When Drugs Look Like Candy: What Role Do Poison Centers Play?

Christopher Hoyte MD, MBA
Medical Director, Rocky Mountain Poison Center
Professor, Emergency Medicine and Medical Toxicology
University of Colorado School of Medicine

Case

- A two year-old boy, healthy, presents to the emergency department with lethargy and somnolence
- HR 110 BP 90/60 RR 16 Temp 37.1^{o}C O_2 Sat 97%RA
- Mother reports finding him near a bottle of a gummi medication where bottle was opened and spilled on the ground
- Sleepy, minimally arousable, no evidence of trauma, pupils 2mm and reactive, moving all extremities to painful stimuli, reflexes intact

Objectives

- What is a poison center?
- Data
- Trends
- Age is more than just a number
- Guidelines

Poison Centers

- Practice Toxicology, Public Health
  - Prevent
  - Mitigate
- 1953, First Poison Center (PC) established
  - Focused on children's accidental ingestions and household products
- 1958: America’s Poison Centers founded
- Rapid increase in number of PCs due to rising awareness of poisonings
  - 1970s: Over 400 centers across the country.
- ’80s and ‘90s centers consolidated for efficiency and to provide 24/7 service.
- 2002: National Poison Help Line (1-800-222-1222)
- Current: 55 PCs

Merative **Micromedex**®

Keyword search

Home | Drug Interactions | IV Compatibility | Drug ID | Drug Comparison | CareNotes | NeoFax® / Pediatrics | Tox & Drug Product Lookup | RED BOOK | Calculators

Tox & Drug Product Lookup

Products and Substances | Martindale Global Drug | Company Contacts

Search for product or substance

Search by Name

- Drug product name
- Commercial/household product name or chemical
- Substance including plant and animal scientific or common name
- Slang terms/street names for drugs or substances

Search by Code

- AAPCC code - Lookup Definitions
- Micromedex product ID
- National Drug Code (NDC)
- Chemical Abstracts Service (CAS) number
- Drug Identification Number (DIN - Canada)
- Environmental Protection Agency (EPA) code
- Universal Product Code (UPC)
- Pest Control Product (PCP) code
- California Registry Number (CRN)
- Fertilizer Act

SYMPTOMS AND FINDINGS:
Nausea, vomiting, feeble pulse, slow respiration, stupor, CNS depression. This may be preceded in some cases by CNS stimulation with excitement and delirium. Animals dying from acute acetaminophen intoxication exhibit respiratory failure. SEE card on Acetaminophen.

TREATMENT:
Give milk. If large amount ingested, perform gastric lavage. Give activated charcoal to delay absorption. Give saline cathartic (sodium sulfate or sodium phosphate-biphosphate). Maintain respiration. Symptomatic and supportive. SEE card on Acetaminophen.

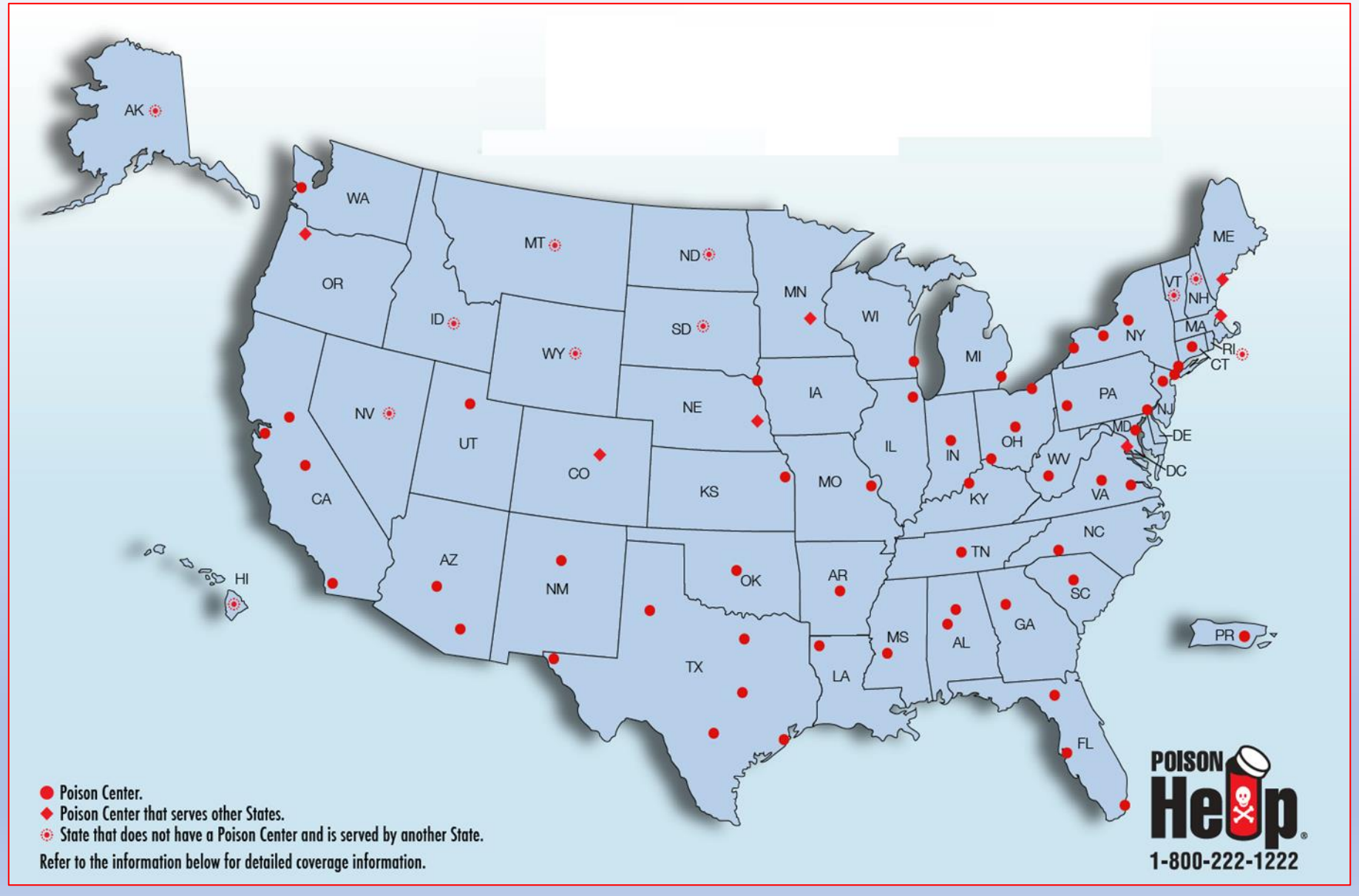
SOURCE OF INFORMATION: Medical Department, Mead Johnson Laboratories; Kastrup, Facts and Comparisons; See card on Acetaminophen for additional references.

Fifty-first Supplement August 1967
National Clearinghouse for Poison Control Centers [illegible] 54

POISON HELP!
1-800-222-1222

POISON Help™
1-800-222-1222
AAPCC

AMERICA'S POISON CENTERS
Treatment • Education • Prevention


AK
HI
WA
OR
CA
NV
ID
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
MD
DE
DC
NJ
CT
RI
MA
VT
NH
ME
PR
Poison Center.
Poison Center that serves other States.
State that does not have a Poison Center and is served by another State.
Refer to the information below for detailed coverage information.
POISON
Help
1-800-222-1222

