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BRIEF REPORT

Toxicology

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Toxic Exposures in Children: A Review of Emergency Department Transfers to a Tertiary Pediatric Hospital

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Abstract

Objectives: Pediatric poisonings are a common emergency department (ED) presentation. In some instances, the first hospital may not have the capability to manage a pediatric patient beyond initial stabilization, requiring transfer to a tertiary children's hospital. This study aims to describe the clinical characteristics and outcomes of pediatric transfers following various xenobiotic exposures.

Methods: We performed a retrospective analysis of patients ≤18 years transferred to a tertiary children's hospital for any intentional or unintentional xenobiotic exposure between July 1, 2021 and June 30, 2023. An electronic data query was performed using specific keywords, and then, medical record reviews were conducted by a team of emergency medicine physicians and medical toxicologists. Information regarding exposure, interventions, and disposition was collected.

Results: A total of 544 patients were identified, and 167 were included in this analysis. The median age was 15 years (IQR: 5, 17). Of the 167 patients, 134 (80.2%) were admitted to the children's hospital. Acetaminophen was the most common exposure (n = 37, 22.2%), followed by polysubstance (n = 24, 14.3%) and tetrahydrocannabinol (n = 13, 7.8%). Intravenous normal saline bolus was the most common initial intervention. Forty-eight (28.8%) patients were directly admitted from the first ED, and 119 patients were ED to ED transfers. Of those, 86 (72.3%) patients were ultimately admitted from the second ED to an inpatient unit.

abstract continues

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Abstract (continued)

Conclusion: Most transferred patients were admitted, making these transfers clinically indicated and an appropriate use of resources. When comparing characteristics of admitted versus discharged patients, no clear difference beyond age was noted.

Keywords: *pediatrics, toxicology, retrospective, xenobiotics, emergency medicine*

1 INTRODUCTION

1.1 Background

Pediatric poisonings, both intentional and unintentional, are a substantial public health issue, leading to approximately 713,000 emergency department (ED) visits per year.[1] Multiple studies have demonstrated a sharp increase in pediatric ingestion-related ED visits compared with prepandemic data.[2–4] According to the Centers for Disease Control, in 2021 and 2022, there was an increase in 162 and 171 weekly ED visits for poisonings, respectively, compared with 2019.[3] Some pediatric patients may present initially to a hospital, whether it is a community or tertiary site, which may lack the proper resources or expertise to manage the patient long term, requiring the patient to be transferred to a tertiary pediatric hospital. Patients with toxicological exposures in particular are more frequently transferred compared with other pediatric conditions.[5] However, transferring a patient can incur significant logistical, financial, and resource burdens on healthcare systems and patients.[6] Although 1 prior study found an average cost for families to range from $556 to $1455, another found upward of $4843 per pediatric patient.[6,7] To our knowledge, no study has assessed whether transfers for pediatric toxicological exposures are clinically indicated and represent an appropriate use of resources.

1.2 Importance

Given the significant quantity of poisoning-related visits and the resource utilization that patients may require, it is important to understand how these patients present, what their clinical course entails, and what resources are utilized in their care. A greater understanding of the clinical presentations, which ultimately prompt transfer and the care delivered in EDs versus pediatric tertiary care centers, could potentially avoid an unnecessary transfer and improve resource utilization.

1.3 Goals of This Investigation

The goal of this study was to describe the final disposition of pediatric patients transferred to a tertiary children's hospital, assess differences in disposition based on xenobiotic exposure, and describe the need for interventions and subspecialty consultations.

2 METHODS

2.1 Study Design and Setting

A retrospective analysis of patients ≤18 years old transferred to a tertiary children's hospital in New York for both intentional and unintentional xenobiotic exposures between July 1, 2021 and June 30, 2023 was performed. This included both in-network and out-of-network transferring hospitals.

