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Prevalence of and Changes in Tooth Loss Among Adults Aged ≥50 Years with Selected Chronic Conditions — United States, 1999–2004 and 2011–2016

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Extensive tooth loss can lead to poor diet resulting in weight loss or obesity (*1*). It can also detract from physical appearance and impede speech, factors that can restrict social contact, inhibit intimacy, and lower self-esteem (*1*). Chronic medical conditions and oral conditions share common risk factors (*2*). Persons with chronic conditions are more likely to have untreated dental disease, which can result in tooth loss. Three measures of tooth loss during 1999–2004 and 2011–2016 were estimated by comparing data from the National Health and Nutrition Examination Survey (NHANES) for each period among adults aged ≥50 years with selected chronic conditions.* The three measures were 1) edentulism (having no teeth); 2) severe tooth loss (having eight or fewer teeth) (*3*); and 3) lacking functional dentition (having <20 teeth out of 28, which is considered a full set for the purpose of NHANES assessments) (*4*). During 2011–2016, prevalences of edentulism and severe tooth loss were ≥50% higher among adults with fair or poor general health, rheumatoid arthritis, asthma, diabetes, emphysema, heart disease, liver condition, or stroke than among those with those adults without the chronic condition. Lack of functional dentition was also more prevalent among adults with chronic conditions than among persons without these conditions. Tooth loss is preventable with self-care and routine dental visits (*1*). To encourage these behaviors, public health professionals can educate the public about the association between having a chronic condition and tooth loss, and primary care providers can educate their patients about the importance of healthy behaviors and screen and refer them for needed dental care.

Data obtained from CDC's NHANES, a multistage probability sample designed to assess the health and nutritional status of the noninstitutionalized U.S. population through participant interviews and physical examinations,† were analyzed for all adults aged ≥50 years and those with selected chronic conditions; the analysis was limited to adults who completed a dental examination as part of NHANES. Prevalences of the three categories of tooth loss (edentulism and severe tooth loss [determined by the Global Burden of Disease to cause major difficulty in eating meat, fruits, and vegetables (*3*)] and lacking functional dentition), using the World Health Organization criteria (*4*) during 2011–2016 were estimated. Lack of functional dentition provides the most actionable information among the three measures because it detects symptomatic tooth loss in the earliest stage. Chronic conditions were self-reported except for uncontrolled diabetes, obesity, and the number of teeth lost, which were clinically assessed. Estimated prevalence

* Data from three 2-year cycles of NHANES were combined for each period: 1999–2000, 2001–2002, and 2003–2004 and 2011–2012, 2013–2014, and 2015–2016, respectively.

† https://www.cdc.gov/nchs/nhanes.htm.

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of tooth loss and chronic conditions were standardized to the U.S. 2000 Census population by 5-year age increments and sex. T-tests were used to determine whether prevalence of each category of tooth loss varied by chronic disease status and whether lack of functional dentition differed from 1999–2004 to 2011–2016. All analyses were conducted using SAS-callable SUDAAN software (version 11.0.3; RTI International), which accounted for the examination sample weights and the complex, clustered design of NHANES.

The study sample comprised 6,283 adults during 1999–2004 and 7,443 during 2011–2016. During these periods, the following respective prevalences of selected chronic conditions were reported: fair or poor general health (24.5%, 21.7%), any arthritis (43.3%, 45.0%), rheumatoid arthritis (16.3%, 6.1%), asthma (5.4%, 8.9%), diabetes (13.7%, 17.7%), emphysema (4.1%, 3.7%), heart disease (16.7%, 13.4%), liver condition (1.6%, 2.6%), and history of stroke (5.4% during both periods) (Table 1).

During 2011–2016, among adults who had a dental exam, the prevalences of edentulism, severe tooth loss, and lacking functional dentition were 10.8%, 16.9%, and 31.8%, respectively (Table 2). The prevalences of edentulism and severe tooth loss were higher among persons with each selected chronic condition except obesity than they were among those who did not have the condition. The prevalence of edentulism was at least twice as high among adults with fair or poor general health, emphysema, heart disease, or stroke history as it was among those without the condition; the prevalence of severe tooth loss was ≥50% higher for adults with fair or poor general health, rheumatoid arthritis, asthma, diabetes, uncontrolled diabetes, emphysema, heart disease, liver condition, or stroke, compared with those who did not have the condition.

