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Surveillance of Human Adenovirus Types and the Impact of the COVID-19 Pandemic on Reporting — United States, 2017–2023

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Abstract

Human adenoviruses (HAdVs) are typically associated with mild respiratory illnesses, although severe disease and outbreaks in congregate settings occur. The National Adenovirus Type Reporting System (NATRS) is a passive, laboratory-based surveillance system that monitors trends in circulation of HAdV types in the United States. This report summarizes the distribution of HAdV types reported to NATRS during 2017–2023. During this 7-year period, 2,241 HAdV specimens with typing results were reported to NATRS. The number of specimens with HAdV typing results reported varied annually during 2017–2019 (range = 389–562) and declined during 2020–2023 (range = 58–356). During 2017–2023, six HAdV types (1–4, 7, and 14) accounted for 88.3% of typed specimens reported; 17.0% of specimens were identified as outbreak-related. An increase in type 41 reporting was associated with a hepatitis cluster during 2021–2022. Reporting to NATRS has declined since the COVID-19 pandemic, despite continued HAdV circulation reported through passive laboratory surveillance to the National Respiratory and Enteric Virus Surveillance System. Enhanced participation in NATRS is needed to improve monitoring of circulating HAdV types.

Introduction

Human adenoviruses (HAdVs) are classified into seven species (designated A–G) and approximately 100 types (designated with integers) (*1*). HAdV types are associated with various respiratory illnesses as well as nonrespiratory illnesses including gastroenteritis and conjunctivitis (*1*). HAdV types are sometimes associated with differing degrees of illness severity, although how HAdV type and host factors interact and result in a clinical syndrome is not fully understood. Most HAdV infections are mild or asymptomatic. However, severe illness can occur, either sporadically in otherwise healthy persons or, more frequently, in persons with immunocompromising conditions (*1*). Outbreaks of HAdV have been described in congregate settings including college campuses, hospitals, and military training sites (*1*–*4*). An HAdV vaccine against types 4 and 7 is only available for military personnel*; these types have caused outbreaks of severe respiratory illness. This report summarizes HAdV typing data reported during 2017–2023 to the National Adenovirus Type Reporting System (NATRS),† a passive, laboratory-based surveillance system that monitors HAdV types across the United States.

* https://www.cdc.gov/vaccines/hcp/vis/vis-statements/adenovirus.html
† https://www.cdc.gov/adenovirus/php/surveillance/about-natrs.html

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Methods

Data Sources

Participating laboratories with HAdV typing results voluntarily report quarterly to NATRS. Results are accompanied by limited demographic, clinical, and laboratory data, and indication of whether the specimen was associated with an outbreak or cluster. Additional outbreak-related specimens are identified through manual review and follow-up communications with public health officials. Laboratory testing for HAdVs is performed by molecular assay, antigen detection, or virus isolation. The HAdV target is included in many commercially available polymerase chain reaction (PCR) panels for respiratory pathogens. Because HAdV testing and typing do not typically influence clinical management of patients with HAdV infections, diagnostic HAdV testing is not routine and few laboratories routinely perform HAdV typing.[§] However, during public health investigations, such as those related to outbreaks, laboratory specimens are more likely to be sent for HAdV testing and typing to help characterize illnesses, determine the scope of the outbreak, and design interventions. Thus, outbreak specimens might be more likely to be reported to NATRS.[¶]

[§] Type identification of HAdV-positive specimens requires additional testing. Because relatively few clinical or public health laboratories currently perform HAdV typing, those with typing capacity (including the CDC diagnostic laboratory) have provided technical assistance during epidemiologic investigations or outbreaks.

[¶] Laboratory guidance and resources for adenovirus typing are provided by CDC and the Association of Public Health Laboratories. https://www.cdc.gov/adenovirus/php/laboratory-testing/index.html; https://www.aphl.org/programs/infectious_disease/Pages/Adenovirus.aspx

Data Analysis

This report describes the distribution of HAdV results reported to NATRS during 2017–2023 by patients' state of residence and age group. In addition, the distribution of typing results by specimen type and year of specimen collection were examined, and the HAdV types associated with outbreaks during the study period were identified. Reports with missing HAdV typing data, missing date of collection, and known instances in which multiple specimens of the same HAdV type were collected from the same patient within 90 days were excluded. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[**]

Results

Reports Submitted to NATRS

Six laboratories reported results to NATRS for 2,909 specimens collected during 2017–2023, including CDC's Respiratory Virus Diagnostics Laboratory, four state public health laboratories, and one U.S. Department of Defense laboratory. Specimens originated from patients living in 30 states (Figure 1). After exclusion of reports with missing HAdV typing data (381) or date of collection (274) and multiple specimens of the same HAdV type from the same patient (13),[††] a total of 2,241 typing

[**] 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

[††] No cases of the same HAdV type from the same patient but from different sources were found.

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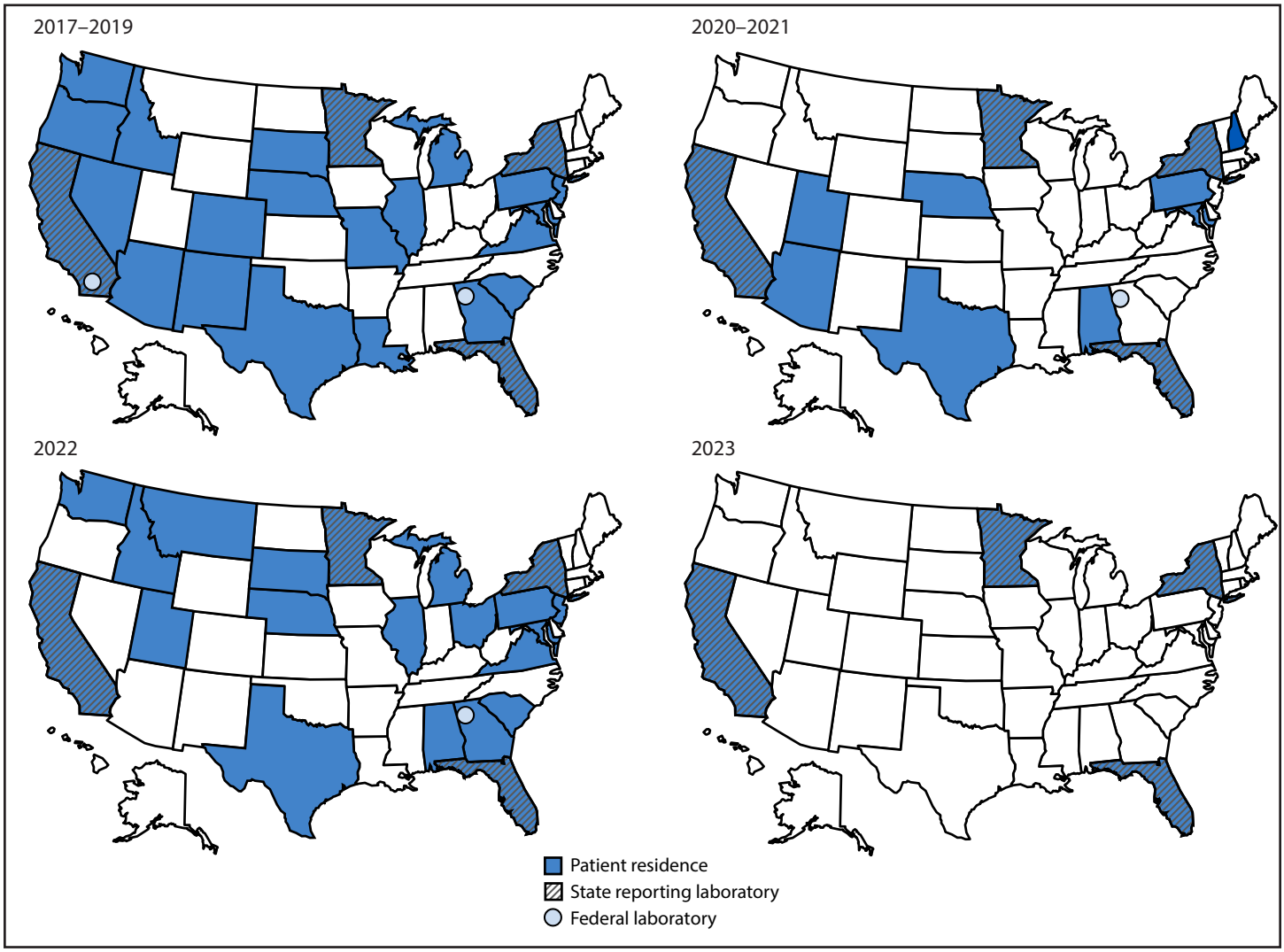
FIGURE 1. Geographic distribution of cases with human adenovirus typing data, by patient state of residence and reporting laboratory — National Adenovirus Type Reporting System, United States, 2017–2023*,†



Abbreviations: HAdV = human adenovirus; HHS = U.S. Department of Health and Human Services; NATRS = National Adenovirus Type Reporting System.

