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Cannabis-Involved Emergency Department Visits Among Persons Aged <25 Years Before and During the COVID-19 Pandemic — United States, 2019–2022

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Abstract

To understand trends in U.S. cannabis-involved emergency department (ED) visits (i.e., those for which cannabis use was documented in the chief complaint or a discharge diagnosis) among young persons aged <25 years during the COVID-19 pandemic, CDC used National Syndromic Surveillance Program data to examine changes in ED visits during 2019–2022. Mean weekly cannabis-involved ED visits among all young persons were higher during the COVID-19 pandemic in 2020, 2021, and 2022, compared with corresponding periods in 2019. Large increases in cannabis-involved ED visits throughout the COVID-19 pandemic compared with prepandemic surveillance periods in 2019 were identified among persons aged ≤10 years. ED visit rates among children and adolescents aged 11–14 years did not differ by sex until the first half of the 2020–21 school year (2020, weeks 37–53), when ED visit rates among females surpassed those among males. Improving clinicians' awareness of rising cannabis-involved ED visits might aid in early diagnosis of cannabis intoxication among young persons. Further, increasing adults' knowledge regarding safe cannabis storage practices, strengthening youths' coping and problem-solving skills through evidence-based prevention programs, and modifying cannabis packaging to decrease appeal to youths might help prevent intentional and unintentional cannabis use.

Introduction

Approximately 18.7% of U.S. persons aged ≥12 years used cannabis in 2021.* Expansion of legalization of medical and nonmedical cannabis[†] has contributed to increased availability and use of cannabis by adults (*1*), and Monitoring the Future data show that youth's perception of the risk of cannabis use has declined.[§] The COVID-19 pandemic has been associated with increases in substance use for some youths (*2*); however, cannabis-involved emergency department (ED) visits began increasing statistically significantly several years before the start of the pandemic among all age groups except ages 15–24 years (*3*).

* https://www.samhsa.gov/data/sites/default/files/2022-12/2021NSDUHFFRHighlights092722.pdf

† https://www.ncsl.org/health/state-medical-marijuana-laws

§ https://monitoringthefuture.org/wp-content/uploads/2022/12/mtf2022.pdf

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Methods

CDC analyzed data from a weekly average of 1,671 EDs consistently reporting data¶ to the National Syndromic Surveillance Program (NSSP).**,†† In collaboration with state and local health departments, CDC developed and validated a definition for cannabis-involved ED visits using *International Classification of Diseases, Tenth Revision, Clinical Modification* diagnosis codes F12.1, F12.2, F12.9, or T40.7; or chief complaint text indicating cannabis use (e.g., "smoke weed" or "ingest hash") (Supplementary Box, https://stacks.cdc.gov/view/cdc/130568). Changes in cannabis-involved ED visit rates among persons aged <25 years between 2019 and 2022 were quantified and stratified by age group and sex, using four metrics: 1) mean weekly number of cannabis-involved ED visits, 2) rates of cannabis-involved ED visits (number of cannabis-involved ED visits per 10,000 ED visits),§§ 3) overall visit ratios¶¶ and for each sex by year (calculated as the rate of ED visits that were cannabis-involved during the study period divided by the rate during the 2019 reference period), and 4) visit ratios by sex*** (calculated as the rate of female ED visits that were cannabis-involved divided by the rate of male ED visits within the same period). Four periods during 2020, 2021, and 2022 were analyzed: weeks 1–11 (prepandemic in 2020),††† weeks 12–23 (second half of school year), weeks 24–36 (summer), and weeks 37–53 (first half of school year). Overall visit ratios were calculated comparing ED visit rates during these periods in 2020-2022 with rates for the

¶ To reduce artifactual impact from changes in reporting patterns, analyses were restricted to facilities with more consistent reporting of more complete data (coefficient of variation ≤0.40 and average weekly informative discharge diagnosis ≥75% complete during 2019–2022).

** NSSP is a collaboration among CDC, local, and state health departments, and federal, academic, and private sector partners. NSSP receives medical record data from approximately 75% of EDs across 50 U.S. states, the District of Columbia, and Guam, although fewer than 50% of facilities from California, Hawaii, Minnesota, and Oklahoma currently participate in NSSP. https://www.cdc.gov/nssp/index.html

†† https://www.cdc.gov/nssp/overview.html

§§ Rates were calculated by dividing the number of cannabis-related ED visits by the total number of ED visits for the relevant surveillance period among the population of interest (by age and sex).

¶¶ Visit ratios were calculated by dividing the rate of cannabis-related ED visits during the surveillance period by the rate of cannabis-related ED visits during the reference period. The reference period is the 2019 period (i.e., epidemiologic weeks) corresponding to the surveillance period. Ratios >1 indicate a higher rate of cannabis-related ED visits during the surveillance period than during the reference period. Visit ratio analyses did not include weeks 1–11, 2020 as a reference period.

*** Female-to-male visit ratios (the rate of female cannabis-related ED visits during the surveillance period divided by the rate of male visits during the same period) >1 indicate a higher rate of female than male cannabis-involved ED visits during the specified surveillance period.

††† A standardized method of counting weeks to allow for the comparison of data year after year; epidemiologic weeks start on a Sunday and end on a Saturday.

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corresponding epidemiologic weeks in 2019. Analyses were conducted using R software (version 4.2.2; R Foundation). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.[§§§]

Results

During December 30, 2018–January 1, 2023, a total of 539,106 cannabis-involved ED visits occurred among persons aged <25 years (64.9 per 10,000 ED visits) in the United States. During the pandemic, the average number of weekly cannabis-involved ED visits involving persons aged ≤10 years ranged from 30.4 (2020, weeks 12–23) to 71.5 (2022, weeks 24–36), compared with the prepandemic periods (range = 18.7 [2019, weeks 1–11] to 23.2 [2020, weeks 1–11]) (Table 1). Among persons aged 11–14 years, the mean number of weekly cannabis-involved ED visits during the pandemic ranged from 69.8 (2020, weeks 12–23) to 209.3 (2022, weeks 12–23), compared with 90.5 (2019, weeks 24–36) to 138.5 (2020, weeks 1–11) during the prepandemic period. Among adolescents and young adults aged 15–24 years, the average weekly number of cannabis-involved ED visits during the pandemic ranged from 2,275.8 (2020, weeks 12–23) to 2,813.2 (2021, weeks 12–23), compared with 2,117.5 (2019, weeks 1–11) to 2,531.1 (2020, weeks 1–11) during the prepandemic period.

Among children aged <10 years, the pandemic peak in mean weekly visits (71.5) occurred during the summer of 2022 (weeks 24–36). During the pandemic, cannabis-involved ED visit rates among children aged ≤10 years began declining during the second half of the 2020–21 school year (2021, weeks 12–23), but increased thereafter, peaking during the summer of 2022 (weeks 24–36) at 4.0. Cannabis-involved ED visit ratios per 10,000 ED visits in this age group ranged from 2.4 (2021, weeks 37–53) to 5.8 (2021, weeks 1–11) (Table 2).

Among children and adolescents aged 11–14 years, the pandemic peak in mean weekly visits (209.3) occurred during the second half of the 2021–22 school year (2022, weeks 12–23). Beginning in 2020, cannabis-involved ED visits also increased among persons aged 11–14 years, and during this time, visit ratios among females were higher (range = 1.5 [2020, weeks 37–53] to 2.7 [2022, weeks 1–11]) than they were among males (range = 0.9 [2021, weeks 24–36] to 1.6 [2022, weeks 1–11]). Within this age group, visit ratios by sex were not statistically significantly different during the early 2020 pandemic periods; however, beginning in the first half of the 2020–21 school year (2020, weeks 37–53), ED visit rates among females surpassed those among males and remained higher than rates among males throughout the study period.

More than 90% of cannabis-involved ED visits by persons aged <25 years occurred among those aged 15–24 years. The peak in mean weekly cannabis-involved ED visits among this age group (2,813.2) occurred during the second half of the 2020–21 school year (2021, weeks 12–23). Among children and adolescents aged 11–14 years, the peak (209.3) was approximately 7% of the peak among the older group and occurred 1 year later (2022, weeks 12–23). Rates of cannabis-involved ED visits were elevated among persons aged 15–24 years from 2020 through summer 2021 relative to reference periods (visit ratio range = 1.1 [2021, weeks 24–36] to 1.7 [2020, weeks 12–23]); however, rates briefly returned to baseline during the first half of the school year in both 2021 and 2022 (weeks 12–23) (Figure).