The overall prevalence of lack of functional dentition decreased 11.7 percentage points from 1999–2004 (43.5%) to 2011–2016 (31.8%) (Figure) (Supplementary Table, https://stacks.cdc.gov/view/cdc/88330). Improvements were detected for persons with fair or poor general health, any arthritis, diabetes, and obesity. The most notable improvements were among persons reporting diabetes (16.6 percentage-point decrease) and uncontrolled diabetes (18.8 percentage-point decrease). Prevalence of lack of functional dentition increased by 11.2 percentage points among persons with rheumatoid arthritis during this period. During 2011–2016, lack of functional dentition was ≥50% more prevalent among adults reporting fair or poor general health, rheumatoid arthritis, emphysema, or heart disease than among those not reporting the condition (Supplementary Table, https://stacks.cdc.gov/view/cdc/88330).

Discussion

Among adults aged ≥50 years who had a dental exam as part of NHANES, having at least one selected chronic condition was associated with increased tooth loss. Studies using earlier NHANES data also found this association (*1*,*2*). Although the prevalence of lack of functional dentition largely decreased from 1999–2004 to 2011–2016, the association between tooth

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TABLE 1. Case definitions and prevalences* of selected chronic conditions among adults aged ≥50 years — National Health and Nutrition Examination Survey, United States, 1999–2004 and 2011–2016

Health condition	Case definition	Prevalence, % (SE)	
		1999–2004	2011–2016
General health (fair or poor)	Reporting fair or poor general health versus excellent, very good, or good	24.5 (1.1)	21.7 (1.0)
Any arthritis	Answered "yes" to ever being told had arthritis	43.3 (0.8)	45.0 (0.9)
Rheumatoid arthritis	Answered "yes" to ever being told had arthritis and "yes" to having rheumatoid arthritis	16.3 (0.6)	6.1 (0.4)
Asthma	Answered "yes" to both ever being told had asthma and "yes" to still having asthma	5.4 (0.4)	8.9 (0.6)
Diabetes	Answered "yes" to ever being told had diabetes by doctor or other health care professional	13.7 (0.6)	17.7 (0.6)
Uncontrolled diabetes	Glycohemoglobin level ≥6.5%	11.6 (0.5)	14.6 (0.6)
Emphysema	Answered "yes" to ever being told had emphysema by a doctor or other health care professional	4.1 (0.4)	3.7 (0.3)
Heart disease	Answered "yes" to ever being told had congestive heart failure, coronary heart disease, angina/angina pectoris, or heart attack by a doctor or other health care professional	16.7 (0.8)	13.4 (0.5)
Liver condition	Answered "yes" to both ever being told had any kind of liver condition by a doctor or other health care professional and "yes" to still having a liver condition	1.6 (0.2)	2.6 (0.3)
Obesity	Body mass index score (determined during clinical examination) ≥30 kg/m^2	32.7 (1.0)	39.9 (1.0)
Stroke	Answered "yes" to ever being told had a stroke	5.4 (0.3)	5.4 (0.3)

Abbreviation: SE = standard error.
* All estimates were standardized by using 5-year age increments and sex to U.S. 2000 Census population.

loss and having a chronic condition remained, and among persons who reported having rheumatoid arthritis, the prevalence of lack of functional dentition increased. The reasons for this finding are not known; the prevalence of reported rheumatoid arthritis decreased substantially (>60%) from 1999–2004 to 2011–2016 (Table 1), so the increase in prevalence of lack of functional dentition among persons with rheumatoid arthritis could possibly be attributable to changes in the sample composition between surveys.

Dental caries and periodontal (gum) disease are the leading causes of tooth loss; both are preventable. Primary prevention of caries includes treatment with fluoride applied professionally or at home and added to drinking water; scaling and root planing in a dental office can also prevent and stop the progression of periodontal disease (*1*). In addition to fluoride, dental fillings (restorations) can also prevent the progression of caries. A 2009 analysis of 1999–2004 NHANES data found that after controlling for covariates, (e.g., race/ethnicity and income), persons with chronic conditions had higher levels of unmet dental treatment needs than did persons without chronic conditions; obesity, diabetes, emphysema, and stroke were associated with a higher prevalence of unmet need for treatment of caries, and diabetes and obesity were associated with higher prevalences of unmet need for treatment of periodontitis (*2*).

