

## Endotracheal Intubation for Toxicologic Exposures: A Retrospective Review of Toxicology Investigators Consortium (ToxIC) Cases.

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### Published In/Presented At

Beauchamp GA, Hendrickson RG, Hatten BW; Toxicology Investigators Consortium (ToxIC). Endotracheal Intubation for Toxicologic Exposures: A Retrospective Review of Toxicology Investigators Consortium (ToxIC) Cases. *J Emerg Med.* 2016 Oct;51(4):382-388.e11. doi: 10.1016/j.jemermed.2016.05.056. Epub 2016 Jul 29.

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## Selected Topics: Toxicology



### ENDOTRACHEAL INTUBATION FOR TOXICOLOGIC EXPOSURES: A RETROSPECTIVE REVIEW OF TOXICOLOGY INVESTIGATORS CONSORTIUM (TOXIC) CASES

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**Abstract—Background:** Endotracheal intubation remains a cornerstone of early resuscitation of the poisoned patient, but little is known about which substances are associated with intubation. **Objectives:** Our objective was to describe patient exposures to substances reported to the American College of Medical Toxicology (ACMT) Toxicology Investigators Consortium (ToxIC) that were managed with intubation between 2010 and 2014. **Methods:** We performed a retrospective review of cases managed with endotracheal intubation in the ACMT ToxIC Registry from January 1, 2010 through December 31, 2014. **Descriptive statistics** were used to describe patient exposures. **Results:** A total of 2724 exposures to substances were managed with endotracheal intubation. Intubated patients were 52% male and 82% adults. For all ages taken together, the most common known single-substance exposures managed with intubation were sedative hypnotics (9.8%), antidepressants (8.7%), and opioids (8.0%). The most common single ingestions associated with intubation in various age groups were: opioids (<2 years old), alpha-2 agonists (2–6 years old), antidepressants (7–18 years old), sedative-hypnotics (19–65 years old), and cardiac medications (>65 years old). Multiple substances were involved in 29.0% of exposures. Decontamination and elimination processes were used in 12.8% of patients. **Conclusions:** The most common substances involved in single- and multiple-substance exposures managed with intubation varied by age group. Most patients

were managed with supportive care. Knowledge of substances commonly involved in exposures managed with intubation may inform triage and resource planning in the emergency department resuscitation of critically ill poisoned patients. © 2016 Elsevier Inc. All rights reserved.

**Keywords—**drug overdose; endotracheal intubation; poisoning; airway management; toxicology; resuscitation

### INTRODUCTION

Between 2000 and 2013, there were over 320,000 toxic exposures associated with intubation reported to the National Poison Data System (NPDS) (1). A recent study demonstrated increasing severity of toxicologic exposures reported to NPDS (2). Poisoned patients may present with a number of different medical findings that contribute to respiratory failure requiring intubation. Findings that both contribute to the need for, and complicate, airway management, include altered mental status due to poisoning by a sedating agent, acidosis, electrolyte abnormality, respiratory failure due to pulmonary edema or pneumonitis, hemodynamic instability, and seizure (3–17). The American College of Medical Toxicology (ACMT) Toxicology Investigators

Consortium (Toxic) was established in 2010 and maintains a prospective case registry of all patients managed at the bedside by medical toxicologists in the United States, Australia, Canada, Saudi Arabia, and Israel. It publishes annual reports summarizing demographics, source of consultation, agents involved in toxicological exposures, signs, symptoms, clinical findings, treatments provided, and fatalities (18,19). Endotracheal intubation remains a cornerstone of early resuscitation and symptomatic care for poisoned patients. Our objective was to describe a subset of patient exposures reported to the ACMT Toxic group between January 2010 and December 2014 that were managed with intubation.

## METHODS

This study was approved by the ACMT Research Board and our institutional review board. We performed a retrospective review of de-identified cases in the ACMT Toxic Registry from January 1, 2010 through December 31, 2014. The ACMT Toxic group maintains a prospective case registry of all patients managed at the bedside by medical toxicologists from 47 consulting groups covering 77 different institutions in the United States, Australia, Canada, Saudi Arabia, and Israel (18,19). Methodology for utilizing the Toxic registry has been described elsewhere (20). The data collection form consisted of demographics, reason for exposure, source of consultation, reason for consultation, agents involved in the exposure, presenting clinical findings, laboratory test or electrocardiogram abnormalities, treatment provided, and any reported deaths. These data are reported voluntarily by participating medical toxicology sites involved in the Toxic Registry. Cases are included in the Toxic registry if a bedside consultation was performed by the medical toxicology service. The Toxic database was searched for patients managed with endotracheal intubation. Search terms used by the Toxic data management team to provide these data included all patients submitted to the registry for whom “non-pharmacologic support” was selected, and included “intubation/ventilatory management.” Data provided by Toxic in a standardized spreadsheet format were organized by a single-study investigator. Descriptive statistics were used to report numbers of exposures associated with intubation by age group. Within each age group, descriptive statistics were used to describe numbers of exposures by substance category, and by specific substance. For all exposures to substances managed with intubation, we determined percentage of exposures by source of consult, reason for exposure, clinical features, and management provided.

## RESULTS

### *All Patients Managed with Intubation*

Among the 34,662 cases of potential toxicological exposures reported to the ACMT Toxic Registry between January 1, 2010 and December 31, 2014, a total of 2724 patient exposures were managed with endotracheal intubation (7.9%). There were 1934 exposures involving single substances and 790 exposures involving multiple substances. A summary of exposure characteristics including number of exposures to substances managed with intubation by age group, source of consult, reason for exposure, clinical features, and management, is found in Table 1. Table 2 lists the top 10 known single-substance exposures involved in patients of all ages taken together that were managed with intubation—sedative hypnotics were most commonly involved (9.8% of patients managed with intubation), followed by antidepressants (8.7%) and opiates/opioids (8.0%). Multiple substances were involved in 29.0% of exposures.

Tables 3 and 4 show the top three categories of substances involved in single and multiple exposures managed with intubation in pediatric and adult patients, respectively. See Supplementary Tables 1–13 (Appendix, available online) for the specific substances involved for all cases managed with intubation in this study, by age group.

