

When Polytrauma and Polysubstance Collide: Care Considerations

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Krysta Baack, PharmD, BCPS

Pharmacy Coordinator, Emergency Medicine



1

Disclosures

I have no financial relationship with any pharmaceutical companies, biomedical device manufacturers or distributors, or others whose products or services may be considered related to the content of my presentation.

2

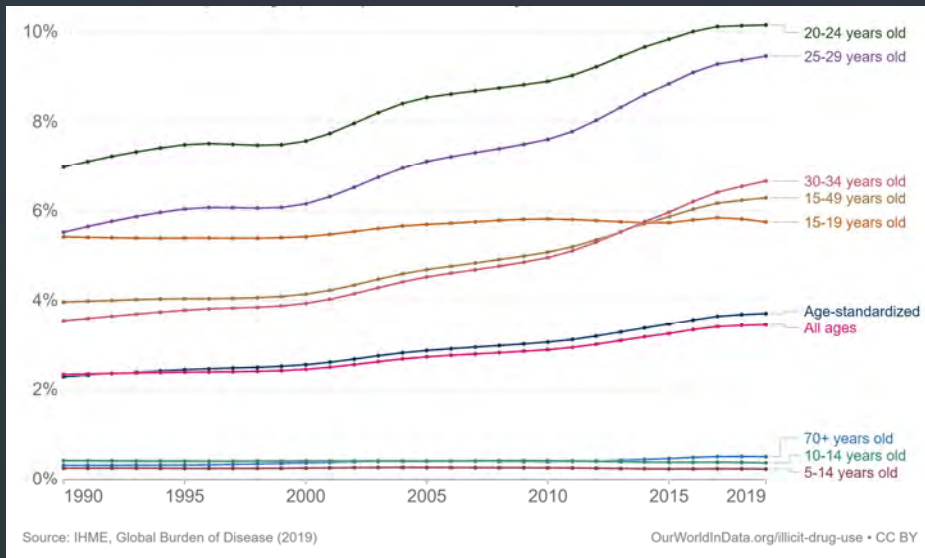
Objective

Examine common presentations, potential complications, and management of central nervous system depressants (or other drugs of abuse) in the context of a trauma patient.



3

Prevalence of Drug Use By Age, United States



1. OurWorldInData.org [Accessed Sept 20, 2022.]

4

Background/Epidemiology



Use of illicit substances in the past month, United States

Age	Any Illicit Drug	Marijuana	Prescription Psychotherapeutic Drug(s)
Percent of Population (USA) in 2019			
≥12 yo	13.0	11.5	1.9
12-13 yo	2.6	1.0	0.6
14-15 yo	7.3	6.2	1.0
16-17 yo	16.1	14.9	2.4
18-25 yo	24.9	23.0	3.4
26-34 yo	21.0	19.0	3.2
≥35 yo	9.5	8.2	1.5

2. cdc.gov. [Accessed September 20, 2022.]

5

Opioid
↓ respiratory rate
↓ blood pressure
constricted pupils
normal skin
depressed mental status

Cholinergic
↓ heart rate
constricted pupils
diaphoretic
depressed mental status

Anticholinergic
↑ heart rate
↑ blood pressure
↑ temperature
dilated pupils
dry skin
depressed mental status, confusion, hallucinations, seizures

Sedative-Hypnotic
normal vital signs
normal pupils
normal skin
depressed mental status

Hallucinogenic
↑ heart rate
normal or dilated pupils
normal skin
confusion
hallucinations

Sympathomimetic
↑ heart rate
↑ blood pressure
↑ respiratory rate
dilated pupils
diaphoretic
alert, agitated, seizures

Toxidromes


3. jems.com. [Accessed September 23, 2022.]

6

Drug	Results
Amphetamines	NEGATIVE
Benzodiazepines	NEGATIVE
Barbiturate	NEGATIVE
Cocaine	NEGATIVE
Phencyclidine (PCP)	NEGATIVE
Marijuana	NEGATIVE
MDA-Analogues	NEGATIVE
Methadone	POSITIVE
Opiates	POSITIVE
Oxycodone	POSITIVE

Methadone, oxycodone are opioids. Some urine drug screen assays will differentiate in their result readings.