Because traditional Medicare (Parts A and B) does not cover routine dental care, older adults with chronic conditions might have difficulty accessing clinical dental care because they lack dental insurance. Some Medicare Advantage plans (Part C), however, do cover routine dental services (*5*). Persons with low household income might also lack access because of the limited dental safety net; in 2019, only 18 states and the District of Columbia offered extensive dental services to adults enrolled in Medicaid (*6*). In addition, chronic conditions can limit mobility, which might make visiting a dentist and maintaining good home care more difficult.

Data from the 2017 Medical Expenditure Panel Survey indicated that >40% of adults aged ≥65 years had a past-year visit to a physician's office but no visit to a dentist (Agency for Healthcare Research and Quality, unpublished analysis, 2019). Better integration and collaboration between all providers could improve health care outcomes. Health care professionals can thus play an important role in helping their patients with chronic conditions keep their natural teeth. Providers can

Summary

What is already known about this topic?

Older adults are more likely to annually visit a doctor than a dentist. Certain chronic conditions are associated with severe tooth loss, which can diminish quality of life and interfere with eating healthy foods.

What is added by this report?

Among adults aged ≥50 years who had a dental exam as part of the National Health and Nutrition Examination Survey, those reporting selected chronic conditions were significantly more likely to have severe tooth loss than were persons without chronic conditions.

What are the implications for public health practice?

Health care professionals can educate patients with chronic diseases about their increased risk for tooth loss, screen for dental disease, and refer patients for needed dental care.

TABLE 2. Prevalences and prevalence ratios* of edentulism, severe tooth loss, and lack of functional dentition among U.S. adults aged ≥50 years with and without selected chronic conditions who had a dental exam — National Health and Nutrition Examination Survey, United States, 2011–2016

	Edentate (zero teeth)		Severe tooth loss (≤8 teeth)		Lack of functional dentition (<20 teeth)	
Condition	**% (SE)**	**Prevalence ratio†**	**% (SE)**	**Prevalence ratio†**	**% (SE)**	**Prevalence ratio†**
All	**10.8 (0.8)**	**N/A**	**16.9 (1.0)**	**N/A**	**31.8 (1.2)**	**N/A**
General health						
Fair or poor	19.2 (1.7)§	2.29	30.2 (1.8)§	2.31	52.4 (2.1)§	2.01
Good or better	8.4 (0.6)		13.1 (0.8)		26.1 (1.1)	
Any arthritis						
Yes	12.3 (1.2)§	1.24	18.6 (1.3)§	1.18	35.8 (1.7)§	1.22
No	9.9 (0.8)		15.7 (1.0)		29.3 (1.1)	
Rheumatoid arthritis						
Yes	18.2 (2.6)§	1.77	25.1 (2.7)§	1.54	48.3 (2.5)§	1.57
No	10.3 (0.8)		16.3 (1.0)		30.7 (1.2)	
Asthma						
Yes	16.9 (2.0)§	1.64	24.9 (2.2)§	1.54	44.1 (3.1)§	1.44
No	10.3 (0.8)		16.2 (1.0)		30.6 (1.2)	
Diabetes						
Yes	15.2 (1.6)§	1.52	24.2 (2.0)§	1.56	43.4 (2.3)§	1.46
No	10.0 (0.8)		15.5 (1.0)		29.7 (1.3)	
Uncontrolled diabetes						
Yes	13.8 (1.7)§	1.35	23.4 (1.9)§	1.51	42.2 (2.2)§	1.42
No	10.2 (0.8)		15.5 (1.0)		29.8 (1.2)	
Emphysema						
Yes	39.2 (5.6)§	3.96	49.1 (6.0)§	3.11	66.1 (5.9)§	2.15
No	9.9 (0.7)		15.8 (0.9)		30.7 (1.1)	
Heart disease						
Yes	20.7 (2.6)§	2.11	29.3 (2.2)§	1.89	51.2 (3.2)§	1.72
No	9.8 (0.7)		15.5 (1.0)		29.8 (1.2)	
Liver condition						
Yes	16.2 (2.5)§	1.51	26.5 (3.3)§	1.60	45.7 (4.5)§	1.45
No	10.7 (0.8)		16.6 (1.0)		31.5 (1.2)	
Obesity						
Yes	11.9 (1.0)	1.16	18.8 (1.0)§	1.19	35.6 (1.5)§	1.23
No	10.3 (0.9)		15.8 (1.2)		29.0 (1.4)	
Stroke						
Yes	22.6 (3.2)§	2.24	35.0 (3.7)§	2.20	55.8 (3.4)§	1.82
No	10.1 (0.8)		15.9 (1.0)		30.7 (1.2)	