2.2 Selection of Participants

Figure illustrates the final selection of patients. An electronic data set was obtained from our hospital network's centralized transfer center. This included all patients transferred to the tertiary children's hospital within the timeframe mentioned

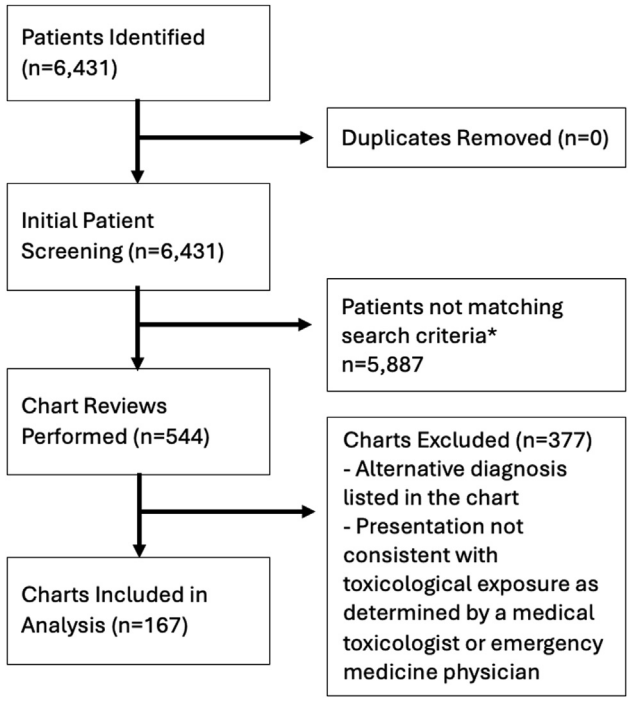

FIGURE. Flowchart of patient selection for final analysis. *Search terms included if a xenobiotic was mentioned by name or the following keywords: ingestion, toxicity, poisoning, chemical, overdose, unresponsive, suicide attempt, foreign body ingestion, altered mental status, agitation, psychiatric, seizures, status epilepticus, respiratory depression, respiratory arrest, and cardiac arrest.

The Bottom Line

Pediatric xenobiotic exposures are a prevalent emergency department (ED) presentation, accounting for over 700,000 visits annually. Some patients are transferred to a children's hospital, resulting in additional resource utilization including time and costs, especially if the patients are discharged after a short stay in the second ED. This study aimed to characterize xenobiotic exposures, interventions, and the disposition of patients transferred over a 2-year period. In total, 167 patients were transferred, with 80.2% requiring admission. Those admitted were found to be older with a median age of 15 years. Acetaminophen, polysubstance, and tetrahydrocannabinol were the most common exposures of those transferred.

above from any hospital within the New York area. Specific keywords listed as the reason for transfer by the sending physician were queried. The search criteria included the name of any specific xenobiotic exposure or the following search terms: ingestion, toxicity, poisoning, chemical, overdose, unresponsive, suicide attempt, foreign body ingestion, altered mental status, agitation, psychiatric, seizures, status epilepticus, respiratory depression, respiratory arrest, and cardiac arrest. The inclusion criteria were patients transferred due to a toxicological exposure of any route (eg, ingestion, inhalation, dermal, etc), as determined by a team of emergency medicine physicians and medical toxicologists based on chart review. This included both intentional and unintentional exposures. Exclusion criteria included if an alternative diagnosis was documented in the chart or if the patient's presentation was not consistent with a toxicological exposure.

2.3 Measurements

Information regarding exposure, symptoms, interventions, and disposition was collected. Five random charts were initially reviewed among 7 emergency physicians and medical toxicologists to establish a standardized chart abstraction process and optimize the consistency of chart abstractions. A formal inter-rater agreement assessment was not performed. The remaining charts were divided among the groups to review independently. If there was uncertainty during the chart review process, that chart was discussed with the entire group to reach a consensus. All data were entered into a standardized Research Electronic Capture database. Our health system's institutional review board determined that this was a quality improvement project and that institutional review board approval was not required.

