Surveillance for Lyme Disease After Implementation of a Revised Case Definition — United States, 2022

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Abstract

Lyme disease, a tickborne zoonosis caused by certain species of *Borrelia* spirochetes, is the most common vectorborne disease in the United States. Approximately 90% of all cases are reported from 15 high-incidence jurisdictions in the Northeast, mid-Atlantic, and upper-Midwest regions. After the implementation of a revised surveillance case definition in 2022, high-incidence jurisdictions report cases based on laboratory evidence alone, without need for additional clinical information. In 2022, 62,551 Lyme disease cases were reported to CDC, 1.7 times the annual average of 37,118 cases reported during 2017–2019. Annual incidence increased most in older age groups, with incidence among adults aged ≥65 years approximately double that during 2017–2019. The sharp increase in reported Lyme disease cases in 2022 likely reflects changes in surveillance methods rather than change in disease risk. Although these changes improve standardization of surveillance across jurisdictions, they preclude detailed comparison with historical data.

Introduction

Lyme disease is a tickborne infection caused by spirochetes in the *Borrelia burgdorferi* sensu lato complex (*1,2*). Signs and symptoms of early disease include erythema migrans, a red, expanding rash often with central clearing, as well as fever and fatigue. Untreated infection can disseminate, affecting the heart, joints, and nervous system (*1*). National surveillance for Lyme disease in the United States began in 1991 and has documented a steady increase in incidence and geographic range. A majority of cases of Lyme disease are reported from 15 high-incidence jurisdictions (those reporting at least 10 confirmed cases per 100,000 population for 3 years) located in the Northeast, mid-Atlantic, and upper-Midwest regions* (*3*). Laboratory diagnosis

relies almost exclusively on serologic testing for antibodies to *B. burgdorferi* using a two-tier process (*1*).

Before 2022, national surveillance for Lyme disease required the collection of clinical information, most often coupled with laboratory evidence of infection, to classify cases. As the number of Lyme disease infections has increased, the workload associated with collecting clinical information has proven prohibitive in several high-incidence jurisdictions, leading to the adoption of modified, jurisdiction-specific surveillance practices, including in New York and Massachusetts (*2, 4–6*). These divergent approaches often precluded the reporting of cases to CDC and prevented accurate comparison of trends across jurisdictions and over time (*3,7*).

To address this challenge, effective January 1, 2022, the Council of State and Territorial Epidemiologists (CSTE), in partnership with CDC, revised the national surveillance case definition for Lyme disease.[†] The revised case definition provides for reporting of cases from high-incidence jurisdictions based on laboratory evidence alone, without the need to collect additional clinical information. Cases reported from low-incidence

† https://ndc.services.cdc.gov/conditions/lyme-disease/

Continuing Education examination available at https://www.cdc.gov/mmwr/mmwr_continuingEducation.html

* As of 2022, high-incidence jurisdictions are Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin.

jurisdictions still require supporting clinical information, although probable case classification criteria have been updated to only include those patients with objective signs of infection. This report summarizes the first year of Lyme disease surveillance data collected using the 2022 case definition and compares these data to cases reported during 2017–2019.

Methods

Lyme disease cases are classified by state and local health departments according to CSTE surveillance case definitions and reported to CDC through the Nationally Notifiable Diseases Surveillance System.[§] Because of reporting anomalies related to the COVID-19 pandemic (2020–2021) (*8*), cases reported in 2022 were compared with those reported during 2017–2019. 2020 U.S. Census Bureau data were used as population denominators for incidence calculations.[¶] Several reporting dates were used to compare trends in seasonality. For the years 2017–2019, illness onset date was used, whereas for 2022, illness onset date, diagnosis date, laboratory test date, and date of laboratory report to health department were used. Data were analyzed using SAS software (version 9.4; SAS Institute). This activity was

[§] https://www.cdc.gov/nndss/index.html
[¶] https://data.census.gov/table?q=Age+and+Sex&t=Populations+and+People&g=010XX00US&d=DEC+Demographic+and+Housing+Characteristics&tid=DECENNIALDHC2020.P12; https://data.census.gov/table?g=010XX00US$0400000&tid=PEPPOP2019.PEPANNRES

reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[**]

Results

Overall: 2022 Versus 2017–2019

After implementation of a revised Lyme disease case definition, a total of 62,551 Lyme disease cases were reported to CDC in 2022 (including 59,734 from high-incidence jurisdictions and 2,817 from low-incidence jurisdictions).[††] This finding represented an overall 68.5% increase from the annual average of 37,118 cases reported during 2017–2019, including a 72.9% increase in high-incidence jurisdictions and a 10.0% increase in low-incidence jurisdictions (Table). During 2022, 95.5% of reported cases were reported from high-incidence jurisdictions, compared with an average of 93.1% during 2017–2019. Lyme disease incidence in 2022 (18.9 cases per 100,000 population) was 68.8% higher than that during 2017–2019 (11.2). In 2022, median incidence among high-incidence jurisdictions (68.3 cases per 100,000) was 58% higher than that during 2017–2019 (43.3), although median incidence among low-incidence jurisdictions (0.52 cases per 100,000) was 24% lower than during 2017–2019 (0.68).

[**] 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.
[††] 2022 data from the National Notifiable Diseases Surveillance System. Interim data as of February 13, 2023, before finalization and publication by CDC's Office of Public Health Data, Surveillance, and Technology.

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TABLE. Number of reported Lyme disease cases and Lyme disease incidence, by jurisdiction and incidence category* — United States, 2017–2019 and 2022

	No. of reported cases[†]			Incidence[§]		
Jurisdiction	2017–2019[¶]	2022	Percent change**	2017–2019[¶]	2022	Incidence difference[††]
High-incidence jurisdictions*						
Connecticut	1,714	2,022	18.0	47.5	56.1	8.5
Delaware	590	298	−49.5	59.6	30.1	−29.5
District of Columbia	88	77	−12.5	12.7	11.2	−1.5
Maine	1,807	2,653	46.8	132.7	194.7	62.1
Maryland	1,563	2,035	30.2	25.3	32.9	7.6
Massachusetts	144	5,052	3,408.3	2.1	71.9	69.8
Minnesota	1,796	2,685	49.5	31.5	47.1	15.6
New Hampshire	1,506	1,085	−28.0	109.4	78.8	−30.6
New Jersey	4,237	5,897	39.2	45.6	63.5	17.9
New York	4,345	16,798	286.6	21.5	83.2	61.6
Pennsylvania	10,369	8,413	−18.9	79.7	64.7	−15.0
Rhode Island	1,071	2,326	117.2	97.6	212.0	114.3
Vermont	911	1,312	44.0	141.6	204.0	62.4
Virginia	1,332	1,403	5.3	15.4	16.3	0.8
West Virginia	735	2,470	236.1	41.0	137.7	96.7
Wisconsin	2,349	5,208	121.7	39.9	88.4	48.5
Subtotal	**34,557**	**59,734**	**72.9**	**43.3**	**68.3**	**25.0**
Low-incidence jurisdictions*						
Alabama	48	32	−33.3	1.0	0.6	−0.3
Alaska	8	7	−12.5	1.1	1.0	−0.1
Arizona	15	9	−40.0	0.2	0.1	−0.1
Arkansas	9	2	−77.8	0.3	0.1	−0.2
California	131	77	−41.2	0.3	0.2	−0.1
Colorado	5	10	100.0	0.1	0.2	0.1
Florida	180	233	29.4	0.8	1.1	0.2
Georgia	15	31	106.7	0.1	0.3	0.2
Hawaii	NR	NR	—	NR	NR	—
Idaho	14	10	−28.6	0.8	0.5	−0.2
Illinois	315	259	−17.8	2.5	2.0	−0.4
Indiana	162	236	45.7	2.4	3.5	1.0
Iowa	280	154	−45.0	8.8	4.8	−4.0
Kansas	35	9	−74.3	1.2	0.3	−0.9
Kentucky	21	72	242.9	0.5	1.6	1.1
Louisiana	8	5	−37.5	0.2	0.1	−0.1
Michigan	322	557	73.0	3.2	5.5	2.3
Mississippi	3	3	0	0.1	0.1	0
Missouri	13	7	−46.2	0.2	0.1	−0.1
Montana	9	13	44.4	0.8	1.2	0.4
Nebraska	13	9	−30.8	0.7	0.5	−0.2
Nevada	16	10	−37.5	0.5	0.3	−0.2
New Mexico	4	3	−25.0	0.2	0.1	−0.1
North Carolina	280	279	−0.4	2.7	2.7	0
North Dakota	42	22	−47.6	5.4	2.8	−2.6
Ohio	343	553	61.2	2.9	4.7	1.8
Oklahoma	0	0	0	0	0	0
Oregon	73	61	−16.4	1.7	1.4	−0.3
South Carolina	36	44	22.2	0.7	0.9	0.2
South Dakota	10	12	20.0	1.1	1.4	0.3
Tennessee	40	32	−20.0	0.6	0.5	−0.1
Texas	49	23	−53.1	0.2	0.1	−0.1
Utah	24	16	−33.3	0.7	0.5	−0.2
Washington	33	23	−30.3	0.4	0.3	−0.1
Wyoming	3	4	33.3	0.5	0.7	0.2
Subtotal	**2,561**	**2,817**	**10.0**	**0.7**	**0.5**	**−0.2**
U.S. total	**37,118[§§]**	**62,551**	**68.5**	**11.2**	**18.9**	**7.7**

See table footnotes on the next page.

TABLE. (*Continued*) Number of reported Lyme disease cases and Lyme disease incidence, by jurisdiction and incidence category* — United States, 2017–2019 and 2022

Abbreviation: NR = not reportable.

* High-incidence jurisdictions are defined as jurisdictions reporting 10 or more confirmed cases per 100,000 population for 3 years. All other jurisdictions are low incidence.

† Lyme disease surveillance case definitions are available at https://ndc.services.cdc.gov/conditions/lyme-disease/. Case counts reflect the total number of cases (confirmed and probable).

§ Incidence is defined as the number of cases per 100,000 population according to 2020 U.S. Census Bureau data. Subtotal incidence figures reflect median incidence across jurisdictions in each incidence category.

¶ Cases and incidence during 2017–2019 reflect the 3-year annual average.

