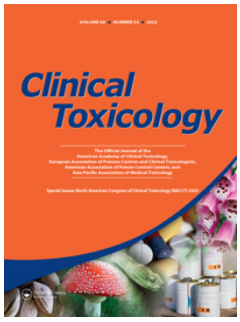

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abnormalities, and an antinuclear antibody test was negative. While in the ED, she developed acute onset agitation, hypotension, tachycardia, and muscle rigidity. Toxicology was initially consulted with concern for neuroleptic malignant syndrome (NMS) which was ruled out. She was transferred to an intensive care unit, where she rapidly became unresponsive with labored breathing requiring intubation for airway protection. Neurologic exam was significant for disconjugate gaze, absent withdrawal from pain, and extensor plantar responses present. Her ammonia level was profoundly elevated at 1222 mcg/dL. Given her neurologic deterioration, hypertonic saline and mannitol were administered for presumed cerebral edema, and dialysis was initiated for her hyperammonemia. Despite treatment, at around 16 h after the presentation to the ED, her pupils became fixed and dilated. Subsequent neurological evaluation was consistent with brain death. Genetics was consulted, but no underlying metabolic conditions were identified via exome sequencing. The patient passed away 64 h after the presentation to the ED.
Discussion: Acute hyperammonemia is a neurologic emergency leading to glutamate-induced neuroexcitation and toxicity terminating in irrecoverable cerebral edema. Clinically, as seen in this case, hyperammonemia can resemble other toxicological pathologies such as NMS or serotonin syndrome, which is a consult frequently sought at poison centers. The mechanism of DFX-induced liver toxicity is not well understood, with case reports postulating interference with urea cycle functioning, free drug accumulation in the setting of chelation with low iron stores, and drug metabolizing enzyme polymorphisms. DFX's prescribing information suggests interrupting chelation therapy when serum ferritin falls below 500 ng/mL; increased free drug concentrations could have been a contributing factor in the development of toxicity.
Conclusions: This report emphasizes the consideration of acute hyperammonemia as a cause for neurological effects consistent with serotonin syndrome and NMS. Given the absence of infectious, metabolic, or autoimmune etiology, we suggest that DFX was the cause of the patient's liver dysfunction and hyperammonemia. The FDA's Pediatric Advisory Committee is currently evaluating similar cases of hyperammonemia in pediatric patients taking DFX.

KEYWORDS Pediatric; deferasirox; hyperammonemia

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89. Etiology of methemoglobinemia: an NPDS observational study

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Background: There are few data that distinguish rare from common causes of methemoglobinemia (MetHb). Classic teachings often cite aniline dye or chlorates as frequent causes. Recognition of the substances most commonly implicated in causing MetHb can inform clinicians, impact treatment decisions, and influence prevention discussions. The National Poison Data System (NPDS) added MetHb as a clinical effect in 2019. The aim of this investigation was to identify the most common etiologic substances implicated in modern day MetHb using data reported to NPDS.
Methods: This was a retrospective cross-sectional study using electronic data from NPDS evaluating drugs and chemicals coded with MetHb as a clinical effect from January 1, 2019 to January 31, 2022. Inclusion criteria included all cases with MetHb coded as a clinical effect, treated at a healthcare facility, and outcome coded $\geq$ moderate effect. Exclusion criteria were information and non-human cases, cases coded as "unrelated effect, the exposure was probably not responsible for the effect(s)," or outcome scored as "not followed, minimal clinical effects possible (no more than minor effect possible)." Cases were also excluded if the product was unknown or believed to not cause MetHb. Unknown substances were defined as unable to identify product based on generic category. The primary outcome was to identify substances associated with MetHb, and further identify substances associated with methylene blue administration or fatal outcome.
Results: There were 809 reported cases in which MetHb was coded as a clinical outcome and after 129 excluding cases, 680 cases were evaluated. The average patient age was 41 (SD 21) years with 85% 18 years or older; 49% were female. Overall, the five most common substances associated with MetHb were: dapsone, nitrate/nitrite, unknown, phenazopyridine, and benzocaine and those who received methylene blue are listed in. Of the fatal cases, nitrite/nitrate, unknown, acetaminophen, hydroxychloroquine, and rasburicase were the most common. Patients with a fatal outcome from exposure to nitrites/nitrates were younger and most often coded as intentional suicide attempts.
Conclusions: Overall, we found dapsone to be the most common agent for MetHb but not frequently associated with death. Nitrites/nitrates were among the most common causes of MetHb, to receive methylene blue, and the most likely to cause fatalities. Limitations of this study include its retrospective nature and the potential for coding variability.