2.4 Outcomes

The primary outcome of this study was the final disposition of the transferred patient based on the xenobiotic exposure, including discharge versus admission at the children's hospital. The admission disposition encompasses direct medical or intensive care unit (ICU) admissions, medical admissions from the children's ED, and transfers to a psychiatric facility. Secondary outcomes included the need for intervention at the initial ED and subspecialty consultation at the children's hospital.

2.5 Statistical Analysis

Descriptive statistics, including frequencies, proportions, medians, and IQRs, were used to describe the study sample. Patients were stratified by disposition once transferred. This included discharge from the second ED or admission. To assess differences in characteristics based on disposition at the children's hospital, Wilcoxon rank sum, chi-square, and Fisher exact tests were used, as appropriate. A P value of $< .05$ was considered statistically significant. All analyses were conducted using SAS 9.4 (SAS Institute).

3 RESULTS

3.1 Initial Characteristics

Between July 1, 2021 and June 30, 2023, a total of 6431transfers occurred; 544 of these charts matched the search criteria. Of the 544 charts reviewed, 167 (30.7%) met the inclusion criteria for analysis. Therefore, 2.6% of all transfers were due to toxicological exposures. The characteristics of these patients are shown in Table 1. Overall, the median age was 15 years (IQR: 5-17 years), with the majority of patients comprising the age group ≥13 years (70.1%). The most common route of exposure was oral (88.0%). Most patients were ED to ED transfers (71.3%). Of note, no deaths occurred among transfers to the pediatric hospital.

3.2 Primary Outcome: Disposition

As shown in Table 1, 19 patients (11.4%) were directly admitted to the inpatient floor, whereas 29 (17.4%) were admitted directly to the ICU. Of the 119 patients who were ED to ED transfers, 86 (72.3%) were ultimately admitted. The median age of admitted patients was higher (16 years, IQR: 14-17 years) compared with discharged patients (4 years, IQR: 2-13 years, $P < .001$).

Breakdown of xenobiotics is shown in Table 2. Acetaminophen was the most common exposure (n = 37, 22.2%), and 97% of patients with an acetaminophen ingestion were

TABLE 1. Characteristics of transferred pediatric patients stratified by disposition at the children's hospital.

Variables	Total sample (N = 167) n (col %)	Admitted[a] (N = 134) n (col %)	Discharged (N = 33) n (col %)	*P* value
Age, y				
Median, (IQR)	15 (5, 17)	16 (14, 17)	4 (2, 13)	<.001*
Sex				
Female	113 (67.7%)	98 (73.1%)	15 (45.5%)	.005**
Male	53 (31.7%)	35 (26.1%)	18 (54.6%)	
Other	1 (0.6%)	1 (0.8%)	0 (0.0%)	
Sending facility type				
In-network	84 (50.3%)	69 (51.5%)	15 (45.5%)	.534***
Out-of-network	83 (49.7%)	65 (48.5%)	18 (54.6%)	
Patient transferred to				
Emergency department	119 (71.3%)	86 (64.2%)	33 (100.0%)	<.001***
Floor	19 (11.4%)	19 (14.2%)	0 (0.0%)	
Intensive care unit	29 (17.4%)	29 (21.6%)	0 (0.0%)	
Route of exposure[b]				
Oral	147 (88.0%)	122 (91.0%)	25 (75.8%)	.031**
Inhalation	6 (3.6%)	2 (1.5%)	4 (12.1%)	.015**
Nasal	1 (0.6%)	1 (0.8%)	0 (0.0%)	1.000**
Dermal	3 (1.8%)	1 (0.8%)	2 (6.1%)	.100**
Rectal	1 (0.6%)	1 (0.8%)	0 (0.0%)	1.000**
Subcutaneous	1 (0.6%)	1 (0.8%)	0 (0.0%)	1.000**
Other	14 (8.4%)	9 (6.7%)	5 (15.2%)	.155**
Xenobiotic known				
Yes	149 (89.2%)	118 (88.1%)	31 (93.9%)	.531**
No	18 (10.8%)	16 (11.9%)	2 (6.1%)	
Quantity of xenobiotic known				
Yes	87 (52.1%)	75 (56.0%)	12 (36.4%)	.043***
No	80 (47.9%)	59 (44.0%)	21 (63.6%)	
Time of exposure known				
Yes	109 (65.3%)	91 (67.9%)	18 (54.6%)	.158**
No	58 (34.7%)	43 (32.1%)	15 (45.5%)	