** Percent change in the number of cases reported during 2022 versus 2017–2019.

†† Incidence difference = (incidence in 2022 – 3-year average incidence during 2017–2019).

§§ Because of rounding of the average number of cases per jurisdiction, the total in the individual jurisdiction rows does not sum to the national 2017–2019 average.

Sex and Age

Males accounted for the majority of cases during 2017–2019 (57.7%) and 2022 (57.3%). The age distribution was bimodal during both periods, but a larger percentage of reported cases occurred among adults in 2022 than did during 2017–2019 (Figure 1). Among persons aged 5–9 years, incidence during 2022 (16.5 cases per 100,000) was 11.5% higher than the 2017–2019 average (14.8). Among adults aged 75–79 years, incidence during 2022 (38.3) was 2.2 times the average during 2017–2019 (17.3) (Figure 1).

Illness Onset and Other Available Dates

Illness onset date was available for more than two thirds (67.8% [75,491 of 111,354]) of cases reported during 2017–2019, but only 4.8% (2,987 of 62,551) of cases in 2022. Illness onset peaked during calendar week 26 during both 2017–2019 and 2022; however, in 2022, the diagnosis, laboratory test, and reporting dates peaked 2 weeks later (week 28) (Figure 2).

Discussion

After implementation of a revised surveillance case definition in 2022, the number of reported Lyme disease cases in the United States increased 68.5% over the average reported during 2017–2019; in high-incidence jurisdictions, the number of cases increased 72.9%, whereas in low-incidence jurisdictions, the number of cases increased 10.0%. This change reflects a large increase in the number of cases reported from high-incidence jurisdictions on the basis of laboratory evidence alone. Before 2022, many of these cases would have been excluded, either because health departments were unable to obtain the necessary clinical information or because available clinical data were inconsistent with the objective criteria specified in the case definition. The increases in incidence in 2022 compared with 2017–2019 are particularly large among high-incidence jurisdictions that had previously modified Lyme disease surveillance practice to minimize the case investigation workload. The total number of cases in many low-incidence jurisdictions decreased, presumably because of changes in the 2022 case definition requiring objective signs and symptoms

of Lyme disease for the probable case classification in these areas with lower disease risk.

The relative increase in Lyme disease incidence in 2022 was larger among older age groups, with age-specific incidences more than doubling among adults aged ≥65 years relative to those during 2017–2019. The differential increase in incidence might reflect 1) more frequent laboratory testing among older age groups, 2) proportionally more disseminated illness in older age groups, and 3) proportionally more positive laboratory test results related to previous exposure to *B. burgdorferi* rather than a current illness.

Date of illness onset is rarely available in high-incidence jurisdictions given reliance on laboratory-based reporting without case investigation to ascertain clinical information. Alternative dates related to laboratory testing or reporting still demonstrate summer seasonality, but are shifted 2 weeks later, reflecting the expected time lag required after symptom onset to mount a detectable immune response to *B. burgdorferi* (1).

Limitations

The findings in this report are subject to at least two limitations. First, surveillance for Lyme disease is subject to under- and overreporting. Despite an increase in reported cases in 2022, it is likely that current surveillance does not capture all cases of Lyme disease, specifically cases of early disease for which diagnosis is based on clinical findings alone, including presence of erythema migrans rash, and laboratory evidence is lacking because of insufficient elapsed time to mount a detectable antibody response. Previous case definitions relied on direct clinician report to identify such cases; however, the frequency of such reporting was highly variable among high-incidence jurisdictions (6). Conversely, reporting based solely on serologic testing might result in the inclusion of clinically incompatible or nonincident cases (i.e., a positive laboratory test result based on previous infection). Antibody titers remain elevated for months to years after treatment for Lyme disease, and asymptomatic seroconversion is also known to occur (1). In these instances, testing for Lyme disease when another etiology is responsible for the current illness might generate an

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FIGURE 1. Reported Lyme disease incidence (A) and the ratio of the 2022 incidence to the average 2017–2019 incidence (B), by sex and 5-year age group — United States, 2017–2019 and 2022
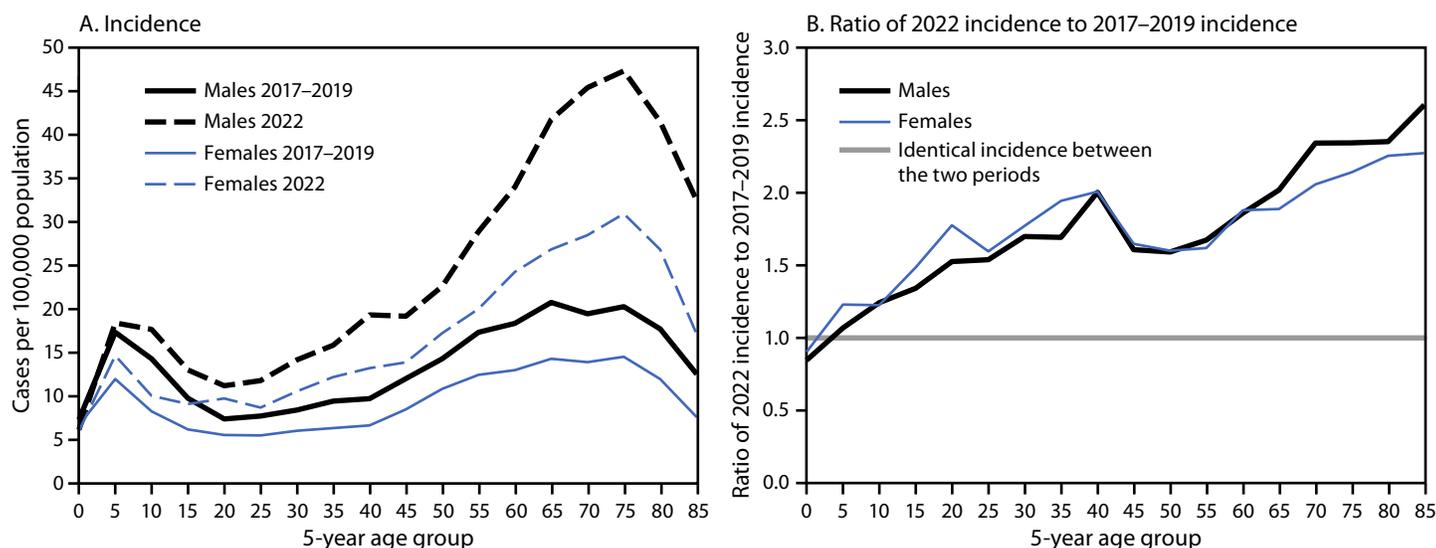
FIGURE 2. Week of illness onset or laboratory test and reporting date for reported Lyme disease cases* — United States, 2017–2019 and 2022
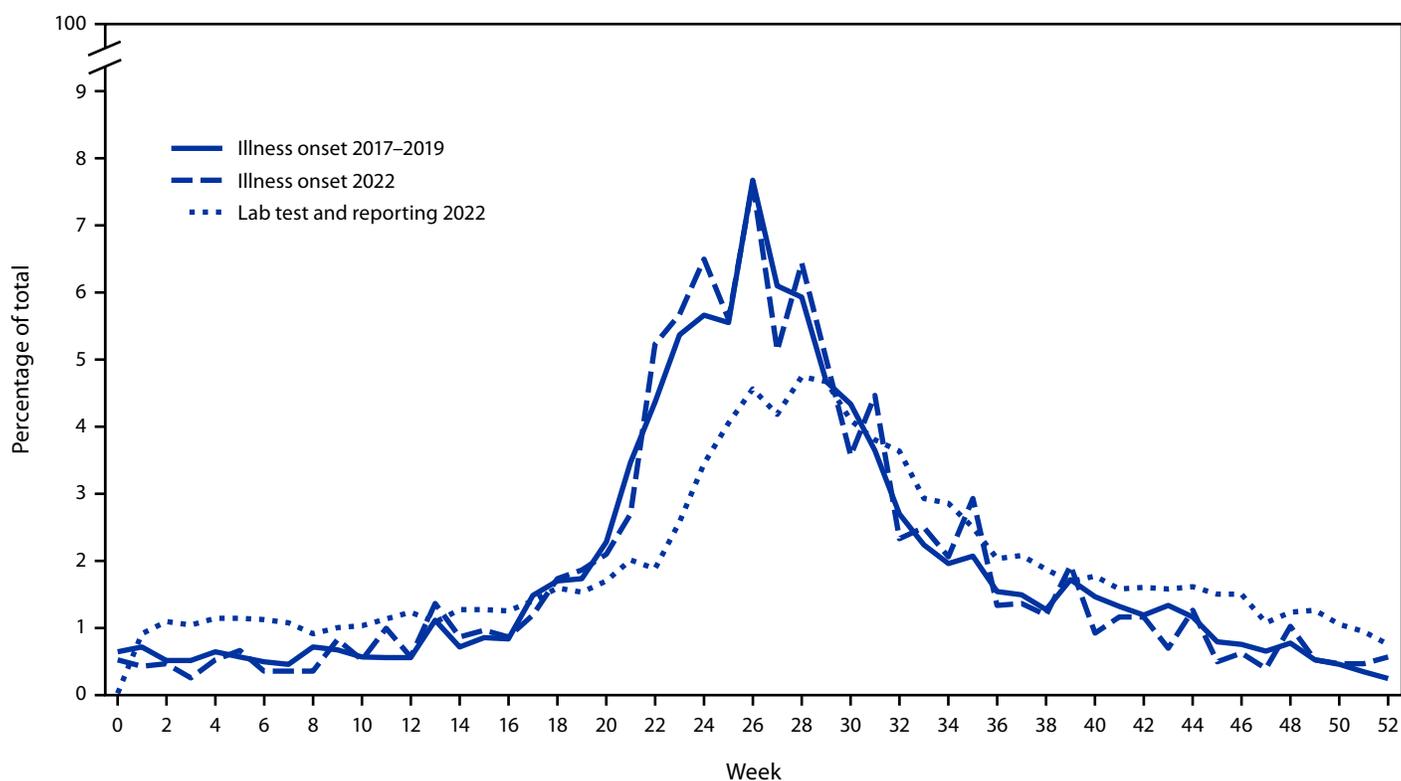
* Week 1 begins on the first Sunday of the calendar year.

erroneous case report. Second, changes in laboratory testing between the two analysis periods might have influenced Lyme disease incidence. The Food and Drug Administration cleared the first modified two-tier test (MTTT) serologic assays for

Lyme disease in 2019[§§] (*9*). These assays have higher sensitivity in early illness than do standard algorithms and might have

[§§] https://www.aphl.org/aboutAPHL/publications/Documents/ID-2021-Lyme-Disease-Serologic-Testing-Reporting.pdf

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Summary

What is already known about this topic?