* Typing results were reported to NATRS from the California Department of Public Health Laboratory (2017–2023); Coronavirus and Other Respiratory Viruses Diagnostic Laboratory, CDC (2017–2019 and 2021–2022); Bureau of Public Health Laboratories, Florida Department of Health (2017–2023); Public Health Laboratory, Minnesota Department of Health (2017–2023); Naval Health Research Center (2017–2019); and Wadsworth Center, New York State Department of Health (2017–2019 and 2021–2023).

† Although the laboratories participating in NATRS are physically located in HHS Regions 2 (New York), 4 (Georgia and Florida), 5 (Minnesota), and 9 (California) only, specimens originated from patients living in 30 states and all 10 HHS regions.

results were included in the analysis (Supplementary Table, https://stacks.cdc.gov/view/cdc/168891).

Respiratory specimens accounted for the largest percentage of specimens (82.3%); the second largest group included stool specimens, which accounted for 6.4% of all specimens (Table). Each year, respiratory specimens constituted >70% of reported types; during 2017, 2018, and 2022, stool represented >5% of specimens (Figure 2).[§§]

[§§] During the 7-year study period, molecular typing methods, including partial or full genome sequencing (1,327; 59.2%) and type-specific real-time PCR (756; 33.7%), were predominantly used for HAdV typing. The traditional serum neutralization test was used infrequently (103; 4.6%).

Annual reporting to NATRS increased from 389 specimens in 2017 to 562 in 2019. However, annual reports declined during the COVID-19 pandemic in 2020 (58 specimens) and 2021 (103). In 2022 and 2023, a total of 356 and 273 reports, respectively, were received, lower than the average annual mean of 484 reported during 2017–2019 (Figure 2). Throughout the study period, specimens with typing results reported to NATRS were most frequently collected from infants and young children aged 0–4 years (1,009; 45.0%), young adults aged 18–29 years (616; 27.5%), and children and adolescents aged 5–17 years (359; 16.0%). Typed specimens collected from

TABLE. Distribution of human adenovirus types, specimen types, and outbreak-related cases — National Adenovirus Type Reporting System, United States, 2017–2023

HAdV type	No. (column %)	Specimen type, no. (row %)			Outbreak-related cases no., (row %)
		Respiratory	Stool	Other*	
3	530 (23.7)	493 (93.0)	5 (0.9)	32 (6.0)	9 (1.7)
4	411 (18.3)	327 (79.6)	65 (15.8)	19 (4.6)	141 (34.3)
2	311 (13.9)	278 (89.4)	5 (1.6)	28 (9.0)	7 (2.3)
7	300 (13.4)	258 (86.0)	22 (7.3)	20 (6.7)	86 (28.7)
1	254 (11.3)	219 (86.2)	7 (2.8)	28 (11.0)	8 (3.1)
14	174 (7.8)	128 (73.6)	10 (5.7)	36 (20.7)	75 (43.1)
41	91 (4.1)	21 (23.1)	27 (29.7)	43 (47.3)	39 (42.9)
5	90 (4.0)	73 (81.1)	0 (—)	17 (18.9)	2 (2.2)
Other†	80 (3.6)	48 (60.0)	2 (2.5)	30 (37.5)	14 (17.5)
Total (row %)	**2,241 (100.1)§**	**1,845 (82.3)**	**143 (6.4)**	**253 (11.3)**	**381 (17.0)**

Abbreviation: HAdV = human adenovirus.
* Other specimen type includes unidentified source (183; 72.3%), blood (39; 15.4%), ocular swab (13; 5.1%), serum (13; 5.1%), urine (4; 1.6%), and tissue (1; 0.4%).
† Other HAdV types include 6, 8, 9, 11, 12, 21, 22, 25, 31, 35, 37, 40, 53, and 56.
§ Total percentage does not sum to 100.0 because of rounding.

adults aged ≥30 years were infrequent (95; 4.2%); patient age was missing for 162 (7.2%) specimens.

During 2017–2023, six HAdV types accounted for 88.3% of all reported data: 530 (23.7%) type 3; 411 (18.3%) type 4; 311 (13.9%) type 2; 300 (13.4%) type 7; 254 (11.3%) type 1; and 174 (7.8%) type 14. The annual distribution of HAdV types varied (Figure 2). During 2017–2019, types 4 (22.3%), 3 (20.6%), and 7 (19.9%) were the most frequently reported; however, during 2020–2022, types 2 (27.1%), 1 (20.7%), 41 (15.3%), and 4 (14.9%) were most frequently reported. In 2023, types 3 (68.9%) and 2 (11.0%) predominated.

Among all 2,241 specimens reported during 2017–2023, a total of 381 (17.0%) were identified as outbreak-related (Table). Among 1,451 typed specimens reported during 2017–2019, a total of 267 (18.4%) were outbreak-related. Among these, the most frequent outbreak-related types were 7 (32.2%), 4 (29.2%), and 14 (27.0%). During 2020–2021, among 161 specimens, 17 (10.6%) were related to an outbreak, including a nationwide investigation into pediatric hepatitis suspected to be associated with type 41 adenovirus infection.¶¶ Among these specimens, 11 (64.7%) were type 41. In 2022, among 356 specimens reported, 97 (27.2%) were outbreak-related; most were types 4 (65.0%) and 41 (26.8%). No outbreak-related specimens were identified in 2023.

Discussion

HAdV type surveillance is useful for monitoring circulation patterns over time, guiding outbreak investigations, and supporting development of diagnostic tests, therapeutics, and vaccines. During 2017–2023, the most frequently reported HAdV types (1–4, 7, and 14) accounted for 88% of NATRS specimens. Similarly, a previous NATRS report found that these same six types accounted for 86% of specimens reported in the United States during 2003–2016 (*5*). These surveillance findings suggest that vaccines and therapeutics with coverage of certain HAdV types could help mitigate community and outbreak-related illness.

Because HAdV typing does not typically influence clinical management, a substantial proportion (17%) of typing results reported to NATRS were identified as being associated with an outbreak or other epidemiologic investigation. During 2021–2022, type 41 was more frequently reported, largely because of the enhanced investigations of HAdV-associated acute pediatric hepatitis (*6*,*7*). Outbreaks in congregate settings such as colleges, health care facilities, and military environments, particularly those involving HAdV types 4 and 7, influenced the observed trends in HAdV type distribution during the study period. In 2017, an outbreak associated with HAdV type 7 occurred among unvaccinated military trainees in Virginia (*2*), and in 2019, an outbreak associated with type 4 occurred at a military training academy in Connecticut (*4*). During 2018–2022, types 4 and 7 were linked to multiple college outbreaks across several states (*3*,*8*,*9*).