IQR, interquartile range. **P* value derived from Wilcoxon rank sum test. ***P* value derived from Fisher exact test. ****P* value derived from chi-square test.

[a] Includes direct medical admissions, medical admissions from the ED, and transfers to a psychiatric facility.

[b] Response options are not mutually exclusive.

admitted. This is followed by polysubstance (n = 24, 14.4%) and tetrahydrocannabinol (n = 13, 7.8%), of which 96% and 46% were admitted, respectively.

3.3 Secondary Outcomes: Interventions and Consultation

The initial interventions of transferred patients are shown in Table 3. An intravenous fluid bolus was the most common intervention at the initial ED (n = 78, 46.7%), followed by N-acetylcysteine (NAC; n = 42, 25.2%). There were also 29 patients (17.4%) who received gastrointestinal decontamination (activated charcoal n = 25, whole bowel irrigation n = 2, gastric lavage n = 2) at the initial hospital, with only one of these patients discharged once transferred. Table 4 shows the subspecialties involved once the patient was transferred to the pediatric hospital. Medical toxicology (n = 127, 76.1%) was the most common specialty consulted. Among admitted patients, 83.6% (112/134) had a medical toxicology consultation, compared with only 45.5% (15/33) of those discharged ($P < .001$). Patients who did not have a subspecialty consultation were significantly more likely to be discharged (12/134, 9.0% vs 14/33, 42.2%, $P < .001$). No difference was observed for other consultations.

TABLE 2. Xenobiotic exposures of transferred pediatric patients stratified by disposition.

Xenobiotic	Total (N = 167) n (col %)	Admitted[a] (N = 134) n	Discharged (N = 33) n	Proportion admitted n admitted/n total %
Acetaminophen	37 (22.2%)	36	1	97.3
Polysubstance	24 (14.4%)	23	1	95.8
THC	13 (7.8%)	6	7	46.2
Unknown	11 (6.6%)	9	2	81.8
Imidazoline	8 (4.8%)	8	0	100
Bupropion	7 (4.2%)	7	0	100
Caustic	6 (3.6%)	3	3	50.0
Diphenhydramine	6 (3.6%)	5	1	83.3
Escitalopram	6 (3.6%)	6	0	100
Detergent pod	6 (3.6%)	1	5	16.7
SSRI[b]	5 (3.0%)	5	0	100
Sympathomimetic	7 (4.2%)	4	3	57.1
Salicylate	3 (1.8%)	3	0	100
CCB	3 (1.8%)	2	1	66.7
Carbon monoxide	3 (1.8%)	0	3	0.0
Ethanol	3 (1.8%)	2	1	66.7
Antipsychotic	3 (1.8%)	3	0	100
Opioid	3 (1.8%)	2	1	66.7
Beta-blocker	1 (0.6%)	1	0	100
Iron	1 (0.6%)	0	1	0.0
SNRI	1 (0.6%)	1	0	100
Benzodiazepine	1 (0.6%)	1	0	100
Hydrocarbon	1 (0.6%)	1	0	100
Ibuprofen	1 (0.6%)	0	1	0.0
Insulin	1 (0.6%)	1	0	100
Lead	1 (0.6%)	1	0	100
Lithium	1 (0.6%)	1	0	100
Melatonin	1 (0.6%)	0	1	0.0
Peppermint candy	1 (0.6%)	0	1	0.0
Superwarfarin	1 (0.6%)	1	0	100
Toxic alcohol	1 (0.6%)	1	0	100

CCB, calcium channel blocker; SNRI, selective norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor; THC, tetrahydrocannabinol.