Discussion

Cannabis-involved ED visits began increasing statistically significantly among all age groups except 15–24 years several years before the pandemic (*3*), potentially as a result of expanding state-level policies legalizing cannabis use. Importantly, the current study found that cannabis-involved ED visits among all persons aged <25 years increased during the COVID-19 pandemic, and despite fluctuations, remained higher than 2019 prepandemic levels throughout 2022. The specific reasons for these increases are unknown, and potential drivers might differ by age.

Among persons aged ≤10 years, cannabis-involved ED visit rates during the pandemic far exceeded those preceding the pandemic; these findings are consistent with recent National Poison Data System data demonstrating that from 2017 to 2021, cases of edible cannabis ingestion among children aged <6 years increased by 1,375%, with statistically significant increases in toxicity and severity during the COVID-19 pandemic relative to those observed 2 years earlier (*4*). In June 2022, the Food and Drug Administration released a consumer alert[¶¶¶] warning that THC-containing edibles are easily mistaken for products that might appeal to children and recommended that these products be kept in a safe place out of children's reach, such as in a locked box. Strengthening policies requiring comprehensive labeling could also mitigate risk for unintentional ingestion.****

Cannabis-involved ED visit rates among children and adolescents aged 11–14 years also increased during the pandemic. Visit ratios by sex did not differ among children and adolescents aged 11–14 years until early into the pandemic;

[§§§] 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.fda.gov/food/alerts-advisories-safety-information/fda-warns-consumers-about-accidental-ingestion-children-food-products-containing-thc

**** https://emergency.cdc.gov/han/2021/han00451.asp

TABLE 1. Average weekly number of cannabis-involved* emergency department visits† among persons aged <25 years, by age group and sex — National Syndromic Surveillance Program, United States, 2019–2022

Year and epidemiologic weeks§	Average weekly no. of cannabis-involved ED visits by age group, yrs								
	≤10			11–14			15–24		
	All	Females	Males	All	Females	Males	All	Females	Males
2019									
1–11	**18.7**	9.5	9.3	**105.1**	49.9	55.1	**2,117.5**	914.9	1,198.1
12–23	**21.9**	11.2	10.8	**113.9**	51.7	62.1	**2,316.1**	1,007.8	1,303.1
24–36	**20.8**	10.3	10.5	**90.5**	41.9	48.2	**2,223.5**	977.6	1,240.3
37–53	**22.2**	10.7	11.5	**120.6**	58.3	62.1	**2,426.1**	1,053.6	1,366.3
2020									
1–11 (prepandemic)	**23.3**	10.8	12.4	**138.5**	67.8	70.5	**2,531.1**	1,119.5	1,403.7
12–23 (second half of school year)	**30.4**	14.3	16.0	**69.8**	37.3	32.4	**2,275.8**	1,013.2	1,257.4
24–36 (summer)	**42.8**	20.9	21.8	**90.8**	47.0	43.6	**2,555.7**	1,177.3	1,370.8
37–53 (first half of school year)	**40.3**	20.1	20.3	**96.4**	52.7	43.2	**2,364.0**	1,095.6	1,261.7
2021									
1–11	**48.5**	24.9	23.5	**108.4**	63.1	44.9	**2,533.1**	1,205.8	1,319.5
12–23 (second half of school year)	**67.0**	32.6	34.3	**133.3**	76.8	55.8	**2,813.2**	1,347.2	1,456.1
24–36 (summer)	**63.3**	30.5	32.7	**97.0**	56.8	40.0	**2,373.5**	1,140.2	1,225.6
37–53 (first half of school year)	**47.4**	24.1	23.3	**147.3**	88.0	58.9	**2,309.2**	1,128.4	1,173.3
2022									
1–11	**57.9**	27.4	30.5	**184.5**	112.9	71.0	**2,351.1**	1,131.0	1,211.7
12–23 (second half of school year)	**66.7**	30.7	35.8	**209.3**	126.0	83.3	**2,774.3**	1,385.8	1,380.4
24–36 (summer)	**71.5**	36.2	35.1	**127.0**	75.0	51.6	**2,345.9**	1,157.8	1,174.6
37–53 (first half of school year)	**66.1**	33.6	32.2	**187.8**	110.9	76.5	**2,314.5**	1,147.7	1,156.1

Abbreviations: ED = emergency department; NSSP = National Syndromic Surveillance Program.

* NSSP collects free-text reason for visit (chief complaint), discharge diagnosis, and patient demographic details. Free-text keywords and diagnostic codes combined using Boolean searches were used to create a keyword syndrome to identify ED visits involving cannabis. CDC developed and validated a definition for cannabis-involved ED visits using *International Classification of Diseases, Tenth Revision, Clinical Modification* diagnosis codes F12.1, F12.2, F12.9, or T40.7 or chief complaint text indicating cannabis use (e.g., "smoke weed" or "ingest hash").

† NSSP receives anonymized medical record information from approximately 75% of nonfederal EDs nationwide. To reduce the artifactual impact of changes in reporting patterns, analyses were restricted to facilities with more consistent reporting of more complete data (coefficient of variation ≤40 and average weekly informative discharge diagnosis ≥75% complete during 2019–2022).

§ A standardized method of counting weeks to allow for the comparison of data year after year; epidemiologic weeks start on a Sunday and end on a Saturday. Four periods were analyzed: prepandemic (epidemiologic weeks 1–11), second half of school year (epidemiologic weeks 12–23), summer (epidemiologic weeks 24–36), and first half of school year (epidemiologic weeks 37–53).

Summary

What is already known about this topic?

Cannabis-involved emergency department (ED) visits increased for youths aged 0–14 years before 2019, as cannabis legalization expanded across the United States.

What is added by this report?

Cannabis-involved ED visits among young persons were higher during the COVID-19 pandemic than during 2019. Large increases in cannabis-involved ED visit rates occurred among children aged ≤10 years, and among persons aged 11–14 years; rates among females aged 11–14 years increased more than they did among males.

What are the implications for public health practice?

To protect youths from unintentional ingestions, it is important that safe cannabis storage practices be employed in households. Local implementation of youth- and young adult–focused evidence-based programs to improve coping with stressors might prevent initiation and continued use of cannabis, and modifications in cannabis packaging might decrease its appeal to youth, as cannabis use policies continue to increase cannabis availability in some states.

however, female cannabis-involved ED visit ratios surpassed those of males in the first half of the 2020–21 school year (2020, weeks 37–53), and this continued throughout most of the pandemic. This might indicate that females were more likely than males to use cannabis to cope with pandemic-related stress. Increased substance use by some young persons might be the result of pandemic-related stressors (*5*); a 2021 study found that during the pandemic, young females were more likely than males to use harmful coping mechanisms to address stressors and were more likely to require hospital admission for eating disorders (*6*). Implementation of evidence-based school-based programs designed to improve coping and problem-solving skills during adolescence have shown promise in preventing cannabis initiation and harmful use (*7*). Increasing substance use prevention efforts through youth-directed programming interventions might help address pandemic-related substance use.

Most cannabis-involved ED visits were among adolescents and young adults aged 15–24 years. More research is needed on age-related cannabis administration routes; however, administration routes that deliver higher concentrations of

TABLE 2. Average weekly rate* and visit ratio† of cannabis-involved emergency department visits§ among persons aged <25 years, by age group — National Syndromic Surveillance Program, United States, 2019–2022