Poison Center

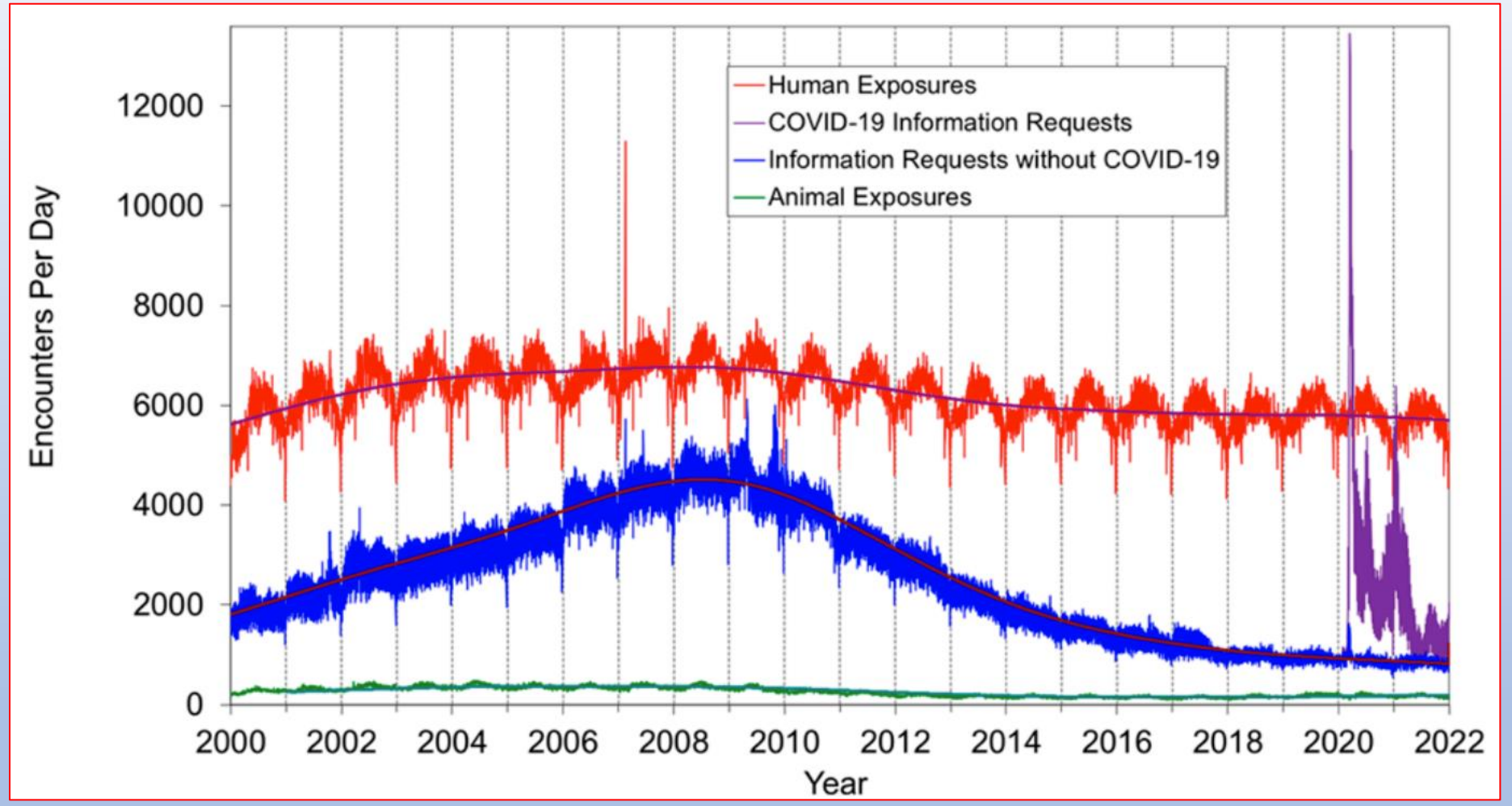
- 24 x 7 service, 365 days
- Staffed by Specialists in Poison Information (SPI)
- Best Practice Call Center Infrastructure
- Core Competency
  - Medical Management of Poisonings/Exposures
- Caller Types
  - General public
  - Healthcare professionals
  - Persons in the workplace
  - Public Health
  - Law Enforcement