Of a total of 1299 exposures to substances in children under the age of 2 years reported to the Toxic registry during the study time period, 60 (4.6%) children were managed with intubation: 57 single-substance exposures and three multi-substance exposures. Of a total of 1767 exposures to substances in children between the ages of 2 and 6 years reported to the Toxic registry during the study time period, 62 (3.5%) children were managed with intubation: 55 single-substance exposures and seven multi-substance exposures. Of a total of 806 exposures to substances in children ages 7–12 years reported to the Toxic registry during the study time period, 36 (4.5%) children were managed with intubation: 35 single-substance exposures and one multi-substance exposure. Of a total of 5358 exposures to substances in patients aged 13–18 years reported to the Toxic registry during the study time period, 321 (6.0%) patients were managed with intubation: 231 single-substance exposures and 90 multi-substance exposures. Of a total of 23,455 exposures to substances in patients aged 19–65 years reported to the Toxic registry during the study time period, 2099 (8.9%) patients were managed with intubation in this group: 1448 single-substance exposures and 651 multi-substance exposures. Of a total of 1905 exposures to substances in patients aged 66–89 years reported to the Toxic registry during the study time period, 129

**Table 1. Characteristics of Patients Managed with Endotracheal Intubation Reported to the ACMT ToxIC Registry 2010–2014**

Characteristic	Number of Cases	Percent of Total Exposures with Intubation
Total	2724	
Male	1421	52.20%
Age, years		
<2	60	2.20%
2–6	62	2.30%
7–12	36	1.32%
13–18	321	11.80%
19–65	2099	77.00%
66–89	129	4.70%
Over 89 years	3	0.10%
Age unknown	14	0.51%
Source of consult		
Emergency department (ED)	1285	47.20%
Outside hospital transfer	437	16.00%
Admitting service (intensive care unit)	406	14.90%
Request from another hospital service (not ED)	399	14.60%
Other	297	10.90%
Reason for exposure		
Unknown	1839	67.50%
Intentional	551	20.20%
Other	409	15.00%
Unintentional	44	1.60%
Clinical features		
Central nervous system depression	1348	49.50%
Respiratory depression	1064	39.10%
Multiple vital sign abnormalities	674	24.70%
Abnormal pH, anion gap, electrolytes or osmolality	515	18.90%
Tachycardia (HR > 140 beats/min)	229	8.40%
Hypotension (SBP < 80 mm Hg)	187	6.90%
Lung injury (ARDS or aspiration pneumonitis)	152	5.60%
Hypertension (SBP > 200 mm Hg or DBP > 120 mm Hg)	125	4.60%
Dysrhythmias/arrhythmias	76	3.10%
Bradycardia (HR < 50 beats/min)	67	2.50%
Hyperthermia T > 40.55°C (105°F)	27	1.00%
Decontamination		
Activated charcoal	251	9.20%
Lavage	64	2.30%
Whole bowel irrigation	36	1.30%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium; HR = heart rate; SBP = systolic blood pressure; DBP = diastolic blood pressure; ARDS = acute respiratory distress syndrome; T = temperature; F = Fahrenheit.

(6.8%) patients were managed with intubation: 91 had single-substance exposures and 38 had multi-substance exposures. Of a total of 72 exposures to substances in patients aged over 89 years reported to the ToxIC registry during the study time period, there were three (4.2%) exposures to single substances that were managed with intubation and no multi-substance exposures managed with intubation in this age group reported by bedside toxicologists.

## DISCUSSION

Emergency providers and toxicologists make complex management decisions based on a limited exposure history during the acute resuscitation of poisoned patients. Endotracheal intubation remains a cornerstone of the management of the patient with severe poisoning, but little is known about the types of substances that are associated with intubation. In this retrospective case review of

exposures to substances managed by medical toxicologists, central nervous system and respiratory depression were the most common findings in patients managed with intubation. Multiple other findings were noted, including temperature dysregulation, hemodynamic instability, and seizures. This suggests that patients with toxicologic exposure managed with intubation may present with multiple features of severe toxicity in addition to respiratory failure or failure to protect the airway. In addition to airway management, patients may simultaneously require aggressive supportive care and pharmacologic support.

Cases in this study shared similarities with overall reported ToxIC registry, including that the most common source of consults was the emergency department (ED), that the majority of cases reported were in patients ages 19–65 years, and that the most common reported exposures included nonopioid analgesics, sedative hypnotics, opioids, antidepressants, and alcohol (18,19).

**Table 2. Top Ten Categories of Substances Involved in Single Exposures of All Ages Managed with Endotracheal Intubation Reported to the ACMT ToxIC Registry 2010–2014**

Agent Class	Number of Cases	Percent of Total Exposures with Intubation
Sedative-hypnotic/muscle relaxant	266	9.8%
Antidepressant	236	8.7%
Opiates/opioids	217	8.0%
Other analgesics	185	6.8%
Alcohols	178	6.5%
Antipsychotics	158	5.8%
Sympathomimetics	128	4.7%
Cardiovascular medications	122	4.5%
Anticonvulsants	79	2.9%
Anticholinergic substances	71	2.6%
Total	2724	100.00%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

In this study, alpha-2 agonists were associated with 14.5% of single exposures to substances in children under the age of 6 years managed with intubation. This is in agreement with a national study of poison center exposures associated with intubation in children <6 years old noting that clonidine was the most frequently involved substance in both single and multiple ingestions, with increasing numbers of such exposures over time between 2000 and 2013 (21). As demonstrated in a recent study demonstrating increasing pediatric exposures to clonidine, alpha-2 agonists remain a high morbidity exposure among pediatric patients (22).