[a] Includes direct medical admissions, medical admissions from the ED, and transfers to a psychiatric facility.

[b] Excludes escitalopram.

4 LIMITATIONS

There are limitations to this current study. First, this was a single-center tertiary pediatric hospital in a suburban setting, and the results may not be generalizable to other centers. Second, the initial data query of transferred patients did not list specific International Classification of Disease-10 codes from the transferring hospital, which can make reproducibility difficult. Third, the small sample size limited our ability to perform multivariable analyses. Fourth, other categories of xenobiotics known to cause severe toxicity such as caffeine, nicotine, sulfonylureas, camphor, and pesticides were not reported in our sample during this time period. Finally, there is no uniform electronic medical record; therefore, patients transferred from an out-of-network hospital often did not have available outside medical records. Therefore, the information listed in the children's hospital ED physician note was used.

TABLE 3. Interventions provided at initial ED stratified by disposition at children's hospital.

Intervention	Total sample (N = 167) n (col %)	Admitted[a] (N = 134) n (col%)	Discharged (N = 33) n (col %)
IV fluid bolus			
Yes	78 (46.7%)	68 (50.8%)	10 (30.3%)
No	68 (40.7%)	49 (36.6%)	19 (57.6%)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
N-acetylcysteine			
Yes	42 (25.2%)	42 (31.3%)	0 (0.0%)
No	105 (62.9%)	77 (57.5%)	28 (84.9%)
Unknown	20 (12.0%)	15 (11.2%)	5 (15.2%)
Antiemetics			
Yes	33 (19.8%)	33 (24.6%)	0 (0.0%)
No	104 (62.2%)	77 (57.5%)	27 (81.8%)
Unknown	30 (18.0%)	24 (17.9%)	6 (18.2%)
Activated charcoal			
Yes	25 (15.0%)	24 (17.9%)	1 (3.0%)
No	121 (72.5%)	93 (69.4%)	28 (84.9%)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
Benzodiazepines			
Yes	25 (15.0%)	22 (16.4%)	3 (9.1%)
No	110 (65.9%)	86 (64.2%)	24 (72.7%)
Unknown	32 (19.2%)	26 (19.4%)	6 (18.2%)
Naloxone			
Yes	11 (6.6%)	10 (6.0%)	1 (3.0%)
No	136 (81.4%)	109 (81.3%)	27 (81.8%)
Unknown	20 (12.0%)	15 (11.2%)	5 (15.2%)
Intubation			
Yes	11 (6.6%)	11 (8.2%)	0 (0.0%)
No	135 (80.8%)	106 (79.1%)	29 (87.9%)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
Sodium bicarbonate			
Yes	6 (3.6%)	6 (4.5%)	0 (0.0%)
No	141 (84.4%)	113 (84.3%)	28 (84.9%)
Unknown	20 (12.0%)	15 (11.2%)	5 (15.2%)
Supplemental oxygen			
Yes	5 (3.0%)	5 (3.7%)	0 (0.0%)
No	141 (84.4%)	112 (83.6%)	29 (87.9)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
CPR			
Yes	3 (1.8%)	2 (1.5%)	1 (3.0%)
No	143 (85.6%)	115 (85.8%)	28 (84.9%)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
Miscellaneous[b]			
Yes	3 (1.8%)	3 (2.2%)	0 (0.0%)
No	144 (68.2%)	116 (86.6%)	28 (84.8%)
Unknown	20 (12.0%)	15 (11.2%)	5 (15.2%)

(Continues)

TABLE 3. (Continued)