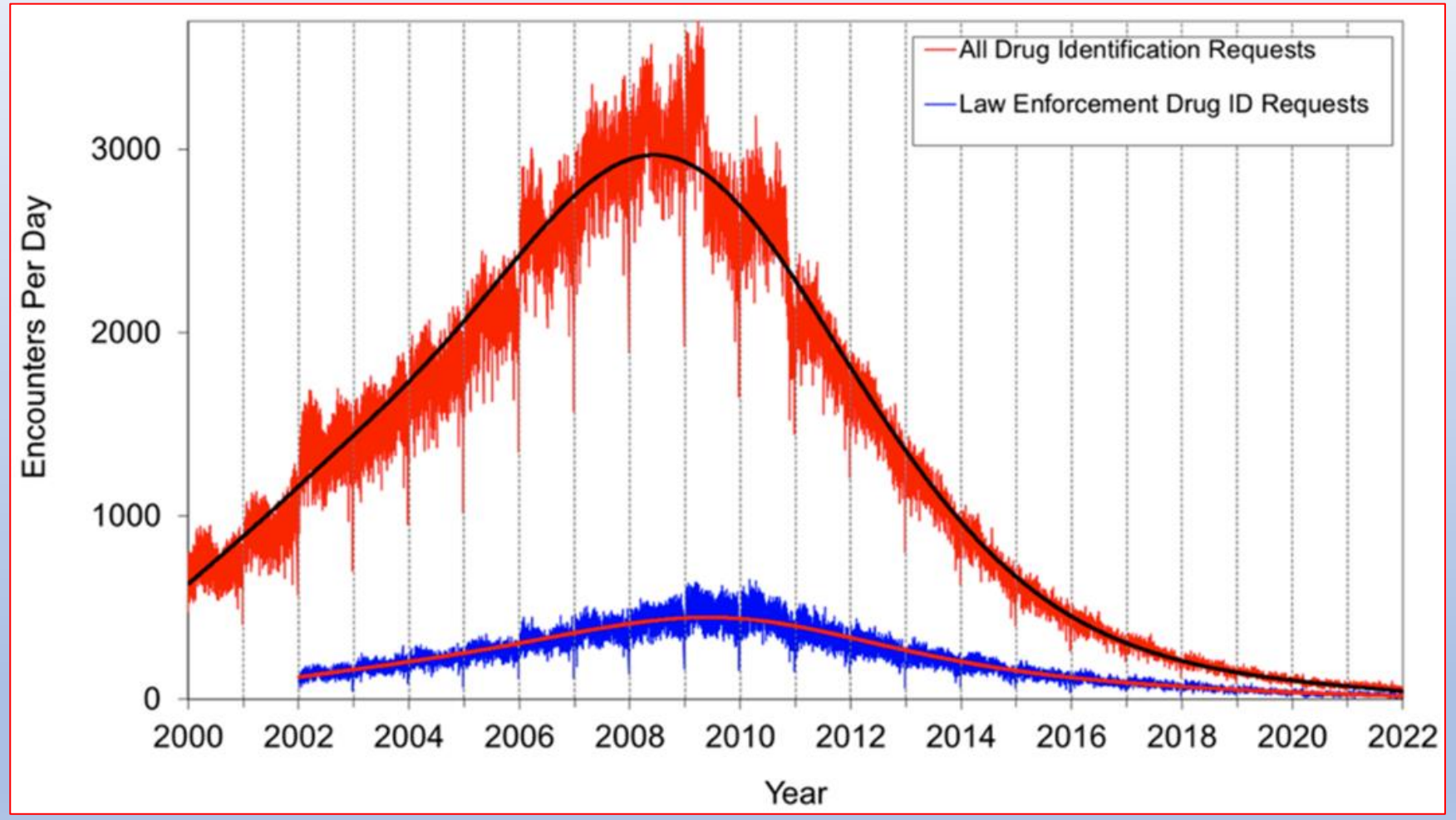
Staff

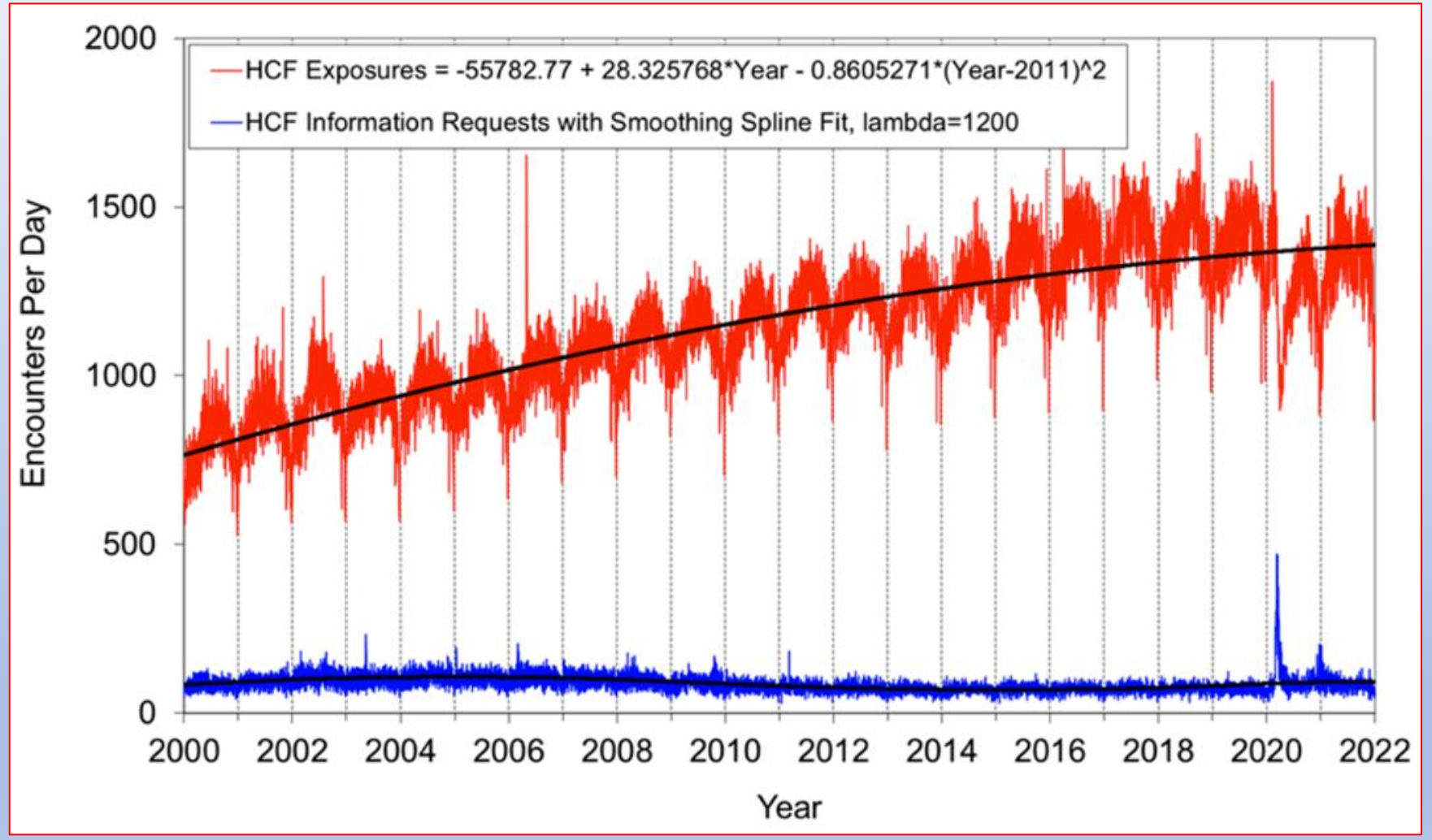
- CSPI/SPI: [Certified] Specialists in Poison Information manage all healthcare and public exposure calls.
  - RNs, PharmDs (n=29)
  - 77% CSPI Staff
- PIP: Poison Information Providers manage low acuity calls
  - Para-professionals
- Backup support
  - Medical Toxicology (physician) fellows & board-certified Medical Toxicologists
  - Clinical Toxicologists
  - Medical Director