Household agents were involved in approximately 10% of single exposures to substances managed with intubation in children under the age of 6 years. National Poison Data System reports suggest that pediatric exposures commonly reported to poison control centers include those to cosmetics/personal care products and household cleaning products (23). This implies that exposures to substances such as caustics, detergents including detergent pods, and cleaning/disinfecting agents are common among reported pediatric poisonings, and can result in significant pediatric morbidity (24). A previous ToxIC registry review of infant and toddler poisonings over a 15-month period found that the most common exposures were cardiac drugs (16%), psychotropic substances (15%), recreational drugs, alcohols, controlled narcotic drugs (13%), and analgesics (9%) (25). Another recent study reported that patients with acute poisoning represented 8% of admissions to a single pediatric intensive care unit and that most of these were unintentional exposures involving analgesics and antidepressants (26). Clonidine, sedative-hypnotics, and antidepressants have previously been noted as common toxicologic exposures among pediatric patients requiring intensive care admis-

**Table 3. Top Three Categories of Substances Involved in Pediatric Single and Multiple Exposures Managed with Intubation by Age Group: ACMT ToxIC Registry 2010–2014**

Reported Exposure	Number of Cases
Age 0–2 years	
Single exposures	
Opioids/opiates	9
Household caustics	6
Other household agents	4
Multiple exposures	
Sedative hypnotics	3
Herbals/dietary supplements/vitamins	3
Antidepressants	2
Age 2–6 years	
Single exposures	
Alpha-2 agonists	8
Other household agents	6
Opioids/opiates	5
Multiple exposures	
Alpha-2 agonists	4
Sympathomimetics	2
Opioids/opiates	1
Age 7–12 years	
Single exposures	
Antidepressants	5
Opioids/opiates	4
Other analgesics	4
Multiple exposures	
Antipsychotics	1
Antidepressants	1
Herbal medications	1
Age 13–18 years	
Single exposures	
Antidepressants	37
Antipsychotics	28
Sedative-hypnotics	23
Multiple exposures	
Antidepressants	19
Sedative-hypnotics	14
Antipsychotics	14
Other analgesics	14

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

sion (27). Pediatric patients may be particularly susceptible to the cardiovascular, respiratory, and central nervous system effects occurring in poisoning (28). The results of our study may provide further insight into the specific effects of substances that are more commonly managed with intubation in children. For example, household agents may compromise the airway through mucosal involvement or change in mental status (24,29). This study found that exposures to substances managed with intubation among children ages 0–18 years included a number of substances that may result in central nervous system or respiratory depression, including opioids/opiates, alpha-2 agonists, antidepressants, antipsychotics, sedative-hypnotics, and anticholinergic xenobiotics. Pediatric exposures to substances that can cause significant sedation, agitation, seizure, or respiratory compromise may result in a high rate of intubation, particularly



**Table 4. Top Three Categories of Substances Involved in Adult Single and Multiple Exposures Managed with Intubation by Age Group: ACMT ToxIC Registry 2010–2014**

Reported Exposure	Number of Cases
Age 19–65 years	
Single exposures	
Sedative hypnotics	222
Antidepressants	186
Opioids/opiates	176
Multiple exposures	
Sedative hypnotics	291
Antidepressants	233
Opioids/opiates	193
Age 66–89 years	
Single exposures	
Cardiac medications	23
Sedative hypnotics	14
Other analgesics	10
Multiple exposures	
Sedative hypnotics	13
Other analgesics	10
Opioids/opiates	8
Age over 89 years	
Single exposures	
Other analgesics	1
Cardiac medications	1
Unknown	1
Multiple exposures	0

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

given that poisoned pediatric patients often require transfer to a facility with pediatric care capabilities.

Medications involved in adult exposures managed with intubation also commonly included those with potential to cause altered mental status, including sedative-hypnotics, antidepressants, and opioids/opiates. Nearly half of the patients in this study were reported by medical toxicologists as having altered mental status. Older adults with exposures managed with intubation commonly involved cardiac medications, which may indicate increased risk of medication error, or self-harm attempt with access to such medications (30).

Decontamination and elimination processes including the use of activated charcoal, gastric lavage, and whole bowel irrigation were used more frequently in this sub-group of the ToxIC registry (12.8% of patients), when compared to overall use in the ToxIC registry in 2013 (4.5% of patients) and 2014 (4.3% of patients) (18,19). This may reflect that the sub-group of patients managed at the bedside by toxicologists, and who were managed with endotracheal intubation, may have had increased toxicity, thus warranting more aggressive management. Alternatively, the use of decontamination and elimination procedures may have been used more liberally in patients with airway protection by endotracheal tube.

### Limitations

There were several limitations to this study. This is a retrospective review of ACMT ToxIC Registry data, which consist solely of exposures that involved a bedside consult by a medical toxicologist. It is possible that higher-acuity cases are entered with greater frequency, resulting in a sample with a greater severity than the true population seen by a medical toxicologist in practice. Further, when compared to national poison center exposures, those managed by a medical toxicologist may be more severe in terms of presenting signs, symptoms, and organ system failure. As such, ToxIC registry cases are not likely to be representative of the majority of toxicological exposures reported to poison centers. Although sites are instructed to enter all cases seen by medical toxicologists, and data entry is regularly monitored for frequency and quality, there may be variability within or between sites. As data in the ToxIC registry are limited to that provided on a voluntary basis by participating medical toxicologists, it is possible that exposures to substances managed with intubation during the study period were underreported by registry providers, or were reported in error. Drug classes and specific agents reported may have been inaccurate due to lack of available information at the time of management by the medical toxicologist, as well as lack of confirmatory testing for specific agents. Cases are entered into ToxIC without patient identifiers such as name or birthdate, making it possible for a patient to have inadvertently been entered twice. However, cases are entered with unique patient medical record numbers, reducing the likelihood that patients who were extubated and then re-intubated would have been entered twice into the database during the same episode. Patients managed with intubation on separate hospital admissions would have been entered as separate cases. Consequently, there is no way to track which cases represented repeated admissions involving intubations. For example, while a review of calls to poison centers regarding potential exposures that were managed with intubation revealed a mean of 22,857 exposures managed with intubation per year, this study identified a mean of 545 exposures managed with intubation per year (21). Data provided to this registry are limited and lack medical decision-making information, such as reason for intubation. This study was further limited by retrospective study design including lack of specific abstractor training, abstractor monitoring, and abstractor blinding to study hypothesis (31).

### CONCLUSIONS

For all ages taken together, the most common known single-substance exposures managed with intubation

were sedative hypnotics, antidepressants, and opioids. However, the types of exposures to substances reported to the ToxIC registry that were managed with intubation varied by age group. Knowledge of substances commonly involved in exposures managed with intubation may inform triage and resource planning in the ED resuscitation of critically ill poisoned patients.