Period, epidemiologic weeks¶ and metric	Age group, yrs											
	≤10				11–14				15–24			
	All	Females	Males	Visit ratio (95% CI)** by sex††	All	Females	Males	Visit ratio (95% CI)** by sex††	All	Females	Males	Visit ratio (95% CI)** by sex††
Cannabis-involved ED visit rate												
1–11, 2019	**0.9**	0.9	0.8	1.2 (0.9–1.5)	**21.2**	19.5	23.0	0.8 (0.8–1.0)	**106.5**	73.8	160.7	0.5 (0.4–0.5)
12–23, 2019	**1.1**	1.2	1.0	1.2 (1.0–1.5)	**22.5**	20.4	24.6	0.8 (0.7–0.9)	**112.9**	80.1	165.2	0.5 (0.5–0.5)
24–36, 2019	**1.2**	1.3	1.1	1.2 (0.9–1.5)	**21.9**	20.7	23.0	0.9 (0.8–1.0)	**109.4**	79.1	156.2	0.5 (0.5–0.5)
37–53, 2019	**1.0**	1.1	1.0	1.1 (0.9–1.3)	**23.2**	22.9	23.5	1.0 (0.9–1.1)	**116.4**	82.3	170.8	0.5 (0.5–0.5)
1–11, 2020	**1.0**	1.0	1.0	1.0 (0.8–1.3)	**25.8**	24.6	27.1	0.9 (0.8–1.0)	**119.5**	85.8	173.3	0.5 (0.5–0.5)
12–23, 2020	**4.2**	4.3	4.1	1.1 (0.9–1.3)	**38.9**	40.5	37.3	1.1 (0.9–1.2)	**188.2**	142.2	254.0	0.6 (0.5–0.6)
24–36, 2020	**4.5**	4.8	4.3	1.1 (1.0–1.3)	**32.4**	32.8	31.9	1.0 (0.9–1.2)	**151.4**	116.7	202.6	0.6 (0.6–0.6)
37–53, 2020	**4.1**	4.5	3.8	1.2 (1.0–1.4)	**32.4**	34.2	30.3	1.1 (1.0–1.3)	**143.5**	108.8	197.7	0.6 (0.5–0.6)
1–11, 2021	**5.0**	5.5	4.5	1.2 (1.0–1.5)	**37.7**	40.6	34.0	1.2 (1.1–1.3)	**162.0**	125.4	220.1	0.6 (0.6–0.6)
12–23, 2021	**4.6**	4.9	4.3	1.1 (1.0–1.3)	**34.9**	39.1	30.0	1.3 (1.2–1.4)	**152.9**	120.9	201.7	0.6 (0.6–0.6)
24–36, 2021	**3.6**	3.7	3.4	1.1 (1.0–1.3)	**23.9**	27.8	19.8	1.4 (1.3–1.6)	**117.7**	93.6	154.3	0.6 (0.6–0.6)
37–53, 2021	**2.5**	2.8	2.2	1.2 (1.1–1.4)	**32.2**	38.3	26.0	1.5 (1.4–1.6)	**117.7**	94.5	153.8	0.6 (0.6–0.6)
1–11, 2022	**3.8**	3.9	3.7	1.0 (0.9–1.2)	**45.5**	53.2	36.9	1.4 (1.3–1.6)	**133.6**	105.1	178.2	0.6 (0.6–0.6)
12–23, 2022	**3.4**	3.4	3.4	1.0 (0.9–1.2)	**44.4**	53.3	35.5	1.5 (1.4–1.6)	**144.6**	119.0	184.1	0.6 (0.6–0.7)
24–36, 2022	**4.0**	4.5	3.6	1.2 (1.1–1.4)	**32.5**	39.3	25.9	1.5 (1.4–1.7)	**122.4**	100.2	154.4	0.7 (0.6–0.7)
37–53, 2022	**2.7**	2.9	2.4	1.2 (1.1–1.4)	**35.8**	43.2	28.7	1.5 (1.4–1.6)	**117.6**	96.1	150.1	0.6 (0.6–0.7)

See table footnotes on the next page.

THC (e.g., vapes and dabs [highly concentrated extracts of THC derived from the marijuana plant]) are common among adolescents and young adults (*8*). Products with high THC concentration can increase the risk for excess consumption and lead to greater intoxicating effects (*9*). The largest visit ratios for this age group occurred immediately after the March 11, 2020, declaration of the pandemic as a public health emergency and during the initial implementation of many state-level stay-at-home orders (*10*). Monitoring the Future data on past-year marijuana use for 2020–2022 showed decreases in use by students in grades 10 and 12 during the pandemic, and slight increases in THC vaping by grade 10 students in 2022, although still below prepandemic levels. However, a National Institute on Drug Abuse analysis found that marijuana use among persons aged 19–30 years increased statistically significantly during 2021, reaching all-time high levels.†††† Thus, the observed increases among persons aged 15–24 years might be driven, at least in part, by use among persons beyond high school age.

Limitations

The findings in this report are subject to at least four limitations. First, NSSP data are not nationally representative; results cannot be generalized to nonparticipating jurisdictions. Second, differential coding practices, changes in emergency care–seeking behavior during the pandemic, and fluctuations in the number of EDs participating in NSSP might underestimate or overestimate ED visits. However, analyses were restricted to facilities consistently reporting data during the study period. Third, although multiple visits by the same patient and the intent of cannabis use (i.e., intentional versus unintentional) cannot be distinguished, the data clearly illustrate patterns in cannabis-involved ED visits. Finally, syndromic surveillance data are updated in near real-time and are not considered final research data sets; results are likely to change as underlying medical record information is updated.

Implications for Public Health Practice

Cannabis-involved ED visits among young persons increased during the COVID-19 pandemic and remained elevated above prepandemic levels. These increases might stem from multiple factors, such as increased use as a coping mechanism for pandemic-related stressors, use of highly concentrated THC products, increased availability of cannabis in states with legal marketplaces, and increased unintentional ingestions associated with packaging that is appealing or confusing to youths. To protect against unintentional ingestions of cannabis, it is important for adults who use cannabis to safely and securely store cannabis products in places inaccessible to children. Communities, schools, and coalitions (such as Drug-Free Community coalitions)§§§§ can implement evidence-based

†††† https://nida.nih.gov/news-events/news-releases/2022/08/marijuana-and-hallucinogen-use-among-young-adults-reached-all-time-high-in-2021

§§§§ https://www.cdc.gov/drugoverdose/drug-free-communities/coalitions.html

TABLE 2. (*Continued*) Average weekly rate* and visit ratio† of cannabis-involved emergency department visits§ among persons aged <25 years, by age group — National Syndromic Surveillance Program, United States, 2019–2022

Period, epidemiologic weeks¶ and metric	Age group, yrs: ≤10 All	≤10 Females	≤10 Males	≤10 Visit ratio (95% CI)** by sex††	11–14 All	11–14 Females	11–14 Males	11–14 Visit ratio (95% CI)** by sex††	15–24 All	15–24 Females	15–24 Males	15–24 Visit ratio (95% CI)** by sex††
Cannabis-involved ED visit ratio (95% CI) during pandemic compared to corresponding surveillance periods in 2019**												
1–11, 2020§§	**1.0**	1.0	1.0	—	**25.8**	24.6	27.1	—	**119.5**	85.8	173.3	—
12–23, 2020	**4.0**	3.7	4.2	—	**1.7**	2.0	1.5	—	**1.7**	1.8	1.5	—
	(3.4–4.6)	(2.9–4.6)	(3.4–5.3)		**(1.6–1.9)**	(1.8–2.2)	(1.3–1.7)		**(1.6–1.7)**	(1.7–1.8)	(1.5–1.6)	
24–36, 2020	**3.7**	3.6	3.8	—	**1.5**	1.6	1.4	—	**1.4**	1.5	1.3	—
	(3.2–4.3)	(3.0–4.5)	(3.1–4.6)		**(1.4–1.6)**	(1.4–1.8)	(1.2–1.6)		**(1.4–1.4)**	(1.4–1.5)	(1.3–1.3)	
37–53, 2020	**4.1**	4.3	4.0	—	**1.4**	1.5	1.3	—	**1.2**	1.3	1.2	—
	(3.6–4.7)	(3.6–5.2)	(3.3–4.8)		**(1.3–1.5)**	(1.4–1.6)	(1.2–1.4)		**(1.2–1.3)**	(1.3–1.4)	(1.1–1.2)	
1–11, 2021	**5.8**	6.0	5.6	—	**1.8**	2.1	1.5	—	**1.5**	1.7	1.4	—
	(5.0–6.9)	(4.8–7.5)	(4.5–7.1)		**(1.6–1.9)**	(1.9–2.3)	(1.3–1.7)		**(1.5–1.6)**	(1.7–1.7)	(1.3–1.4)	
12–23, 2021	**4.4**	4.2	4.5	—	**1.5**	1.9	1.2	—	**1.4**	1.5	1.2	—
	(3.8–5.0)	(3.5–5.1)	(3.7–5.5)		**(1.4–1.7)**	(1.7–2.1)	(1.1–1.4)		**(1.3–1.4)**	(1.5–1.6)	(1.2–1.3)	
24–36, 2021	**2.9**	2.8	3.0	—	**1.1**	1.3	0.9	—	**1.1**	1.2	1.0	—
	(2.5–3.3)	(2.3–3.4)	(2.5–3.6)		**(1.0–1.2)**	(1.2–1.5)	(0.8–1.0)		**(1.1–1.1)**	(1.2–1.2)	(1.0–1.0)	
37–53, 2021	**2.4**	2.6	2.3	—	**1.4**	1.7	1.1	—	**1.0**	1.2	0.9	—
	(2.2–2.8)	(2.2–3.1)	(2.0–2.8)		**(1.3–1.5)**	(1.5–1.8)	(1.0–1.2)		**(1.0–1.0)**	(1.1–1.2)	(0.9–0.9)	
1–11, 2022	**4.4**	4.2	4.7	—	**2.2**	2.7	1.6	—	**1.3**	1.4	1.1	—
	(3.8–5.2)	(3.4–5.3)	(3.7–5.8)		**(2.0–2.3)**	(2.5–3.0)	(1.4–1.8)		**(1.2–1.3)**	(1.4–1.5)	(1.1–1.1)	
12–23, 2022	**3.2**	2.9	3.5	—	**2.0**	2.6	1.4	—	**1.3**	1.5	1.1	—
	(2.8–3.7)	(2.4–3.6)	(2.9–4.3)		**(1.9–2.1)**	(2.4–2.9)	(1.3–1.6)		**(1.3–1.3)**	(1.5–1.5)	(1.1–1.1)	
24–36, 2022	**3.3**	3.4	3.2	—	**1.5**	1.9	1.1	—	**1.1**	1.2	1.0	—
	(2.9–3.7)	(2.8–4.1)	(2.6–3.8)		**(1.4–1.6)**	(1.7–2.1)	(1.0–1.3)		**(1.1–1.1)**	(1.1–1.2)	(1.0–1.0)	
37–53, 2022	**2.6**	2.8	2.5	—	**1.5**	1.9	1.2	—	**1.0**	1.2	0.9	—
	(2.3–3.0)	(2.4–3.3)	(2.1–2.9)		**(1.5–1.6)**	(1.7–2.0)	(1.1–1.3)		**(1.0–1.0)**	(1.1–1.2)	(0.9–0.9)	