4. Quinlan J and Cox F. *Pain Rep* 2 (2017) e611:1-7.



Opioids

- Heroin
- Codeine
- Morphine
- Hydromorphone
- Fentanyl
- Oxycodone
- Methadone
- Illicit Fentanyl Analogs:
 - Acetylfentanyl
 - Furanylfentanyl
 - Carfentanil

7

CERTA: Alternative Approach Option

Channels

- Sodium
- Calcium
- Transient Receptor Potential Channel (TRPV1)

Enzymes

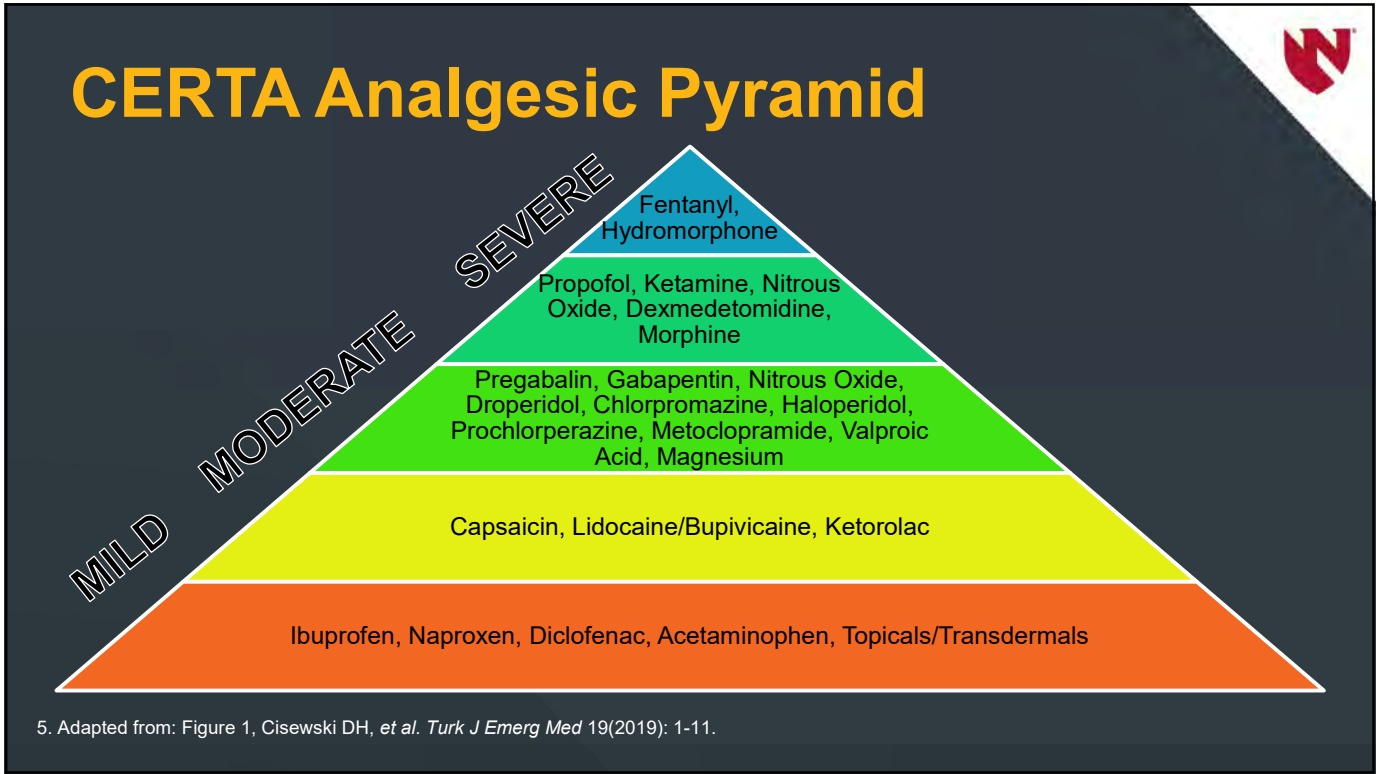
- COX-1 Inhibitor
- COX-2 Inhibitor

Receptors

- Mu-Opioid Agonist
- Dopamine Antagonist (D1, D2)
- Glutamate/NMDA Antagonists
- GABA
- Central Alpha-2 Agonists