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## ARTICLE SUMMARY

### **1. Why is this topic important?**

Endotracheal intubation remains a cornerstone of early resuscitation of the poisoned patient, but prior to this study, little was known about which substances are associated with intubation.

### **2. What does this study attempt to show?**

To improve knowledge about which substances are associated with intubation by age group, this study describes patient exposures to substances reported to the American College of Medical Toxicology (ACMT) Toxicology Investigators Consortium (ToxIC), that were managed with endotracheal intubation between 2010 and 2014.

### **3. What are the key findings?**

This study found that exposures to substances managed with intubation among children aged 0–18 years of age included a number of substances that may result in central nervous system or respiratory depression. Medications involved in adult exposures managed with intubation commonly included those with potential to cause altered mental status. Older adults with exposures managed with intubation commonly involved cardiac medications, which may indicate increased risk of medication error, or self-harm attempt with access to such medications.

### **4. How is patient care impacted?**

Knowledge of substances commonly involved in exposures managed with intubation may inform triage and resource planning in the emergency department resuscitation of critically ill poisoned patients.



**Supplementary Table 1. Single Exposures Among Patients Under 2 Years of Age with Intubations—ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age <2 Years
Opioids/opiates	9	15.8%
Oxycodone	3	5.3%
Morphine	2	3.5%
Methadone	2	3.5%
Tramadol	1	1.8%
Hydromorphone	1	1.8%
Household caustics	6	10.5%
Sodium hydroxide	2	3.5%
Lye	1	1.8%
Hydrochloric acid	1	1.8%
Sulfuric acid	1	1.8%
Other caustic	1	1.8%
Other household agents	4	7.0%
Laundry detergent pods	4	7.0%
Alpha-2 agonists	3	5.3%
Clonidine	2	3.5%
Brimonidine	1	1.8%
Envenomations	3	5.3%
<i>Centruroides</i>	3	5.3%
Hydrocarbons	3	5.3%
Other hydrocarbon	3	5.3%
Herbals/dietary supplements/ vitamins	3	5.3%
Citronella	1	1.8%
Tea tree oil	1	1.8%
Vitamin A	1	1.8%
Alcohols	3	5.3%
Methanol	1	1.8%
Ethanol	1	1.8%
Isopropanol	1	1.8%
Sedative hypnotics	2	3.5%
Baclofen	1	1.8%
Cyclobenzaprine	1	1.8%
Cardiovascular	2	3.5%
Digoxin	1	1.8%
Flecainide	1	1.8%
Antipsychotics	2	3.5%
Olanzapine	2	3.5%
Antidepressants	2	3.5%
Bupropion	1	1.8%
Venlafaxine	1	1.8%
Anticonvulsants	1	1.8%
Carbamazepine	1	1.8%
Cardiovascular medications	1	1.8%
Atorvastatin	1	1.8%
Sympathomimetics	1	1.8%
Tetrahydrozoline	1	1.8%
Anticoagulants	1	1.8%
Brodifacoum	1	1.8%
Other analgesics	1	1.8%
Ibuprofen	1	1.8%
Gases	1	1.8%
Carbon monoxide	1	1.8%
Psychoactive agents	1	1.8%
Phencyclidine	1	1.8%
Total	57	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 2. Multiple Exposures Among Patients Under 2 Years of Age with Intubations—ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures
Sedative hypnotics	3
Zolpidem	1
Buspirone	1
Phenobarbital	1
Herbals/dietary supplements/vitamins	3
Vitamin C	1
Echinacea	1
Elderberry extract	1
Antidepressants	2
Trazodone	1
Other antidepressant	1
Alpha-2 agonists	1
Clonidine	1
Number of patients with multiple exposures	3

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 3. Single Exposures Among Patients 2–6 Years of Age with Intubations–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 2–6 Years
Alpha-2 agonists	8	14.5%
Clonidine	8	14.5%
Other household agents	6	10.9%
Laundry detergent pods	4	7.3%
Detergent	1	1.8%
Ammonia	1	1.8%
Opioids/opiates	5	9.1%
Oxycodone	2	3.6%
Methadone	2	3.6%
Buprenorphine	1	1.8%
Gases	4	7.3%
Carbon monoxide	4	7.3%
Envenomations	4	7.3%
<i>Centruroides</i>	1	1.8%
<i>Loxosceles</i> spider	3	5.5%
Anticonvulsants	4	7.3%
Valproic acid	2	3.6%
Carbamazepine	1	1.8%
Lamotrigine	1	1.8%
Sedative hypnotics	3	5.5%
Alprazolam	1	1.8%
Zolpidem	1	1.8%
Baclofen	1	1.8%
Psychoactive substances	2	3.6%
Marijuana	2	3.6%
Other analgesics	2	3.6%
Acetaminophen	2	3.6%
Antipsychotics	2	3.6%
Risperidone	1	1.8%
Aripiprazole	1	1.8%
Alcohols	2	3.6%
Ethanol	1	1.8%
Isopropyl alcohol	1	1.8%
Anticholinergics	1	1.8%
Promethazine	1	1.8%
Antidepressants	1	1.8%
Bupropion	1	1.8%
Plants	1	1.8%
<i>Solanum dulcamara</i>	1	1.8%
Cough and cold medications	1	1.8%
Camphor	1	1.8%
Envenomations	1	1.8%
<i>Centruroides</i>	1	1.8%
Household caustics	1	1.8%
Potassium hydroxide	1	1.8%
Hydrocarbons	1	1.8%
Gasoline	1	1.8%
Other	1	1.8%
Industrial deodorant fragrance	1	1.8%
Total	55	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 4. Multiple Exposures Among Patients 2–6 Years of Age with Intubations–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures
Alpha-2 agonists	4
Clonidine	3
Guanfacine	1
Sympathomimetics	2
Methamphetamine	1
Amphetamine	1
Opioids/opiates	1
Methadone	1
Anticholinergic	1
Diphenhydramine	1
Cardiovascular medications	1
Propranolol	1
Number of patients with multiple exposures	7