NATRS reporting has declined substantially since the COVID-19 pandemic. Implementation of nonpharmaceutical interventions in response to the pandemic in 2020 disrupted the circulation of most respiratory viruses (*10*). As a result, respiratory HAdV circulation reported to the National Respiratory and Enteric Virus Surveillance System (NREVSS), a passive, laboratory-based surveillance network, initially decreased that year. However, by spring 2021, HAdV circulation reported to NREVSS had returned to typical prepandemic levels, with elevated activity observed in fall 2022 followed by a return to typical prepandemic circulation by fall 2023.*** Thus, the decline in NATRS participation during the pandemic is most likely related to reduced HAdV typing or reporting of HAdV types rather than to diminished HAdV activity.

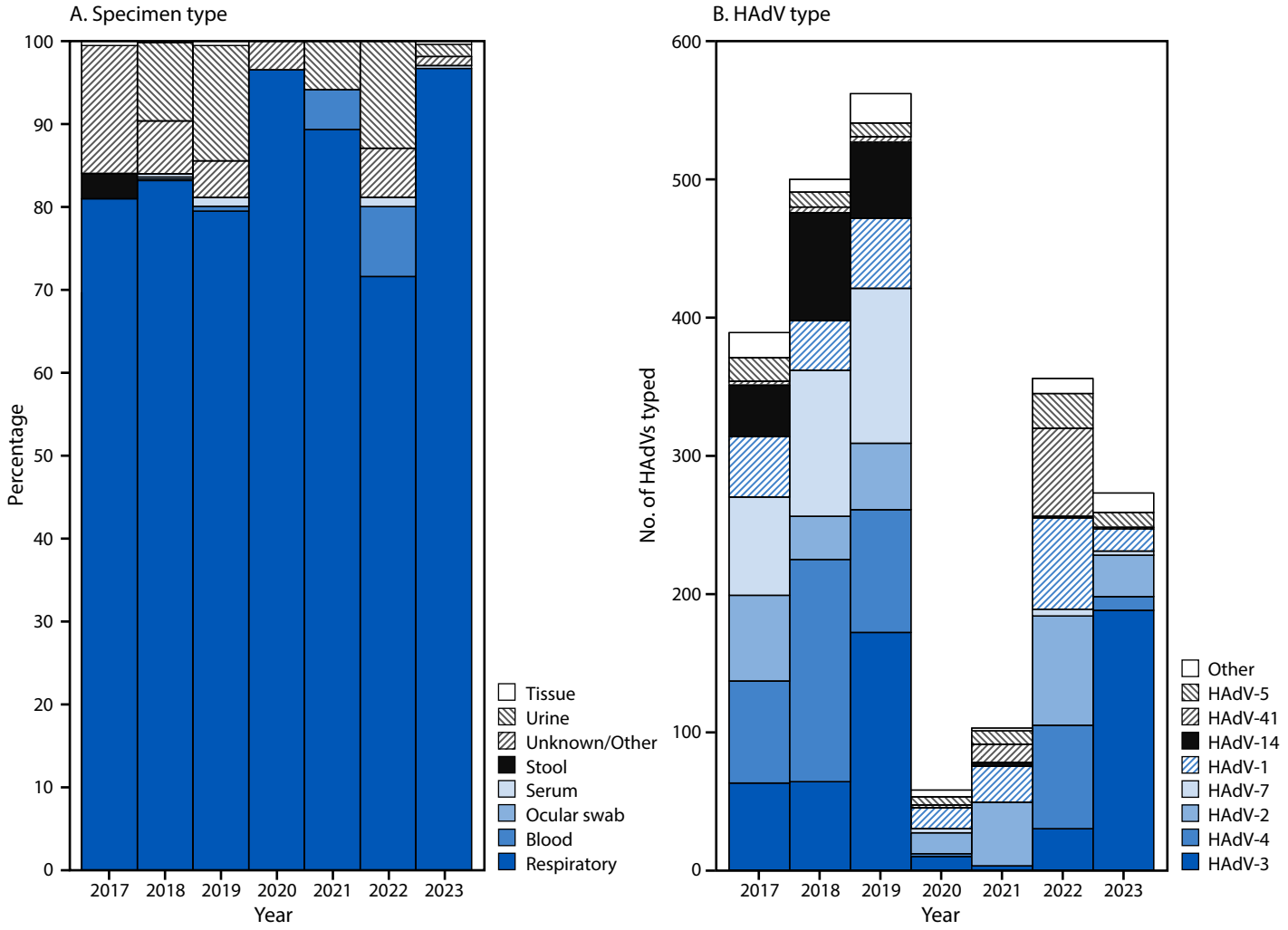
Limitations

The findings in this report are subject to at least four limitations. First, a limited number of laboratories have HAdV typing capacity; thus, data reported to NATRS are not geographically representative of HAdV circulation. Second, reports

¶¶ The HAdV type 41 cases were not associated with a single outbreak but were part of a nationwide epidemiologic investigation during 2021–2022 that resulted in increased reporting of acute hepatitis associated with HAdV infection among children.

*** NREVSS collects the aggregate weekly number of tests performed and the total number of those tests that were positive from participating U.S. laboratories (https://www.cdc.gov/nrevss/php/dashboard/index.html). Among 1,799,424 HAdV tests reported to NREVSS during 2017–2019, there were 54,782 HAdV detections; among 2,908,127 HAdV tests reported during 2021–2023, a total of 120,928 HAdV detections were reported. NREVSS does not collect data on HAdV type.

FIGURE 2. Percent distribution of specimen types reported (A) and number of human adenovirus types (B),* by year of specimen collection — National Adenovirus Type Reporting System, United States, 2017–2023



Abbreviation: HAdV = human adenovirus.

* Frequencies of the top three HAdV types each year are as follows: 2017: HAdV-4 (19.0%), HAdV-7 (18.3%), and HAdV-3 (16.2%); 2018: HAdV-4 (32.2%), HAdV-7 (21.2%), and HAdV-14 (15.6%); 2019: HAdV-3 (30.6%), HAdV-7 (19.9%), and HAdV-4 (15.8%); 2020: HAdV-2 (25.9%), HAdV-1 (25.9%), and HAdV-3 (17.2%); 2021: HAdV-2 (44.7%), HAdV-1 (25.2%), and HAdV-41 (12.6%); 2022: HAdV-2 (22.2%), HAdV-4 (21.1%), and HAdV-1 (18.5%); 2023: HAdV-3 (68.9%), HAdV-2 (11.0%), and HAdV-1 (5.9%).

with missing typing or date of collection data were excluded, further limiting the representativeness of the data. Third, data reported to NATRS do not include detailed epidemiologic or clinical information; therefore, HAdV types could not be associated with specific clinical syndromes or outcomes. Finally, HAdV typing is differentially performed on specimens from severe infections and outbreaks; therefore, NATRS results are unlikely to represent the full distribution of HAdV types circulating in the community.

Implications for Public Health Practice

NATRS is designed for national tracking of circulating HAdV types. However, reporting has declined since public health resources were diverted to the COVID-19 pandemic. To enhance national surveillance and geographic representativeness, laboratories are encouraged to perform typing or refer positive specimens for typing and report their results to NATRS.††† Increasing routine typing of HAdV from both community and outbreak sources is essential for detecting outbreaks locally as well as understanding differences in circulating genotypes and changes in epidemiology and clinical severity. The expanded application of pathogen genomics (i.e., whole genome sequencing) and associated resources since the pandemic can be further leveraged to improve HAdV type surveillance. Expanded laboratory capacity to type HAdVs and enhanced reporting could improve national understanding

††† Laboratories with HAdV typing results can report data to NATRS at natrs@cdc.gov.

Summary

What is already known about this topic?

Human adenoviruses (HAdVs) cause a wide spectrum of respiratory and nonrespiratory illnesses and are associated with outbreaks in congregate settings. The National Adenovirus Type Reporting System (NATRS) was formally initiated in 2014, but has conducted passive, voluntary surveillance of circulating HAdV types in the United States since 2003.

What is added by this report?