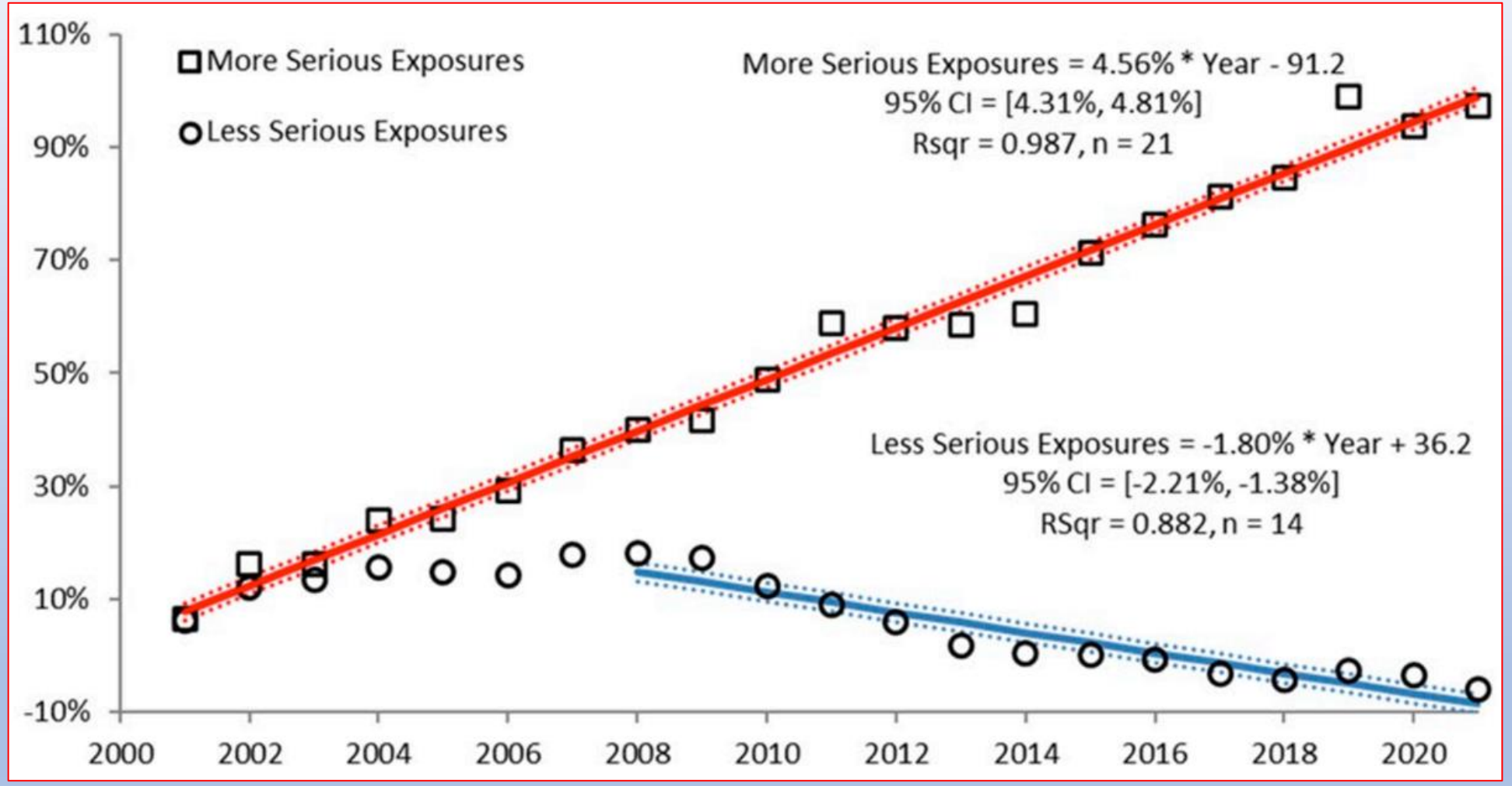
Data Collected

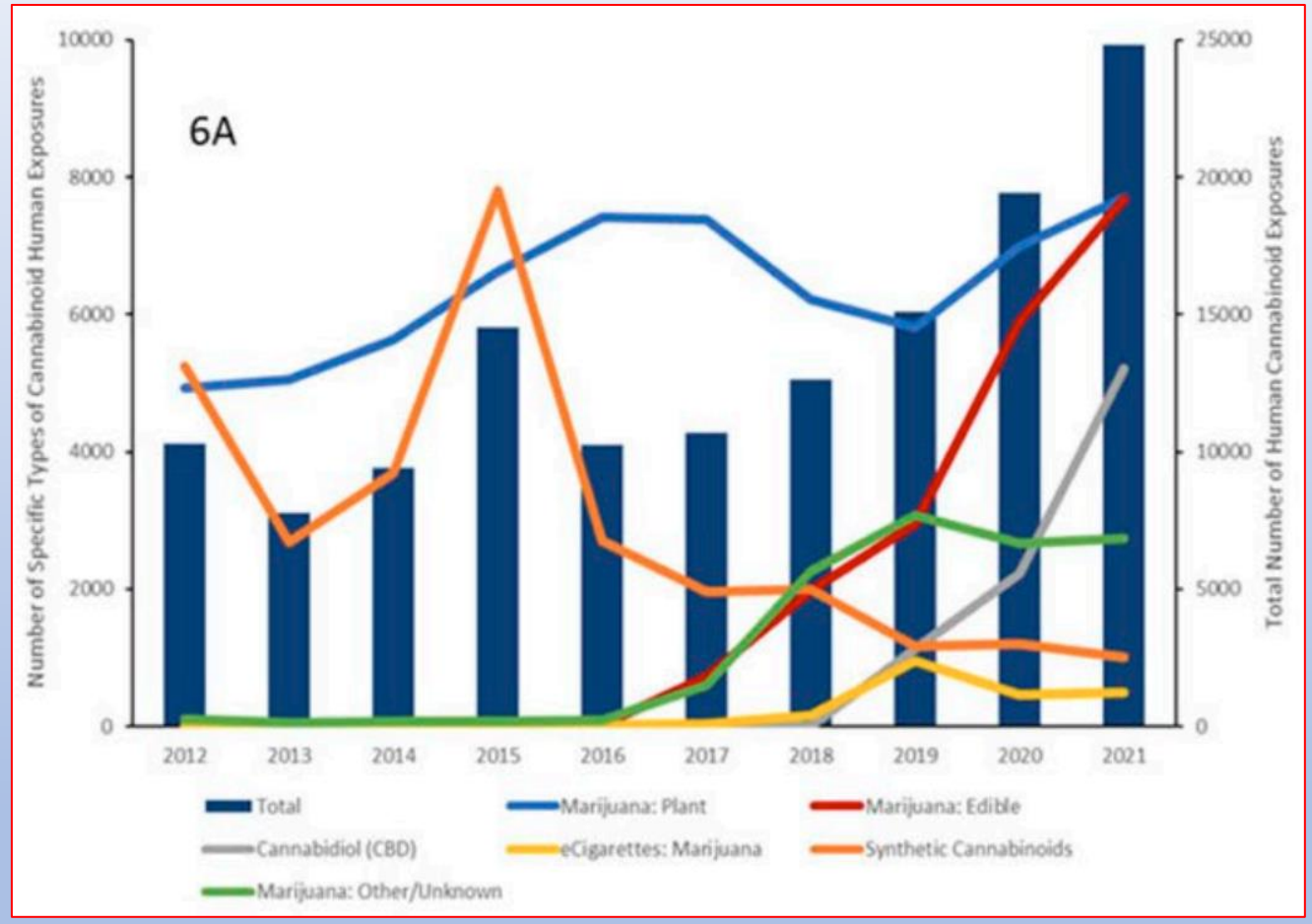
- Age
- Gender
- Substance(s) involved
- Dose/Amount
- Route
- Reason (intentionality)
- Clinical Information
- Site
- Disposition
- Medical outcome
- Therapies/Interventions

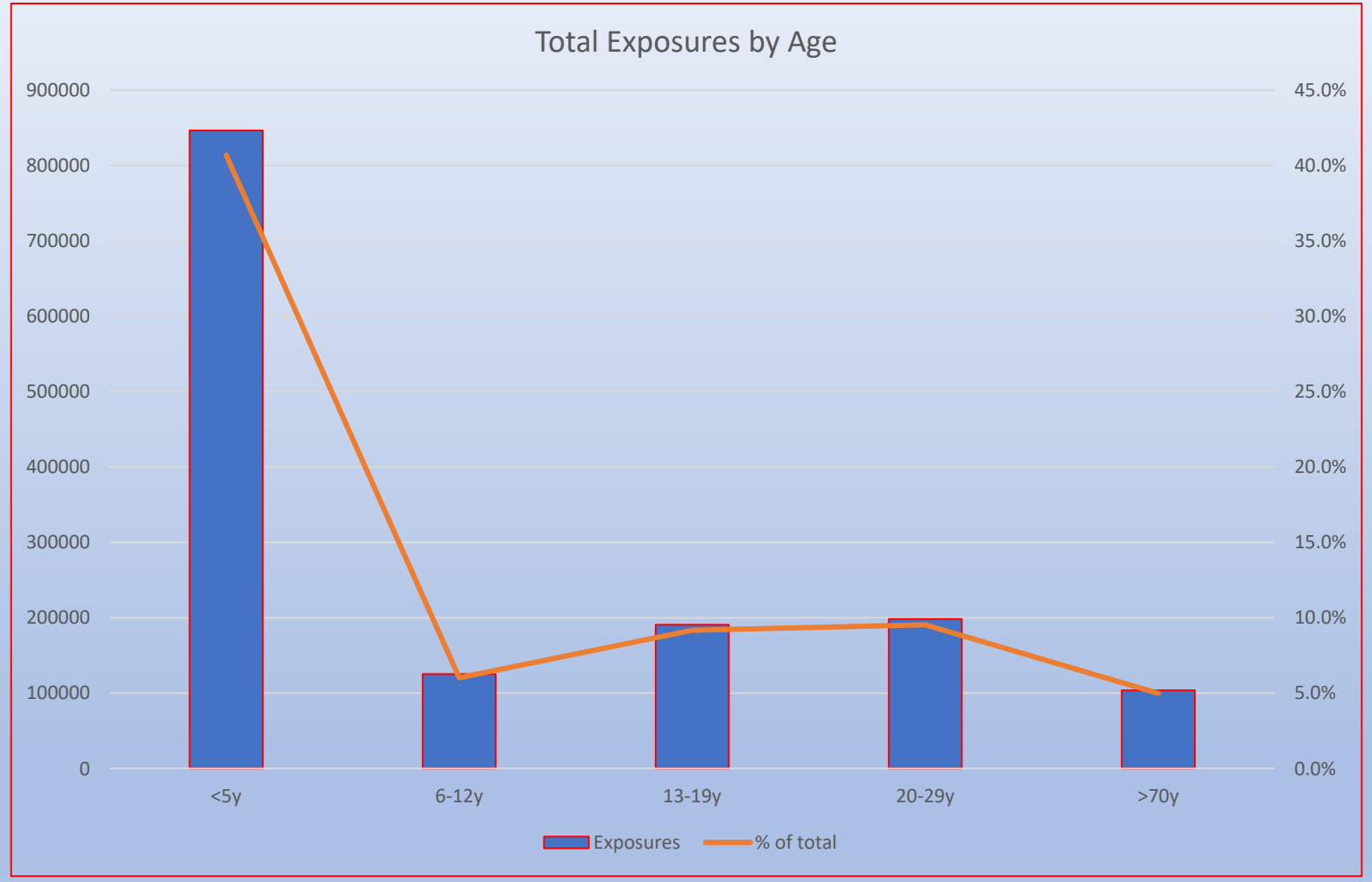

Human Exposures
COVID-19 Information Requests
Information Requests without COVID-19
Animal Exposures
Encounters Per Day
12000
10000
8000
6000
4000
2000
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
Year