Lyme disease is the most common vectorborne disease in the United States, but risk is geographically focal. After the implementation of a revised surveillance case definition in 2022, high-incidence jurisdictions report cases based on laboratory evidence alone, without the need for case investigation to obtain clinical information.

What is added by this report?

In 2022, reported case counts were 1.7 times the annual U.S. average during 2017–2019. The relative change in incidence in 2022 increased with patient age.

What are the implications for public health practice?

Increase in Lyme disease cases in 2022 likely reflects changes in surveillance methods rather than change in disease risk. The case definition change improves standardization of surveillance across jurisdictions but precludes detailed comparison with historical data.

resulted in more persons with positive laboratory evidence of infection (*10*). In contrast, health departments anecdotally reported challenges in receiving or identifying MTTT assays within their systems because of lack of MTTT-specific Logical Observation and Identifiers Names and Codes (LOINC), which might have resulted in underascertainment of persons with positive laboratory evidence in 2022.

Implications for Public Health Practice

The 69% increase in reported cases of Lyme disease after implementation of the 2022 surveillance case definition, with the largest relative increase occurring among older adults, likely reflects modification of surveillance methods in high-incidence jurisdictions rather than a true change in disease risk. Surveillance in low-incidence jurisdictions still necessitates clinical investigation to ascertain probability of locally acquired infection to accurately guide clinical and public education. The revised approach to surveillance will improve standardization of surveillance data across high-incidence jurisdictions but precludes robust comparison of trends with data collected using earlier case definitions. Specific LOINC codes were created and approved in early 2023.¶¶ Use of standardized codes by commercial and clinical laboratories is critical to ensuring consistent identification of persons with laboratory evidence of Lyme disease for surveillance purposes. Although the total number of reported cases is higher than in previous years, it still does not approach the estimated 476,000 Lyme disease diagnoses estimated to occur annually in the United States (*2*), a frequency that highlights the need for effective prevention methods.

¶¶ https://loinc.org/

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Routes of Drug Use Among Drug Overdose Deaths — United States, 2020–2022

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Abstract

Preliminary reports indicate that more than 109,000 drug overdose deaths occurred in the United States in 2022; nearly 70% of these involved synthetic opioids other than methadone, primarily illegally manufactured fentanyl and fentanyl analogs (IMFs). Data from the western United States suggested a transition from injecting heroin to smoking IMFs. CDC analyzed data from the State Unintentional Drug Overdose Reporting System to describe trends in routes of drug use in 27 states and the District of Columbia among overdose deaths that occurred during January 2020–December 2022, overall and by region and drugs detected. From January–June 2020 to July–December 2022, the percentage of overdose deaths with evidence of injection decreased 29.1%, from 22.7% to 16.1%, whereas the percentage with evidence of smoking increased 73.7%, from 13.3% to 23.1%. The number of deaths with evidence of smoking increased 109.1%, from 2,794 to 5,843, and by 2022, smoking was the most commonly documented route of use in overdose deaths. Trends were similar in all U.S. regions. Among deaths with only IMFs detected, the percentage with evidence of injection decreased 41.6%, from 20.9% during January–June 2020 to 12.2% during July–December 2022, whereas the percentage with evidence of smoking increased 78.9%, from 10.9% to 19.5%. Similar trends were observed among deaths with both IMFs and stimulants detected. Strengthening public health and harm reduction services to address overdose risk related to diverse routes of drug use, including smoking and other noninjection routes, might reduce drug overdose deaths.

Introduction

Preliminary data indicate that U.S. drug overdose deaths surpassed 109,000 in 2022; nearly 70% of these deaths involved synthetic opioids other than methadone, primarily illegally manufactured fentanyl and fentanyl analogs (IMFs).* In recent years, deaths co-involving IMFs and stimulants have increased steadily (1). The estimated number of U.S. adults who inject drugs increased from approximately 774,000 in 2011 to nearly 3.7 million in 2018, corresponding to shifts from prescription opioid misuse to the use of heroin and IMFs (2). More recent data suggest transitions from injecting heroin

to smoking IMFs; however, limited data exist on recent changes in routes of drug use for all drugs, and for IMFs beyond the western United States† (3,4). Routes of drug use have implications for overdose risk, infectious disease transmission, other comorbidities, and harm reduction services (5).

Methods

Jurisdictions entered data from death certificates, postmortem toxicology testing, and medical examiner or coroner reports on unintentional and undetermined intent drug overdose deaths into CDC's State Unintentional Drug Overdose Reporting System (SUDORS).§ Routes of drug use were identified using information from scene investigations, witness reports, or autopsy data and were categorized into nonmutually exclusive categories of ingestion,¶ injection,** smoking,†† and snorting§§; other routes (e.g., transdermal) are not presented because sample sizes were small. Among 28 jurisdictions¶¶ with complete data,*** numbers and percentages of overdose

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* https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm (Accessed January 11, 2024).

† https://adai.uw.edu/wordpress/wp-content/uploads/dlm_uploads/FentanylQualitativeReport2023.pdf

§ https://www.cdc.gov/drugoverdose/fatal/sudors.html

¶ Evidence of ingestion included witness reports of taking pills or tablets orally or ingesting liquid orally (e.g., liquid methadone), or the discovery of prescription pills, prescription bottles, liquid substances, or vials for containing liquid substances at the scene of the overdose or on the decedent's body.

** Evidence of injection included witness reports of injecting drugs, items used to prepare and inject substances found at the scene (e.g., needles, cookers, filters, tourniquets, or alcohol pads), or track marks found on the decedent that appeared to be recent.

†† Evidence of smoking included witness reports of smoking drugs or drug paraphernalia at the overdose scene associated with smoking (e.g., pipes, stems, aluminum foil, vape pens, matches, disposable lighters, or gas torches). Fewer than 6.0% of deaths with evidence of smoking had vape pens or e-cigarettes endorsed as evidence; fewer than 3.0% had vape pens or e-cigarettes endorsed with no other evidence of smoking.

§§ Evidence of snorting included witness reports of snorting drugs, drug paraphernalia at the overdose scene associated with snorting (e.g., razor blades or credit cards used to chop and separate powder; straws, rolled paper, dollar bills, or tubes for nasal inhalation; or powder visible on a table or mirror), or powder on the decedent's nose.

¶¶ Alaska, Arizona, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Kansas, Kentucky, Maine, Maryland, Massachusetts, Minnesota, Nebraska, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Virginia, Washington, and West Virginia. Illinois and Washington reported deaths from counties that accounted for ≥75% of drug overdose deaths in the respective state in 2017, per SUDORS funding requirements; all other jurisdictions reported deaths from the full jurisdiction.

*** Jurisdictions were included if medical examiner or coroner reports and toxicology reports were available for ≥75% of deaths during January 2020–December 2022. Analyses were restricted to decedents with an available medical examiner or coroner report (139,740; 95.8% of all deaths).

deaths were calculated by route of drug use and by 6-month period during January 2020–December 2022, overall, and for each U.S. Census Bureau region.[†††] To understand how routes of drug use are related to drugs commonly involved in overdose deaths, percentages of overdose deaths with evidence of each route were calculated by 6-month period for mutually exclusive categories of drugs detected (IMFs[§§§] only, stimulants only, both IMFs and stimulants, and neither IMFs nor stimulants)[¶¶¶] (6). Analyses were performed using SAS software (version 9.4; SAS Institute). This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[****]

Results

Overall Trends

During January 2020–December 2022, a total of 139,740 overdose deaths occurred in 28 jurisdictions; deaths increased 20.2%, from 21,046 during January–June 2020 to 25,301 during July–December 2022. The percentage of deaths with IMFs detected increased 8.4% from 71.4% during January–June 2020 to 77.4% during July–December 2022. Evidence of at least one route of drug use was documented in 71,480 (51.2%) overdose deaths. From January–June 2020 to July–December 2022, the number and percentage of overdose deaths with evidence of smoking increased 109.1% (from 2,794 to 5,843) and 73.7% (from 13.3% to 23.1%), respectively (Figure 1). The number and percentage of deaths with evidence of snorting increased 43.1% (from 2,858 to 4,090) and 19.1% (from 13.6% to 16.2%), respectively. In contrast, the number and percentage of overdose deaths with evidence of injection decreased 14.6% (from 4,780 to 4,080) and 29.1% (from 22.7% to 16.1%), respectively, from January–June 2020 to July–December 2022. Although the number of deaths with evidence of ingestion increased 14.6%, from 3,189 to 3,656, the percentage of such deaths declined 4.6%, from 15.2% to 14.5%.

[†††] 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 eight of nine jurisdictions in the Northeast Region, five of 12 jurisdictions in the Midwest Region, nine of 17 jurisdictions in the South Region, and six of 13 jurisdictions in the West Region.

[§§§] Fentanyl was classified as likely illegally manufactured using toxicology, scene, and witness evidence. For the 8.1% of deaths involving fentanyl that had insufficient evidence for classification as illegal or prescription, fentanyl was classified as illegal because the majority of fentanyl overdose deaths involve illegal fentanyl. All fentanyl analogs except alfentanil, remifentanil, and sufentanil, which have legitimate human medical use, were included as IMFs.

[¶¶¶] Analysis of drugs detected was restricted to decedents with an available toxicology report (136,466; 97.7% of deaths with a medical examiner or coroner report).

[****] 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.

The leading route of use in drug overdose deaths changed from injection during January–June 2020 (22.7% of deaths) compared with ingestion (15.2%), snorting (13.6%), and smoking (13.3%) to smoking during July–December 2022 (23.1% of deaths) compared with snorting (16.2%), injection (16.1%), and ingestion (14.5%). During July–December 2022, most deaths with evidence of smoking (79.7%), snorting (84.5%), or ingestion (86.5%) had no evidence of injection; among deaths with information on route of use, 81.9% had evidence of a noninjection route.