Reporting to NATRS decreased during and after the COVID-19 pandemic, despite continued HAdV circulation reported through passive laboratory surveillance to the National Respiratory and Enteric Virus Surveillance System. During 2017–2023, six HAdV types (1–4, 7, and 14) accounted for 88.3% of typed specimens; 17.0% of specimens were identified as outbreak-related.

What are the implications for public health practice?

Strengthened public health and clinical laboratory capacity to type and report HAdV-positive specimens is needed to improve understanding of HAdV type circulation patterns, which can guide outbreak investigations and support development of diagnostic tests, therapeutics, and vaccines.

of HAdV circulation patterns and better guide public health prevention strategies.

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References

1. Lynch JP 3rd, Kajon AE. Adenovirus: epidemiology, global spread of novel types, and approach to treatment. Semin Respir Crit Care Med 2021;42:800–21. PMID:34918322 https://doi.org/10.1055/s-0041-1733802
2. Bautista-Gogel J, Madsen CM, Lu X, et al. Outbreak of respiratory illness associated with human adenovirus type 7 among persons attending Officer Candidates School, Quantico, Virginia, 2017. J Infect Dis 2020;221:697–700. PMID:30783668 https://doi.org/10.1093/infdis/jiz060
3. Kujawski SA, Lu X, Schneider E, et al. Outbreaks of adenovirus-associated respiratory illness on 5 college campuses in the United States, 2018–2019. Clin Infect Dis 2021;72:1992–9. PMID:32322889 https://doi.org/10.1093/cid/ciaa465
4. Chu VT, Simon E, Lu X, et al. Outbreak of acute respiratory illness associated with human adenovirus type 4 at the United States Coast Guard Academy, 2019. J Infect Dis 2022;225:55–64. PMID:34139752 https://doi.org/10.1093/infdis/jiab322
5. Binder AM, Biggs HM, Haynes AK, et al. Human adenovirus surveillance—United States, 2003–2016. MMWR Morb Mortal Wkly Rep 2017;66:1039–42. PMID:28981484 https://doi.org/10.15585/mmwr.mm6639a2
6. Baker JM, Buchfellner M, Britt W, et al. Acute hepatitis and adenovirus infection among children—Alabama, October 2021–February 2022. MMWR Morb Mortal Wkly Rep 2022;71:638–40. PMID:35511732 https://doi.org/10.15585/mmwr.mm7118e1
7. World Health Organization. Disease outbreak news: acute hepatitis of unknown aetiology in children—multi-country. Geneva, Switzerland: World Health Organization; 2022. https://www.who.int/emergencies/disease-outbreak-news/item/DON-389
8. Montgomery JP, Marquez JL, Nord J, et al. Detection of a human adenovirus outbreak, including some critical infections, using multipathogen testing at a large university, September 2022–January 2023. Open Forum Infect Dis 2024;11:ofae192. PMID:38680614 https://doi.org/10.1093/ofid/ofae192
9. Tori ME, Chontos-Komorowski J, Stacy J, et al. Identification of large adenovirus infection outbreak at university by multipathogen testing, South Carolina, USA, 2022. Emerg Infect Dis 2024;30:358–62. PMID:38270142 https://doi.org/10.3201/eid3002.230623
10. Olsen SJ, Winn AK, Budd AP, et al. Changes in influenza and other respiratory virus activity during the COVID-19 pandemic—United States, 2020–2021. MMWR Morb Mortal Wkly Rep 2021;70:1013–9. PMID:34292924 https://doi.org/10.15585/mmwr.mm7029a1

Notes from the Field

Long COVID and Significant Long COVID–Associated Activity Limitation Among Adults, by Jurisdiction — United States, 2023

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Introduction

Long COVID is a chronic condition comprising a wide range of symptoms and conditions lasting ≥3 months after SARS-CoV-2 infection (*1*). Frequently reported symptoms include fatigue that interferes with daily life, difficulty thinking or concentrating, cough, and heart palpitations.* One in four U.S. adults with Long COVID report significant activity limitations (*2*). Few representative subnational estimates are available to support jurisdiction-specific policy, planning, or programming for Long COVID.

Investigation and Outcomes

CDC analyzed data from the 2023 Behavioral Risk Factor Surveillance System (BRFSS), a large, population-based cross-sectional survey of noninstitutionalized U.S. adults aged ≥18 years (*3*). BRFSS samples participants using random-digit–dialing of mobile and landline telephones.† Self-reported age, sex, previous COVID-19 illness, current Long COVID, and significant activity limitation due to Long COVID were ascertained via telephone interview. Current Long COVID was defined as self-report of any symptoms lasting ≥3 months at the time of interview that were not present before having COVID-19. Significant activity limitation due to Long COVID was defined as the presence of symptoms reducing ability to carry out day-to-day activities "a lot" compared with such ability during the time before having COVID-19. CDC estimated weighted age- and sex-standardized prevalences with 95% CIs of current Long COVID among all adults and significant activity limitation due to Long COVID among adults experiencing Long COVID nationwide, in 48 states,§ the District of Columbia (DC), Guam, Puerto Rico, and the U.S. Virgin Islands. CDC standardized all estimates to the 2020 U.S. Census Bureau population of civilian, noninstitutionalized adults using sex-specific weights by age group for persons aged 18–44, 45–64, and ≥65 years. Analyses were conducted using SAS-callable SUDAAN (version 9.4; RTI International) to account for complex survey design. Prevalence estimates were divided into quintiles to create prevalence maps. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.¶

Preliminary Conclusions and Actions

During 2023, 6.4% (95% CI = 6.3%–6.6%) of noninstitutionalized U.S. adults nationwide were experiencing Long COVID when surveyed. The weighted age- and sex-standardized prevalence of current Long COVID ranged from 2.9% (95% CI = 1.7%–5.1%) in the U.S. Virgin Islands to 9.7% (95% CI = 8.7%–10.9%) in West Virginia (Supplementary Table, https://stacks.cdc.gov/view/cdc/174567). Among adults with current Long COVID, 19.8% (95% CI = 18.9%–20.8%) reported significant activity limitations due to their symptoms. The weighted age- and sex-standardized prevalence of significant activity limitation because of Long COVID among U.S. jurisdictions ranged from 12.8% (95% CI = 7.8%–20.3%) in DC to 29.4% (95% CI = 23.6%–36.0%) in Puerto Rico (Figure). Among the seven jurisdictions with current Long COVID prevalence of ≥8.0%, Idaho, Puerto Rico, and West Virginia were also in the highest prevalence quintile for significant Long COVID–associated activity limitation.

These findings support the ongoing importance of tools to reduce the risk for Long COVID, including vaccination. Adults with Long COVID, particularly those with significant Long COVID–associated activity limitation, might require additional supports to aid recovery, such as health care resources and workplace accommodations (*4*,*5*). These estimates might help guide jurisdiction-specific policy, planning, or programming to support U.S. adults reporting Long COVID–associated limitations.

* https://www.cdc.gov/covid/long-term-effects/long-covid-signs-symptoms.html
† In 2023, BRFSS surveyed 433,323 adults. The median survey response rate for all participating jurisdictions in 2023 was 44.7% and ranged from 21.7% to 63.1%. https://www.cdc.gov/brfss/annual_data/2023/pdf/2023-DQR-508.pdf
§ In 2023, Kentucky and Pennsylvania were unable to collect sufficient data to meet the minimum requirements to be included in the BRFSS public data set.