Abbreviations: ED = emergency department; NSSP = National Syndromic Surveillance Program.

* Rate is the number of cannabis-involved ED visits per 10,000 ED visits. NSSP collects free-text reason for visit (chief complaint), discharge diagnosis, and patient demographic details. Free-text keywords and diagnostic codes combined using Boolean searches were used to create a keyword syndrome to identify ED visits involving cannabis. CDC developed and validated a definition for cannabis-involved ED visits using *International Classification of Diseases, Tenth Revision, Clinical Modification* diagnosis codes F12.1, F12.2, F12.9, or T40.7 or chief complaint text indicating cannabis use (e.g., "smoke weed" or "ingest hash").

† Visit ratios were calculated by dividing the rate of cannabis-related ED visits during the surveillance period by the rate of cannabis-related ED visits during the reference period. The reference period is the 2019 period (i.e., epidemiologic weeks) corresponding to the surveillance period. Ratios >1 indicate a higher rate of cannabis-related ED visits during the surveillance period than the reference period. Visit ratio analyses did not include weeks 1–11, 2020 as a reference period.

§ NSSP receives anonymized medical record information from approximately 75% of nonfederal EDs nationwide. To reduce the artifactual impact of changes in reporting patterns, analyses were restricted to facilities with more consistent reporting of more complete data (coefficient of variation ≤40 and average weekly informative discharge diagnosis ≥75% complete during 2019–2022).

¶ A standardized method of counting weeks to allow for the comparison of data year after year; epidemiologic weeks start on a Sunday and end on a Saturday. Four periods were analyzed: prepandemic (epidemiologic weeks 1–11), second half of school year (epidemiologic weeks 12–23), summer (epidemiologic weeks 24–36), and first half of school year (epidemiologic weeks 37–53).

** 95% CIs that exclude 1 are statistically significant.

†† Visit ratios by sex were calculated by dividing the rate of female cannabis-related ED visits during the surveillance period by the rate of male visits during the same period. Ratios >1 indicate a higher rate of female than male cannabis-involved ED visits during the specified surveillance period.

§§ Visit ratios were not calculated for weeks 1–11, 2020 because this surveillance period is still considered prepandemic.

youth substance use prevention interventions to address changing patterns of cannabis use during the pandemic. These local organizations are best suited to meet youths in their communities and tailor interventions to effectively decrease cannabis use. States can implement or strengthen packaging restrictions to decrease youth appeal (e.g., plain packaging, comprehensive labeling, and more prominent warning labels). In combination, these strategies can help mitigate concerning rises in cannabis-involved ED visits among young persons.

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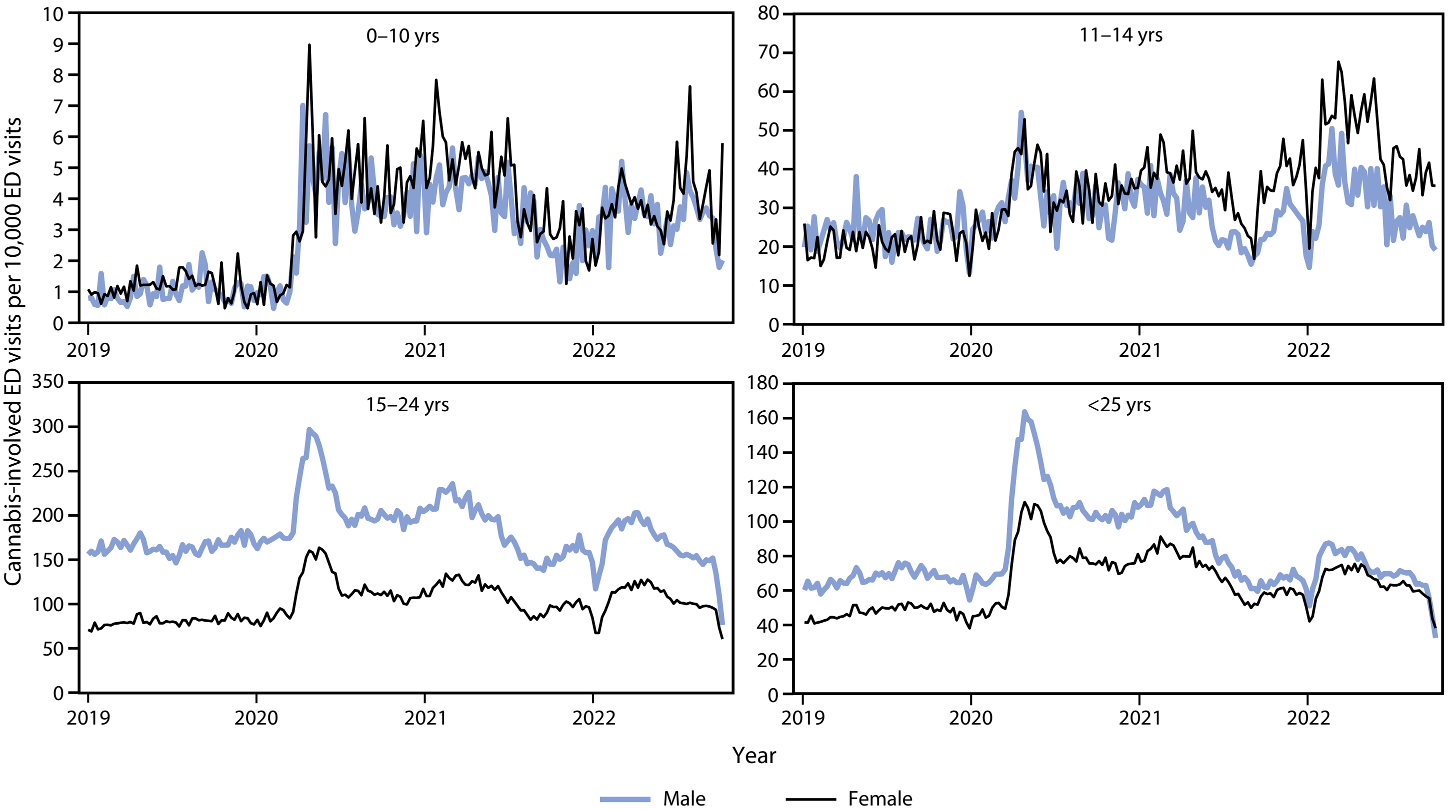
FIGURE. Weekly rates* of cannabis-involved† emergency department visits§ among persons aged <25 years, by age group — National Syndromic Surveillance Program, United States, 2019–2022