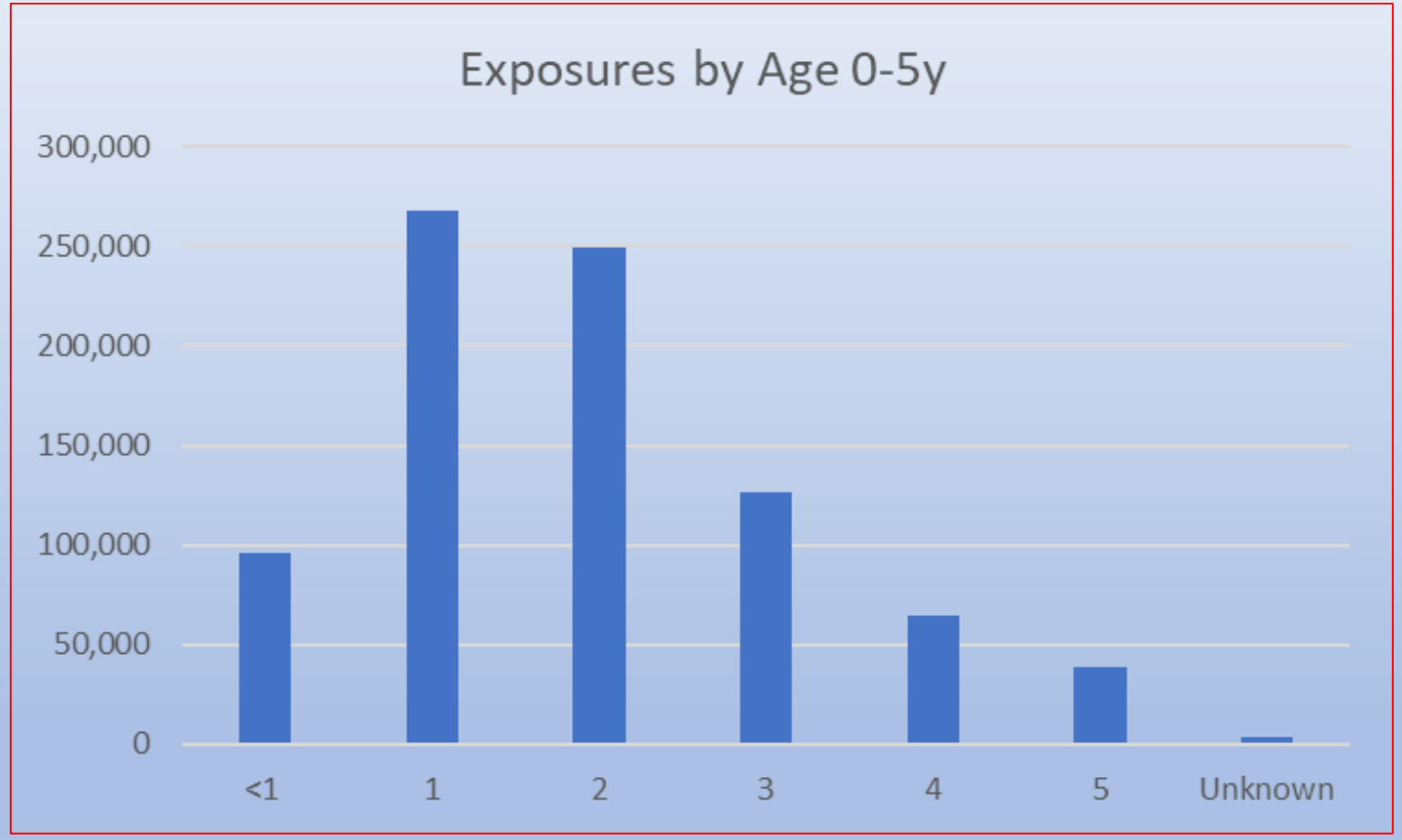

All Drug Identification Requests
Law Enforcement Drug ID Requests
Encounters Per Day
3000
2000
1000
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
Year

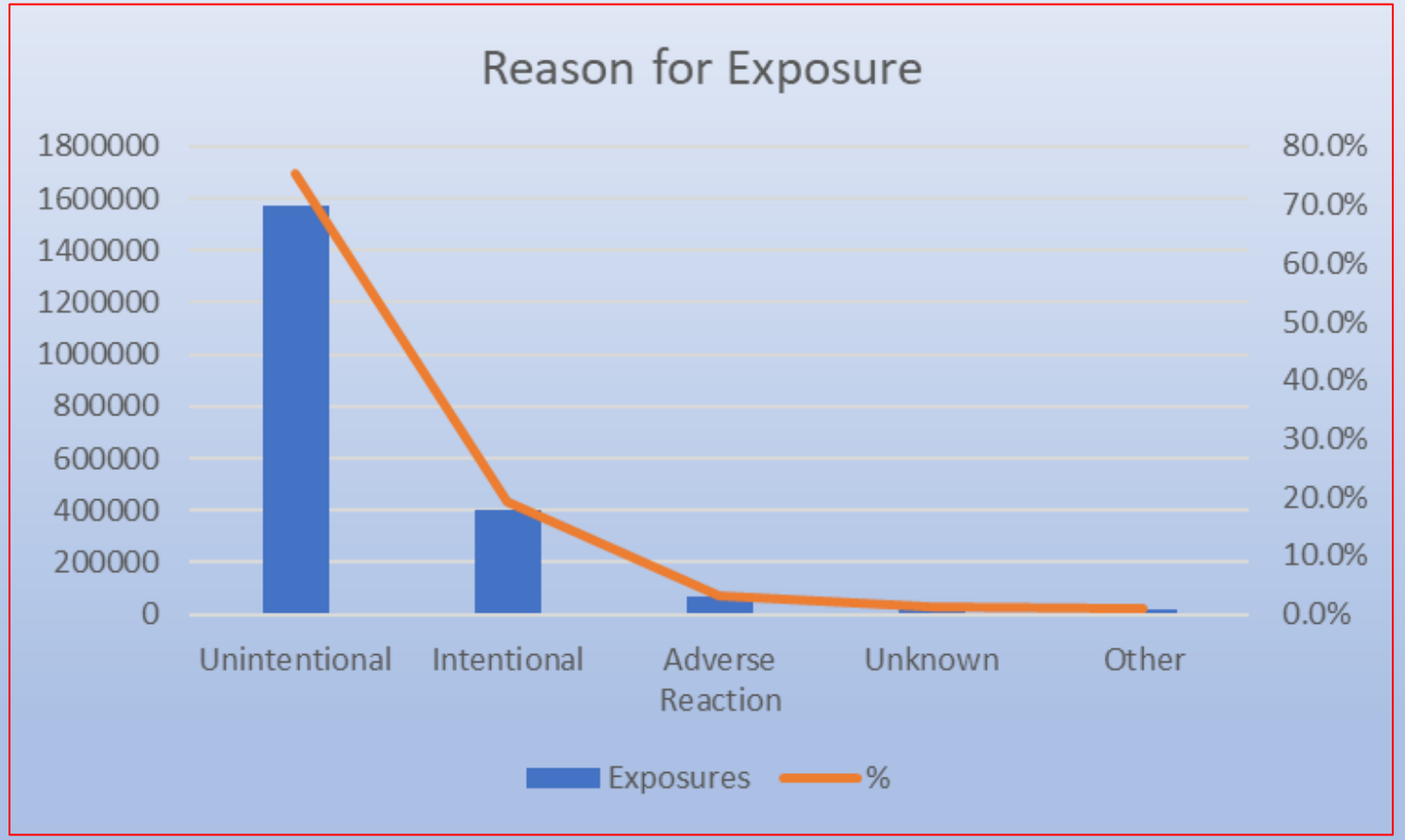

HCF Exposures = -55782.77 + 28.325768*Year - 0.8605271*(Year-2011)^2
HCF Information Requests with Smoothing Spline Fit, lambda=1200
Encounters Per Day
2000
1500
1000
500
0
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
Year