Intervention	Total sample (N = 167) n (col %)	Admitted[a] (N = 134) n (col%)	Discharged (N = 33) n (col %)
Magnesium sulfate			
Yes	3 (1.8%)	3 (2.2%)	0 (0.0%)
No	132 (79.0%)	105 (78.4%)	27 (81.8%)
Unknown	32 (19.2%)	26 (19.4%)	6 (18.2%)
Vasopressors			
Yes	3 (1.8%)	3 (2.2%)	0 (0.0%)
No	132 (79.0%)	105 (78.4%)	27 (81.8%)
Unknown	32 (19.2%)	26 (19.4%)	6 (18.2%)
Albuterol sulfate			
Yes	2 (1.5%)	2 (1.5%)	0 (0.0%)
No	133 (79.6%)	106 (79.1%)	27 (81.8%)
Unknown	32 (19.2%)	26 (19.4%)	6 (18.2%)
Calcium			
Yes	2 (1.2%)	2 (1.5%)	0 (0.0%)
No	145 (86.8%)	117 (87.3%)	28 (85.9%)
Unknown	20 (12.0%)	15 (11.2%)	5 (15.2%)
Gastric lavage[c]			
Yes	2 (1.2%)	2 (1.5%)	0 (0.0%)
No	144 (86.2%)	115 (85.8%)	29 (87.9%)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
Whole bowel irrigation			
Yes	2 (1.2%)	2 (1.5%)	0 (0.0%)
No	144 (86.2%)	115 (85.8%)	29 (87.9%)
Unknown	21 (12.6%)	17 (12.7%)	4 (12.1%)
Cyproheptadine			
Yes	1 (0.6%)	1 (0.8%)	0 (0.0%)
No	146 (87.4%)	118 (88.1%)	28 (84.9%)
Unknown	20 (12.0%)	15 (11.2%)	5 (15.2%)

CPR, cardiopulmonary resuscitation; IV, intravenous.

[a] Includes direct medical admissions, medical admissions from the ED, and transfers to a psychiatric facility.

[b] Insulin, glucagon, and octreotide.

[c] 34 French orogastric tube used for first patient, tube size not identified for second patient.

5 DISCUSSION

The need for an escalation of care or further evaluation is the driving force behind a pediatric interfacility transport program. Several studies have evaluated the appropriateness of pediatric transfers; however, no study has looked specifically at the characteristics of patients with suspected toxicological exposures.[8–10] Approximately 2.6% of pediatric transfers in this study were due to toxicological exposures. Of 167 patients transferred, 134 (80.2%) were admitted to the floor or the ICU. This is higher than previously reported admissions rates of 20% to 44% for pediatric poisonings presenting directly to the ED; however, higher rates of admission would be expected following a transfer as these patients were likely transferred due to more severe toxicities.[11,12] The median age of admitted patients was 16 years, compared with 4 years old for discharged patients. This would also be expected as older patients are more likely to have intentional ingestions, whereas younger patients have more unintentional, exploratory ingestions.

Acetaminophen exposure was the most common, with admission rates of 97.3% (36/37). This is likely due to the need for completion of NAC therapy. Common medications that are known to have severe toxicity in children such as calcium channel blockers, beta-blockers, salicylates, imidazolines, bupropion, and opioids were more likely to require admission, although they were infrequent in our cohort

TABLE 4. Subspecialty consultation at children's hospital stratified by disposition at children's hospital.

Consultants[a]	Total sample (N = 167) n (col %)	Admitted[b] (N = 134) n (col %)	Discharged (N = 33) n (col %)	*P* value
Toxicology	127 (76.1%)	112 (83.6%)	15 (45.5%)	<.001*
Nephrology	4 (2.4%)	3 (2.2%)	1 (3.0%)	1.000**
Gastroenterology	2 (1.2%)	2 (1.5%)	0 (0.0%)	1.000**
Pediatric ICU	8 (4.5%)	8 (6.0%)	0 (0.0%)	.358**
Psychiatry	13 (7.8%)	11 (8.2%)	2 (6.1%)	1.000**
General surgery	2 (1.2%)	2 (1.5%)	0 (0.0%)	1.000**
Neurology	5 (3.0%)	5 (3.7%)	0 (0.0%)	.584**
ECMO team	1 (0.6%)	1 (0.8%)	0 (0.0%)	1.000**
ENT	3 (1.8%)	1 (0.8%)	2 (6.1%)	.100**
Other[c]	7 (4.2%)	4 (3.0%)	3 (9.1%)	.140**
None	26 (15.6%)	12 (9.0%)	14 (42.4%)	<.001*

ECMO, extracorporeal membrane oxygenation; ENT, otolaryngology; ICU, intensive care unit. **P* value derived from chi-square test. ***P* value derived from Fisher's exact test.