Abbreviations: N/A = not applicable; SE = standard error.
* All estimates were standardized by using 5-year age increments and sex to U.S. 2000 Census population.
† Prevalence in group with condition divided by prevalence in those without condition.
§ Statistically significant (p<0.05).

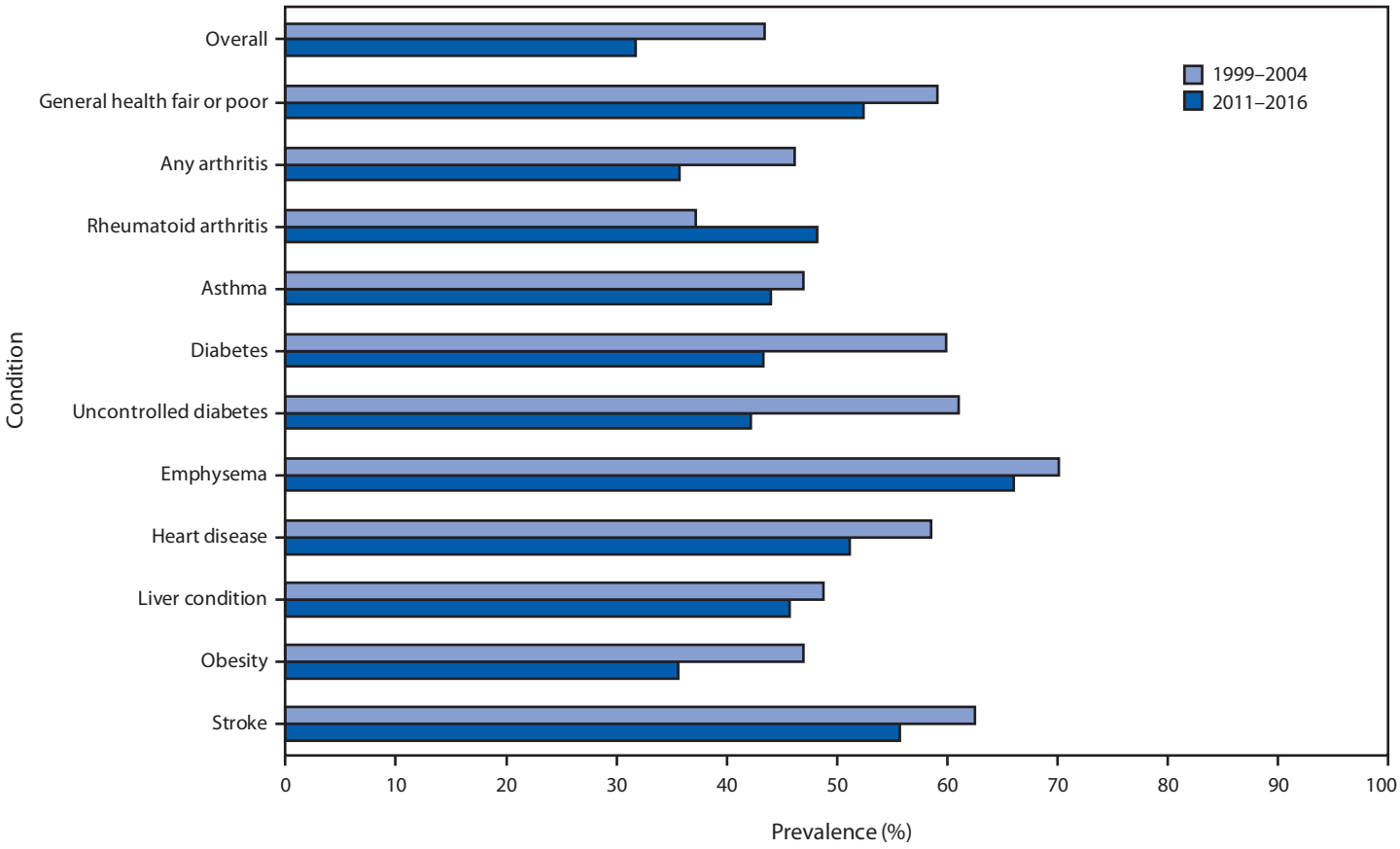
educate these patients about their higher risk for tooth loss and the importance of preventive care administered at home or received in a dental office.