Regional Trends

Regional trends were largely consistent with overall trends. The percentage of overdose deaths with evidence of smoking increased in all U.S. Census Bureau regions (Northeast: 91.0% increase, from 8.9% to 17.0%; Midwest: 75.0%, from 12.4% to 21.7%; South: 48.0%, from 12.5% to 18.5%; and West: 68.9%, from 25.1% to 42.4%) (Figure 2). The percentage of deaths with evidence of snorting increased in three regions (Northeast: 28.2%, from 11.7% to 15.0%; Midwest: 23.0%, from 13.9% to 17.1%; and South: 12.4%, from 14.5% to 16.3%). The percentage with evidence of injection decreased in all regions (Northeast: –21.2%, from 21.2% to 16.7%; Midwest: –36.2%, from 21.8% to 13.9%; South: –27.8%, from 25.9% to 18.7%; and West: –34.3%, from 19.8% to 13.0%). By July–December 2022, smoking was the most commonly identified route of use in overdose deaths in the Midwest (21.7%) and West (42.4%); injection and smoking were most common in the Northeast (16.7% and 17.0%, respectively) and South (18.7% and 18.5%, respectively).

Trends by Drugs Detected

Among overdose deaths with only IMFs detected (13,107; 9.6%), deaths with both IMFs and stimulants detected (58,754; 43.1%), and deaths with only stimulants detected (8,525; 6.2%), the percentage with evidence of smoking increased, and the percentage with evidence of injection decreased from January–June 2020 to July–December 2022 (Figure 3). For IMFs only, the percentage of overdose deaths with evidence of smoking increased 78.9%, from 10.9% to 19.5%, whereas the percentage with evidence of injection decreased 41.6%, from 20.9% to 12.2%. Among deaths with both IMFs and stimulants detected, the percentage with evidence of smoking increased 65.4%, from 17.9% to 29.6%, whereas the percentage with evidence of injection decreased 25.5%, from 28.6% to 21.3%. A similar pattern was observed among deaths with only stimulants detected (smoking: 29.7% increase, from 15.5% to 20.1%; injection: 22.5% decrease, from 10.2% to 7.9%). Among deaths with neither IMFs nor stimulants detected (10,628; 7.8%), the percentage with
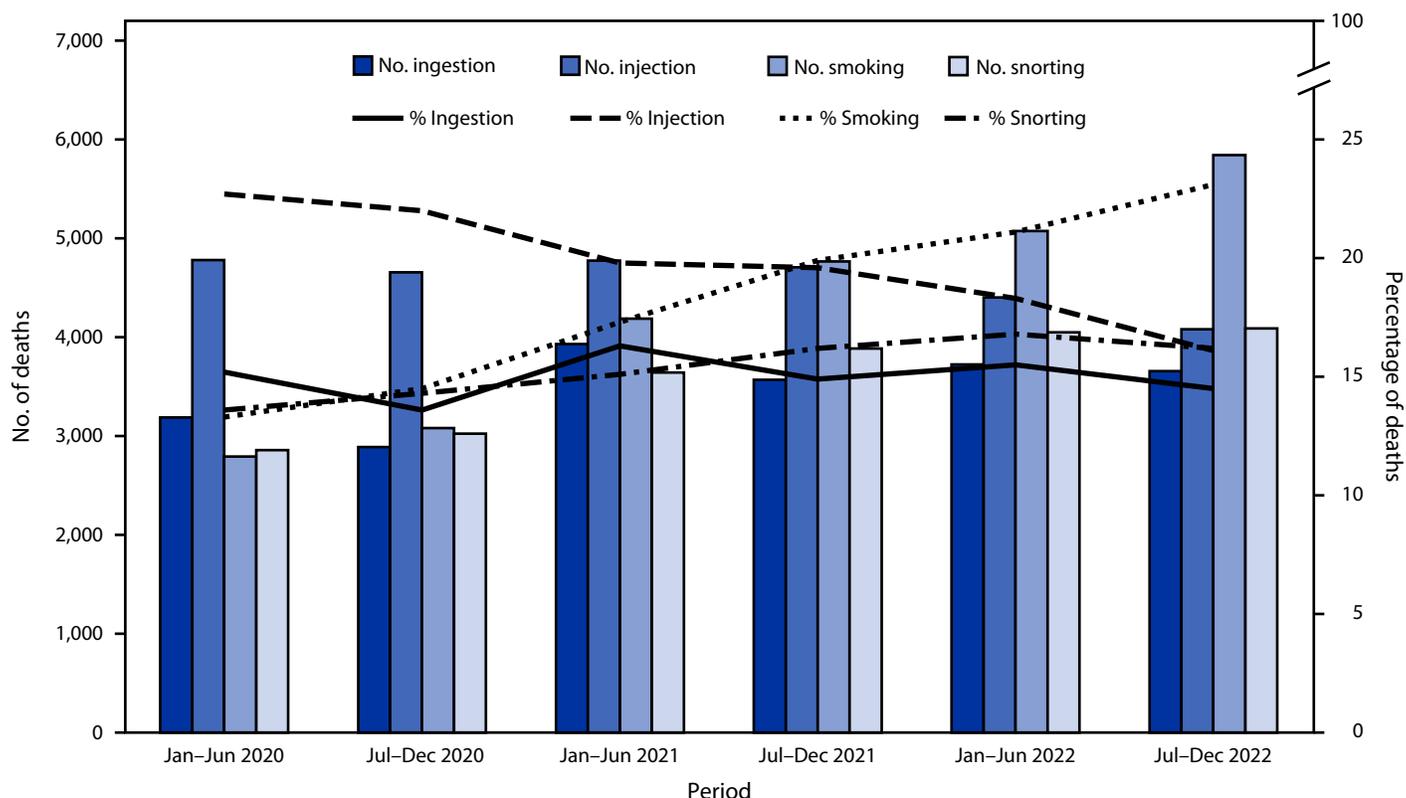
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FIGURE 1. Number and percentage of drug overdose deaths with evidence of selected routes of drug use,*,† by 6-month period of death (N = 139,740) — State Unintentional Drug Overdose Reporting System, 28 jurisdictions,§,¶ January 2020–December 2022

Abbreviation: SUDORS = State Unintentional Drug Overdose Reporting System.
* Percentages with evidence of other routes (i.e., buccal, sublingual, suppository, or transdermal) (583; 0.4%) are not presented because of small sample sizes; decedents with drug use via these routes are included in the denominators. In addition, percentages of decedents with no information on route (68,260; 48.8%) are not shown; these decedents are also included in the denominators.
† Routes of drug use are not mutually exclusive; decedents might have used multiple routes.
§ Alaska, Arizona, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Kansas, Kentucky, Maine, Maryland, Massachusetts, Minnesota, Nebraska, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Virginia, Washington, and West Virginia. Illinois and Washington reported deaths from counties that accounted for ≥75% of drug overdose deaths in the respective state in 2017, per SUDORS funding requirements; all other jurisdictions reported deaths from the full jurisdiction.
¶ Jurisdictions were included if medical examiner or coroner reports and toxicology reports were available for ≥75% of deaths during January 2020–December 2022. Analysis was restricted to deaths with an available medical examiner or coroner report (139,740; 95.8% of all deaths).

evidence of smoking did not change, and the percentage with evidence of injection decreased 42.2% (11.6% to 6.7%); ingestion was the most common route during July–December 2022 (39.4% of deaths) and throughout the study period.

Discussion

The percentage of drug overdose deaths with evidence of smoking increased sharply in all U.S. regions from 2020 to 2022, indicating the importance of an updated response. By late 2022, among decedents with information on route of drug use, more than three fourths had evidence of a noninjection route, highlighting the diversification of methods through which they used drugs.

From January–June 2020 to July–December 2022, the number of overdose deaths with evidence of smoking doubled, and the percentage of deaths with evidence of smoking increased across all geographic regions. By late 2022, smoking was the predominant route of use among drug overdose deaths overall and in the Midwest and West regions. Increases were most pronounced when IMFs were detected, with or without stimulants. Increases in the number and percentage of deaths with evidence of smoking, and the corresponding decrease in those with evidence of injection, might be partially driven by 1) the transition from injecting heroin to smoking IMFs (3,4), 2) increases in deaths co-involving IMFs and stimulants that might be smoked†††† (1), and 3) increases in the use of