¶ 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

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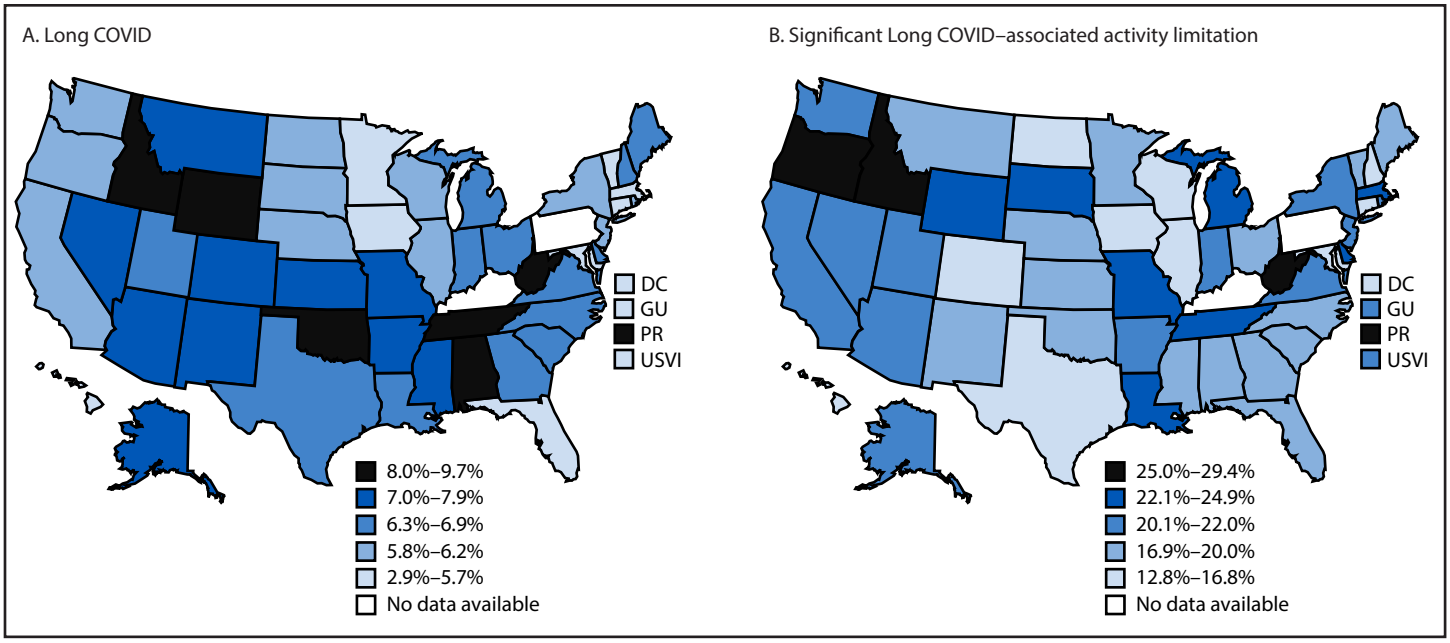
FIGURE. Prevalences of current Long COVID (A) and significant Long COVID–associated activity limitation (B) among adults, by jurisdiction — Behavioral Risk Factor Surveillance System, United States, 2023*,†



Abbreviations: DC = District of Columbia; GU = Guam; PR = Puerto Rico; USVI = U.S. Virgin Islands.

* Prevalence estimates are weighted to account for complex sampling and standardized to the U.S. civilian, noninstitutionalized population based on 2020 U.S. Census Bureau population. Sex-specific weights by age group were applied for ages 18–44, 45–64, and ≥65 years.

† Denominators for prevalence estimates of current Long COVID are the total adult population. Denominators for prevalence estimates for significant activity limitation are the number of adults with current Long COVID.

Summary

What is already known about this topic?

Long COVID might limit a person's ability to carry out day-to-day activities.

What is added by this report?

In 2023, 6.4% (95% CI = 6.3–6.6%) of the noninstitutionalized U.S. adults nationwide were experiencing Long COVID when surveyed. Among adults with current Long COVID, age- and sex-standardized prevalences of reporting significant Long COVID–associated activity limitation ranged from 12.8% in the District of Columbia to 29.4% in Puerto Rico. Among the seven jurisdictions with current Long COVID prevalence of ≥8.0%, Idaho, Puerto Rico, and West Virginia were also in the highest prevalence quintile for significant Long COVID–associated activity limitation.

What are the implications for public health practice?

These findings support the ongoing importance of tools to reduce risk for Long COVID, including vaccination. Jurisdiction-specific estimates might guide policy, planning, or programming to support U.S. adults reporting significant Long COVID–associated activity limitation.

References

1. National Academies of Sciences, Engineering, and Medicine. A long COVID definition: a chronic systemic disease state with profound consequences. Washington, DC: The National Academies Press; 2024. https://nap.nationalacademies.org/read/27768
2. Ford ND, Slaughter D, Edwards D, et al. Long COVID and significant activity limitation among adults, by age—United States, June 1–13, 2022, to June 7–19, 2023. MMWR Morb Mortal Wkly Rep 2023;72:866–70. PMID:37561665 https://doi.org/10.15585/mmwr.mm7232a3
3. CDC. Behavioral Risk Factor Surveillance System. Atlanta, GA: US Department of Health and Human Services, CDC; 2024. Accessed September 27, 2024. https://www.cdc.gov/brfss/index.html
4. Pike J, Kompaniyets L, Lindley MC, Saydah S, Miller G. Direct medical costs associated with post–COVID-19 conditions among privately insured children and adults. Prev Chronic Dis 2023;20:220292. PMID:36757854 https://doi.org/10.5888/pcd20.220292
5. US Department of Labor Office of Disability Employment Policy. Coronavirus resources: COVID-19 and long COVID. Washington, DC: US Department of Labor. https://www.dol.gov/agencies/odep/topics/coronavirus-covid-19-long-covid

Notes from the Field

School-Based Surveillance of *Mycoplasma pneumoniae* Trends and Impact on School Attendance by Students and Staff Members — Missouri, Fall 2024

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Acute respiratory illnesses (ARIs) occur frequently in school students and staff members. These infections are mostly caused by respiratory viruses; however, some are caused by bacteria, including *Mycoplasma pneumoniae*. Primarily affecting young adults and school-aged children, *M. pneumoniae* typically causes mild upper respiratory infections, but can progress to a pneumonia commonly known as "walking pneumonia" (*1*). Currently, no vaccine is available to prevent *M. pneumoniae* infection. After a period of low incidence during the COVID-19 pandemic, *M. pneumoniae* incidence increased in 2023.* Since spring 2024, CDC has reported increasing *M. pneumoniae* diagnoses in U.S. emergency departments, especially among children and adolescents (*2*). This report describes recent trends in *M. pneumoniae* activity observed in a school-based ARI surveillance program, including macrolide resistance in positive specimens. Macrolide resistance in *M. pneumoniae* infections might limit treatment options, potentially worsen patient outcomes, and facilitate the spread of resistant strains in community settings (*3*). This activity was reviewed by Children's Mercy Hospital and CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.†

Investigation and Outcomes

Knowledge of Infectious Diseases in Schools (School KIDS) is a prospective school-based ARI and respiratory virus surveillance program in a large public Missouri school district.§ Participating students (prekindergarten through grade 12) and staff members could submit nasal swabs (self-collected or collected by a school nurse or parent) when they experienced one or more new ARI signs or symptoms (on-demand testing), including cough, fever, nasal congestion, shortness of breath, runny nose, wheezing, or sore throat. At the time of specimen collection, participants or parents completed a symptom survey and reported any missed days of school or work during the previous 7 days; a follow-up survey was sent 7 days after testing.¶ Nasal swabs were tested using multiplex polymerase chain reaction (PCR) for *M. pneumoniae*, *Chlamydia pneumoniae, Bordetella pertussis*, and eight other respiratory viruses.** *M. pneumoniae*–positive swabs were tested at CDC for the presence of mutations that confer resistance to macrolide antibiotics.

During August 18–November 6, 2024, a total of 244 samples from 226 participants in 13 of 33 schools yielded 21 *M. pneumoniae*–positive specimens, from 18 students (seven elementary, six middle school, and five high school) and three staff members. The percentage of positive test results spiked at three timepoints during this period (September 29–October 5 [15.8%], October 13–19 [22.2%], and November 3–6 [19.2%]) (Figure), similar to the increasing trends in percentages of positive test results among children aged 5–17 years nationally (*2*). The median age of students who received positive *M. pneumoniae* test results was 11 years (IQR = 8–14 years); 42.9% were female, and 85.7% identified as non-Hispanic White. In six of the 21 *M. pneumoniae*–positive specimens, other respiratory pathogens were also detected, including rhinovirus/enterovirus (five) and parainfluenza virus type 4 (one).

