Forensic Aspects of the Opioid Crisis

WVU Media Day
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Presented by
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A hidden side of the crisis

- Scientific challenges
- Technical and analytical challenges
- Lack of screening tests
- Laboratory safety
- Crazy mixtures
- Seized drug analysis and backlogs
- Death investigation – medicolegal
- Toxicological analysis
- We can’t keep up
- Legal and social impacts
Seized drug analysis

- Pills, powders, and paraphernalia
- Separate from toxicology
- Typical flow screening → confirmation
- Largest section in labs
- Largest caseload
- Clandestine laboratories
Forensic death investigation

- Equivocal death/questioned death
- Goal is to determine cause of death
- Manner and mechanism
- Proximate cause
- NASHI
- Coroner vs. ME system
- Tools: autopsy and PM toxicology
- ME/Coroner makes final decision and signs the death certificate
Death scene 1st responder
Death investigator called Crime scene response
CONTEXT
No further investigation needed
### Table 13.1  Morphine Equivalent Dose

<table>
<thead>
<tr>
<th>Analgesic</th>
<th>Dose Equivalent to 10 mg Morphine</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-Propoxyphene</td>
<td>130–200 mg</td>
</tr>
<tr>
<td>Codeine</td>
<td>100 mg</td>
</tr>
<tr>
<td>Tramadol</td>
<td>100 mg</td>
</tr>
<tr>
<td>Dihydrocodeine</td>
<td>50 mg</td>
</tr>
<tr>
<td>Meperidine</td>
<td>28 mg</td>
</tr>
<tr>
<td>Hydrocodone</td>
<td>10 mg</td>
</tr>
<tr>
<td>Pentazocine</td>
<td>10 mg (6.7–13.3 mg)</td>
</tr>
<tr>
<td>Morphine (oral)</td>
<td>(10 mg)</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>5.0 mg</td>
</tr>
<tr>
<td>Morphine (IV/IM)</td>
<td>3.33 mg</td>
</tr>
<tr>
<td>Methadone (acute)</td>
<td>2.5–3.33 mg</td>
</tr>
<tr>
<td>Heroin; (IV/IM)</td>
<td>2–2.5 mg</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>2 mg</td>
</tr>
<tr>
<td>Oxymorphone</td>
<td>3.33 mg</td>
</tr>
<tr>
<td>Methadone (chronic)</td>
<td>1.35 mg</td>
</tr>
<tr>
<td>Levorphanol</td>
<td>1.3 mg</td>
</tr>
<tr>
<td>Buprenorphine</td>
<td>0.25 mg</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>0.1–0.2 mg</td>
</tr>
<tr>
<td>Sufentanil</td>
<td>10–20 μg</td>
</tr>
</tbody>
</table>
“The dose makes the poison”

Lethal doses

Carfentanil
Also tolerance, naïve vs. experience, genetic differences in metabolism
Lethal doses

Carfentanil
The drug "gray death" lies in a dish at the crime lab of the Georgia Bureau of Investigations in Decatur, Ga., on Thursday, May 4, 2017. The new and dangerous opioid combo underscores the ever-changing nature of the U.S. addictions epidemic. Investigators who nicknamed the mixture have detected it or recorded overdoses blamed on it in Alabama, Georgia and Ohio. (Photo: AP/Mike Stewart)
Blood levels

Fatal range

Therapeutic range

Time (seconds)  Time (hours-days)
Flow of analysis

Immunoassay – class not compound

Laboratory analysis
Injection

Prepared sample

Separation instrument
Chromatography

Molecular identification instrument
Mass spectrometry

Autopsy sample

![Graph showing separation and molecular identification]
In a nutshell

- Can’t get many standards
- Ones that you can get are expensive
- Lag time of months for “new” ones
- “Inconclusive” findings more common
- Can’t revisit later
- Volume means you can’t catch up
- Every sample has to be treated like it can kill you
State Police Laboratory gets $1 million transfer to reduce backlog of probes

By Wendy Holdren Register-Herald Reporter  Oct 5, 2017
Safety

- Officers in the field
- First responders
- Agents
- Laboratory staff
- Dogs
- Limits field testing
“Every case is like working with chemical warfare agents”
Sources

- Challenging to make
- Large scale industrial processes
- Mostly overseas
- 1 new compound ~ 7 to 10 days
- Legislation can’t keep up
Death investigation impacts

• Lack of space
• Lack of staff
• Additional deaths due to DUI
• Scarcity of forensic pathologists
• Inability to pay for autopsy
• Slow turnaround from toxicology

“The sad thing is that when we find someone, we’ll probably be stealing them from somewhere else.”

Opioids are killing too many people to autopsy all the bodies

By Carter Sherman  Sep 21, 2017

Whenever New Hampshire’s medical examiners suspect someone died of a drug overdose, they autopsy the body. Or at least, they used to.
OPIOID CRISIS
IN WEST VIRGINIA

ONE OF FIVE STATES
WITH LARGEST RATE INCREASE IN SYNTHETIC OPIOID DEATHS

ONE OF FOUR STATES
WITH LARGEST RATE INCREASE IN HEROIN DEATHS

17% INCREASE IN OVERDOSE DEATH RATE
41.5 PER HUNDRED THOUSAND PEOPLE FROM 2014-2015

NATIONAL AVERAGE
OVERDOSE DEATHS INVOLVING OPIOIDS:
10 per 100,000

WEST VIRGINIA AVERAGE
OVERDOSE DEATHS INVOLVING OPIOIDS:
41.5 per 100,000