologists at VIFM and VFPMS always willing to assist with questions