KEYWORDS Methemoglobin; methylene blue; nitrites

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90. Encanto! Elucidating new cannabinoid-associated neurotoxicity objectively

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Background: Symptoms of cannabis intoxication in children can overlap with other significant neurologic pathologies. Here we discuss two pediatric cases of cannabis associated neurotoxicity (CANT) and how blood cannabinoid concentrations changed clinician assessment and patient disposition.
Case series: Case 1 A 6-month-old female presented to the emergency department (ED) with somnolence after falling off a couch. She developed seizure-like activity and received lorazepam and levetiracetam. On exam she had minimally responsive dilated pupils and no evidence of trauma. Labs and head CT were unremarkable. Urine drug screen was positive for carboxy-THC. Since the patient is exclusively nursed by mother with chronic cannabis use, there was a question of passive maternal cannabis exposure. The poison center (PC) was consulted and recommended blood and urine quantitative analysis. Specimens drawn 24–36 h post-exposure showed blood carboxy-THC levels 189 ng/mL and 423 ng/mL in urine. The patient returned to baseline by 72 h. Child Protective Services (CPS) was involved to aid in the safe disposition of the child. Case 2 A 3-year-old female with Multiple Endocrine Neoplasia (MEN) 2A and family history of epilepsy presented with seizure-like activity. She spent the night at her grandmother's house and in the morning reported eye pain and dizziness. In the ED she became tonic and received lorazepam. She was tachycardic and intermittently responsive to name. Labs and head CT were unremarkable. Urine drug screen was positive for carboxy-THC. PC was consulted and

recommended blood quantitative analysis. Specimens drawn 12–24 h post-exposure showed THC 23.8 ng/mL, carboxy-THC 169.1 ng/mL, and hydroxy-THC 21.2 ng/mL. The grandmother later reported giving the child a chocolate edible the night prior to presentation. The patient returned to baseline at 24 h and was discharged home.
Discussion: Successful blood quantification of cannabinoids is highly dependent on the route of exposure. Smoked cannabis causes a peak blood delta-9-THC concentration within 20 min and becomes undetectable as early as 3 h. Oral exposures take several hours to achieve peak concentrations and can take over 24 h to become undetectable. Since the primary route of clinically significant exposures in young children is oral, this population is more likely to have relevant findings with cannabinoid quantification. Passive exposure is often a clinical confounder in the setting of parental cannabis use. In both cases, patients presented with undifferentiated neurologic changes. In Case 1, clinicians were concerned for closed head injury, and urine THC screening may have initially been explained by passive exposure through heavy maternal use. Because cannabinoid concentrations were inconsistent with passive inhalational exposure or breast milk alone, CPS reviewed the case to determine a safe disposition plan. For Case 2, the cannabinoid quantification helped determine that symptoms were from an edible exposure rather than a sequela of MEN or seizure disorder.
Conclusions: There is limited literature describing the pharmacokinetics of oral cannabis in young children with CANT. Quantification of cannabinoids in young children with a positive THC screening assay may differentiate causes of neurologic changes. PCs play an important role in the interpretation of these results.