Abbreviations: ED = emergency department; NSSP = National Syndromic Surveillance Program.
* Number of cannabis-involved ED visits per 10,000 ED visits.
† NSSP collects free-text reason for visit (chief complaint), discharge diagnosis, and patient demographic details. Free-text keywords and diagnostic codes combined using Boolean searches were used to create a keyword syndrome to identify ED visits involving cannabis. CDC developed and validated a definition for cannabis-involved ED visits using *International Classification of Diseases, Tenth Revision, Clinical Modification* diagnosis codes F12.1, F12.2, F12.9, or T40.7 or chief complaint text indicating cannabis use (e.g., "smoke weed" or "ingest hash").
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Updated Operational Guidance for Implementing CDC's Recommendations on Testing for Hepatitis C Virus Infection

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Abstract

Current hepatitis C virus (HCV) testing guidance recommends a two-step testing sequence for diagnosis of HCV infection. Performing an HCV RNA test whenever an HCV antibody test is reactive (complete testing) is critical to achieve national HCV elimination goals. When an HCV antibody test is reactive and no HCV RNA test is performed, testing is considered incomplete. Historically, approximately one third of patients have incomplete testing. This update clarifies that all sites performing HCV screening should ensure single-visit sample collection. This approach allows for automatic HCV RNA testing when an HCV antibody test is reactive to avoid incomplete testing. Use of strategies that require multiple visits to collect HCV testing samples should be discontinued. Automatic HCV RNA testing on all HCV antibody reactive samples will increase the percentage of patients with current HCV infection who are linked to care and receive curative antiviral therapy.

Introduction

Examination of the hepatitis C care cascade in the United States reveals a substantial gap between the number of persons who have a reactive hepatitis C virus (HCV) antibody test and those who undergo nucleic acid testing (NAT) for detection of HCV RNA (*1*). Performing an HCV RNA test whenever an HCV antibody test is reactive (complete testing) is critical to increase the percentage of patients diagnosed with current HCV infection who are linked to care and receive curative antiviral therapy. To address the challenge of incomplete hepatitis C testing, many laboratories have implemented automatic HCV RNA testing whenever an HCV antibody test result is reactive (*2–4*). "Automatic" testing refers to laboratory testing that occurs without additional action on the part of the patient or the health care provider.

Testing for Hepatitis C Virus

Persons with a reactive HCV antibody test result and detectable HCV RNA are determined to have current HCV infection and should be linked to care. Persons who received a reactive HCV antibody test result and undetectable HCV RNA likely have a resolved HCV infection, although falsely reactive HCV antibody tests can occur (*5*). The 2013 CDC testing guidance* describes four possible operational strategies to diagnose current HCV infection:

1. Blood from a subsequent venipuncture is submitted for HCV RNA testing if the blood sample collected is reactive for HCV antibody during initial testing;
2. From a single venipuncture, two specimens are collected in separate tubes, one tube for initial HCV antibody testing, and a second tube for HCV RNA testing if the HCV antibody test is reactive;
3. The same sample of venipuncture blood used for initial HCV antibody testing, if reactive, is reflexed for HCV RNA testing without another blood draw; and
4. A separate blood sample is submitted for HCV RNA testing if the initial testing of HCV antibody has used finger-stick blood.

Operational strategies 2–4 allow for single-visit sample collection, which ensures that HCV RNA testing is performed automatically without requiring a separate health care visit. Operational strategy 1, however, requires two visits to a health care facility, and therefore leads to missed opportunities for HCV diagnosis and linkage to curative HCV treatment.

Methods

In October 2021, the Association of Public Health Laboratories convened a meeting with experts from public health laboratories, academic medical centers, commercial laboratories, public health agencies, and community-based organizations to discuss obstacles to HCV testing in the United States.† After the meeting, CDC reviewed the published literature to determine the magnitude of incomplete hepatitis C testing using the two-step testing sequence.

Review of the Evidence

The following studies conducted in a variety of settings found that use of operational strategy 1 resulted in a sizable proportion of persons having incomplete HCV testing. In addition, studies have found that complete testing rates improve when operational strategies 2–4 are implemented. For example, data from the Chronic Hepatitis Cohort Study found that only 62% of patients had complete HCV testing (*6*). Similarly,

* https://www.cdc.gov/mmwr/pdf/wk/mm62e0507a2.pdf
† https://www.aphl.org/programs/infectious_disease/Documents/2022_05_APHL_HCV_Elimination_Meeting_Report.pdf

only 66% of HCV antibody reactive patients who reported to the New York City Department of Health and Mental Hygiene surveillance system had complete HCV testing; this prompted a requirement in 2015 that all laboratories perform automatic HCV RNA testing (operational strategies 2–4) (*7*). Among Veterans Health Administration (VA) facilities that required a separate visit for subsequent HCV RNA testing (operational strategy 1), only 64% of patients completed the HCV testing sequence, whereas 98% of veterans completed testing in facilities that used operational strategies 2–4 (*8*). Since 2018, VA directive 1300.01 has required that all specimens that are reactive for HCV antibody undergo automatic testing for HCV RNA. Similarly, the Cherokee Nation Health Services found that 68% of persons had complete HCV testing when using operational strategy 1, but after implementing automatic HCV RNA testing, the proportion with complete testing increased to 85% (*2*,*9*). The Mid-Atlantic Permanente Medical Group developed a multifaceted hepatitis C care pathway that included automatic HCV RNA testing and found that the diagnosis of current HCV infection was statistically significantly higher when using the hepatitis C care pathway compared with the historical approach that used operational strategy 1 (*3*). Operational strategy 1 has also been found to not be cost-effective (*10*).

Updated Operational Guidance

This update clarifies that operational strategy 1 should be discontinued; operational strategies 2, 3, or 4 should be used to diagnose current HCV infection. In settings where HCV antibody testing is performed using finger-stick blood (operational strategy 4), a separate sample should be collected at the same visit to ensure that HCV RNA testing is completed when the HCV antibody result is reactive. If an HCV antibody is reactive and no HCV RNA test is performed, testing is considered incomplete; an HCV RNA test should be performed for all HCV antibody reactive samples to establish the diagnosis of current HCV infection. Sites performing HCV screening should ensure single-visit sample collection (operational strategies 2–4) are used to avoid incomplete HCV testing.

Discussion

Complete and accurate testing is the first step in identifying persons with current HCV infection to ensure linkage to care and initiation of curative antiviral therapy. Operational strategy 1 should no longer be used because it can lead to incomplete HCV testing and gaps in the HCV care cascade. Health care facilities and laboratories should update practices to ensure operational strategy 1 is no longer used. Using a single visit to conduct both steps of the HCV testing sequence will increase complete diagnosis of current HCV infection, which will increase the percentage of patients with current HCV infection who are linked to care and receive curative antiviral therapy.

Summary

What is known about this topic?

Current hepatitis C virus (HCV) testing guidance recommends a two-step testing sequence for diagnosis of HCV infection. When an HCV antibody test is reactive and no HCV RNA test is performed, testing is considered incomplete. Historically, approximately one third of patients have incomplete testing.

What is added by this report?

New guidance for completion of HCV testing supports operational strategies that collect samples at a single visit, and automatic HCV RNA testing on all HCV antibody reactive samples. Use of strategies that require multiple visits to collect samples should be discontinued.

What are the implications for public health practice?

Automatic HCV RNA testing on all HCV antibody reactive samples will increase the percentage of patients with current HCV infection who are linked to care and receive curative antiviral therapy.

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Notes from the Field

Emergency Department Visits for Nonfatal Pedal Cyclist Injuries Before and During the COVID-19 Pandemic, United States, 2019–2020

Livia Navon, MS[1]; Keming Yuan, MS[1]; Laurie Beck, MPH[1]

During the early months of the COVID-19 pandemic, many jurisdictions implemented stay-at-home orders (*1*). Vehicle miles traveled (VMT)* in April 2020 declined by 40% compared with VMT in April 2019; annual VMT in 2020 declined by 13% compared with those in 2019 (*2*). Despite decreased VMT, pedal cyclist traffic crash fatalities increased by 10% from 859 in 2019 to 948 in 2020 (*3*). In 2021, pedal cyclist fatalities increased to 966, the highest number reported since 1975 (*3*,*4*). Given the increase in pedal cyclist fatalities despite the decline in VMT in 2020, emergency department (ED) visits for nonfatal pedal cyclist injuries in 2019 and 2020 were compared.