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 5. Single Exposures Among Patients 7–12 Years of Age with Intubations—ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 7–12 Years
Antidepressants	5	14.3%
Amitriptyline	3	8.6%
Bupropion	1	2.9%
Escitalopram	1	2.9%
Opioids/opiates	4	11.4%
Morphine	1	2.9%
Methadone	1	2.9%
Oxycodone	1	2.9%
Fentanyl	1	2.9%
Other analgesics	4	11.4%
Acetaminophen	3	8.6%
Ibuprofen	1	2.9%
Anticonvulsants	3	8.6%
Carbamazepine	2	5.7%
Oxcarbazepine	1	2.9%
Sedative–hypnotics	2	5.7%
Baclofen	1	2.9%
Alprazolam	1	2.9%
Envenomations	2	5.7%
<i>Centruroides</i>	1	2.9%
Crotalinae	1	2.9%
Metals	2	5.7%
Lead	1	2.9%
Magnesium	1	2.9%
Psychoactive substances	1	2.9%
Marijuana	1	2.9%
Cardiac medications	1	2.9%
Amlodipine	1	2.9%
Alcohols	1	2.9%
Ethanol	1	2.9%
Other household agents	1	2.9%
Detergent	1	2.9%
Pesticides	1	2.9%
Carbosulfan	1	2.9%
Other	1	2.9%
Lithium	1	2.9%
Food	1	2.9%
Shellfish	1	2.9%
Total	35	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 6. Multiple Exposures Among Patients 7–12 Years of Age with Intubations—ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures
Antipsychotics	1
Aripiprazole	1
Antidepressants	1
Citalopram	1
Herbal medications	1
Melatonin	1
Number of patients with multiple exposures	1

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 7. Single Exposures Among Patients 13–18 Years of Age with Intubation–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 13–18 Years
Antidepressants	37	16.0%
Amitriptyline	10	4.3%
Bupropion	10	4.3%
Citalopram	9	3.9%
Imipramine	3	1.3%
Trazodone	2	0.9%
Sertraline	1	0.4%
Mirtazapine	1	0.4%
Escitalopram	1	0.4%
Antipsychotics	28	12.1%
Quetiapine	21	9.0%
Olanzapine	4	1.7%
Aripiprazole	2	0.9%
Loxapine	1	0.4%
Sedative–hypnotics	23	10.0%
Baclofen	6	2.6%
Carisoprodol	5	2.2%
Alprazolam	3	1.3%
Clonazepam	2	0.9%
Propofol	1	0.4%
Phenobarbital	1	0.4%
Pregabalin	1	0.4%
Gabapentin	1	0.4%
Temazepam	1	0.4%
Butalbital	1	0.4%
Other	1	0.4%
Anticholinergic agents	23	10.0%
Diphenhydramine	17	7.4%
Doxylamine	1	0.4%
Dicyclomine	1	0.4%
Cyproheptadine	1	0.4%
Cetirizine	1	0.4%
Hyoscyamine	1	0.4%
Other	1	0.4%
Other analgesics	19	8.2%
Acetaminophen	9	3.9%
Ibuprofen	7	3.0%
Aspirin	2	0.9%
Naproxen	1	0.4%
Alcohols	18	7.8%
Ethanol	18	7.8%
Anticonvulsants	18	7.8%
Lamotrigine	10	4.3%
Carbamazepine	6	2.6%
Oxcarbazepine	2	0.9%
Psychoactive substances	17	7.4%
Lysergic acid diethylamide	10	4.3%
Synthetic cannabinoids	3	1.3%
Marijuana	2	0.9%
Gamma-hydroxybutyric acid	1	0.4%
Other	1	0.4%
Opioids/opiates	16	6.9%
Oxycodone	5	2.2%
Methadone	3	1.3%
Heroin	3	1.3%
Tramadol	3	1.3%
Codeine	1	0.4%
Other	1	0.4%

**Supplementary Table 7. Continued**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 13–18 Years
Sympathomimetics	13	5.6%
Cathinones/bath salts	3	1.3%
Dextroamphetamine	2	0.9%
Methylphenidate	2	0.9%
Other	2	0.9%
Pseudoephedrine	1	0.4%
Amphetamine	1	0.4%
Cocaine	1	0.4%
3,4-methylenedioxy-methamphetamine	1	0.4%
Cardiovascular medications	4	1.7%
Propranolol	3	1.3%
Guanfacine	1	0.4%
Antimicrobial	3	1.3%
Isoniazid	3	1.3%
Other household agents	3	1.3%
Paint	1	0.4%
Cleaner	1	0.4%
Detergent	1	0.4%
Lithium	2	0.9%
Diabetic medications	1	0.4%
Metformin	1	0.4%
Cough medications	1	0.4%
Dextromethorphan	1	0.4%
Gastrointestinal medications	1	0.4%
Metoclopramide	1	0.4%
Household caustics	1	0.4%
Sodium hydroxide	1	0.4%
Vitamins & supplements	1	0.4%
Vitamin B3	1	0.4%
Hydrocarbons	1	0.4%
Kerosene	1	0.4%
Unknown	10	4.3%
Total	231	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

(Continued)

**Supplementary Table 8. Multiple Exposures Among Patients 13–18 Years of Age with Intubations—ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures
Antidepressants	19
Bupropion	6
Amitriptyline	5
Mirtazapine	1
Venlafaxine	1
Tranylcypromine	1
Citalopram	1
Sertraline	1
Fluoxetine	1
Doxepin	1
Other antidepressant	1
Sedative-hypnotics	14
Lorazepam	3
Alprazolam	2
Gabapentin	2
Pregabalin	1
Butalbital	1
Clonazepam	1
Phenobarbital	1
Baclofen	1
Carisoprodol	1
Tizanidine	1
Antipsychotics	14
Quetiapine	5
Ziprasidone	2
Olanzapine	2
Aripiprazole	2
Chlorpromazine	1
Clozapine	1
Haloperidol	1
Other analgesics	14
Acetaminophen	8
Ibuprofen	4
Aspirin	2
Anticonvulsants	12
Lamotrigine	3
Topiramate	3
Oxcarbazepine	2
Carbamazepine	1
Phenytoin	1
Valproate	1
Levetiracetam	1
Sympathomimetics	11
Methylphenidate	3
Amphetamine	2
Pseudoephedrine	1
Atomoxetine	1
Cocaine	1
Caffeine	1
Other sympathomimetic	2
Anticholinergic medications	8
Diphenhydramine	4
Promethazine	1
Benztropine	1
Chlorpheniramine	1
Cyproheptadine	1
Opioids/opiates	6
Tramadol	2
Hydrocodone	2
Methadone	1
Oxycodone	1