†††† https://adai.uw.edu/wordpress/wp-content/uploads/SaferSmokingBrief_2022.pdf

FIGURE 2. Percentage of drug overdose deaths with evidence of selected routes of drug use,* by U.S. Census Bureau region[†] and 6-month period of death (N = 139,740) — State Unintentional Drug Overdose Reporting System, 28 jurisdictions,[§] January 2020–December 2022
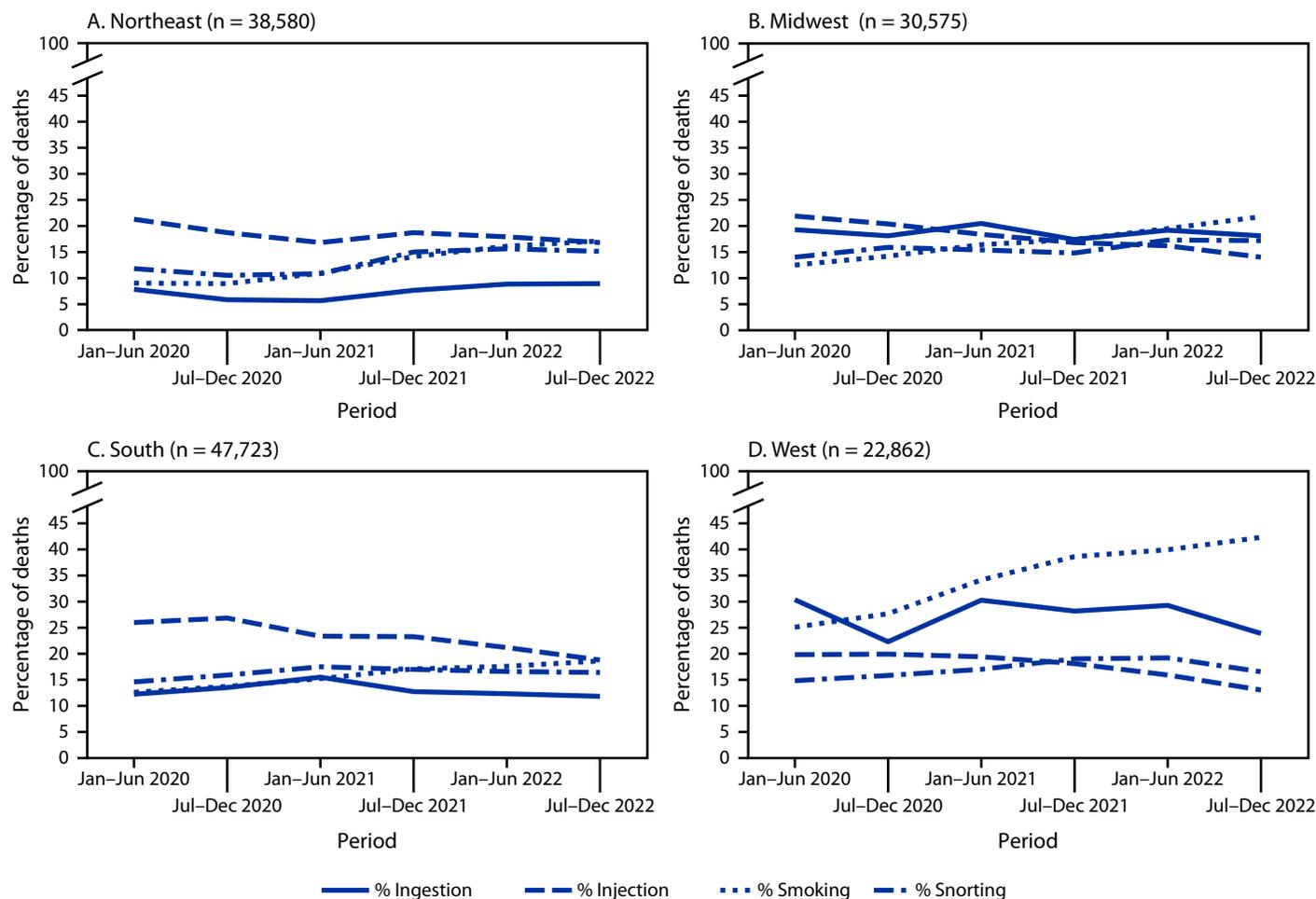
* Percentages with evidence of other routes (i.e., buccal, sublingual, suppository, or transdermal) are not presented because of small sample sizes (Panel A [Northeast]: 136, 0.4%; Panel B [Midwest]: 121, 0.4%; Panel C [South]: 223, 0.5%; and Panel D [West]: 103, 0.5%); decedents with drug use via these routes are included in the denominators. In addition, percentages of decedents with no information on route are not shown (Panel A: 22,541, 58.4%; Panel B: 15,381, 50.3%; Panel C: 22,571, 47.3%; and Panel D: 7,767, 34.0%); these decedents are also included in the denominators.
† Analysis included some, but not all, of the jurisdictions in each U.S. Census Bureau region. *Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Kansas, Minnesota, Nebraska, and Ohio; *South:* Delaware, District of Columbia, Georgia, Kentucky, Maryland, North Carolina, Oklahoma, Virginia, and West Virginia; *West:* Alaska, Arizona, Colorado, Oregon, Utah, and Washington.
§ Jurisdictions were included if medical examiner or coroner reports and toxicology reports were available for ≥75% of deaths during January 2020–December 2022. Analysis was restricted to deaths with an available medical examiner or coroner report (139,740; 95.8% of all deaths).

counterfeit pills, which frequently contain IMFs and are often smoked (*7*). Motivations for transitioning from injection to smoking include fewer adverse health effects (e.g., fewer abscesses), reduced cost and stigma, sense of more control over drug quantity consumed per use (e.g., smoking small amounts during a period versus a single injection bolus), and a perception of reduced overdose risk among persons who use drugs (*3,5,8*). These motivations might also signify lower barriers for initiating drug use by smoking, or for transitioning from ingestion to smoking; compared with ingestion, smoking can

intensify drug effects and increase overdose risk (*9*). Despite some risk reduction associated with smoking compared with injection (e.g., fewer bloodborne infections), smoking carries substantial overdose risk because of rapid drug absorption (*5,9*).

Nearly 80% of overdose deaths with evidence of smoking had no evidence of injection; persons who use drugs by smoking but do not inject drugs might not use traditional syringe services programs where harm reduction messaging and supplies are often provided. In response, some jurisdictions have adapted harm reduction services to provide safer smoking supplies or

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FIGURE 3. Percentage of drug overdose deaths with evidence of selected routes of drug use,* by drugs detected[†,§,¶,**,††] and 6-month period of death — State Unintentional Drug Overdose Reporting System, 28 jurisdictions,[§§] January 2020–December 2022
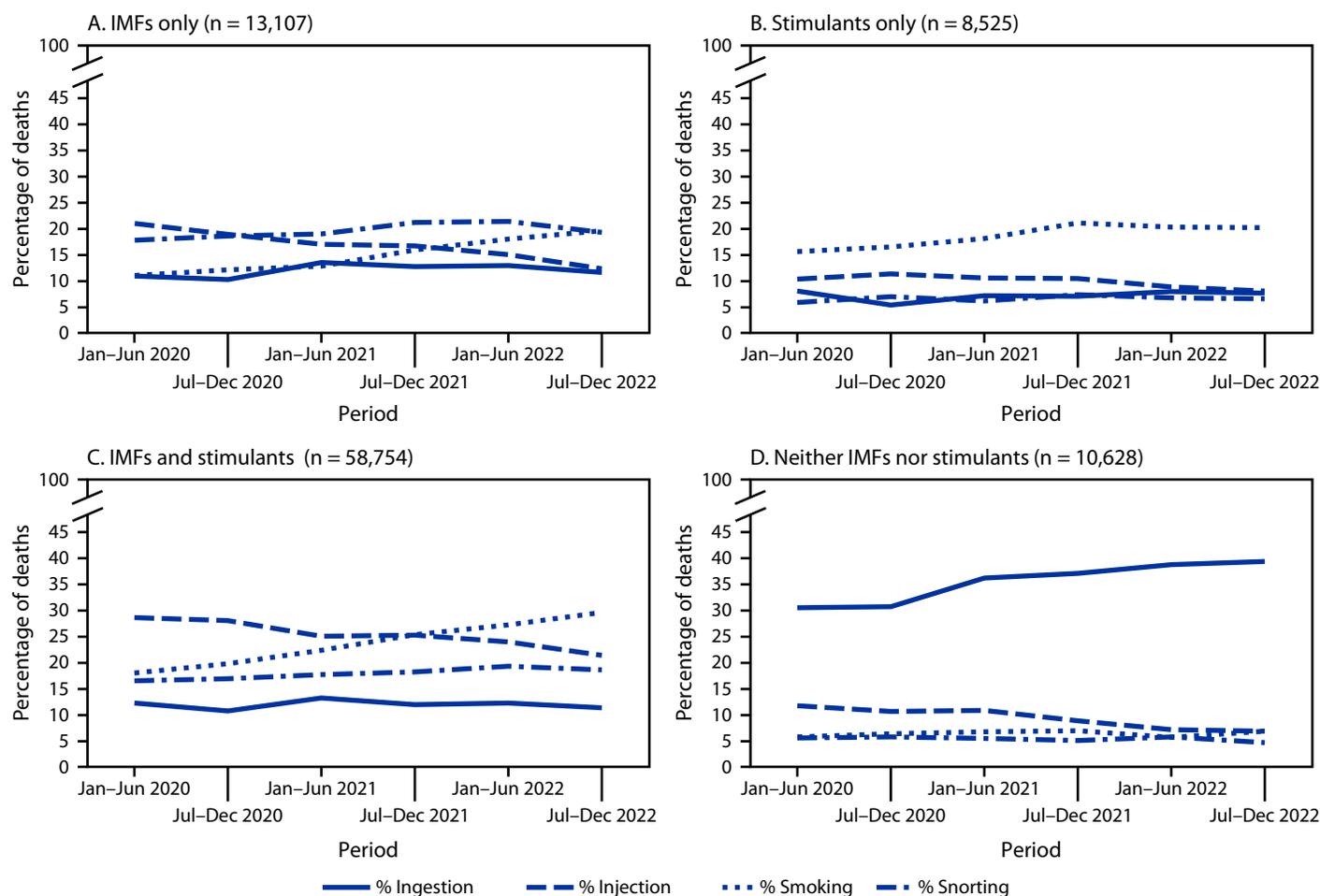
Abbreviations: IMFs = illegally manufactured fentanyls; SUDORS = State Unintentional Drug Overdose Reporting System.
* * Percentages with evidence of other routes (i.e., buccal, sublingual, suppository, or transdermal) are not presented because of small sample sizes (Panel A [IMFs only]: 23, 0.2%; Panel B [Stimulants only]: 11, 0.1%; Panel C [IMFs and stimulants]: 146, 0.2%; and Panel D [Neither IMFs nor stimulants]: 158, 1.5%); decedents with drug use via these routes are included in the denominators. In addition, percentages of decedents with no information on route are not shown (Panel A: 6,802, 51.9%; Panel B: 5,652, 66.3%; Panel C: 25,597, 43.6%; and Panel D: 5,435, 51.1%); these decedents are also included in the denominators.
* † Data on drugs detected come from postmortem toxicology reports; among decedents with a medical examiner or coroner report, analysis was further restricted to decedents with a toxicology report (136,466; 97.7% of decedents with a medical examiner or coroner report).
* § Ethanol and other selected drugs (e.g., naloxone and cotinine) were not considered a drug for this analysis; deaths categorized as IMFs only (Panel A) or stimulant only (Panel B) might have also had ethanol or these other selected drugs detected.
* ¶ Deaths with IMFs and stimulants detected (Panel C) could also have other drugs detected (e.g., prescription opioids).
* ** Deaths with neither IMFs nor stimulants detected primarily had prescription opioids (65.3%) or benzodiazepines (37.3%) detected.
* †† Drug categories are not comprehensive; some deaths are excluded because they contain drug combinations that are not presented in the panels (e.g., deaths with only IMFs and prescription opioids detected).
* §§ Alaska, Arizona, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Kansas, Kentucky, Maine, Maryland, Massachusetts, Minnesota, Nebraska, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah, Vermont, Virginia, Washington, and West Virginia. Illinois and Washington reported deaths from counties that accounted for ≥75% of drug overdose deaths in the respective state in 2017, per SUDORS funding requirements; all other jurisdictions reported deaths from the full jurisdiction.

established health hubs to expand reach to persons using drugs through noninjection routes.[§§§§] In addition, harm reduction

services (e.g., peer outreach and provision of fentanyl test strips for testing drug products and naloxone to reverse opioid overdoses), messaging specific to smoking drugs, and linkage to treatment for substance use disorders can be integrated into other health care delivery (e.g., emergency departments) and public safety (e.g., drug diversion) settings.