Investigation and Outcomes

ED visits for nonfatal pedal cyclist injuries[†] were identified from the 2019–2020 National Electronic Injury Surveillance System–All Injury Program (NEISS-AIP). NEISS-AIP data are collected from a stratified probability sample of hospitals and provide weighted national estimates of ED visits for nonfatal injuries. The monthly proportions of injury-related ED visits accounted for by pedal cyclist injuries in 2020 and 2019 were compared using pairwise t-tests in SAS-callable SUDAAN (version 11.0.3; RTI International); comparison of the changes in monthly proportions by age group and sex was assessed using logistic regression. Variance was estimated using Taylor series linearization. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.[§]

During the early months of the COVID-19 pandemic (March–April 2020), ED visits for nonfatal injuries declined by 31% compared with March–April 2019; the total number of nonfatal injury–related ED visits in 2020 declined by 15% compared with 2019. Despite the decline in total injury-related ED visits, the number of ED visits for pedal cyclist injuries in 2020 (356,630 visits [95% CI = 265,330–447,931]) was 8% higher than in 2019 (328,903 visits [95% CI = 255,096–402,711]). During March–August 2020 and in November 2020, monthly proportions of injury-related ED visits accounted for by pedal cyclist injuries were significantly higher than during the same months in 2019 (Table). The age group with the largest increase during most months was children and adolescents aged <18 years. For example, pedal cyclist injuries in this age group accounted for 6.0% of injury-related ED visits in April 2020, which was 2.9 times higher than in April 2019 (2.1%). In April 2020, pedal cyclist injuries among adults aged ≥18 years accounted for 1.5% of injury-related ED visits, which was 1.5 times higher than in April 2019 (1.0%); among adults aged ≥50 years, the proportion of pedal cyclist ED visits in April 2020 (1.7%) was 2.1 times higher than in April 2019 (0.8%). Increases among children and adolescents aged <18 years were sustained during February–November 2020; among adults aged ≥18 years, increased monthly proportions of pedal cyclist ED visits were observed primarily during March–June 2020.

Although the monthly proportions of injury-related ED visits accounted for by pedal cyclist injuries were consistently higher among males in both 2019 and 2020, increases in the proportions of pedal cyclist ED visits during March–May and July–August 2020 were higher among females than males. For example, in April 2020, pedal cyclist injuries accounted for 1.7% of injury-related ED visits among females, which was 2.4 times as high as those in April 2019 (0.7%). The proportion of pedal cyclist ED visits among males in April 2020 (2.5%) was 1.6 times higher than in April 2019 (1.6%). Increases among females were sustained during March–August 2020; among males, increased monthly proportions of pedal cyclist ED visits were observed during February–June 2020.

* VMT is a measure of distance traveled by vehicles in a given region during a specified time. Data reported to the Federal Highway Administration by states and the District of Columbia include only motorized vehicles (e.g., cars, light trucks, sport utility vehicles, motorcycles, and heavy trucks); pedal cycle travel is not included. https://www.fhwa.dot.gov/policyinformation/tmguide/2022_TMG_Final_Report.pdf

† Pedal cyclist injuries are defined as injuries to a pedal cycle rider from a collision, loss of control, crash, or some other event. This category includes riders of bicycles, tricycles, mountain bikes, and unicycles. Injuries unrelated to riding a pedal cycle, such as repairing a bicycle or tripping over a bicycle are not included in this category. Injuries that occurred in traffic, not in traffic (such as in a driveway or other offroad location such as a bicycle trail), and where the location of injury was unspecified, were included in this analysis to capture all nonfatal pedal cyclist injuries. In 2020, 37% of pedal cyclist injuries occurred in traffic; 27% did not occur in traffic, and 37% had insufficient documentation to determine where the injury occurred. https://www.cdc.gov/injury/wisqars/nonfatal_help/index.html#nonfatal

§ 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.

TABLE. Estimated monthly number of emergency department visits for total and pedal cyclist–related nonfatal injuries and monthly percentage of visits due to pedal cyclist injuries, by age group and sex — National Electronic Injury Surveillance System–All Injury Program, United States, 2019–2020

Characteristic/ Yr	Pedal cyclist–related injury ED visits											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Age group, yrs, % (95% CI)												
2019												
<18	0.5 (0.3–0.8)	0.8 (0.3–1.2)	1.3 (0.9–1.8)	2.1 (1.7–2.5)	2.8 (2.3–3.3)	3.7 (3.2–4.2)	3.1 (2.5–3.6)	3.9 (3.0–4.8)	2.8 (2.2–3.3)	1.6 (1.2–1.9)	1.0 (0.7–1.4)	0.8 (0.4–1.3)
≥18	0.7 (0.3–1.1)	0.7 (0.4–1.0)	0.8 (0.4–1.1)	1.0 (0.6–1.3)	1.0 (0.8–1.3)	1.1 (1.0–1.3)	1.4 (1.1–1.6)	1.3 (1.1–1.5)	1.3 (1.0–1.5)	1.1 (0.8–1.4)	0.8 (0.5–1.0)	0.7 (0.4–0.9)
18–49	0.7 (0.3–1.0)	0.5 (0.3–0.7)	0.7 (0.4–0.9)	1.1 (0.7–1.4)	1.0 (0.7–1.2)	1.2 (1.0–1.4)	1.4 (1.1–1.7)	1.4 (1.1–1.6)	1.5 (1.1–1.8)	1.1 (0.8–1.4)	0.7 (0.5–0.9)	0.6 (0.4–0.9)
≥50	—[*]	0.9 (0.4–1.4)	—	0.8 (0.4–1.3)	1.1 (0.8–1.4)	1.0 (0.8–1.3)	1.3 (1.1–1.6)	1.2 (0.8–1.6)	1.0 (0.7–1.3)	1.0 (0.7–1.4)	0.9 (0.5–1.3)	0.7 (0.3–1.1)
2020												
<18	0.7 (0.4–1.0)	1.2[†] (0.8–1.7)	2.2[†] (1.7–2.7)	6.0[†] (4.8–7.2)	5.7[†] (4.8–6.6)	5.4[†] (4.4–6.5)	5.3[†] (4.6–6.1)	5.1[†] (4.1–6.1)	3.9[†] (2.9–4.9)	2.4[†] (1.9–2.8)	1.8[†] (1.3–2.2)	1.1 (0.7–1.5)
≥18	0.8 (0.4–1.2)	0.8 (0.4–1.1)	1.1[†] (0.6–1.7)	1.5[†] (0.9–2.0)	1.7[†] (1.2–2.2)	1.5[†] (1.2–1.8)	1.4 (1.1–1.7)	1.5[†] (1.3–1.7)	1.4 (1.2–1.6)	1.2 (0.9–1.5)	0.9 (0.6–1.2)	0.7 (0.4–1.1)
18–49	0.8 (0.4–1.1)	0.7 (0.4–1.0)	0.9[†] (0.6–1.3)	1.2 (0.8–1.7)	1.5[†] (1.1–2.0)	1.4 (1.1–1.7)	1.5 (1.1–1.8)	1.6 (1.2–1.9)	1.4 (1.2–1.6)	1.3 (0.9–1.6)	0.8 (0.5–1.0)	0.7 (0.4–0.9)
≥50	—	0.9 (0.4–1.4)	—	1.7[†] (0.9–2.6)	1.9 (1.0–2.8)	1.6[†] (1.2–2.0)	1.4 (1.0–1.7)	1.4 (1.1–1.7)	1.3 (1.0–1.7)	1.2 (0.8–1.5)	1.1 (0.6–1.5)	—
Sex, % (95% CI)												
2019												
Female	0.4 (0.2–0.6)	—	0.4 (0.2–0.7)	0.7 (0.4–1.0)	0.8 (0.6–1.0)	1.0 (0.8–1.2)	0.9 (0.7–1.1)	0.8 (0.7–1.0)	0.8 (0.6–1.1)	0.6 (0.4–0.9)	0.3 (0.2–0.5)	0.3 (0.2–0.5)
Male	0.9 (0.5–1.4)	0.9 (0.5–1.2)	1.2 (0.8–1.7)	1.6 (1.3–1.9)	2.0 (1.7–2.3)	2.2 (1.9–2.4)	2.3 (2.0–2.6)	2.6 (2.2–2.9)	2.2 (1.8–2.5)	1.6 (1.4–1.9)	1.3 (0.9–1.6)	1.0 (0.6–1.5)
2020												
Female	0.5 (0.2–0.8)	0.5 (0.2–0.7)	0.9[†] (0.5–1.3)	1.7[†] (1.1–2.3)	1.7[†] (1.2–2.2)	1.5[†] (1.3–1.7)	1.4[†] (1.1–1.6)	1.4[†] (1.1–1.7)	1.1 (0.8–1.3)	0.7 (0.5–1.0)	0.5 (0.3–0.8)	—
Male	1.0 (0.5–1.5)	1.2[†] (0.7–1.7)	1.6[†] (1.1–2.2)	2.5[†] (2.0–3.0)	2.8[†] (2.2–3.3)	2.6[†] (2.1–3.0)	2.6 (2.2–3.0)	2.6 (2.3–3.0)	2.4 (2.1–2.7)	1.9 (1.6–2.3)	1.4 (1.0–1.9)	1.0 (0.7–1.4)
Total, % (95% CI)												
2019	**0.7 (0.3–1.0)**	**0.7 (0.4–1.0)**	**0.9 (0.5–1.2)**	**1.2 (0.9–1.5)**	**1.4 (1.2–1.6)**	**1.6 (1.4–1.8)**	**1.7 (1.4–1.9)**	**1.8 (1.6–2.0)**	**1.6 (1.3–1.9)**	**1.2 (1.0–1.4)**	**0.8 (0.6–1.1)**	**0.7 (0.4–1.0)**
2020	**0.8 (0.4–1.2)**	**0.9 (0.5–1.2)**	**1.3[†] (0.8–1.8)**	**2.2[†] (1.7–2.6)**	**2.3[†] (1.9–2.7)**	**2.1[†] (1.8–2.4)**	**2.1[†] (1.8–2.4)**	**2.1[†] (1.9–2.4)**	**1.8 (1.6–2.1)**	**1.4 (1.1–1.7)**	**1.0[†] (0.7–1.3)**	**0.8 (0.5–1.1)**
ED visits, no.												
2019												
Pedal cyclist ED visits	13,954	12,984	19,228	25,958	33,993	38,565	42,655	44,668	38,422	26,965	17,165	14,348
Injury-related ED visits	2,067,565	1,879,084	2,196,156	2,180,453	2,386,593	2,352,969	2,543,118	2,479,241	2,425,673	2,289,238	2,046,299	2,063,942
2020												
Pedal cyclist ED visits	16,613	17,471	22,592	27,920	42,471	43,696	44,090	45,058	36,447	27,932	18,683	13,658
Injury-related ED visits	2,134,526	2,038,440	1,729,883	1,288,572	1,839,591	2,062,185	2,138,277	2,142,528	1,999,441	1,987,562	1,814,376	1,711,755