**Supplementary Table 8. Continued**

Exposure	Number of Exposures
Cardiovascular medications	4
Clonidine	3
Metoprolol	1
Alcohols	4
Ethanol	4
Cough and cold medications	4
Dextromethorphan	3
Guaifenesin	1
Psychogenic substances	4
Synthetic cannabinoids	2
Marijuana	1
Other psychogenic substances	1
Herbals/dietary supplements/vitamins	2
Caffeine	1
Melatonin	1
Gastrointestinal medications	1
Lansoprazole	1
Lithium	1
Number of patients with multiple exposures	90

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

(Continued)

**Supplementary Table 9. Single Exposures Among Patients 19–65 Years of Age with Intubations—ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 19–65 Years
Sedative hypnotics	222	15.3%
Carisoprodol	38	2.6%
Clonazepam	27	1.9%
Cyclobenzaprine	25	1.7%
Baclofen	21	1.5%
Alprazolam	21	1.5%
Zolpidem	17	1.2%
Lorazepam	11	0.8%
Gabapentin	10	0.7%
Diazepam	9	0.6%
Butalbital	7	0.5%
Phenobarbital	6	0.4%
Temazepam	5	0.3%
Tizanidine	5	0.3%
Other sedative hypnotic	4	0.3%
Pregabalin	3	0.2%
Propofol	2	0.1%
Oxazepam	2	0.1%
Buspirone	2	0.1%
Chlordiazepoxide	1	0.1%
Flurazepam	1	0.1%
Chloral hydrate	1	0.1%
Metaxalone	1	0.1%
Methocarbamol	1	0.1%
Pentobarbital	1	0.1%
Eszopiclone	1	0.1%
Antidepressants	186	12.8%
Amitriptyline	63	4.4%
Bupropion	33	2.3%
Citalopram	16	1.1%
Trazodone	13	0.9%
Doxepin	12	0.8%
Venlafaxine	11	0.8%
Duloxetine	9	0.5%
Sertraline	7	0.5%
Nortriptyline	7	0.5%
Mirtazapine	5	0.3%
Paroxetine	3	0.2%
Desvenlafaxine	2	0.1%
Phenelzine	1	0.1%
Tranylcypromine	1	0.1%
Escitalopram	1	0.1%
Desipramine	1	0.1%
Milnacipran	1	0.1%
Opioids/opiates	176	12.2%
Heroin	44	3.0%
Methadone	31	2.1%
Oxycodone	31	2.1%
Tramadol	18	1.2%
Morphine	16	1.1%
Hydrocodone	11	0.8%
Fentanyl	6	0.4%
Other opioid	6	0.4%
Oxymorphone	3	0.2%
Buprenorphine	3	0.2%
Hydromorphone	2	0.1%
Tapentadol	2	0.1%
Codeine	1	0.1%

(Continued)

**Supplementary Table 9. Continued**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 19–65 Years
Loperamide	1	0.1%
Propoxyphene	1	0.1%
Alcohols	149	10.3%
Ethanol	99	6.8%
Ethylene glycol	37	2.6%
Isopropyl alcohol	7	0.5%
Propylene glycol	2	0.1%
Methanol	2	0.1%
Diethylene glycol	1	0.1%
Other toxic alcohol	1	0.1%
Antipsychotics	123	8.5%
Quetiapine	90	6.2%
Olanzapine	17	1.2%
Risperidone	4	0.3%
Clozapine	4	0.3%
Aripiprazole	3	0.2%
Haloperidol	2	0.1%
Ziprasidone	1	0.1%
Chlorpromazine	1	0.1%
Loxapine	1	0.1%
Sympathomimetics	112	7.7%
Methamphetamine	40	2.8%
Cocaine	32	2.2%
Other sympathomimetic	15	1.0%
Amphetamine	9	0.6%
Cathinone	6	0.4%
3,4-Methylenedioxy-methamphetamine	5	0.3%
Dextroamphetamine	2	0.1%
Pseudoephedrine	1	0.1%
Phentermine	1	0.1%
Lisdexamfetamine	1	0.1%
Other analgesics	148	10.2%
Acetaminophen	116	8.0%
Aspirin	18	1.2%
Ibuprofen	8	0.6%
Naproxen	3	0.2%
Colchicine	1	0.1%
Other	1	0.1%
Acetaminophen combination medication	1	0.1%
Cardiac medications	91	6.3%
Propranolol	14	1.0%
Verapamil	11	0.8%
Metoprolol	10	0.7%
Clonidine	10	0.7%
Amlodipine	10	0.7%
Diltiazem	8	0.6%
Carvedilol	6	0.4%
Atenolol	5	0.3%
Lisinopril	3	0.2%
Nitrates	3	0.2%
Digoxin	2	0.1%
Nifedipine	2	0.1%
Cilostazol	1	0.1%
Flecainide	1	0.1%
Prazosin	1	0.1%
Labetalol	1	0.1%
Nadolol	1	0.1%
Enalapril	1	0.1%

(Continued)