All 21 participants with *M. pneumoniae*–positive test results completed both initial and follow-up surveys. In the 7 days before the *M. pneumoniae*–positive test result, frequent signs and symptoms were cough (95.2%), nasal congestion (56.5%), runny nose (52.2%), and sore throat (52.2%). After 7 days, 11 (52.4%) student and staff member participants reported the persistence of signs and symptoms. In addition, 16 participants (76.2%) missed ≥1 day of school or work, and nine (42.9%) sought medical care. Among 15 (71.4%) specimens for which macrolide susceptibility was determined, mutations known to confer resistance to macrolides in *M. pneumoniae* were detected in one specimen.

* The number of *M. pneumoniae* infections has varied over time, and infections might occur more frequently in summer and early fall. Cyclical peaks have been noted to occur every 3–7 years.

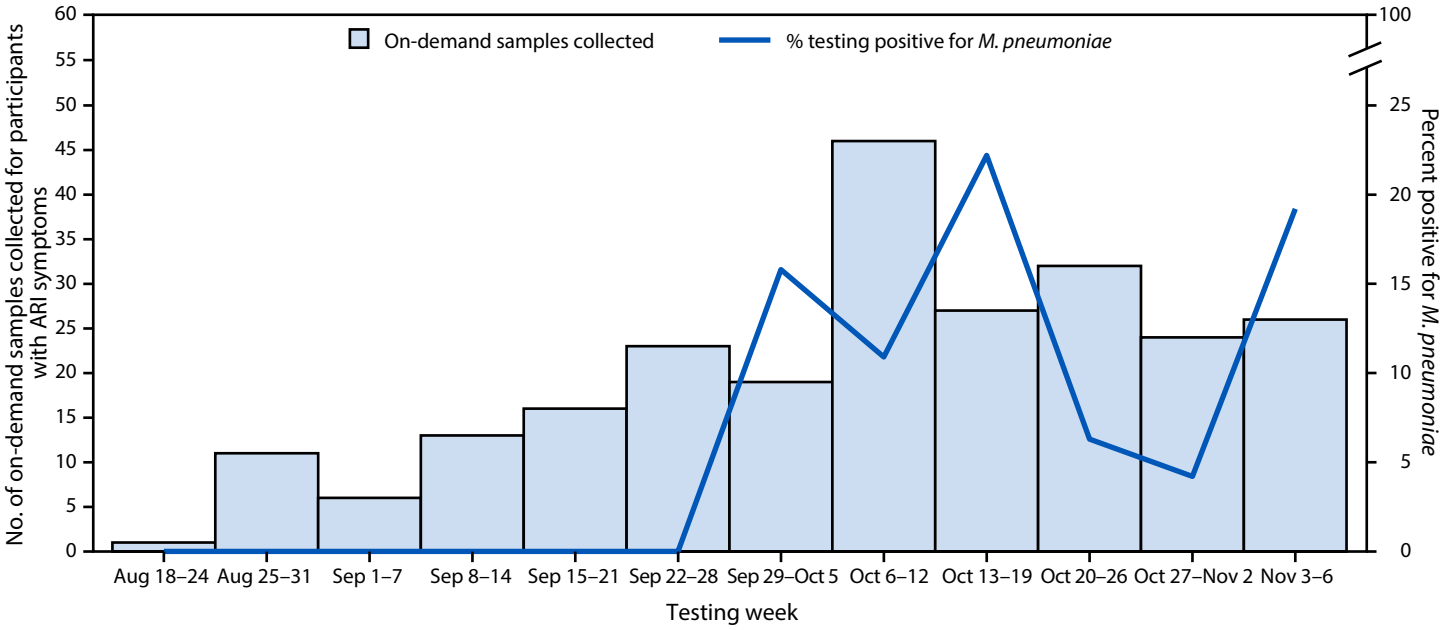
† 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

§ https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2024.1408281/full

¶ Surveys were sent using Research Electronic Data Capture (REDCap) to parents or staff members based on preferred method of communication (i.e., text or email). Surveys recorded information on whether participant had acute respiratory illness signs or symptoms (i.e., cough, fever, nasal congestion, shortness of breath, runny nose, wheezing, or sore throat) and the number of days of missed school or work (if any) because of illness in the 7 days preceding completion of the survey.

** Testing was performed using QIAstat Dx respiratory panel (QIAGEN) for all pathogens noted in the report and respiratory viruses including adenovirus, human metapneumovirus, influenza A and B, parainfluenza virus types 1–4, rhinovirus/enterovirus, respiratory syncytial virus, SARS-CoV-2, and seasonal coronaviruses 229E, HKU1, NL63, and OC43.

FIGURE. Nasal swab samples submitted for *Mycoplasma pneumoniae* testing by symptomatic* students† and staff members participating in Knowledge of Infectious Diseases in Schools surveillance (N = 244) — Missouri, August 18–November 6, 2024§



Abbreviation: ARI = acute respiratory infection.
* Self-report of one or more ARI signs or symptoms, including cough, fever, nasal congestion, shortness of breath, runny nose, wheezing, or sore throat.
† Prekindergarten through grade 12.
§ Enrollment increased over time, leading to increasing numbers of samples being collected over time. On-demand testing (i.e., self-collection and submission of nasal swabs from symptomatic persons) was available to all students and staff members enrolled in Knowledge of Infectious Diseases in Schools surveillance.

Summary

What is already known about this topic?

Mycoplasma pneumoniae is a frequent cause of respiratory illness and, in severe cases, can lead to pneumonia. Macrolide antibiotics are the recommended treatment for severe or persistent infections; macrolide resistance is uncommon in the United States.

What is added by this report?

School-based surveillance of *M. pneumoniae* infections at one large public Missouri school district indicated a spike in cases during fall 2024. Most (76.2%) infected students and staff members missed school or work, and approximately one half (52.4%) experienced symptoms for ≥1 week.

What are the implications for public health practice?

School-based surveillance can support clinical and public health decision-making, including implementation of preventive measures against respiratory illnesses in schools during the fall and winter respiratory season.

Preliminary Conclusions and Actions

The trend in cases of *M. pneumoniae* infection detected through this school surveillance platform appears to align with national emergency department trends, particularly concerning an observed increase in cases among children and adolescents during a similar time frame (*2*). *M. pneumoniae* transmission might occur in schools, and signs and symptoms among school-aged children are similar to those caused by respiratory viruses. Preventive measures, such as handwashing, covering coughs and sneezes, and other strategies to prevent respiratory virus spread can also help reduce *M. pneumoniae* transmission in schools (*4*). Clinicians might consider testing for and treating *M. pneumoniae* infections in students or staff members with persistent or severe respiratory symptoms. If antibiotics are prescribed, macrolides are considered a first-line treatment for moderate to severe laboratory-confirmed infections or when clinically indicated. Second-line treatments with antibiotics, such as tetracyclines, might be considered for patients experiencing persistent or severe respiratory symptoms (*5*). Continued, voluntary school-based surveillance for *M. pneumoniae* can support clinical and public health decision-making by guiding preventive measures against ARIs in schools during fall and winter and judicious use of antimicrobials. School KIDS data raises awareness of respiratory trends, supports anticipatory guidance, and enhances clinical management, aiding decision-making across multiple levels.