The percentage and number of deaths with evidence of injection decreased across regions and drug categories. Observed decreases might reflect transitions to noninjection routes and response to public health efforts to reduce injection drug use because of its risk for overdose and infectious disease transmission (*3,4,10*). Despite these declines, more than 4,000 drug overdose deaths had evidence of injection during July–December 2022. Syringe services programs help to engage persons who use drugs in services (*10*); sustained efforts to provide sterile injection supplies, additional harm reduction tools, and linkage to treatment for substance use disorders, including medications for opioid use disorder, are important for further reduction in the number of overdose deaths from injection drug use. Lessons learned from implementing syringe services programs could be applied to other harm reduction and outreach models to reach more persons who use drugs by any route.

Limitations

The findings in this report are subject to at least four limitations. First, analyses included 28 jurisdictions; results might not be generalizable to the rest of the United States. Second, for nearly one half of deaths, no information about route of drug use was available; thus, percentages of deaths with evidence of each route are underestimated. However, no notable differences by time or demographic characteristics among deaths with and without route of drug use information were identified. Third, percentages of noninjection routes are likely underestimated more than those with injection because evidence of injection is easier to identify (e.g., syringes) than evidence of other routes (e.g., stems and straws can be evidence of snorting or smoking). Finally, routes could not be linked to the use of a specific drug unless only one drug class was detected. Analyses of single drug classes detected (IMFs only and stimulants only) were presented to better link routes to drugs.

Implications for Public Health Practice

Routes of drug use have implications for overdose risk, infectious disease transmission, and harm reduction services (*5*). Although unsafe injection drug use practices might be most risky in terms of infectious disease transmission, other routes, particularly smoking, still carry substantial overdose risk (*9*). Sharp increases in deaths with evidence of smoking and continued prevalence of other routes of drug use highlight the importance of 1) expanded messaging emphasizing overdose risk associated with smoking and other routes; 2) continued and expanded support for syringe services programs to provide comprehensive, integrated health services; and 3) enhanced outreach and harm reduction services (e.g., peer outreach and provision of fentanyl test strips and naloxone) across multiple

Summary

What is already known about this topic?

More than 109,000 drug overdose deaths occurred in the United States in 2022; nearly 70% involved illegally manufactured fentanyls (IMFs). Data from the western United States suggested a transition from injecting heroin to smoking IMFs.

What is added by this report?

From January–June 2020 to July–December 2022, the percentage of overdose deaths with evidence of smoking increased 73.7%, and the percentage with evidence of injection decreased 29.1%; similar changes were observed in all U.S. regions. Changes were most pronounced in deaths with IMFs detected, with or without stimulant detection.

What are the implications for public health practice?

Strengthening and expanding public health and harm reduction services to address overdose risk with smoking and other noninjection routes might reduce deaths.

settings for persons using drugs by smoking and other routes. These strategies might increase access to lifesaving services for persons who use drugs through all routes.

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Hepatitis A Exposure Response and Outbreak Prevention in a Large Urban Jail — Los Angeles County, California, May–July 2023

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Abstract

Correctional settings provide a high-risk environment for hepatitis A transmission because of the high proportion of homelessness and injection drug use among persons who are incarcerated. On May 30, 2023, Los Angeles County Department of Public Health informed the Communicable Disease Surveillance and Control (CDSC) unit of the Los Angeles County Jail system that a symptomatic incarcerated person had received a positive test result for acute hepatitis A. Upon learning the next day that the patient was a food handler, CDSC staff members identified 5,830 potential contacts of the index patient, 1,702 of whom had been released from the jail. During June 1–12, a total of 2,766 contacts who did not have a documented history of hepatitis A serology or vaccination that could be confirmed from the electronic health record or state immunization registry were identified. These persons were offered hepatitis A vaccination as postexposure prophylaxis; 1,510 (54.6%) accepted vaccination. Contacts who were food handlers without confirmed evidence of immunity and who declined vaccination were removed from food-handling duties for the duration of their potential incubation period. No additional cases were identified. Identifying contacts promptly and using immunization and serology records to ensure rapid delivery of postexposure prophylactic vaccine can help prevent hepatitis A transmission during exposures among incarcerated populations.

Investigation and Results

The Los Angeles County Jail system (LACJ), the largest in the United States, consists of six facilities. The average number of bookings per year is 53,000, and daily census is approximately 13,330 persons. Correctional Health Services (CHS), a department within the Los Angeles County Department of Health Services, provides health care for the incarcerated population.

Index Patient

On May 25, 2023, an incarcerated man aged 41 years housed in the Los Angeles County Men's Central Jail sought care at a clinic and reported vomiting for 2 days (Figure 1). The clinic documented that he received antiemetics and antacids and that he reported feeling better later that day. On May 28, he sought care at LACJ Urgent Care, reporting that he had not eaten in 4 days because of abdominal pain, nausea, and vomiting, and that he had jaundice. LACJ Urgent Care staff members noted jaundice of the skin and that the patient had been incarcerated on April 27, 2023, with self-reported homelessness, injection drug use, and alcohol use disorder on the intake history. He had been on a Clinical Institute Withdrawal Assessment protocol beginning April 28, 2023, and was transferred to Los Angeles General Medical Center (LAGMC) from LACJ Urgent Care on May 28 for emergency evaluation. He remained there until June 2. Liver enzymes were elevated, and antihepatitis A virus (HAV) immunoglobulin (Ig) M was reactive. A stool sample collected on May 28 was positive for hepatitis A by polymerase chain reaction on June 2. The patient had no documented history of hepatitis A immunity (vaccination or serology) in the existing electronic health records or in the statewide immunization registry.*
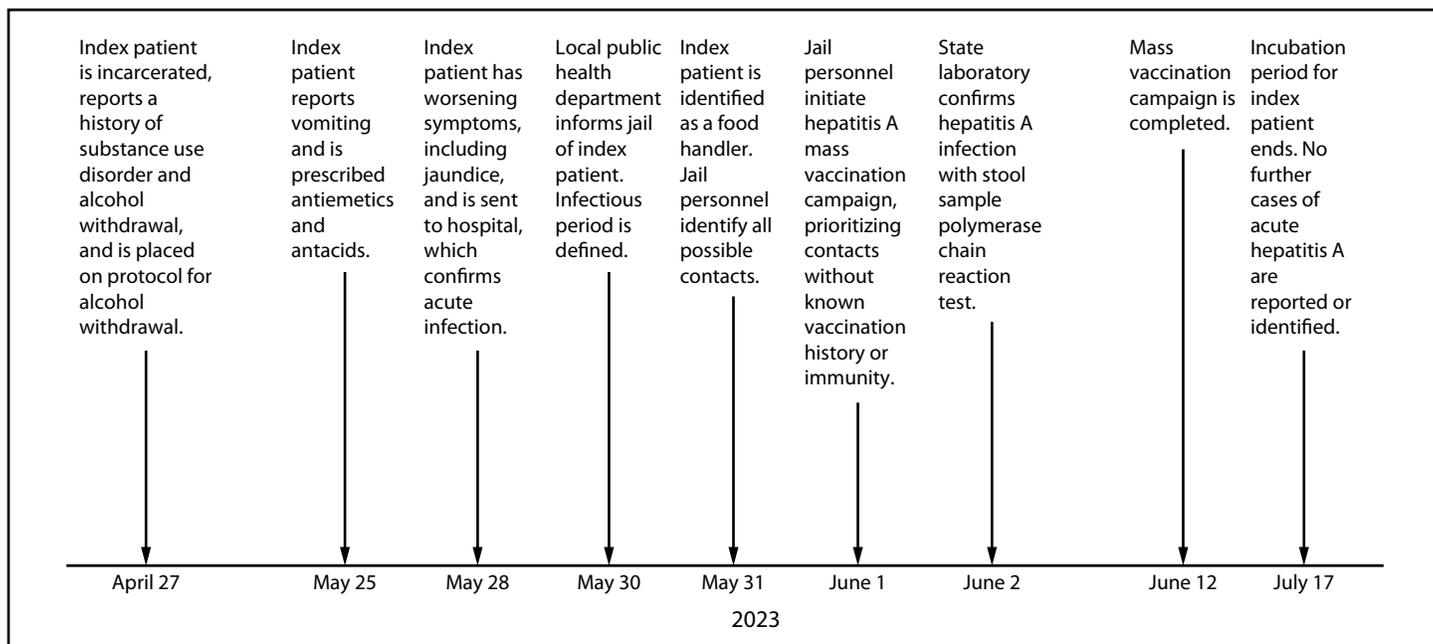
Exposure Determination

On May 30, CHS Communicable Disease Surveillance and Control staff members were informed of the reactive anti-HAV IgM test result and formulated a plan to provide postexposure prophylactic hepatitis A vaccination to persons who had shared housing with the index patient during the infectious period.† Based on the reported symptoms of the index patient, the index patient's infectious period was defined as May 9–28, with the potential incubation period of the index patient's contacts estimated to end on July 17.§ On May 31, the Acute Communicable Disease Control (ACDC) branch of the Los Angeles County Department of Public Health informed CHS that they had interviewed the patient earlier the same day during his inpatient stay at LAGMC, and he had been assigned to food preparation in the Men's Central Jail kitchen. The contact investigation was expanded to account for both shared housing and food handling after the interview with the index patient.