Supplementary Table 9. Continued

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 19–65 Years
Hydralazine	1	0.1%
Anticholinergics	45	3.1%
Diphenhydramine	28	1.9%
Promethazine	6	0.4%
Hydroxyzine	5	0.3%
Doxylamine	2	0.1%
Atropine	1	0.1%
Benztropine	1	0.1%
Meclizine	1	0.1%
Other anticholinergic	1	0.1%
Psychoactive agents	36	2.5%
Gamma-hydroxybutyric acid	10	0.7%
Synthetic cannabinoids	9	0.6%
Phencyclidine	9	0.6%
Tetrahydrocannabinol	4	0.3%
Lysergic acid diethylamide	2	0.1%
Dimethyltryptamine	1	0.1%
Gamma-butyrolactone	1	0.1%
Anticonvulsants	52	3.6%
Valproic acid	20	1.4%
Carbamazepine	15	1.0%
Lamotrigine	11	0.8%
Phenytoin	2	0.1%
Oxcarbazepine	2	0.1%
Topiramate	2	0.1%
Diabetic medications	24	1.7%
Metformin	15	1.0%
Insulin	7	0.5%
Glyburide	1	0.1%
Other sulfonylurea	1	0.1%
Gases	19	1.3%
Carbon monoxide	9	0.6%
Cyanide	6	0.4%
Smoke	2	0.1%
Nitric oxide	1	0.1%
Hydrogen sulfide	1	0.1%
Household caustics	15	1.0%
Other	4	0.3%
Hydrochloric acid	3	0.2%
Sodium hydroxide	3	0.2%
Borates	2	0.1%
Ammonia	1	0.1%
Potassium hydroxide	1	0.1%
Sodium hypochlorite	1	0.1%
Hydrocarbons	9	0.6%
Gasoline	2	0.1%
Unspecified	2	0.1%
Xylene	1	0.1%
Chloroform	1	0.1%
Methyl chloride	1	0.1%
Difluoroethane	1	0.1%
Kerosene	1	0.1%
Cough and cold medications	7	0.5%
Dextromethorphan	6	0.4%
Other	1	0.1%
Anesthetics	5	0.3%
Bupivacaine	2	0.1%
Benzonatate	2	0.1%
Other	1	0.1%
Insecticides	4	0.3%

Supplementary Table 9. Continued

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 19–65 Years
Other insecticides	4	0.3%
Metals	4	0.3%
Lithium	3	0.2%
Thallium	1	0.1%
Anticoagulants	3	0.2%
Warfarin	2	0.1%
Rivaroxaban	1	0.1%
Antibiotics	3	0.2%
Isoniazid	1	0.1%
Trimethoprim-sulfamethoxazole	1	0.1%
Levamisole	1	0.1%
Gastrointestinal medications	2	0.1%
Domperidone	1	0.1%
Metoclopramide	1	0.1%
Plants	2	0.1%
Kratom	1	0.1%
Moonflower	1	0.1%
Vitamins and supplements	2	0.1%
Caffeine	1	0.1%
Vitamin B3	1	0.1%
Other household agents	2	0.1%
Other disinfectant solution	2	0.1%
Envenomations	1	0.1%
Crotalinae	1	0.1%
Other	6	0.4%
Contrast dye	1	0.1%
Iodine	1	0.1%
Bicarbonate	1	0.1%
T3 thyroid hormone	1	0.1%
Succinylcholine	1	0.1%
Water	1	0.1%
Unknown	34	2.3%
Total	1448	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

(Continued)

**Supplementary Table 10. Multiple Exposures Among Patients 19–65 Years of Age with Intubations–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures
Sedative hypnotics	291
Clonazepam	54
Alprazolam	35
Cyclobenzaprine	31
Lorazepam	29
Carisoprodol	28
Zolpidem	25
Gabapentin	20
Diazepam	12
Baclofen	10
Butalbital	8
Phenobarbital	5
Tizanidine	4
Temazepam	3
Eszopiclone	3
Methocarbamol	3
Buspirone	2
Pregabalin	2
Zopiclone	1
Chlordiazepoxide	1
Metaxalone	1
Chlorzoxazone	1
Meprobamate	1
Brotizolam	1
Other sedative hypnotic	11
Antidepressants	233
Amitriptyline	56
Citalopram	31
Bupropion	23
Trazodone	20
Mirtazapine	17
Venlafaxine	17
Fluoxetine	13
Sertraline	11
Duloxetine	10
Paroxetine	9
Doxepin	8
Escitalopram	7
Nortriptyline	4
Milnacipran	1
Desipramine	1
Imipramine	1
Desvenlafaxine	1
Other antidepressant	3
Opioids/opiates	193
Oxycodone	55
Hydrocodone	40
Methadone	26
Morphine	16
Tramadol	13
Heroin	11
Fentanyl	8
Codeine	6
Hydromorphone	4
Propoxyphene	3
Buprenorphine	3
Meperidine	2
Other opioid	6
Other analgesics	128
Acetaminophen	103
Ibuprofen	10

(Continued)

**Supplementary Table 10. Continued**

Exposure	Number of Exposures
Aspirin	8
Naproxen	4
Ketoprofen	1
Phenazopyridine	1
Other analgesic	1
Antipsychotics	102
Quetiapine	48
Olanzapine	19
Risperidone	11
Ziprasidone	8
Aripiprazole	4
Haloperidol	3
Chlorpromazine	3
Prochlorperazine	2
Clozapine	2
Clotiapine	1
Perphenazine	1
Alcohols	83
Ethanol	73
Ethylene glycol	4
Methanol	3
Propylene glycol	2
Isopropyl alcohol	1
Anticholinergic medications	70
Diphenhydramine	40
Hydroxyzine	16
Promethazine	5
Doxylamine	3
Benztropine	2
Glycopyrrolate	1
Desloratadine	1
Cyproheptadine	1
Brompheniramine	1
Cardiac medications	67
Metoprolol	12
Lisinopril	10
Clonidine	10
Amlodipine	8
Verapamil	4
Propranolol	4
Diltiazem	3
Atenolol	2
Rosuvastatin	1
Tamsulosin	1
Isosorbide	1
Fenofibrate	1
Prazosin	1
Furosemide	1
Other statin	1
Spironolactone	1
Quinidine	1
Hydrochlorothiazide	1
Triamterene	1
Nifedipine	1
Nitroglycerin	1
Other cardiac medication	1
Sympathomimetics	61
Cocaine	22
Methamphetamine	12
Amphetamine	8
Methylphenidate	4
3,4-Methylenedioxy-methamphetamine	3
Dextroamphetamine	2

(Continued)