KEYWORDS Cannabis; pediatric; analytical toxicology
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91. Epidemiology of hydrocodone exposures reported to the US poison centers

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Background: Drug overdoses are a leading cause of unintentional injury-associated death in the US (US.) with 100,306 fatalities in 2021. Opioid dispensing rates continue to remain very high in certain areas across the country. According to the U.S Drug Enforcement Administration, 24.4 million individuals used hydrocodone for non-medical purposes. Emergency department (ED) visits for opioid overdoses rose 30% in all parts of the US from July 2016 through September 2017. This study aims to examine the national trends in hydrocodone exposures reported to US poison centers (PCs).
Methods: The National Poison Data System (NPDS) was queried for all closed, human exposures to hydrocodone from January 01, 2015 through December 31, 2021 using the American Association of Poison Control Center (AAPCC) generic code identifiers. We identified and descriptively assessed the relevant demographic and clinical characteristics. Reports from acute care hospitals and hospital based EDs (ACHs) were evaluated as a subset. Trends in hydrocodone exposure frequencies and rates (per 100,000 human exposures) were analyzed using Poisson regression methods. Percent changes from the first year of the study (2014) were reported with the corresponding 95% confidence intervals (95% CI).
Results: During the study period, there were 106,078 toxic exposures to hydrocodone that were reported to the PCs. The frequency of exposures decreased by approximately 50% (95% CI: 45.5%, 53.3%; $p < 0.001$), and the rate of exposures significantly decreased by 57% (95% CI: 48.2%, 65.9%; $p < 0.001$). Of the total hydrocodone calls, the proportion of calls from ACHs was approximately 55%, with this trend remaining constant through the study period. Multiple substance exposures accounted for 56.7% of the overall hydrocodone calls and 70.1% of calls from ACHs. Approximately 18% of the patients reporting hydrocodone exposures were admitted to the critical care unit (CCU), with 13% of patients being admitted to a psychiatric facility. Residence was the most common site of exposure (94.3%), and 62% of these cases were enroute to the hospital via EMS when the PC was notified. Cases were predominantly female (61.3%), with the most common age group being 20–29 years (16.2%) followed by 30–39 years (13.6%). Suspected suicides (45.2%) was the most common reason for exposure, followed by therapeutic errors (20.3%), with exposures for both reasons being higher in cases reported by ACH. Major effects and moderate effects were seen in 6.1% and 20.6% cases, respectively. There were over 600 deaths during the study. The most frequently co-occurring substances associated with the cases were benzodiazepines (17%) and alcohol (9.7%).
Conclusions: PC data demonstrated a decreasing trend of hydrocodone exposures, which may in part be attributed to the reformulation of this medication with abuse-deterrent properties. However, the high proportion of calls from acute-care hospitals and EDs indicates higher risk of such exposures which may be mediated by several clinical and demographic factors.

KEYWORDS Opioids; overdose; national poison data system
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92. Impact of an education module on the knowledge and attitudes of emergency physicians towards prescribing buprenorphine for opioid-use disorder

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Background: The COVID-19 pandemic has exacerbated the existing opioid epidemic, contributing to an increase in overdose-related deaths. Buprenorphine is an important treatment for patients with opioid-use disorder (OUD) and initiation in the Emergency Department (ED) has been shown to improve outcomes for these patients. Our objective was to assess the impact of a three-pronged education module on the knowledge and attitudes of emergency medicine (EM) physicians towards using buprenorphine for the treatment of OUD.
Methods: We developed a three-pronged educational module including rationale for OUD treatment with buprenorphine, an evidence-based ED buprenorphine induction pathway and electronic medical record tools (documentation templates, order sets and discharge instructions) that were deployed to providers in an urban academic ED. A voluntary anonymous pre-post survey was administered. Using a 6-point Likert Scale, participants were asked about their understanding, experience, and confidence with prescribing buprenorphine for patients with OUD. Descriptive statistics were applied.
Results: Forty-nine subjects participated, including approximately two-thirds faculty physicians and one-third residents. A minority of respondents were female (37%). Most (80%) had no direct experience in prescribing buprenorphine. When asked if buprenorphine reduces the likelihood of death from opioid overdose,