5. Cisewski DH, et al. *Turk J Emerg Med* 19(2019): 1-11.

8



9

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Sedative -Hypnotic

- Benzodiazepines
 - Alprazolam
 - Lorazepam
 - Diazepam
 - Midazolam
 - Clonazepam
- Barbiturates
 - Amobarbital
 - Pentobarbital
 - Phenobarbital
 - Secobarbital
- General street names:
 - Barbs, Blockbusters, Christmas trees, Downers, Phennies, Sleepers

3. jems.com. [Accessed September 23, 2022.]
 4. Quinlan J and Cox F. *Pain Rep* 2 (2017) e611:1-7.

10

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Hallucinogenic

- Marijuana (Tetrahydrocannabinol, THC)
- Phencyclidine (PCP)
- Ketamine
- Lysergic acid diethylamide (LSD)
- Psilocybin and Mescaline(mushrooms)
- Dextromethorphan (DXM)

3. jems.com. [Accessed September 23, 2022.]
 4. Quinlan J and Cox F. *Pain Rep* 2 (2017) e611:1-7.

11

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Sympathomimetic

- Methamphetamine
- Cocaine
- 3,4-methylenedioxy-methamphetamine (MDMA, ecstasy)

3. jems.com. [Accessed September 23, 2022.]
 4. Quinlan J and Cox F. *Pain Rep* 2 (2017) e611:1-7.

12

Operative Considerations in the Addicted Patient



6. Beaulieu P. *Can J Anesth* (2017) 64:1236-1264.

13

Cannabis

Damage to the
respiratory
mucosa

Low dose:
tachycardia and
hypertension

High dose:
bradycardia and
orthostatic
hypotension

Risk of
myocardial
infarction

Prolonged
sedative effects
of anesthesia

Metabolized by
CYP3A4 and
CYP2C9

6. Beaulieu P. *Can J Anesth* (2017) 64:1236-1264.

14

Cocaine



Cardiac

- Hypertension
- Tachyarrhythmias
- Myocardial ischemia

Intubation

- Induction agent precautions
- Paralytic agent precautions

Other

- Hyperthermia
- Thrombocytopenia
- Nasal septum and soft palate alterations

6. Beaulieu P. *Can J Anesth* (2017) 64:1236-1264.

15

Opioids



Hemodynamic
Instability

Chronic
Constipation

Perioperative
and Post-
Operative Pain
Management

QT Prolongation

Naltrexone Use

6. Beaulieu P. *Can J Anesth* (2017) 64:1236-1264.

16

Ketamine and Sympathomimetic Drugs



Ketamine

Prolonged effects of co-administered opioids

Exaggerated response to sympathomimetics

LSD and PCP

Inhibit plasma cholinesterase activity

MDMA and methamphetamine

Hyponatremia

Rhabdomyolysis

6. Beaulieu P. *Can J Anesth* (2017) 64:1236-1264.

17

Other Considerations



Difficult IV Access



Bloodborne pathogens



Malnutrition



Concomitant liver or kidney dysfunction



Serotonin Syndrome

6. Beaulieu P. *Can J Anesth* (2017) 64:1236-1264.

18

Illicit Drug	Clinical Drug	Interaction
Cocaine	Disulfiram	↑↑ plasma cocaine concentration, resulting in ↑↑ HR and BP
	Methadone	↓↓ methadone concentration
	Buprenorphine	↓↓ Buprenorphine plasma concentration
	Phenytoin	Phenytoin induced toxicity/death
MDMA	Ritonavir	Death
	Bupropion	↑↑ plasma concentration of bupropion and MDMA
	Methylphenidate	↑↑ BP and HR
	Paroxetine	↑↑ MDMA concentration
Cannabis	Warfarin	↑↑ warfarin concentration, resulting in ↑↑ anticoagulation effects
	Naltrexone	Potential of cannabis-induced HR ↑
	Ketoconazole	↑↑ plasma concentration of CBD and THC
Methamphetamine	Haloperidol	Drug-induced parkinsonism
	Ritonavir	Death
Kratom	Quetiapine	Death

Adapted from 7. Abbott KL, et al. *Drug Metab Rev* (2020) 52:1, 44-65.