Supplementary Table 10. Continued

Exposure	Number of Exposures
Lisdexamfetamine	1
Ephedrone	1
Other sympathomimetic	8
Anticonvulsants	43
Valproate	17
Lamotrigine	11
Topiramate	7
Oxcarbazepine	4
Carbamazepine	2
Phenytoin	1
Levetiracetam	1
Lithium	13
Psychoactive substances	12
Phencyclidine	4
Synthetic cannabinoids	3
Nicotine	2
Lysergic acid diethylamide	2
Gamma-hydroxybutyric acid	1
Vitamins & supplements	11
Caffeine	9
Melatonin	1
Multivitamin	1
Endocrine medications	11
Metformin	4
Glipizide	2
Prednisone	2
Levothyroxine	1
Insulin	1
Glyburide	1
Gases	10
Carbon monoxide	5
Smoke	2
Nitric oxide	2
Cyanide	1
Cough and cold medications	9
Dextromethorphan	7
Guaifenesin	1
Other cough medication	1
Antibiotics	7
Levofloxacin	2
Nitrofurantoin	1
Tetracycline	1
Erythromycin	1
Quinine	1
Cephalexin	1
Anticoagulants	7
Warfarin	5
Brodifacoum	1
Clopidogrel	1
Household Caustics	6
Sodium hypochlorite	3
Sodium hydroxide	1
Potassium hydroxide	1
Hydrochloric acid	1
Gastrointestinal medications	6
Docusate	2
Omeprazole	1
Ondansetron	1
Metoclopramide	1
Bisacodyl	1
Hydrocarbons	3
Nitromethane	1
Other hydrocarbon	2

Supplementary Table 10. Continued

Exposure	Number of Exposures
Chemotherapeutic agents	1
Hydroxychloroquine	1
Plants	1
Other plant	1
Other	1
Triptans	1
Number of patients with multiple exposures	651

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

(Continued)

**Supplementary Table 11. Single Exposures Among Patients 66–89 Years of Age with Intubations–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 66–89 Years
Cardiac medications	23	25.3%
Amlodipine	5	5.5%
Diltiazem	4	4.4%
Metoprolol	4	4.4%
Digoxin	4	4.4%
Atenolol	2	2.2%
Lisinopril	1	1.1%
Flecainide	1	1.1%
Nifedipine	1	1.1%
Losartan	1	1.1%
Sedative hypnotics	14	15.4%
Zolpidem	6	6.6%
Temazepam	3	3.3%
Alprazolam	1	1.1%
Lorazepam	1	1.1%
Clonazepam	1	1.1%
Baclofen	1	1.1%
Butalbital	1	1.1%
Other analgesics	10	11.0%
Acetaminophen	9	9.9%
Aspirin	1	1.1%
Opioids/opiates	7	7.7%
Oxycodone	2	2.2%
Morphine	2	2.2%
Hydrocodone	1	1.1%
Tramadol	1	1.1%
Methadone	1	1.1%
Gases	7	7.7%
Carbon monoxide	5	5.5%
Cyanide	2	2.2%
Antidepressants	5	5.5%
Amitriptyline	3	3.3%
Paroxetine	1	1.1%
Citalopram	1	1.1%
Alcohols	5	5.5%
Ethanol	3	3.3%
Isopropyl alcohol	1	1.1%
Methanol	1	1.1%
Anticoagulants	3	3.3%
Rivaroxaban	2	2.2%
Warfarin	1	1.1%
Antipsychotics	3	3.3%
Clozapine	1	1.1%
Quetiapine	1	1.1%
Risperidone	1	1.1%
Anticholinergic agents	2	2.2%
Diphenhydramine	2	2.2%
Diabetic medications	2	2.2%
Metformin	1	1.1%
Insulin	1	1.1%
Household caustics	2	2.2%
Sodium hydroxide	1	1.1%
Hydrogen peroxide	1	1.1%
Sympathomimetics	2	2.2%
Amphetamine	1	1.1%
Cocaine	1	1.1%
Anticonvulsants	1	1.1%
Carbamazepine	1	1.1%

**Supplementary Table 11. Continued**

Exposure	Number of Exposures	Percent of Total Single Exposures with Intubation in Age 66–89 Years
Chemotherapeutic agent	1	1.1%
Methotrexate	1	1.1%
Envenomation	1	1.1%
Crotalinae	1	1.1%
Anesthetics	1	1.1%
Bupivacaine	1	1.1%
Other	2	2.2%
Carbidopa-levodopa	1	1.1%
Botulinum toxin	1	1.1%
Total	91	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

(Continued)

**Supplementary Table 12. Multiple Exposures Among Patients 66–89 Years of Age with Intubations–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures
Sedative hypnotics	13
Alprazolam	3
Lorazepam	3
Carisoprodol	2
Gabapentin	1
Buspirone	1
Clonazepam	1
Cyclobenzaprine	1
Other sedative hypnotic	1
Other analgesics	10
Acetaminophen	5
Aspirin	4
Ibuprofen	1
Opioids/opiates	8
Oxycodone	4
Hydrocodone	2
Tramadol	1
Meperidine	1
Antidepressants	7
Bupropion	2
Mirtazapine	2
Duloxetine	1
Amitriptyline	1
Trazodone	1
Anticholinergic medications	5
Diphenhydramine	3
Doxylamine	1
Hydroxyzine	1
Cardiovascular medications	4
Atenolol	1
Diltiazem	1
Dofetilide	1
Clonidine	1
Household caustics	3
Sodium hydroxide	1
Sodium hypochlorite	1
Other caustic	1
Endocrine medications	3
Levothyroxine	2
Finasteride	1
Metals	2
Cadmium	1
Selenium	1
Alcohols	2
Ethanol	1
Ethylene glycol	1
Chemotherapeutic agent	1
Hydroxychloroquine	1
Cough and cold medications	1
Dextromethorphan	1
Antibiotics	1
Trimethoprim sulfamethoxazole	1
Antipsychotics	1
Quetiapine	1
Number of patients with multiple exposures	38

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.

**Supplementary Table 13. Single Exposures Among Patients Over 89 Years of Age with Intubations–ACMT ToxIC Registry 2010–2014**

Exposure	Number of Exposures	Percent of Age Group Total
Other analgesics	1	33.3%
Aspirin	1	33.3%
Cardiac medications	1	33.3%
Digoxin	1	33.3%
Unknown	1	33.3%
Total	3	100.0%

ACMT = American College of Medical Toxicology; ToxIC = Toxicology Investigators Consortium.