Abbreviation: ED = emergency department.

* Dashes indicate estimate suppressed because coefficient of variation >30%.

† Difference in the pairwise comparison of the monthly percentage in 2020 compared with 2019 is statistically significant at p<0.05.

Preliminary Conclusions and Analysis

The proportion of injury-related ED visits accounted for by pedal cyclist injuries increased in the first year of the COVID-19 pandemic; increases were largest among children and adolescents aged <18 years, adults aged ≥50 years, and females. These findings, coupled with the recent increase in the number of pedal cycling fatalities (*3*), highlight the need for additional pedal cycling safety interventions. To reduce pedal cyclist injury risk, engineering and roadway designs that incorporate safety features for pedal cyclists (e.g., bicycle lanes) can be implemented, and states and localities can consider helmet laws for pedal cyclists of all ages to increase helmet use (*5*).

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Notes from the Field

Multipathogen Respiratory Virus Testing Among Primary and Secondary School Students and Staff Members in a Large Metropolitan School District — Missouri, November 2, 2022–April 19, 2023

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Respiratory virus infections are common in school-aged children (*1*). Although children spend most of their awake hours in the school setting, few data are available on the prevalence of respiratory viruses in schools. Surveillance for respiratory viruses other than SARS-CoV-2 has not been widely conducted in primary and secondary schools (*2*).

Prospective Surveillance and Preliminary Results

To determine the prevalence of respiratory viruses in school students and staff members, prospective surveillance was implemented in a large metropolitan school district in Kansas City, Missouri with 33 pre-Kindergarten (pre-K)–grade 12 schools during the 2022–23 school year. All district students and staff members were eligible to enroll in opt-in respiratory virus testing and symptom surveys irrespective of the presence of symptoms; enrollment information was sent by the school district using existing communication channels. Self-collected anterior nasal swabs were obtained monthly and tested using multiplex viral polymerase chain reaction.* Thirty-six hours before each scheduled monthly test, an electronic survey was sent to enrolled participants (or their parent or guardian) inquiring about respiratory virus infection symptoms during the preceding 7 days.† Logistic regression models were used to compare positivity across age groups. Regression models accounted for clustering within schools when calculating cluster-robust SEs. Percentile-based bootstrapped CIs were calculated using Stata 17 software (version 17.0; StataCorp). The goal of this report is to share timely virus testing results during ongoing surveillance. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.§

Among the 894 total participants, 639 (71.5%) were students (representing 3.0% of total district enrollment of 21,419), and 255 (28.5%) were staff members (representing 7.1% of the total 3,577 district full-time staff members). Demographic characteristics of participants were similar to those reported districtwide, except that the proportion of female participants was higher (60.7%) than that from districtwide estimates (51.1%), and the proportion of students qualifying for free or reduced price meals was lower (31.3% versus 38.0%)¶ (*3*). Among students, the median age was 10.1 years (IQR = 7.5–12.5 years), 289 (45.2%) were male, 406 (63.5%) were non-Hispanic White (White), 80 (12.5%) were Hispanic or Latino (Hispanic), 49 (7.7%) were non-Hispanic multiracial (multiracial), and 46 (7.2%) were non-Hispanic Black or African American (Black). Among staff members, the median age was 42.2 years (IQR = 34.3–51.1 years), 21 (8.2%) were male, 214 (83.9%) were White, 12 (4.7%) were Hispanic, seven (2.7%) were multiracial, and five (2.0%) were Black.

A total of 3,232 surveillance specimens were tested, including 872 (27.0%) from staff members and 2,360 (73.0%) from students (Table). Student specimens included 90 (2.8%) from pre-K students, 1,413 (43.7%) from elementary school students, 479 (14.8%) from middle school students, and 378 (11.7%) from high school students. A median of four specimens per participant (IQR = 3–5) were collected; these included 80 (2.5%) in November, 404 (12.5%) in December, 711 (22.0%) in January, 798 (24.7%) in February, 824 (25.5%) in March, and 415 (12.83%) in April. Overall, 805 (24.9%) specimens tested positive for any virus (95% CI = 23.4%–26.4%). A substantially higher percentage of pre-K specimens tested positive (40.0%) compared with staff member specimens (14.1%) ($p<0.001$).** Overall, rhinovirus/enterovirus (RV/EV) was detected most frequently (392; 12.1%), followed by all seasonal coronaviruses including NL63, HKU1, OC43, and 229E

* Testing was performed using Hologic Panther Fusion Assays for adenovirus; human metapneumovirus; influenza A and B viruses; parainfluenza virus, types 1–4; rhinovirus/enterovirus, RSV, and SARS-CoV-2; and seasonal coronaviruses, including 229E, HKU1, NL63, and OC43.

† Surveys were deployed using Research Electronic Data Capture via text message or email based on parent (for students) or participant (for staff members) preference. Parents and staff members were asked whether participants had respiratory virus infection signs and symptoms (i.e., fever, cough, nasal congestion, runny nose, sore throat, wheezing, shortness of breath, or none of the above) during the previous 7 days and were instructed to select all that applied.

§ 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.

¶ Participants enrolled were 60.7% female, 78.7% White, 6.9% Black, 7.7% multiracial, 11.3% Hispanic, 92.8% with English as their preferred language, and 31.3% qualified for free or reduced meals. School districtwide demographic characteristics for the 2022–23 school year were 51.0% female, 71.0% White, 10.4% Black, 4.5% multiracial, 10.3% Hispanic, 88.1% with English as their preferred language, and 38.0% qualified for free or reduced meals.