[a] Not mutually exclusive.

[b] Includes direct medical admissions, medical admissions from the ED, and transfers to a psychiatric facility.

[c] Includes ophthalmology, interventional radiology, cardiology, child protective services, oral and maxillofacial surgery, dermatology.

(12%). Interestingly, tetrahydrocannabinol exposure resulted in a 46.2% (6/13) admission rate. However, this is similar to prior reported admission rates for patients, albeit under 6 years old.[13] Both this study and the referenced study took place in states where recreational marijuana use is legalized. All 3 carbon monoxide-exposed patients were discharged, which could have potentially been an avoidable transfer. Among detergent pod ingestions, only 1 of 6 exposures led to admission. Further review reveals that 1 admitted patient required an upper endoscopy as well as direct laryngoscopy, whereas the others only required observation or otolaryngology consultation in the ED. Pediatric otolaryngology consultation may not have been available at the initial hospital, thus necessitating the transfer. Involving medical toxicology in the patient's care was also associated with a higher admission rate, likely due to a propensity to consult medical toxicology in higher acuity patients. No significant difference was noted for other consultations.

Regarding interventions the patient received at the first hospital, all patients who were started on NAC therapy were admitted. All but 1 patient who received gastrointestinal decontamination was admitted, likely due to the concern for severe toxicity from the initial exposure and the need for further monitoring. Regarding the 2 patients who received gastric lavage, 1 patient had a 34 French orogastric tube placed, but the tube size was not identified for the second patient. One patient who received cardiopulmonary resuscitation was discharged. Further review of the chart shows that this patient had ingested oxycodone/acetaminophen, and cardiopulmonary resuscitation was initiated by paramedics for thready pulses during transfer. The patient was then given naloxone with improvement, monitored in the pediatric ED, and ultimately discharged. Statistical comparisons of differences in interventions based on disposition were not performed due to the large number of patients arriving from an out-of-network hospital without complete initial records.

The decision to transfer patients to a pediatric tertiary hospital may depend on the type of exposure, clinical signs and symptoms, and whether the toxicological exposure was intentional (eg, suicide attempt) or unintentional. Despite the study's relatively small sample size, our findings suggest that many toxicological cases presenting at hospitals without pediatric capabilities and were determined by an ED physician to need transfer to a pediatric center did in fact require hospital admission and continued interventions. Further studies are needed to evaluate characteristics among individual classes of xenobiotics for transferred patients as well as ED and inpatient length of stay. Future studies that reliably involve poison centers or medical toxicology services at outside hospitals in the decision for transfer may further minimize the need for unnecessary transfers of poisoned patients.

AUTHOR CONTRIBUTIONS

R.F., H.H., J.C., and P.S. conceived the study. R.F., H.H., J.C., P.S., and T.L. designed the study. R.F., H.H., J.C., C.M., M.G., M.H., and P.S. collected data. P.S. and M.H. supervised the conduct of the data collection. T.L. provided statistical advice on study design and analyzed the data. R.F., T.L., C.M., and M.G. drafted the manuscript. All authors contributed substantially to its revision. R.F. takes responsibility for the paper as a whole.

FUNDING AND SUPPORT

There were no grants or financial support.

DATA AVAILABILITY

The dataset is available upon request, from the date of article publication by contacting Richard Fisher, MD at rfisher7@northwell.edu and after executing a data sharing agreement among parties involved.

CONFLICTS OF INTEREST

There are no conflicts of interests.

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