19

Summary



Drug abuse is becoming increasingly common and is more common in trauma patients compared to the general population

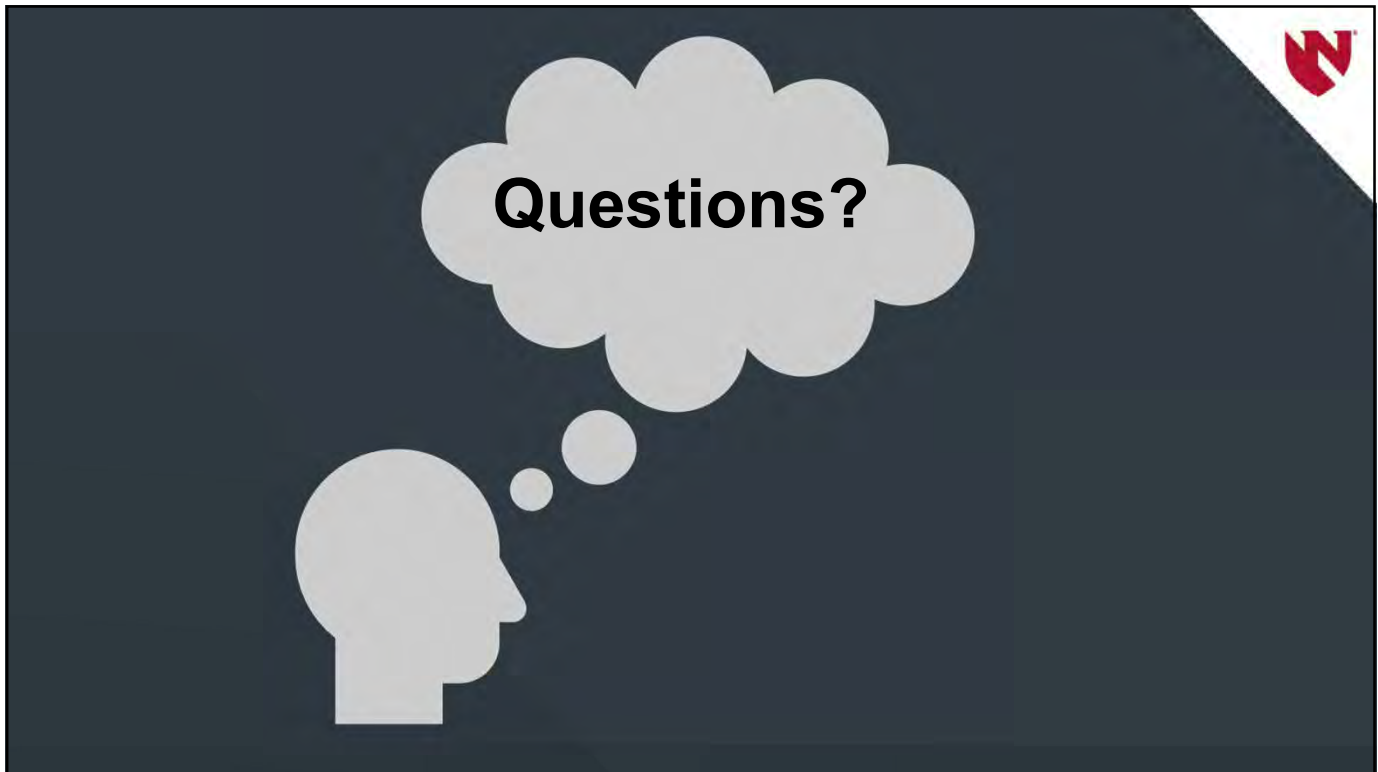


Toxins can be classified or grouped based upon their common physical findings, called toxidromes

