

Classification of Traumatic Deaths

- Mechanical - sharp or blunt (firearm injury)
- Thermal - excessive heat or cold
- Chemical - poisons or drugs
- Electrical - electrocution or Lightning

Week 2:

Trier-of-Fact: The party that makes the decision of guilty or not guilty in a trial.

Bench Trial: Trial where the trier-of-fact is the judge.

Jury Trial: Trial where the trier-of-fact is the jury.

In Canada, a jury is composed of 12 members of the general public (plus alternates).

- Jury listens to evidence presented and are instructed by judge as to the applicable case law
- Apply law to facts and evidence of the case and reach a decision of guilt or innocence

Admissibility of Evidence

- The determination of what matters may come before the trier-of-fact
- Rules of evidence seek to protect the jury from hearing evidence that is prejudicial, irrelevant, time wasting, unconstitutional or unreliable
- Major rule that applies to all evidence, it must be relevant and competent
- Relevant: A condition of admissibility of evidence. It is made up of materiality and probativeness.
- Material means the evidence has something to do with the case being tried.
- Probativeness means that the evidence must prove something

Competent: A condition of admissibility of evidence. A set of legal constraints on the admissibility of evidence

- Prejudice (evidence cannot unduly prejudice trier-of-fact; i.e. prior convictions)
- Constitutional constraints (prohibit unreasonable searches of people and places; search warrant is required)
- Statutory constraints (privileges btw Dr. and patient, lawyer and client, marital partners)
- Hearsay (statement made outside of court)

Voir Dire - means a "trial within a trial". It is a hearing to determine the admissibility of certain evidence (or the competency of a witness). The jury is removed from the court room for a voir dire and the judge makes a determination regarding whether or not the evidence may be heard by the jury.

USA

Federal Rules of Evidence (FREs) – FRE 702:

- If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, training, or education, may testify thereto in the form of an opinion or otherwise if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

Frye (USA): general acceptance by relevant scientific community (published in peer-reviewed journal)

- 1923: James Alphonso Frye convicted on murder in Washington D.C.

2. Illicit Drugs or Drugs of Abuse - are licit drugs with desirable psychoactive effects or side effects that are abused OR are naturally occurring or semi-synthetic substances that have pleasurable psychoactive effects that are abused.

- E.g. Oxycontin, heroin, LSD, Cannabis

3. Poisons - compounds with harmful or toxic effects

- E.g. carbon monoxide, cyanide

PHARMACOLOGY- is the study of drug action

- Pharmacokinetics: is the study of how drugs move into and out of the body.
- There are 4 processes:
 - ABSORPTION-how drugs are introduced into the body. Can be through gastrointestinal tract (oral), intramuscular, intravenous, rectal, topical (thru skin), subcutaneous (under the skin) and lungs (inhalation).
 - Effects can be rapid or prolonged depending upon the route of absorption and the how the drug is formulated (i.e. some are sustained release)
 - DISTRIBUTION- Involves the mechanisms by which drugs get to their site of action. Mostly through the bloodstream.
 - METABOLISM-The process whereby a drug or other substance is chemically changed to a different form, called a metabolite. Metabolism may have different purposes: the primary purpose is to create a compound (s) that may be more water soluble, and therefore easier to eliminate
 - ELIMINATION-the ways that drugs are removed from the body, usually by excretion in the urine and feces. Other forms of elimination include respiration and perspiration.
- "Pharmacodynamics: is the study of the physiological effects of drugs on the body or what the "drug does to the body"
 - ABUSE- drug abuse occurs when people take drugs for purposes other than for which they are intended.
 - DEPENDENCE: Addiction & Withdrawal-physical dependence results in a withdrawal syndrome if the substance used is stopped. It includes high temperature, physical discomfort and could be fatal.
 - TOLERANCE-a phenomenon whereby the body's organ systems adapt to a drug. Therefore, increasing doses are necessary to achieve an equivalent psychoactive effect.
 - SYNERGISM: the total effect on the body of two or more drugs taken together is greater than the effects would be if the drugs were taken separately. Drugs work together to magnify effects or create effects that would not have occurred otherwise. An example would be alcohol and Valium

Forensic Toxicology: What type of samples do we work with?

- Most common fluids heart blood, femoral blood and urine
- Less common samples Vitreous fluid, Liver tissue, Stomach contents
- The samples come from medical/legal autopsies

How do we analyze biological fluids for drugs and alcohol?