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* Since 2000, all persons incarcerated within LACJ have electronic health records. As of September 2022, CHS began using the same electronic health records system as the Los Angeles County Department of Health Services.
† Although CHS and LAGMC share the same electronic health records platform, the electronic health record identifiers used by the two facilities are different and led to reliance on external notification of the reactive IgM anti-HAV test result.
§ https://www.bop.gov/resources/pdfs/hep_a_timeline_calc.xlsx

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FIGURE 1. Timeline of hepatitis A exposure discovery and response by Correctional Health Services Communicable Disease and Surveillance Unit staff members — Los Angeles County, California, April–July 2023

Index patient is incarcerated, reports a history of substance use disorder and alcohol withdrawal, and is placed on protocol for alcohol withdrawal.	Index patient reports vomiting and is prescribed antiemetics and antacids.	Index patient has worsening symptoms, including jaundice, and is sent to hospital, which confirms acute infection.	Local public health department informs jail of index patient. Infectious period is defined.	Index patient is identified as a food handler. Jail personnel identify all possible contacts.	Jail personnel initiate hepatitis A mass vaccination campaign, prioritizing contacts without known vaccination history or immunity.	State laboratory confirms hepatitis A infection with stool sample polymerase chain reaction test.	Mass vaccination campaign is completed.	Incubation period for index patient ends. No further cases of acute hepatitis A are reported or identified.
April 27	May 25	May 28	May 30	May 31	June 1	June 2	June 12	July 17

2023

Public Health Response

CHS Communicable Disease Surveillance and Control staff members identified and shared with ACDC a list of 5,830 persons who had been housed in Men's Central Jail during the defined infectious period, 1,702 of whom had been released from the jail. From the list of 4,128 contacts in custody, electronic health records and the state immunization registry were reviewed to remove persons with documented positive hepatitis A serology or vaccination. (Figure 2). This activity was reviewed and approved by the Los Angeles County Public Health, Ambulatory Care Network, and Health Services Administration Institutional Review Board.¶

Vaccination

An initial hepatitis A vaccine supply was procured from the Los Angeles County Department of Public Health (226 doses), and CHS purchased additional vaccine (1,500 doses). Because of the initial limited supply, CHS began offering vaccine on June 1 only to persons located in the same housing units as the index patient, and then, on June 2 and June 3, to those in the additional Men's Central Jail kitchen incarcerated worker dormitories. Upon acquisition of additional vaccine, vaccination of the remaining contacts (i.e., persons who were incarcerated who had been in Men's Central Jail during the infectious period and who were not kitchen workers) began on June 4. During June 1–12, a total of 2,766 persons were

offered vaccine and 1,510 (54.6%) agreed to receive it. Persons who initially declined vaccination were offered a second opportunity to receive vaccine. Incarcerated kitchen workers with undocumented vaccination history or undocumented serology who declined vaccination were removed from kitchen duties until the end of their potential incubation period.
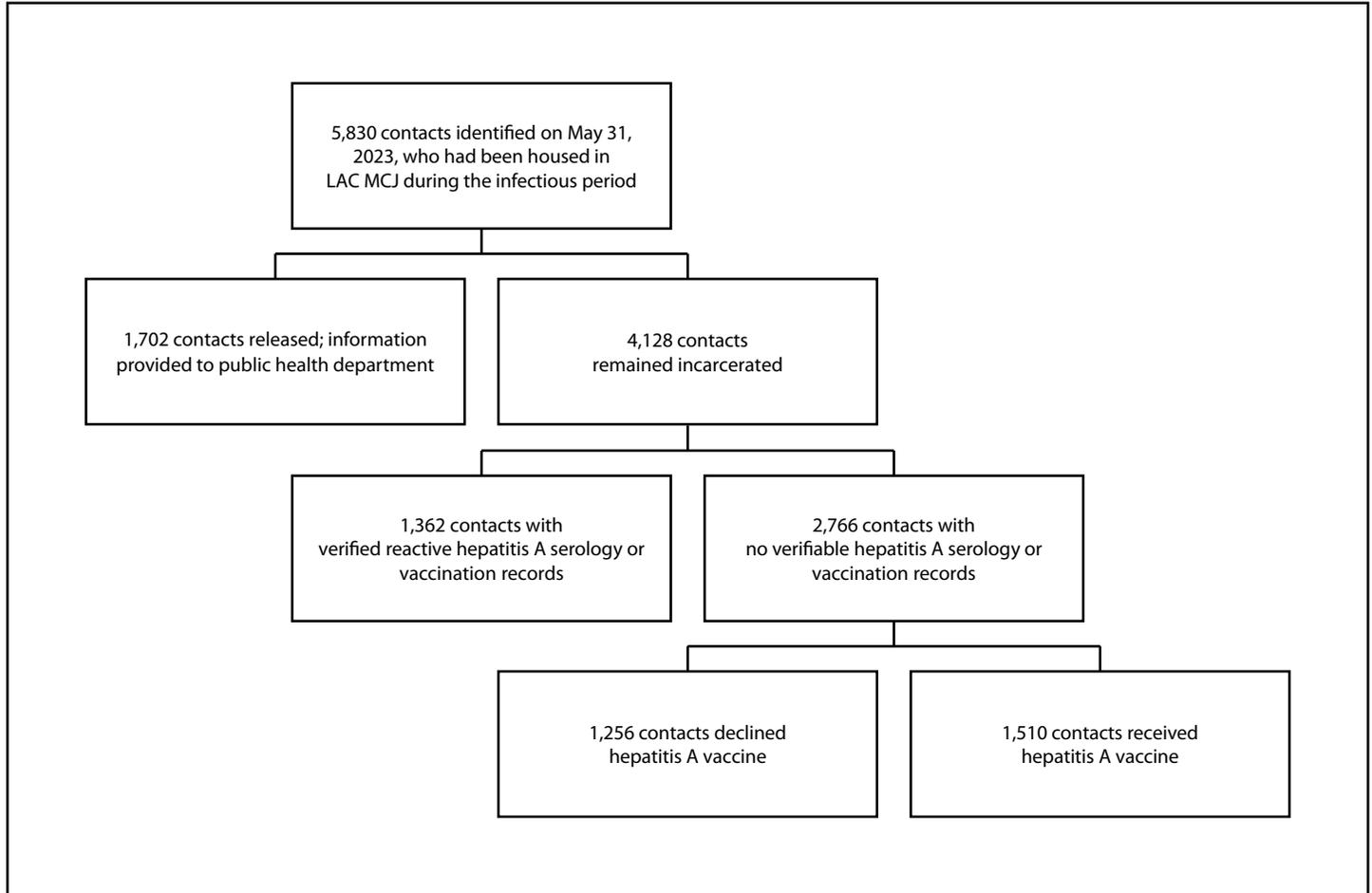
Los Angeles County Men's Central Jail health care and custodial employees who were in contact with the index patient during his infectious period were notified of possible exposure and were offered hepatitis A vaccination through a combination of CHS employee health clinic and Los Angeles County Department of Public Health immunization services. Daily CHS communicable disease surveillance laboratory reports that identified reactive anti-HAV IgM results were enhanced by creating an additional report that noted hepatitis A or any related signs or symptoms as a reason for emergency hospital transfer. As of October 16, 2023, no additional cases of acute hepatitis A had been reported or identified in any of the LACJ facilities.

Discussion

Since 2016, person-to-person outbreaks of hepatitis A in the United States have been increasingly occurring among persons who use drugs, those who experience homelessness, and men who have sex with men (*1*). The risk for hepatitis A transmission is elevated in jails because they house a disproportionate number of persons in these populations, in addition to their crowded living conditions and transient population.

¶ 45 C.F.R. part 46.101(c); 21 C.F.R. part 56.

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FIGURE 2. Identification of contacts at Los Angeles County Men's Central Jail who were eligible to receive postexposure prophylaxis hepatitis A vaccine — Los Angeles County, California, May–July 2023

Abbreviations: LAC = Los Angeles County; MCJ = Men's Central Jail.

Identification of an acute hepatitis A case in a jail, therefore, requires a prompt response and contact identification (*2*).

CHS was able to implement a timely infection control response by identifying all possible incarcerated contacts and initiating a mass vaccination response within 48 hours of notification of the index case (Figure 1). Mass vaccination campaigns for time-sensitive responses in jail settings can be challenging because they involve a large number of persons, as well as logistic issues, and obstacles to timely vaccine procurement. During 2007–2010, hepatitis vaccination campaigns were conducted at LACJ among men who have sex with men (*3*) and during 2017–2019 among the entire LACJ population (CHS, unpublished data, 2019) in response to the 2017 hepatitis A outbreak in San Diego (*4*).

An effort to improve compliance with the mandatory reporting to the California immunization registry led to steps being taken to improve the quality and completeness of hepatitis A

and B vaccination records in the state immunization registry as well as hepatitis A and B vaccination and serology records in the electronic health record. These records helped focus vaccination efforts on persons who were not immune and offer postexposure prophylaxis to those identified as eligible for receipt within 2 weeks of identifying the index patient. The prompt vaccine rollout likely helped reduce transmission and prevent an outbreak among the LACJ population, and the enhanced surveillance, which included the monitoring of emergency hospital transfers made because of suspicion of acute hepatitis A, helped identify possible secondary cases or clusters needing further investigation. Because of the range of the hepatitis A incubation period (15–50 days) and the date of incarceration of the index patient, whether his infection was acquired before or during incarceration is uncertain. The index patient had reported risk factors at the time of intake (i.e., homelessness and injection drug use) for which hepatitis A vaccination is

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Summary

What is already known about this topic?

Risk for hepatitis A transmission in correctional settings is high because of the high proportion of homelessness and injection drug use among persons who are incarcerated.

What is added by this report?

On May 30, 2023, the Los Angeles County Jail system was notified that an incarcerated person had received a positive hepatitis A test result. Using electronic health records and the state immunization registry, investigators identified persons eligible for hepatitis A vaccination, and a vaccination response was initiated within 48 hours: 2,766 persons were offered vaccine, and 1,510 (54.6%) agreed to receive it. No additional cases were identified.

What are the implications for public health practice?

Identifying contacts promptly and using immunization and serology records to ensure rapid delivery of postexposure prophylactic vaccine can help prevent hepatitis A transmission during exposures among incarcerated populations.

recommended (*1,2*). The correctional environment presents a unique opportunity to reduce hepatitis A transmission and disease through vaccination (*5–7*); accordingly, CHS might consider a more comprehensive routine vaccination strategy, including offering vaccination at intake.

