

COVID-19 and Pediatric Ingestions

Karima A. Lelak, MD,^a Varun Vohra, PharmD,^b Mark I. Neuman, MD, MPH,^c Ahmed Farooqi, PhD,^d Michael S. Toce, MD, MS,^c Usha Sethuraman, MD^a

On March 13, 2020, the United States declared the coronavirus disease 2019 outbreak a national emergency.¹ Consequently, the abrupt shift in the school and home dynamics, combined with ensuing psychosocial and economic household stressors, placed children at increased risk of harm.² In particular, early 2020 data indicated an increase in household cleaner and disinfectant exposures.³ However, the impact of the pandemic on overall pediatric ingestions is unclear. Our objective was to compare national trends in pediatric ingestions during the pandemic to a similar pre-pandemic period.

METHODS

All closed cases of ingestions involving children aged ≤ 19 years reported to US poison control centers from March 13 to December 31, 2020 (pandemic), were compared with an identical period from 2017 to 2019 (pre-pandemic). A closed case is either one in which the regional poison center determined no further follow-up or recommendations were required or no further information on the case was available.⁴ All US poison control center operations and reporting were consistent across the study period. Aggregate national data were abstracted from the American Association of Poison Control Centers National Poison Data System.⁴ Information requests and animal calls were excluded. Abstracted data included age group,

sex, substance ingested, reason, exposure and management site, disposition, and medical outcome. Clinically significant outcomes were defined as a moderate or major effect or death.⁴ Descriptive statistics were used to describe the study cohorts, and categorical variables were compared by using the χ^2 test. The significance level was set to $\alpha < .05$. The study was exempt from review by our institutional review board.

RESULTS

There were 861 626 pediatric ingestions during the pandemic, representing a 6.3% absolute decrease compared with the pre-pandemic years (Fig 1A). The pandemic period had an increase in proportion of teenagers and children aged ≤ 5 years compared with the pre-pandemic years (Table 1). There was a relative increase in intentional ingestions accounting for 10.8% of all ingestions during the pandemic period versus 10.3% during the pre-pandemic period (0.5% difference, 95% confidence interval: 0.4%–0.6%, $P < .001$) (Table 1). In addition, there was a relative increase in ingestions occurring at home during the pandemic period when compared with the pre-pandemic period (1.9% difference, 95% confidence interval: 1.8%–2.0%, $P < .0001$).

Ingestions of hand sanitizers increased by 43% (18 099 vs 12 653, $P < .0001$) and melatonin

^aDivision of Emergency Medicine, Department of Pediatrics, Children's Hospital of Michigan and Central Michigan University, Detroit, Michigan; ^bMichigan Poison Center and Department of Emergency Medicine, School of Medicine, Wayne State University, Detroit, Michigan; ^cDivision of Emergency Medicine, Department of Pediatrics, Boston Children's Hospital and Harvard Medical School, Harvard University, Boston, Massachusetts; and ^dClinical Research Institute, College of Medicine, Central Michigan University, Mount Pleasant, Michigan

Drs Lelak and Sethuraman conceptualized and designed the study, analyzed and interpreted the data, and drafted and revised the manuscript and tables for important intellectual content; Dr Vohra conceptualized and designed the study, coordinated and supervised data collection, analyzed and interpreted the data, and critically reviewed the manuscript for important intellectual content; Drs Neuman and Toce designed the study, analyzed and interpreted the data, and revised the manuscript critically for important intellectual content; Dr Farooqi conducted data analyses and critically reviewed the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Address correspondence to Karima Lelak, MD, Division of Pediatric Emergency Medicine, Department of Pediatrics, Children's Hospital of Michigan, 3901 Beaubien St, Detroit, MI 48201. E-mail: klelak@dmc.org