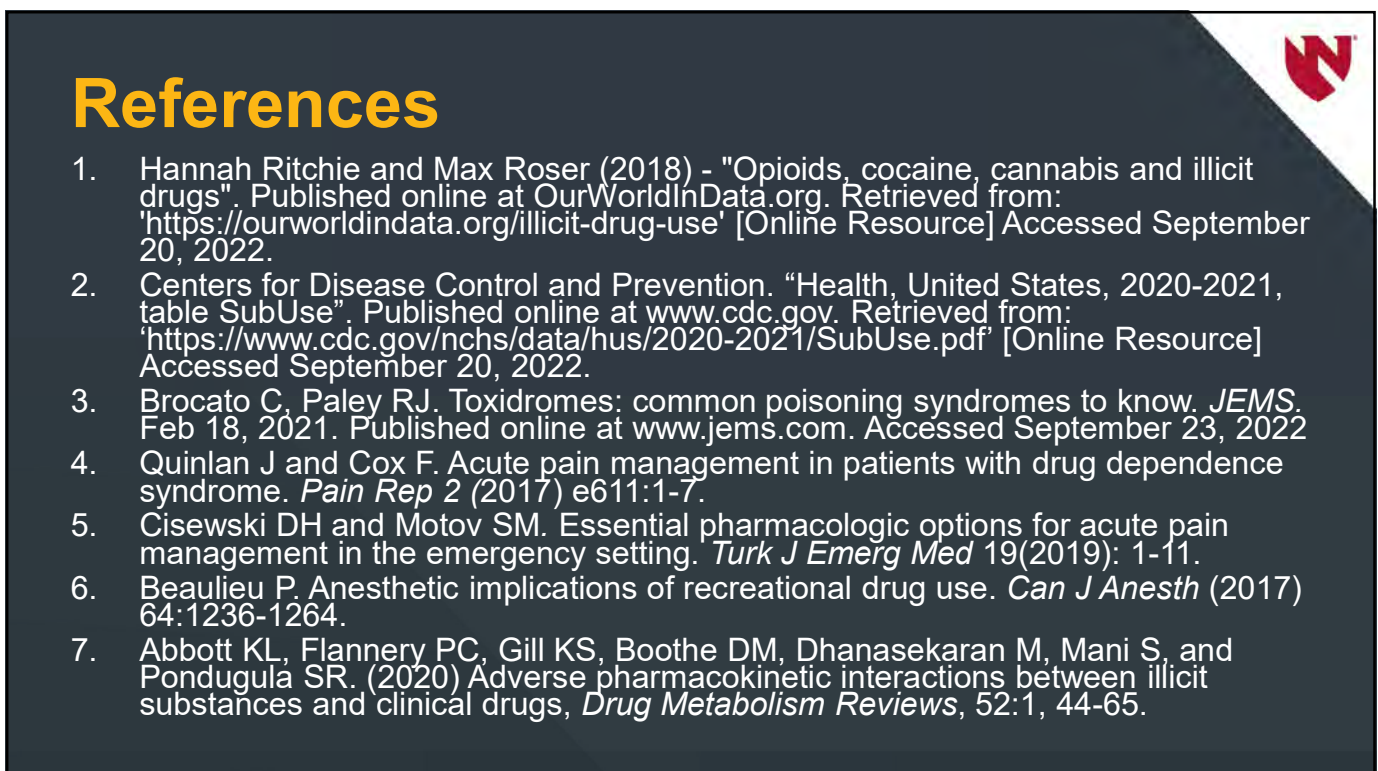


There are important care considerations a clinician should be aware of in the setting of recreational drug use

20



21



22

References

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7. Abbott KL, Flannery PC, Gill KS, Boothe DM, Dhanasekaran M, Mani S, and Pondugula SR. (2020) Adverse pharmacokinetic interactions between illicit substances and clinical drugs, *Drug Metabolism Reviews*, 52:1, 44-65.

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23



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24