Implications for Public Health Practice

The infection control response initially included a plan to offer hepatitis A vaccine and Ig to persons who were immunocompromised, aged >60 years, or both (*8*); however, Ig could not be obtained within the indicated time frame because of logistic issues. Future infection control planning at CHS involves maintaining a supply of hepatitis A Ig for emergency use in case of an exposure or outbreak. A major limitation of the CHS hepatitis A surveillance process was that reactive IgM anti-HAV laboratory results from LAGMC did not appear in CHS communicable disease laboratory reports because of the different electronic health record identifiers used by the two facilities. A modified communicable disease surveillance report that retrieves reactive IgM anti-HAV results from LAGMC conducted on CHS patients that contains CHS-specific identifiers was created after the response to help prevent delays in identifying cases and planning for exposure response and mitigation. This exposure response highlights the importance of initiating a rapid response to hepatitis A exposure in a jail setting to minimize risk for transmission and help prevent an outbreak. Having relevant laboratory results for reportable communicable diseases consistently and seamlessly communicated electronically across different health systems with mutual patients and using serology and vaccination records from electronic health records and state immunization registries can facilitate and optimize the response to a potential exposure by ensuring the timely administration of postexposure prophylaxis to those who are at greatest risk.

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Notes from the Field

Long COVID Prevalence Among Adults — United States, 2022

Nicole D. Ford, PhD[1]; Abraham Agedew[1,2]; Alexandra F. Dalton, PhD[1]; Jordan Singleton, MD[1,3]; Cria G. Perrine, PhD[1]; Sharon Saydah, PhD[1]

Introduction

Post-COVID conditions, also known as Long COVID, encompass a range of health problems* that emerge, persist, or recur following acute COVID-19 illness, including fatigue, respiratory symptoms, and neurologic symptoms. In 2022, 6.9% of U.S. adults reported ever experiencing Long COVID (*1*). State- and territory-specific surveillance estimates can guide public health action to mitigate the impact of Long COVID; however, few published data are available. The Association of State and Territorial Health Officials (*2*) and the Council of State and Territorial Epidemiologists (*3*) have published reports outlining gaps and needs in Long COVID surveillance for state, tribal, local, and territorial public health agencies.

Investigation and Outcomes

CDC analyzed data from noninstitutionalized U.S. adults aged ≥18 years participating in the 2022 Behavioral Risk Factor Surveillance System (BRFSS), a population-based cross-sectional survey (*4*). Respondents were sampled using random digit dialing of both landline and cellular telephones. Self-reported age, sex, previous COVID-19 diagnosis,[†] and ever having experienced Long COVID were ascertained via telephone interview. Long COVID was defined as the self-report of any symptoms lasting ≥3 months that were not present before having COVID-19. CDC estimated weighted age- and sex-standardized prevalence with a 95% CI of ever having experienced Long COVID among all adults nationally, irrespective of COVID-19 history, in the 50 states, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands. Estimates were standardized to the 2020 U.S. Census Bureau population of noninstitutionalized, civilian adults. Sex-specific weights by age group were applied for persons aged 18–44, 45–64, and ≥65 years. Analyses were conducted using SAS-callable SUDAAN (version 9.4; RTI International) and account for complex survey design. Prevalence estimates were divided into quintiles. This activity was reviewed by CDC,

deemed not research, and was conducted consistent with applicable federal law and CDC policy.[§]

Preliminary Conclusions and Analysis
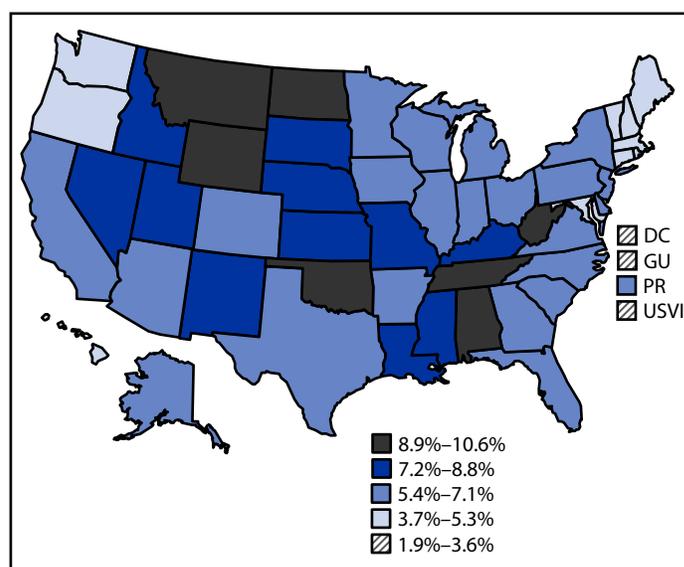
Nationally, 6.4% of noninstitutionalized U.S. adults reported ever having experienced Long COVID (95% CI = 6.2%–6.5%) (Supplementary Table, https://stacks.cdc.gov/view/cdc/147385). The weighted age- and sex-standardized prevalence ranged from 1.9% (95% CI = 0.9%–4.1%) for the U.S. Virgin Islands to 10.6% (95% CI = 9.5%–11.8%) for West Virginia (Figure) and exceeded 8.8% (the highest prevalence quintile cutoff) in seven states. Prevalences tended to be lower in New England and the Pacific and higher in the South, Midwest, and West.[¶]

This study was subject to some limitations. BRFSS did not capture treatment during acute COVID infection, time since COVID-19 illness, or duration or severity of symptoms, which could influence the reported prevalence of Long COVID. In addition, information about COVID-19 vaccination was only available for a subset of jurisdictions and is not included in this report.

[§] 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.cdc.gov/nchs/hus/sources-definitions/geographic-region.htm

FIGURE. Prevalence of reported experience of Long COVID among adults aged ≥18 years, by jurisdiction — Behavioral Risk Factor Surveillance System, United States, 2022

- 8.9%–10.6%
- 7.2%–8.8%
- 5.4%–7.1%
- 3.7%–5.3%
- 1.9%–3.6%

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

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* https://www.cdc.gov/coronavirus/2019-ncov/long-term-effects/index.html
[†] Respondents were classified as having previously had COVID-19 if they responded affirmatively to the question, "Has a doctor, nurse, or other health professional ever told you that you tested positive for COVID-19?" or if they reported a positive test result based on a home test.

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Summary

What is already known about this topic?

Long COVID encompasses a range of health problems that emerge, persist, or recur following acute COVID-19 illness.

What is added by this report?

Age- and sex-standardized prevalence of reporting ever having experienced Long COVID among Behavioral Risk Factor Surveillance System survey respondents in U.S. states and territories ranged from 1.9% (95% CI = 0.9%–4.1%) in the U.S. Virgin Islands to 10.6% (95% CI = 9.5%–11.8%) in West Virginia; prevalence of Long COVID exceeded 8.8% in seven states.

What are the implications for public health practice?

Ongoing assessment of jurisdiction-specific prevalence of Long COVID could inform policy, planning, or programming to support U.S. adults experiencing Long COVID.

The findings in this report address an important data gap in knowledge about the prevalence of Long COVID. Given the increased health care needs among persons experiencing Long COVID (5), ongoing assessment of state- and territory-level prevalence data could guide policy, planning, or programming. State-level estimates might also help identify geographic disparities in Long COVID across the United States that could guide interventions to promote health equity.

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QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Aged ≥18 Years Who Were Advised During the Past 12 Months by a Doctor or Other Health Professional to Increase Their Amount of Physical Activity or Exercise,[†] by Age Group and Sex — National Health Interview Survey, United States, 2022[§]
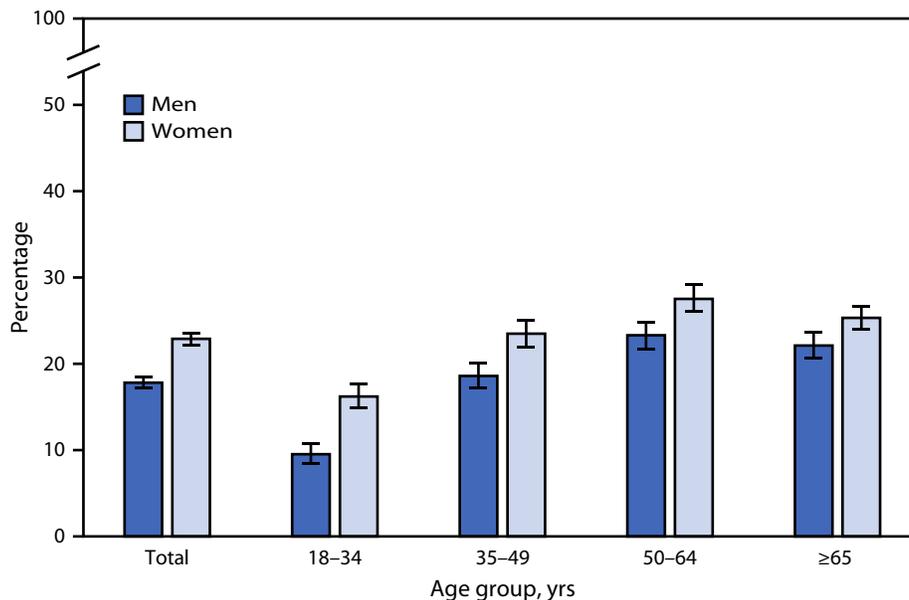
* With 95% CIs indicated by error bars.
[†] Based on a response of "yes" to the survey question, "During the past 12 months, has a doctor or other health professional advised you to increase the amount of physical activity or exercise you get?"
[§] Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

In 2022, among adults aged ≥18 years, women were more likely than men (22.9% versus 17.8%) to be advised during the past 12 months by a doctor or other health professional to increase their amount of physical activity or exercise. Percentages were higher among women than men in all age groups: 16.2% versus 9.5% among adults aged 18–34 years, 23.5% versus 18.6% among those aged 35–49 years, 27.5% versus 23.3% among those aged 50–64 years, and 25.3% versus 22.1% among those aged ≥65 years. Among both men and women, the percentage of those who were advised during the past 12 months by a doctor or other health professional to increase their amount of physical activity or exercise was lowest among those aged 18–34 years.

Source: National Center for Health Statistics, National Health Interview Survey, 2022. https://www.cdc.gov/nchs/nhis.htm
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