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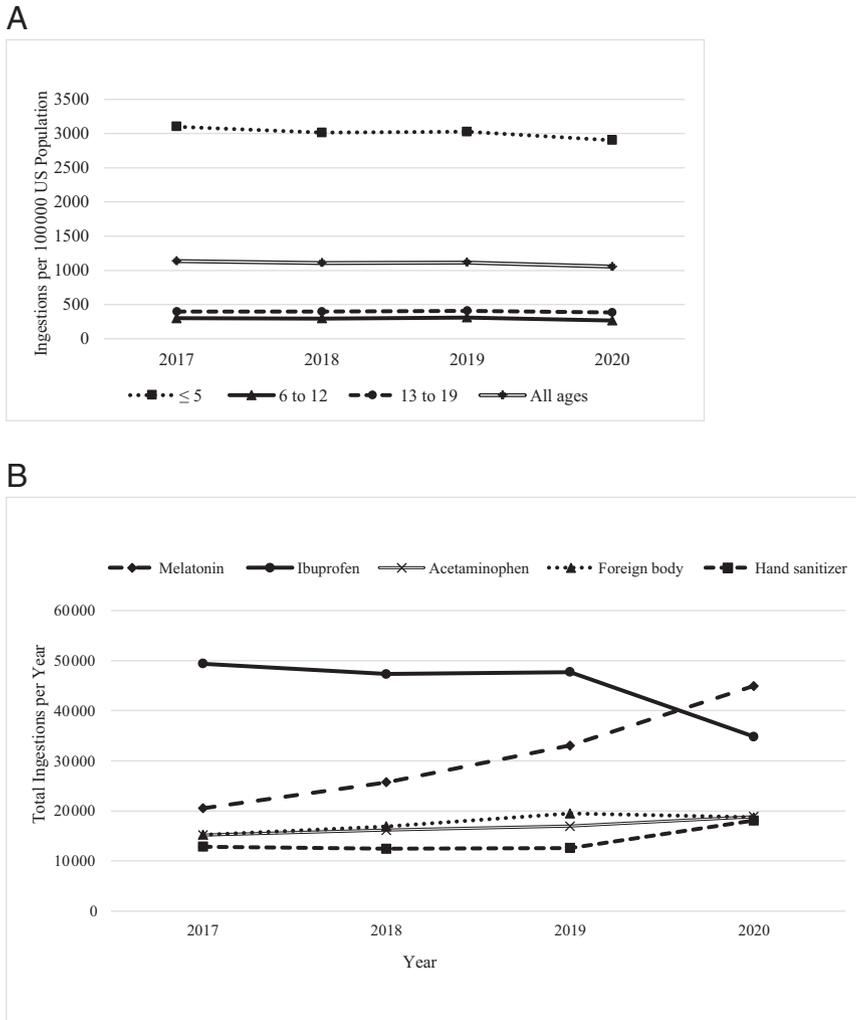


FIGURE 1 Pediatric ingestion trends 2017–2020. A, Rate of ingestion by age group (≤ 5 years, 6–12 years, and 13–19 years). Population estimates are based on the US Census Bureau. B, Total yearly ingestions of the most common substances in 2020 (melatonin, ibuprofen, acetaminophen, foreign body, and hand sanitizer) compared with the previous 3 years.

by 70% (44 957 vs 26 431, $P < .0001$) during the pandemic period. Additionally, melatonin ingestions supplanted analgesics as the most frequently ingested substance during the pandemic period (Fig 1B). Clinically significant outcomes associated with ingestions increased during the pandemic period (4.2% vs 3.6%, $P < .001$). Whereas overall ingestions managed at a health care facility decreased by 14.2% during the pandemic, there was an increase in the proportion of

adolescents ($P < .001$), intentional ingestions ($P < .001$) and hospitalizations ($P < .001$) (Table 1).

DISCUSSION

Ingestion-related calls to poison control centers and those subsequently managed at health care facilities decreased during the pandemic. The latter is consistent with a report of an overall decrease in pediatric

emergency department visits.⁵ This decline may be secondary to a combination of social restrictions, apprehensions in seeking care at a medical center, and increased parental supervision due to work-from-home advisories.^{5,6} The majority of ingestions occurred at the home, aligning with school and child care closures during the pandemic.

The increase in clinically significant ingestions observed in our study could be a consequence of misperceptions of health care facility safety during the pandemic. This may have subsequently contributed to delays in presentations and potentially worse outcomes.⁶

The increase in the proportions of adolescent and intentional ingestions may reflect heightened social, emotional, and psychological stressors on this age group. Initiatives focusing on implementing support systems for this vulnerable population are warranted. The heightened hand sanitizer and melatonin ingestions parallel the ubiquitous rise in the sale and use of such products during the pandemic and ease of accessibility among children.^{3,7} This demands continued attention, given reports of methanol-contaminated hand sanitizer ingestions with severe adverse outcomes.⁸

Limitations include voluntary reporting to poison control centers and reliance on secondhand narratives, which may include partially incomplete information. Additionally, drug concentrations are rarely obtained to confirm ingestions. Finally, incomplete coding of the poison control center data may have also skewed ingestion frequencies.