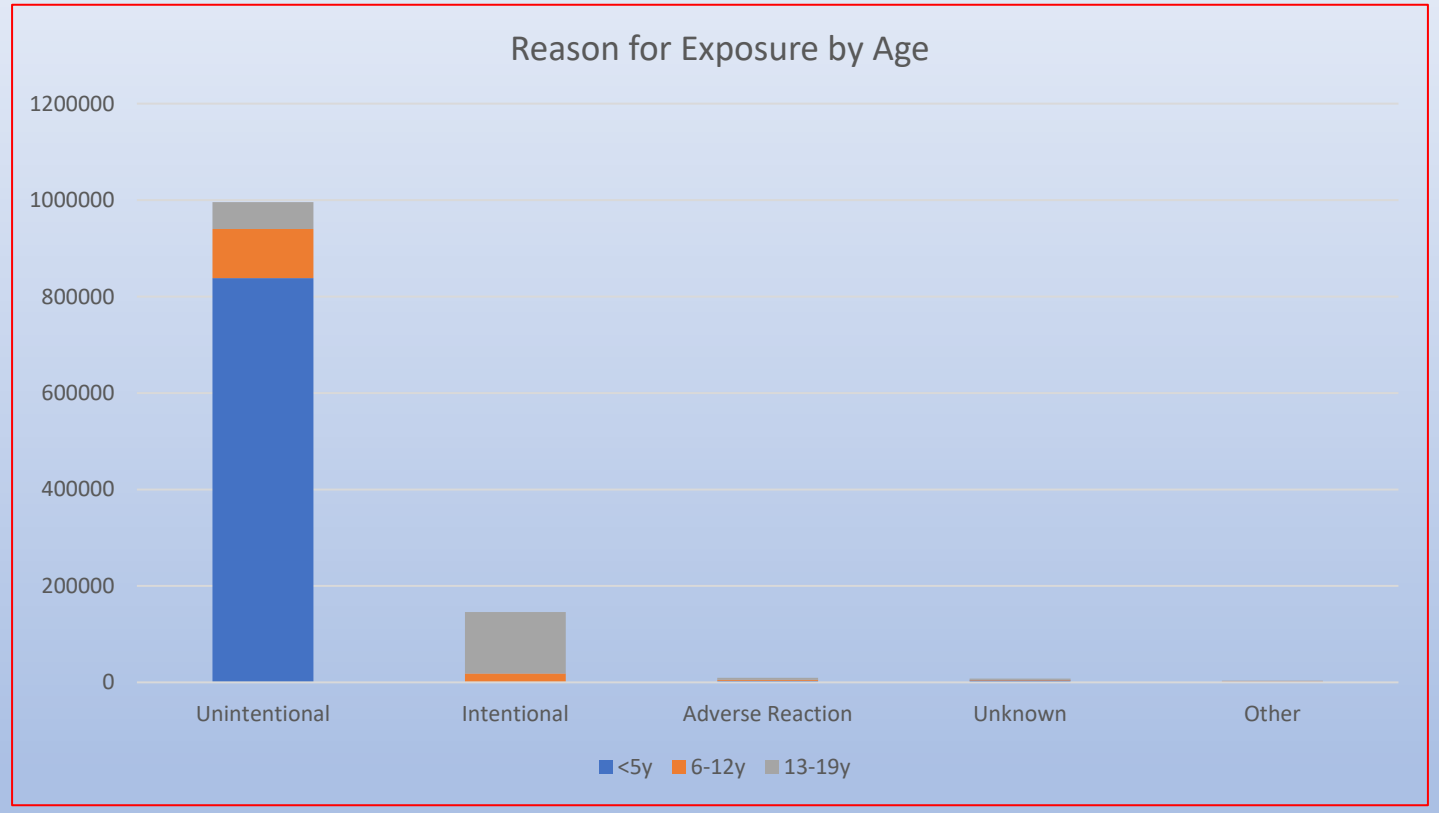

More Serious Exposures
Less Serious Exposures
More Serious Exposures = 4.56% * Year - 91.2
95% CI = [4.31%, 4.81%]
Rsqr = 0.987, n = 21
Less Serious Exposures = -1.80% * Year + 36.2
95% CI = [-2.21%, -1.38%]
RSqr = 0.882, n = 14
110%
90%
70%
50%
30%
10%
-10%
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020

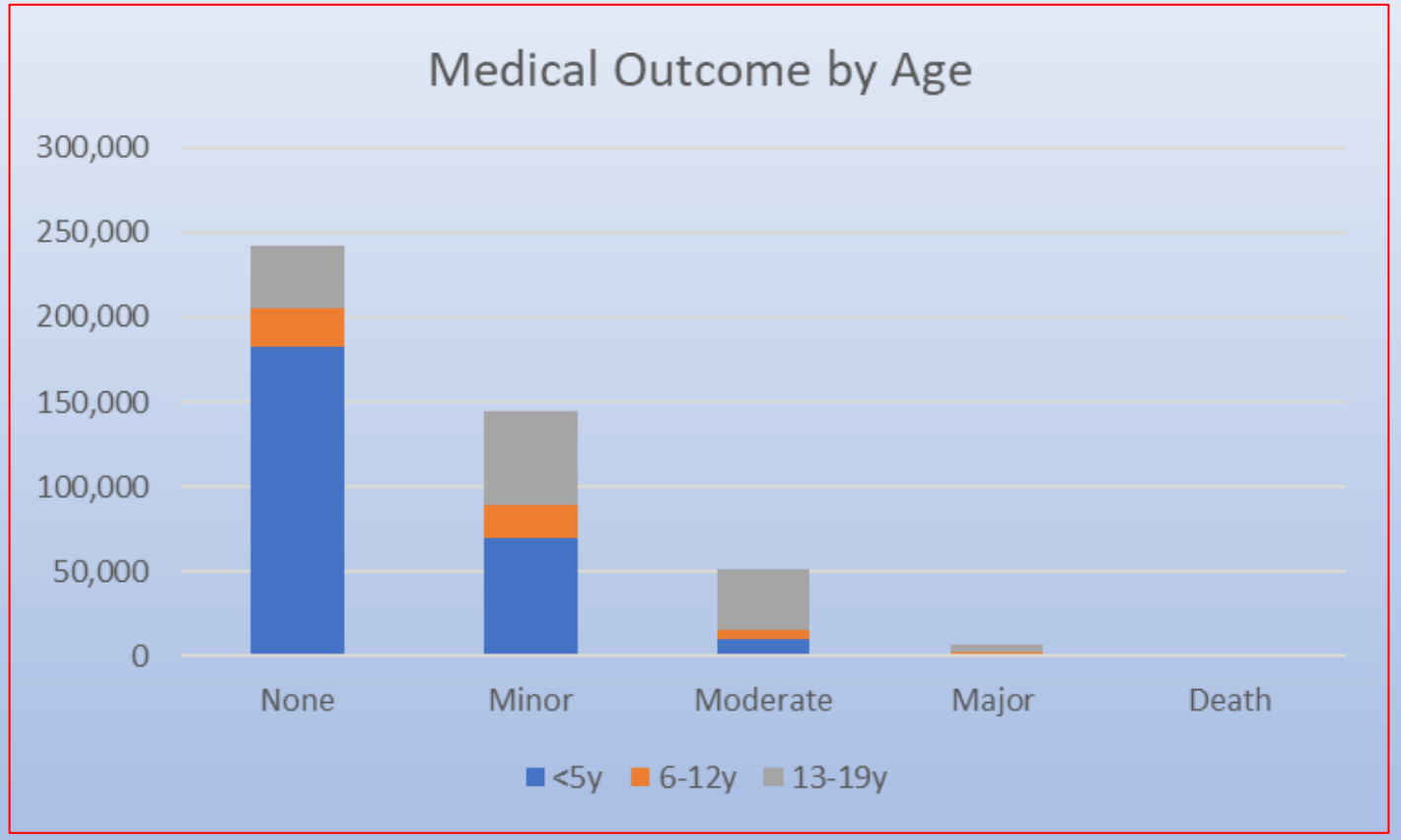

6A
Number of Specific Types of Cannabinoid Human Exposures
Total Number of Human Cannabinoid Exposures
10000
8000
6000
4000
2000
0
25000
20000
15000
10000
5000
0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Total
Marijuana: Plant
Marijuana: Edible
Cannabidiol (CBD)
eCigarettes: Marijuana
Synthetic Cannabinoids
Marijuana: Other/Unknown

