Non-suspicious drugs and poisoning related autopsies

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Toxicology

- When death is likely to be due to a drug/drugs
- When no cause of death is found at autopsy
- In cases of traumatic death/suicide with ?impaired reasoning
- Where poor compliance with medications may have contributed to death
- Deaths in custody/under a deprivation of liberty safeguarding order

- Samples ideally taken before opening the body (urine and vitreous)
- Samples taken with minimal disruption to body (blood)

The Role of the Autopsy

- To establish whether a death is drug (toxin) related
- To establish the pathological consequences of drug use or misuse
- To establish if traumatic injuries were a consequence of drug use (or lack of drug use)
- To establish if natural disease processes might be present which may have increased susceptibility to the effects of a drug
- To obtain appropriate samples for toxicological analysis

Information prior to Autopsy

- Details as to the scene of death (written and photographic)
  - where and when found, and by whom
  - posture, position and clothing
  - any idea of period of time between death and discovery
  - presence of drug paraphernalia
  - method of identification
  - movements and activities prior to death
- Previous medical history
- Medical therapy regimen (current and prior)
- Known, or suspected, blood-borne virus status

Health and Safety Precautions

- Removal of deceased's clothing
- PPE against body fluid and aerosol-carried pathogens
- Mortuary and mortuary table ventilation
- Awareness of local sharps injury protocols
- Presence of other 'interested' individuals e.g. coroner's officers / police / SOCO

The Autopsy

- External examination:
  - Identification
  - Body habitus (over/under weight, muscle bulk etc.)
  - Evidence of current/previous self harm
  - Puncture marks/skin abscesses/fistulae
  - Scars/tattoos (professional/amateur)
  - Mouth/anus and genitals for signs of trauma/body packing or stuffing
  - Jaundice, clubbing, spider naevi, splinter haemorrhages, palmar erythema, spider naevae, bruising, froth/vomit around face

  DON'T FORGET TO EXAMINE THE BACK

The Autopsy

- Internal examination
  - Cardiovascular: cardiomyopathies / infective endocarditis
  - Gastrointestinal: pills/powders/tablets in the GI tract
    cirrhosis/fatty liver
    varices/Mallory-Weiss tears/gastritides
    pancreatits
    tongue biting
  - CNS: cerebral abscesses/meningitis
    cerebellar atrophy
    subdural haemorrhage (trauma)

The Autopsy

- Internal examination
  - Musculoskeletal system: fractures/osteoporosis
  - Respiratory system: pulmonary oedema
    aspiration of gastric contents
    stasis pneumonia
    powder in nasal cavities
    opportunistic infections, e.g. tuberculosis
  - Genitourinary system: bladder distension (MDMA)
    urinary retention (anti-cholinergic drugs)
    haemorrhagic cystitis (ketamine)

Toxicology

- When death is likely to be due to drug use
- Where no cause of death is found at autopsy
- In cases of traumatic death/suicide where there is the possibility of impaired reasoning
- Where poor medication compliance may have contributed to death
- When the death was in custody/whilst on a DOLS
- When inadvertent overdose is suspected
- When toxicological analysis may contribute to identifying an otherwise natural cause of death (e.g. beta hydroxybutyrate analysis)

Toxicology - Blood

- Admission blood vs post mortem blood
- Ideally from the leg or arm vessels before organ removal
- 10ml into a sterile universal, 10ml into a fluoride oxalate (2% w/v) tube
- Store at 4^{o}C as soon as practical

Toxicology - Urine

- Direct sample vs catheter bag (record which)
- Direct sample with needle and syringe through the abdominal wall, or after bladder exposed
- 20ml into sterile universal, 10ml into fluoride oxalate tube (2% w/v)

Toxicology – Vitreous fluid

- For analysis of ethanol, glucose, (urea, electrolytes) and beta-hydroxy butyrate.
- Sample both eyes and collect in a single fluoride oxalate tube (2%w/v)
- After sampling re-inflate globes with water or saline to preserve shape

Toxicology – other samples

- CNS (frontal lobe) – 2cm^2 of tissue into clean aluminium foil and then inert sterile glass pot
- Hair – taken from the vertex, cut as close to the scalp as possible, tie cut end with thread and wrap in clean aluminium foil
- Liver - 2cm^2 of tissue into clean silver foil and then inert sterile glass pot
- Bile – check with local toxicology laboratory
- Muscle (psoas) - check with local toxicology laboratory

Toxicological interpretation

- Sex, age, body habitus, state of decomposition
- Circumstances of death (Coroner's G5/sudden death report)
- Occupational and social history
- Medical history
- Drug history
- Estimated interval since drug taken
- Circumstantial evidence (bottles, blister packs, paraphernalia)
- Main pathological findings at autopsy
- Known infectious case, or high-risk group (IVDU)

- Your contact details for ongoing discussions

Interpretation of Toxicology Results

- A collaborative endeavour between pathologist and clinical scientist
- Know the 'routine' panel processed and whether other analyses are available
- Consider jointly the need to send away for specialist analysis (and ask Coronial approval before doing so)
- Be comfortable giving an opinion rather than an absolute in your report
- Remember most cases will be heard in the Coroner's Court – it is the responsibility of the Coroner to determine the 'final' cause of death and case verdict

Fact and Fiction

- Fact:
  - Good quality samples give good quality analysis and quantification
  - If it's not tested for/asked for you will never know the answer
  - The biological effect of a particular concentration of a drug may vary widely between individuals (e.g. tolerance, age, underlying disease process etc.)
  - There may be variation in interpretation of results between different publications
  - Many people have survived what may be considered a 'fatal' level of a drug, many have died due to a level which would typically be considered as 'below fatal' – interpretation of all the autopsy and circumstantial information is crucial
  - Drug effects often combine and/or enhance each others effects
  - The pathologist's role is to obtain the appropriate samples, work closely with the toxicology laboratory staff to help direct and interpret analyses and assist the Coroner in the finalisation of the cause of death

Fact and Fiction

- Fiction:
  - It is possible to determine from a post mortem drug level how much drug was initially taken
  - It is possible to determine the period between drug ingestion and death even if the amount of the drug taken is known (suspected)
  - It is possible from a post mortem drug level to determine which order the drugs were taken in, or the speed at which they were taken
  - ABSOLUTE FACT: it is likely you will be asked to comment on all three of these matters frequently during your inquest career !!!