TABLE 1 Comparison of Pediatric Ingestions During the Pandemic (2020) Versus Prepandemic Period (2017–2019)

| Characteristic | Year, n (%) | | P |
|---|----------------------------|----------------|-------|
| | 2017–2019; 3-year Average | 2020 | |
| All Ingestions | n = 2 757 796; n = 919 265 | n = 861 626 | — |
| Age, y | | | <.001 |
| ≤5 | 712 708 (77.5) | 670 352 (77.8) | — |
| 6–12 | 87 006 (9.5) | 76 403 (8.9) | — |
| 13–19 | 119 551 (13.0) | 114 871 (13.3) | — |
| Sex | | | <.001 |
| Male | 470 376 (51.2) | 435 982 (50.6) | — |
| Female | 446 465 (48.6) | 422 762 (49.1) | — |
| Unknown | 2424 (0.3) | 2882 (0.3) | — |
| Reason | | | <.001 |
| Unintentional | 813 237 (88.5) | 758 422 (88.0) | — |
| Intentional | 94 560 (10.3) | 92 918 (10.8) | — |
| Other | 11 468 (1.2) | 10 286 (1.2) | — |
| Exposure site | | | <.001 |
| Residence | 882 457 (96.0) | 843 935 (97.9) | — |
| School | 17 554 (1.9) | 3475 (0.4) | — |
| Other | 19 255 (2.1) | 14 216 (1.6) | — |
| Management site | | | <.001 |
| Managed on-site (non-HCF) | 713 205 (77.6) | 687 181 (79.8) | — |
| Patient already in or en route to HCF when PCC called | 146 284 (15.9) | 125 478 (14.6) | — |
| Patient was referred by PCC to HCF | 44 432 (4.8) | 43 642 (5.1) | — |
| Other | 15 344 (1.7) | 5 325 (0.6) | — |
| Outcome ^a | | | <.001 |
| No effect | 208 499 (22.7) | 186 261 (21.6) | — |
| Minor effect | 86 566 (9.4) | 84 283 (9.8) | — |
| Clinically significant | 33 187 (3.6) | 35 906 (4.2) | — |
| Death | 69 (0.0) | 81 (0.23) | — |
| Other | 591 013 (64.3) | 555 218 (64.4) | — |
| Ingestion managed at a HCF | n = 438 853; n = 146 284 | n = 125 478 | — |
| Age, y | | | <.001 |
| ≤5 | 62 619 (42.8) | 45 728 (36.4) | — |
| 6–12 | 11 151 (7.6) | 9980 (8.0) | — |
| 13–19 | 72 515 (49.6) | 69 770 (55.6) | — |
| Sex | | | <.001 |
| Male | 59 676 (40.8) | 47 192 (37.6) | — |
| Female | 86 399 (59.1) | 78 106 (62.2) | — |
| Unknown | 210 (0.1) | 180 (0.1) | — |
| Reason | | | <.001 |
| Unintentional | 72 067 (49.3) | 52 714 (42.0) | — |
| Intentional | 70 910 (48.5) | 69 838 (55.7) | — |
| Other | 3307 (2.3) | 2926 (2.3) | — |
| Outcome ^a | | | <.001 |
| No effect | 50 487 (34.5) | 38 966 (31.1) | — |
| Minor effect | 41 986 (28.7) | 38 382 (30.6) | — |
| Clinically significant | 28 679 (19.6) | 30 365 (24.2) | — |
| Death | 61 (0.0) | 71 (0.23) | — |
| Other | 25 132 (17.2) | 17 765 (14.2) | — |
| Disposition | | | <.001 |
| Hospitalized | 54 983 (37.6) | 54 674 (43.6) | — |
| ICU | 15 842 (10.8) | 14 591 (26.7) | — |
| Treated and released | 85 921 (58.7) | 66 200 (52.8) | — |
| Other | 5380 (3.7) | 4604 (3.7) | — |

HCF, health care facility; PCC, poison control center; —, not applicable.

^a No effect: no signs or symptoms.⁴ Minor effect: minimally bothersome symptoms; self-limited; resolved without intervention (eg, self-limited gastrointestinal symptoms).⁴ Clinically significant outcomes include moderate effect or major effect or death. Moderate effect: systemic symptoms requiring intervention; not life-threatening (eg, brief seizure readily resolved with treatment; high fever).⁴ Major effect: life-threatening symptoms (eg, status epilepticus, respiratory failure requiring intubation).⁴ Other: cases that were not followed or unable to be followed to a known outcome but judged as likely nontoxic exposures, exposures with minimal clinical effects, or exposure deemed not responsible to the effect.⁴

CONCLUSIONS

Pediatric ingestion calls to poison control centers decreased during the pandemic. However, there were significant increases in intentional hand sanitizer and melatonin ingestions and those with clinically significant outcomes. Further studies are required to determine the long-term impact of the pandemic on pediatric ingestions to institute appropriate preventive measures and resource allocation.

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