** Enrollment was ongoing at the time of analysis.

TABLE. Multiplex polymerase chain reaction testing results from self-collected nasal swabs from students and staff members participating in prospective respiratory virus surveillance testing in schools (N = 3,232) — Missouri, November 2, 2022–April 19, 2023

	School level, no. of specimens (% of total)									
	Pre-K n = 90 (2.8)		Elementary school n = 1,413 (43.7)		Middle school n = 479 (14.8)		High school n = 378 (11.7)		Staff members n = 872 (27.0)	
Virus detected, no. (%)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
Any virus detection, 805 (24.9)*	**36**	**40.0 (26.4–45.2)**	**466**	**33.0 (29.6–36.7)**	**117**	**24.4 (18.1–29.2)**	**63**	**16.7 (12.9–20.5)**	**123**	**14.1 (10.9–16.5)**
Rhinovirus/Enterovirus, 392 (12.1)	13	14.4 (3.2–29.8)	241	17.1 (14.5–20.0)	65	13.6 (7.9–17.6)	31	8.2 (6.0–10.3)	42	4.8 (3.2–6.5)
Adenovirus, 70 (2.2)	11	12.2 (7.6–21.0)	46	3.3 (2.2–4.5)	7	1.5 (0.8–3.8)	3	0.8 (0.4–2.5)	3	0.3 (0.1–0.8)
Seasonal coronavirus, 181 (5.6)	6	6.7 (2.9–8.8)	114	8.1 (6.7–9.3)	17	3.5 (1.1–5.8)	11	2.9 (1.2–4.9)	33	3.8 (2.7–5.0)
Human metapneumovirus, 93 (2.9)	4	4.4 (2.4–11.9)	52	3.7 (2.6–5.0)	13	2.7 (1.0–4.2)	7	1.9 (1.2–3.2)	17	1.9 (0.9–3.2)
SARS-CoV-2, 77 (2.4)	2	2.2 (1.5–4.2)	29	2.1 (1.3–2.9)	9	1.9 (0.7–3.8)	8	2.1 (0.7–4.8)	29	3.3 (2.0–5.2)
Parainfluenza virus, 29 (0.9)	2	2.2 (1.0–8.5)	13	0.9 (0.5–1.3)	5	1.0 (0.3–2.5)	4	1.1 (0.6–3.3)	5	0.6 (0.2–1.3)
RSV,† 23 (0.7)	1	1.1 (0.6–2.8)	11	0.8 (0.3–1.4)	5	1.0 (0.5–2.8)	4	1.1 (0.3–3.0)	2	0.2 (0.1–0.6)
Influenza A,† 21 (0.6)	0	—	11	0.8 (0.4–1.2)	5	1.0 (0.4–2.5)	2	0.5 (0.2–1.1)	3	0.3 (0.1–0.7)
Influenza B, 2 (0.1)	0	—	0	—	1	0.2 (0.1–1.2)	0	—	1	0.1 (0.1–0.1)
Reported symptoms during previous 7 days, no.										
Asymptomatic, 1,628	28	31.1 (18.0–41.6)	657	46.5 (42.0–51.2)	246	51.4 (37.8–57.2)	220	58.2 (46.9–65.4)	477	54.7 (49.0–60.7)
One or more symptoms, 765	37	41.1 (32.3–65.0)	343	24.3 (21.3–27.5)	111	23.2 (18.0–33.6)	53	14.0 (6.8–18.6)	221	25.3 (21.3–29.6)
Survey not completed, 839	25	27.8 (3.1–40.2)	413	29.2 (24.1–34.1)	122	25.5 (18.6–36.4)	105	27.8 (19.9–45.8)	174	20.0 (15.5–24.6)

Abbreviations: Pre-K = pre-Kindergarten; RSV = respiratory syncytial virus.
* Viral detections are not mutually exclusive.
† RSV peak occurred during October–November 2022; influenza peak occurred during October–December 2022. https://www.cdc.gov/surveillance/resp-net/dashboard.html (Accessed July 6, 2023).

(181; 5.6%). Among specimens from pre-K and elementary school students, RV/EV (14.4% and 17.1%, respectively), adenovirus (12.2% and 3.3%, respectively), seasonal coronaviruses (6.7% and 8.1%, respectively) and human metapneumovirus (4.4% and 3.7%, respectively) were frequently detected. Among staff member specimens, RV/EV (4.8%), seasonal coronaviruses (3.8%), and SARS-CoV-2 (3.3%) were frequently detected. Influenza and respiratory syncytial virus (RSV) were infrequently detected from surveillance specimens, possibly because testing commenced after the occurrence of early seasonal peaks (*4*,*5*). More than one virus was detected in 81 (2.5%) specimens.

Among the 3,232 symptom surveys sent, 2,393 (74.0%) were completed. Pre-K students had the highest prevalence of reporting one or more symptoms (41.1%) compared with high school students, among whom prevalence of symptoms was lowest (14.0%) ($p<0.001$).

Preliminary Conclusions

The findings in this report are subject to at least three limitations. First, participation in this program is voluntary; participants who opt in might not be representative of the full school population. Second, all nasal swabs were collected by participants, and approximately 25% of specimens did not have known symptomatology because of lack of survey response. Finally, this early report describes positive laboratory results, not the likelihood of individual students or staff members receiving a positive test result during the school year.

The COVID-19 pandemic highlighted the gap in knowledge related to the prevalence and symptoms of respiratory viruses among children and in schools. These data are important to improve understanding of the epidemiology of respiratory viruses in a school setting, including but not limited to SARS-CoV-2. To support healthy learning environments for all, it is important to implement strategies to prevent and reduce the spread of infectious diseases, including staying up to date with recommended vaccinations, including COVID-19 and influenza vaccines, practicing good hand hygiene and respiratory etiquette, staying home when sick, and improving indoor ventilation. Final results of this surveillance effort will assist in refining the spectrum of panrespiratory approaches to respiratory virus prevention and could direct guidance in primary and secondary schools.

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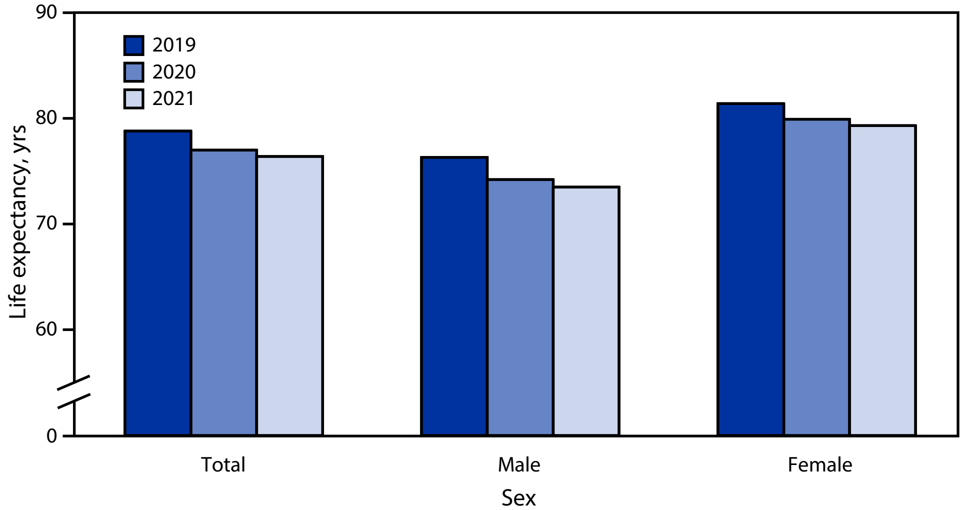
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Life Expectancy at Birth, by Sex — National Vital Statistics System, United States, 2019–2021



Life expectancy at birth for the total population declined 2.4 years from 78.8 in 2019 to 76.4 years in 2021. Life expectancy declined for both males and females during this period. For males, life expectancy declined from 76.3 to 73.5 years and for females from 81.4 to 79.3 years. Life expectancy was higher for females than males by 5.1 years in 2019, and that difference increased to 5.8 years in 2021.

Sources: National Vital Statistics System, United States Life Tables, 2020 (https://www.cdc.gov/nchs/data/nvsr/nvsr71/nvsr71-01.pdf); Mortality in the United States, 2021. https://www.cdc.gov/nchs/data/databriefs/db456.pdf

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