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References

1. Parrott GL, Kinjo T, Fujita J. A compendium for *Mycoplasma pneumoniae*. Front Microbiol 2016;7:513. PMID:27148202 https://doi.org/10.3389/fmicb.2016.00513
2. Eduns C, Clopper BR, DeVies J, et al. Notes from the field: reemergence of *Mycoplasma pneumoniae* infections in children and adolescents after the COVID-19 pandemic, United States, 2018–2024. MMWR Morb Mortal Wkly Rep 2024;73:149–51. PMID:38386615 https://doi.org/10.15585/mmwr.mm7307a3
3. Diaz MH, Benitez AJ, Winchell JM. Investigations of *Mycoplasma pneumoniae* infections in the United States: trends in molecular typing and macrolide resistance from 2006 to 2013. J Clin Microbiol 2015;53:124–30. PMID:25355769 https://doi.org/10.1128/JCM.02597-14
4. CDC. School preparedness: preventing spread of infection in K–12 schools. Atlanta, GA: US Department of Health and Human Services, CDC; 2024. https://www.cdc.gov/orr/school-preparedness/infection-prevention/index.html
5. Kimberlin DW, Barnett ED, Lynfield R, Sawyer MH. Mycoplasma pneumoniae and other Mycoplasma species infections. In: Kimberlin D, Barnett E, Lynfield R, Sawyer M, eds. Red book 2021–2024: report of the Committee on Infectious Diseases. Itasca, IL: American Academy of Pediatrics; 2024. https://publications.aap.org/redbook/book/347/chapter/5754389/Mycoplasma-pneumoniae-and-Other-Mycoplasma-Species

Notes from the Field

Geo-Temporal Trends in Fentanyl Administration Routes Among Adults Reporting Use of Illegally Manufactured Fentanyl When Assessed for Substance-Use Treatment — 14 U.S. States, 2017–2023

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During 2019–2023, U.S. overdose deaths involving fentanyl have more than doubled, from an estimated 35,474 in 2019 to 72,219 in 2023 (*1*). From 2020 to 2022, overdose deaths with only illegally manufactured fentanyl (IMF) detected and evidence of smoking IMF increased by 78.9%; deaths with evidence of injection decreased by 41.6% (*2*). Smoking, however, could not be linked specifically to IMF use when deaths involved multiple drugs (e.g., methamphetamine co-used with IMF). To characterize IMF administration routes among all persons who use IMF, with or without other drugs, IMF administration routes were examined among adults assessed for substance use treatment who used IMF during the past 30 days.

Investigation and Outcomes

The National Addictions Vigilance Intervention and Prevention Program's Addiction Severity Index-Multimedia Version (ASI-MV) tool* includes a convenience sample of adults aged ≥18 years assessed for substance-use treatment. CDC analyzed treatment assessments conducted between July 1, 2017, and June 30, 2023, which were restricted to 14 states† with at least 100 assessments reporting past 30-day IMF use (16,636)§ and stratified by administration routes (swallowed, snorted or sniffed, smoked, and injected¶). The percentage of persons reporting each administration route was calculated for 6-month periods by U.S. Census Bureau region.** Significant (p-value <0.05) trends by administration route were identified using Joinpoint (Joinpoint version 5.1.0; National Cancer Institute) and Pearson correlations. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.††

In the Midwest, South, and West U.S. Census Bureau regions, increases in smoking (from 7.8% during July–December 2017 to 38.2% during January–June 2023 [Midwest]; from 15.4% during January–June 2020 to 54.0% during January–June 2023 [South]; and from 45.7% during January–June 2018 to 85.7% during January–June 2023 [West]) were strongly negatively correlated with decreases in injection (Pearson correlation coefficient [r] = −0.96; p<0.001 [Midwest]; −0.98; p<0.001 [South]; and −0.74; p<0.01 [West]). Injection decreased from 75.2% during January–June 2020 to 41.2% during January–June 2023 in the Midwest U.S. Census Bureau region; from 54.2% during July–December 2020 to 30.3% during January–June 2023 in the South; and from 65.6% during July–December 2018 to 9.1% during January–June 2023 in the West, but timing of changes across each census region varied (Figure). In the Northeast, increases in snorting or sniffing (from 18.9% during July–December 2017 to 45.5% during January–June 2023) were strongly negatively correlated (r = −0.89; p<0.001) with a decrease in injection (from 83.8% during July–December 2017 to 63.4% during January–June 2023).

Preliminary Conclusions and Actions

Consistent with other fatal overdose investigations (*2*), the percentage of persons injecting IMF sharply declined across all U.S. Census Bureau regions between 2017 and 2023, although the magnitudes of these declines were region-specific. Some persons who use IMF reportedly believe that smoking is safer than injecting IMF (*3*). Whereas avoiding injection likely reduces the risk for acquiring bloodborne viruses (e.g., HIV or HCV) and soft tissue infections (*2*,*4*), noninjection routes might contribute to overdose or other health problems (e.g., orofacial lesions associated with snorting) (*5*). Compared with injection, smoking IMF is associated with a higher frequency of use throughout the day and potentially higher daily

* https://uprisehealth.com/resources/national-addictions-vigilance-intervention-and-prevention-program-navipprotm-a-real-time-product-specific-public-health-surveillance-system-for-monitoring-prescription-drug-abuse/

† Selected states with at least 100 assessments reporting past 30-day IMF use during July 2017–June 2023: *Northeast*: Massachusetts (3,692); *Midwest*: Michigan (1,026), Missouri (463), Indiana (186), and Ohio (130); *South*: Tennessee (6,200), Oklahoma (2,201), Maryland (1,248), Florida (250), Louisiana (198), West Virginia (127), and North Carolina (123); and *West*: Wyoming (409) and Colorado (383).

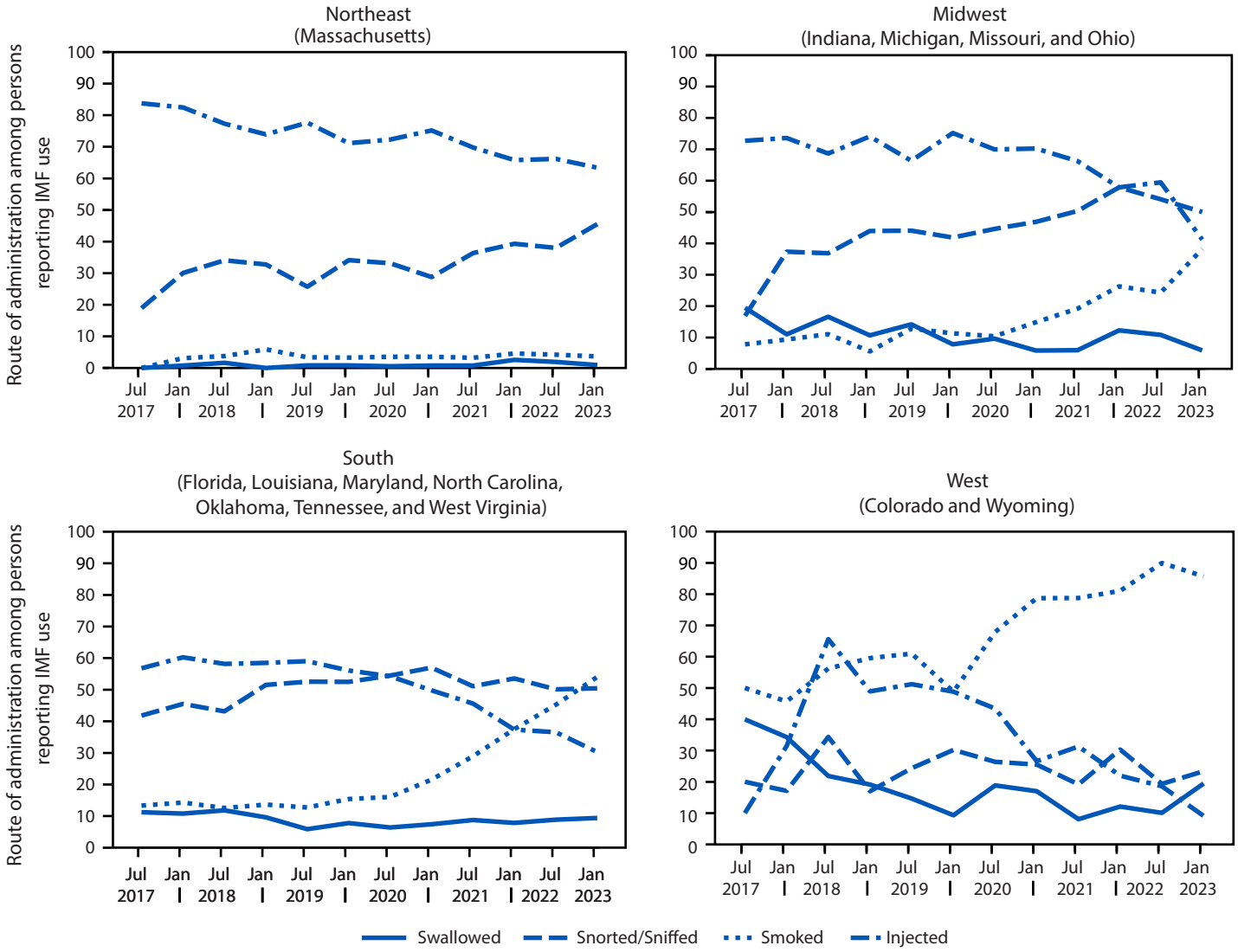
§ The ASI-MV assessment asks persons completing the questionnaire, "In the past 30 days, estimate how many days you used street fentanyl." The definition of street fentanyl in the ASI-MV was "Street fentanyl (illegal fentanyl and carfentanil, sometimes combined with other drugs such as heroin or cocaine)." In this study, 2.6% of ASI-MV assessments were repeat assessments, indicating that they were completed by a unique person with a previous assessment within the 6-month period.