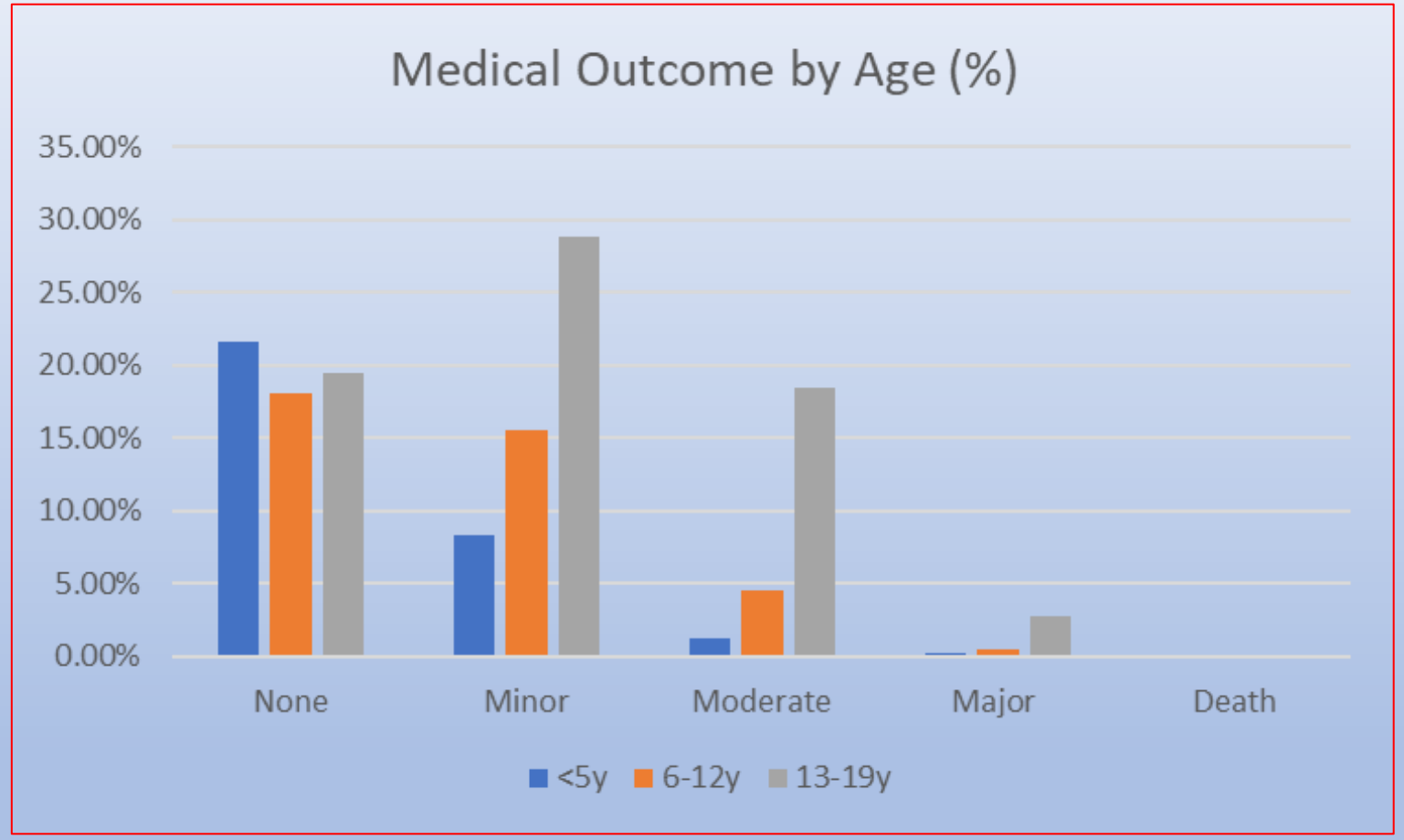

Total Exposures by Age
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
<5y
6-12y
13-19y
20-29y
>70y
Exposures
% of total


Exposures by Age 0-5y
300,000
250,000
200,000
150,000
100,000
50,000
0
<1
1
2
3
4
5
Unknown


Reason for Exposure
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Unintentional
Intentional
Adverse Reaction
Unknown
Other
Exposures
%


Reason for Exposure by Age
1200000
1000000
800000
600000
400000
200000
0
Unintentional
Intentional
Adverse Reaction
Unknown
Other
<5y
6-12y
13-19y


Medical Outcome by Age
300,000
250,000
200,000
150,000
100,000
50,000
0
None
Minor
Moderate
Major
Death
<5y
6-12y
13-19y


Medical Outcome by Age (%)
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
None
Minor
Moderate
Major
Death
<5y
6-12y
13-19y

Guidelines

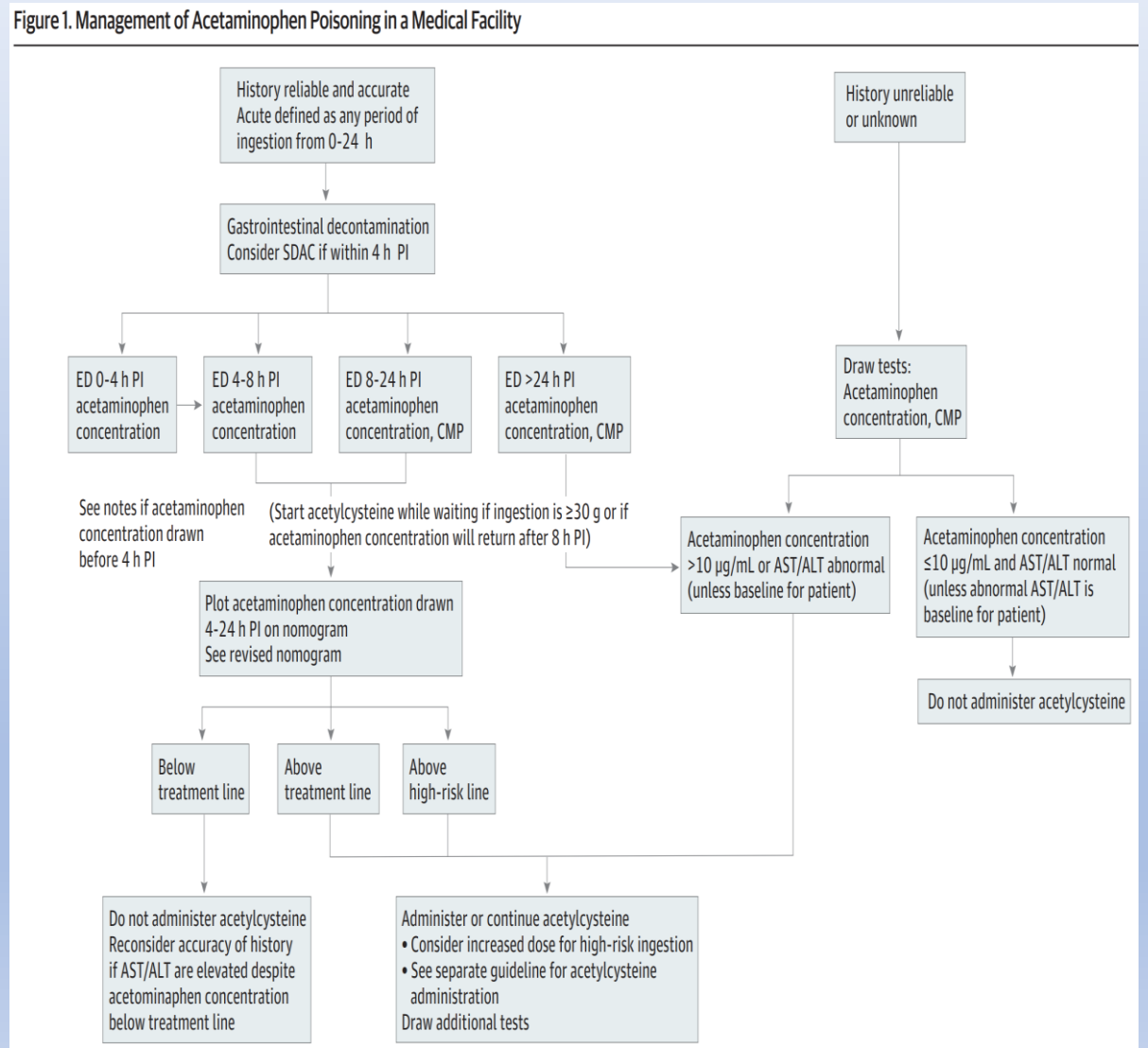
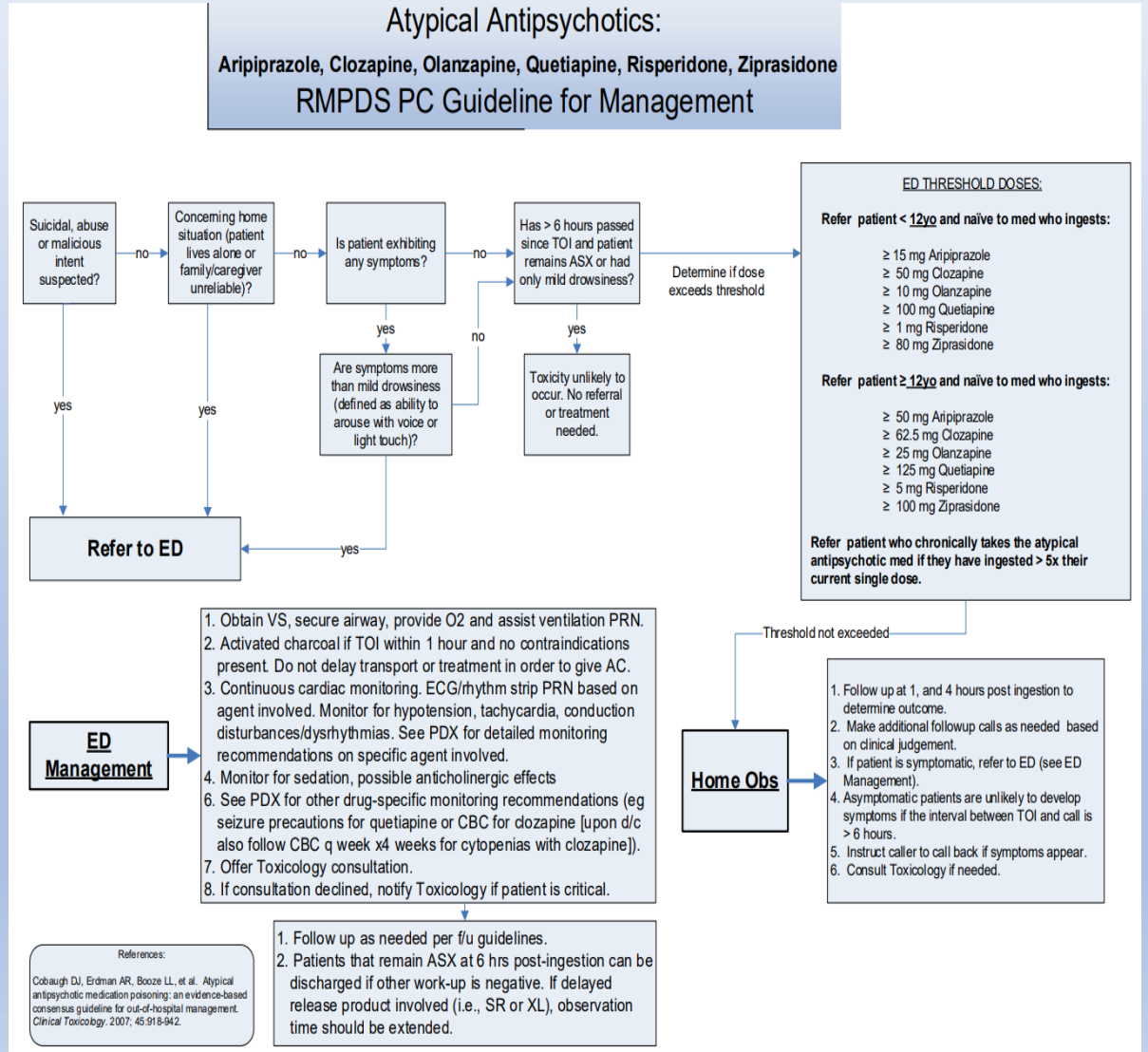