- For drugs:
 - Extract the drugs from the biological samples using some form of solvent extraction
 - E.g. toluene, methanol, methylene chloride, water
 - Instrumental analysis: Gas chromatograph (GC), Mass spectrometer (MS), Liquid chromatograph (LC), and LC-MS/MS

- Intimate Partner Violence (also referred to as domestic violence) is a crime. It results from an imbalance in power and control over one's partner.
- Domestic violence is primarily committed by men against women but also occurs in same sex relationships and by women against men.
- All survivors are not physically battered or beaten. Abuse can include other forms of mistreatment and cruelty such as constant threatening, psychological/emotional, sexual, financial/material, spiritual and verbal abuse.
- Forensic Nursing is: The application of the forensic aspects of healthcare combined with education of the registered nurse in the scientific investigation and treatment of trauma and/or death of victims and perpetrators of violence, criminal activity and traumatic accidents.
- A Forensic Nurse provides direct services to nursing, medical and law agencies as well as providing expert court testimony.
- Sexual Assault Nurse Examiner (SANE): Is a registered nurse who has advanced education in forensic examinations of sexual assault victims.
- The SANE will provide emergency healthcare and psychological support for victims of sexual assault or intimate partner violence.

Options of care may include;

- The collection of a sexual assault evidence kit
- Forensic documentation
- Assessment of risks and treatment of HIV and other sexually transmitted diseases.
- Assess safety and provide community/program resources
- Treatment of any injuries, referral to a physician
- Assessment of risks for pregnancy, STI's including HIV and treatment
- Facilitation with the police if requested
- Mandatory reporting to CAS
- Safety assessment, community resources and counselling options
- Injuries may or may not occur in victims of a sexual assault
- Only 11% have injuries
- Injury or lack thereof in sexually assaulted patients can be due to multiple factors

All aspects of care including police involvement is an individual choice.

Drug Facilitated Sexual Assault

- Is a sexual assault where substances have been either voluntarily or involuntarily taken which renders the person more vulnerable to unwanted sexual activity.
- Complainant is mentally and/or physically incapacitated by a drug or combination of drugs and then sexually assaulted.

Which drugs are used in DFSA?

- Any drug which ...
 - alters social inhibitions
 - decreases the level of consciousness
 - causes amnesia or confusion in an individual
- Thereby
 - enabling an assailant to take advantage of the impaired person for sexual purposes

“Ideal” Drug Characteristics

- Easy to obtain

High impact disasters such as airplane crashes and acts of terrorism such as bombings will often result in fragmentation, degradation and co-mingling of human remains rendering identification of all victims via visual ID, dental records and/or fingerprints unlikely.

The power of DNA based information:

Recovered remains can be compared to:

- 1) DNA from known personal effects (i.e toothbrush, razor); this is DIRECT comparison
- 2) DNA from known biological family members (i.e parents, children, siblings); known as INDIRECT identification and uses kinship analysis

Benefits:

- 1) Not limited to any one particular body part (i.e fingertips, skull)
- 2) Small fragments of human remains can be used
- 3) DNA can be used to associate separated or co-mingled body parts/remains

Options:

- 1) Routine DNA testing – STR (short tandem repeat) based; uses PCR (polymerase chain reaction) to target and amplify regions of interest
- 2) Y-STRs – male specific testing; same Y-STR profile passed from father to each of his sons (familial linkages)
- 3) Mitochondrial DNA – females pass their mitochondria directly to all offspring (familial linkages); uses sequencing; good for degraded and aged samples
- 4) Mini-STRs - uses smaller fragments that are less susceptible to degradation; STR based

Other forensic sciences involved:

- Crime Scene Investigation
- Document examination
- Chemistry (explosives)
- Toxicology/biological/chemical agents
- Nuclear forensics

Considerations:

- Evidence Recovery
- Chain of custody
- Sample storage
- Family liaison
- DNA collection from relatives

WHY DO WE NEED TO KNOW WHAT HAPPENED?

- Acts of terrorism (find and identify explosives, accelerants, persons responsible)
- Accidents (determine cause to prevent reoccurrence)
- Natural disasters (lessons learned to enhance future warning systems, emergency preparedness etc.)

CASE EXAMPLES:

1) Swiss Air Flight 111 – Human-made - Accident

- Death toll: 229

Summary:

- Scheduled flight from New York to Geneva, Switzerland
- MD11 aircraft with 215 passengers and 14 crew on board (229 total)