¶ IMF administration routes are not mutually exclusive. A person can report more than one route in the survey, and the sum of proportions can exceed one. The injection category includes injection in the vein and the skin or muscle.

** U.S. Census Bureau regions were used to stratify jurisdictions into geographic regions (https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf). Region analysis included one of nine jurisdictions in the Northeast region, four of 12 jurisdictions in the Midwest region, seven of 17 jurisdictions in the South region, and two of 13 jurisdictions in the West region.

†† 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

FIGURE. Routes of administration* of illegally manufactured fentanyl among persons assessed for substance use treatment, by U.S. Census Bureau region† — 14 states, July 2017–June 2023



Abbreviation: IMF = illegally manufactured fentanyl.

* IMF administration routes are not mutually exclusive. A person can report more than one route in the survey, and the sum of proportions can therefore exceed one. Injection includes injection into the vein or into the skin or muscle.

† Selected states with at least 100 assessments reporting past 30-day IMF use during July 2017–June 2023: *Northeast*: Massachusetts (3,692); *Midwest*: Michigan (1,026), Missouri (463), Indiana (186), and Ohio (130); *South*: Tennessee (6,200), Oklahoma (2,201), Maryland (1,248), Florida (250), Louisiana (198), West Virginia (127), and North Carolina (123); and *West*: Wyoming (409) and Colorado (383).

dosages consumed (*3*). Substantial shifts to smoking IMF in the Midwest, South, and West, and sniffing or snorting IMF in the Northeast (i.e., Massachusetts) highlight the need to understand local trends in drug use and tailor local messaging, outreach, and linkage to medical care, including effective treatment for opioid use disorder in persons using IMF through noninjection routes.

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Summary

What is already known about this topic?

From 2020 to 2022, among overdose deaths with only illegally manufactured fentanyl (IMF) detected, those with evidence of smoking IMF increased by 78.9%, and those with evidence of injection decreased by 41.6%.

What is added by this report?

From July–December 2017 to January–June 2023, the percentage of persons injecting IMF sharply declined across all U.S. Census Bureau regions, with region-specific differences in magnitude; correspondingly, IMF snorting or sniffing increased in the Northeast, and IMF smoking increased in the Midwest, South, and West regions.

What are the implications for public health practice?

Whereas avoiding injection likely reduces infectious disease transmission, noninjection routes might still contribute to overdose. Provision of locally tailored messaging and linkage to medical treatment is important among persons using IMF through noninjection routes.

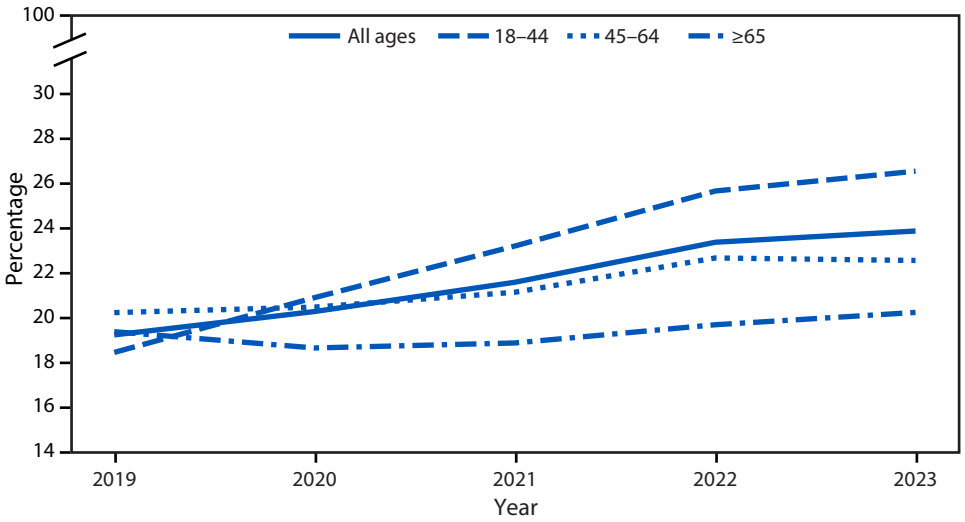
References

1. Ahmad FB, Cisewski JA, Garnett M, Warner M. National Vital Statistics Program: provisional drug overdose death counts by specific drugs. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2024. https://www.cdc.gov/nchs/nvss/vsrr/prov-drug-involved-mortality.htm
2. Tanz LJ, Gladden RM, Dinwiddie AT, et al. Routes of drug use among drug overdose deaths—United States, 2020–2022. MMWR Morb Mortal Wkly Rep 2024;73:124–30. PMID:38358969 https://doi.org/10.15585/mmwr.mm7306a2
3. Ciccarone D, Holm N, Ondocsin J, et al. Innovation and adaptation: the rise of a fentanyl smoking culture in San Francisco. PLoS One 2024;19:e0303403. PMID:38776268 https://doi.org/10.1371/journal.pone.0303403
4. Megerian CE, Bair L, Smith J, et al. Health risks associated with smoking versus injecting fentanyl among people who use drugs in California. Drug Alcohol Depend 2024;255:111053. PMID:38128362 https://doi.org/10.1016/j.drugalcdep.2023.111053
5. Gold M, Boyack I, Caputo N, Pearlman A. Imaging prevalence of nasal septal perforation in an urban population. Clin Imaging 2017;43:80–2. PMID:28242555 https://doi.org/10.1016/j.clinimag.2017.02.002

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Mental Health Treatment Trends* Among Adults Aged ≥18 Years, by Age Group — United States, 2019–2023†



* Adults were considered to have received mental health treatment if they reported 1) taking medication for anxiety or depression or 2) during the past 12 months having taken medication for emotions, concentration, behavior or mental health, or having received mental health therapy from a mental health professional. Additional information is available in the Supplementary Table.
† Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

From 2019 to 2023, the percentage of adults who had received any mental health treatment during the past 12 months increased from 19.2% to 23.9%. This pattern was similar among adults aged 18–44 and 45–64 years. No significant change was observed among adults aged ≥65 years.

Supplementary Table: https://stacks.cdc.gov/view/cdc/174552

Source: National Center for Health Statistics, National Health Interview Survey, 2019–2023. https://www.cdc.gov/nchs/nhis.htm

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For more information on this topic, CDC recommends the following link: https://www.cdc.gov/mental-health/.

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