Figure 1. Management of Acetaminophen Poisoning in a Medical Facility
History reliable and accurate
Acute defined as any period of ingestion from 0-24 h
History unreliable or unknown
Gastrointestinal decontamination
Consider SDAC if within 4 h PI
ED 0-4 h PI acetaminophen concentration
ED 4-8 h PI acetaminophen concentration
ED 8-24 h PI acetaminophen concentration, CMP
ED >24 h PI acetaminophen concentration, CMP
Draw tests: Acetaminophen concentration, CMP
See notes if acetaminophen concentration drawn before 4 h PI
(Start acetylcysteine while waiting if ingestion is ≥30 g or if acetaminophen concentration will return after 8 h PI)
Acetaminophen concentration >10 µg/mL or AST/ALT abnormal (unless baseline for patient)
Acetaminophen concentration ≤10 µg/mL and AST/ALT normal (unless abnormal AST/ALT is baseline for patient)
Plot acetaminophen concentration drawn 4-24 h PI on nomogram
See revised nomogram
Do not administer acetylcysteine
Below treatment line
Above treatment line
Above high-risk line
Do not administer acetylcysteine
Reconsider accuracy of history if AST/ALT are elevated despite acetominaphen concentration below treatment line
Administer or continue acetylcysteine
• Consider increased dose for high-risk ingestion
• See separate guideline for acetylcysteine administration
Draw additional tests


Atypical Antipsychotics:
Aripiprazole, Clozapine, Olanzapine, Quetiapine, Risperidone, Ziprasidone
RMPDS PC Guideline for Management
Suicidal, abuse or malicious intent suspected?
Concerning home situation (patient lives alone or family/caregiver unreliable)?
Is patient exhibiting any symptoms?
Has > 6 hours passed since TOI and patient remains ASX or had only mild drowsiness?
Determine if dose exceeds threshold
Are symptoms more than mild drowsiness (defined as ability to arouse with voice or light touch)?
Toxicity unlikely to occur. No referral or treatment needed.
Refer to ED
ED THRESHOLD DOSES:
Refer patient < 12yo and naïve to med who ingests:
≥ 15 mg Aripiprazole
≥ 50 mg Clozapine
≥ 10 mg Olanzapine
≥ 100 mg Quetiapine
≥ 1 mg Risperidone
≥ 80 mg Ziprasidone
Refer patient ≥ 12yo and naïve to med who ingests:
≥ 50 mg Aripiprazole
≥ 62.5 mg Clozapine
≥ 25 mg Olanzapine
≥ 125 mg Quetiapine
≥ 5 mg Risperidone
≥ 100 mg Ziprasidone
Refer patient who chronically takes the atypical antipsychotic med if they have ingested > 5x their current single dose.
Threshold not exceeded
ED Management
1. Obtain VS, secure airway, provide O2 and assist ventilation PRN.
2. Activated charcoal if TOI within 1 hour and no contraindications present. Do not delay transport or treatment in order to give AC.
3. Continuous cardiac monitoring. ECG/rhythm strip PRN based on agent involved. Monitor for hypotension, tachycardia, conduction disturbances/dysrhythmias. See PDX for detailed monitoring recommendations on specific agent involved.
4. Monitor for sedation, possible anticholinergic effects
6. See PDX for other drug-specific monitoring recommendations (eg seizure precautions for quetiapine or CBC for clozapine [upon d/c also follow CBC q week x4 weeks for cytopenias with clozapine]).
7. Offer Toxicology consultation.
8. If consultation declined, notify Toxicology if patient is critical.
Home Obs
1. Follow up at 1, and 4 hours post ingestion to determine outcome.
2. Make additional followup calls as needed based on clinical judgement.
3. If patient is symptomatic, refer to ED (see ED Management).
4. Asymptomatic patients are unlikely to develop symptoms if the interval between TOI and call is > 6 hours.
5. Instruct caller to call back if symptoms appear.
6. Consult Toxicology if needed.
1. Follow up as needed per f/u guidelines.
2. Patients that remain ASX at 6 hrs post-ingestion can be discharged if other work-up is negative. If delayed release product involved (i.e., SR or XL), observation time should be extended.
References:
Cobaugh DJ, Erdman AR, Booze LL, et al. Atypical antipsychotic medication poisoning: an evidence-based consensus guideline for out-of-hospital management. Clinical Toxicology. 2007; 45:918-942.

Toxic Tetrahydrocannabinol (THC) Dose in Pediatric Cannabis Edible Ingestions

Lesley C. Pepin, MD,[a] Mark W. Simon, MD,[a] Shireen Banerji, PharmD,[a] Jan Leonard, MSPH,[b] Christopher O. Hoyte, MD,[a,c] George S. Wang, MD[a,d]

abstract

OBJECTIVE: The study characterizes cannabis toxicity in relation to tetrahydrocannabinol (THC) dose in pediatric edible cannabis ingestions.

METHODS: This is a retrospective review of children aged <6 years presenting with edible cannabis ingestions of known THC dose within a pediatric hospital network (January 1, 2015–October 25, 2022). Cannabis toxicity was characterized as severe if patients exhibited severe cardiovascular (bradycardia, tachycardia/hypotension requiring vasopressors or intravenous fluids, other dysrhythmias), respiratory (respiratory failure, apnea, requiring oxygen supplementation), or neurologic (seizure, myoclonus, unresponsiveness, responsiveness to painful stimulation only, requiring intubation or sedation) effects. Cannabis toxicity was characterized as prolonged if patients required >6 hours to reach baseline. The relationship between THC dose and severe and prolonged toxicity was explored using multivariable logistic regression and receiver operator characteristic curve analyses.

RESULTS: Eighty patients met inclusion. The median age was 2.9 years. The median THC ingestion was 2.1 mg/kg. Severe and prolonged toxicity was present in 46% and 74%, respectively. THC dose was a significant predictor of severe (adjusted odds ratio 2.9, 95% confidence interval: 1.8–4.7) and prolonged toxicity (adjusted odds ratio 3.2, 95% confidence interval: 1.6–6.5), whereas age and sex were not. Area under the curve was 92.9% for severe and 87.3% for prolonged toxicity. THC ingestions of ≥1.7 mg/kg can predict severe (sensitivity 97.3%) and prolonged toxicity (sensitivity 75.4%).

CONCLUSIONS: The THC dose of edible cannabis correlates to the degree of toxicity in children <6 years old. The threshold of 1.7 mg/kg of THC may guide medical management and preventive regulations.

Summary

- Poison Center function
- Data
- Trends
- How guidelines are approached

Questions