Primary care providers can also screen patients for common dental conditions and refer them for necessary care. A 2011 Institute of Medicine report§ found that health care professionals, with proper training, can assess risk and screen for common oral conditions (*7*); an oral health curriculum designed for medical providers is available on the Smiles for Life website (*8*). Nonprofit organizations can also play a role in preventing tooth loss by educating their constituents about their higher risk for tooth lost and need for prevention. Among the chronic conditions included in this review, the only one with recommendations for routine dental visits as the standard of care is diabetes (*9*). A Cochrane review found some evidence that treating periodontitis can improve outcomes (i.e. glycemic control) among persons with diabetes (*10*). In this study, improvements in maintaining functional dentition were notably high among persons with diabetes.

The findings in this report are subject to at least three limitations. First, the data for most chronic conditions were self-reported. Second, the prevalences of some chronic conditions were low; therefore, there might have been insufficient power to detect a significant difference. Small sample size also might have contributed to statistically unreliable changes among persons reporting emphysema, a liver condition, or stroke history.

§ Currently known as The National Academies of Science, Engineering, and Medicine.

FIGURE. Change in prevalence*,† of lack of functional dentition (<20 teeth) among U.S. adults aged ≥50 years with selected chronic conditions — National Health and Nutrition Examination Survey, United States, 1999–2004 and 2011–2016



* All estimates were standardized to the 2000 U.S. Census population by 5-year age increments and sex.
† Change in prevalence is statistically significant ($p<0.05$) for all conditions except asthma, emphysema, heart disease, liver condition, and stroke.

Finally, some covariates associated with chronic disease such as race/ethnicity and income were not controlled for; therefore, differences in dental health status between persons with and without chronic conditions could also have been attributable to these factors.

During 2016–2018, CDC funded programs in six states to enhance understanding of connections between chronic disease and oral health in state health department programs. Several states initiated pilot projects to implement strategies for better coordination of medical and dental care. CDC currently supports medical-dental integration activities to increase bidirectional messaging and referrals for dentists and primary care providers serving patients with prediabetes, diabetes, and hypertension.¶ Information obtained from these activities can be used to develop effective approaches to reduce the high prevalence of tooth loss among persons with chronic conditions and support better chronic disease management.

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¶ https://www.cdc.gov/chronicdisease/resources/publications/aag/oral-health.htm.

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Evaluation of a Program to Improve Linkage to and Retention in Care Among Refugees with Hepatitis B Virus Infection — Three U.S. Cities, 2006–2018

Janine Young[1]; Colleen Payton[2]; Patricia Walker[3]; Daniel White[1]; Megan Brandeland[4]; Gayathri S. Kumar[5]; Emily S. Jentes[5]; Ann Settgast[3]; Malini DeSilva[3]

An estimated 257 million persons worldwide have chronic hepatitis B virus (HBV) infection (*1*). CDC recommends HBV testing for persons from countries with intermediate to high HBV prevalence (≥2%), including newly arriving refugees (*2*). Complications of chronic HBV infection include liver cirrhosis and hepatocellular carcinoma, which develop in 15%–25% of untreated adults infected in infancy or childhood (*3*). HBV-infected patients require regular monitoring for both infection and sequelae. Several studies have evaluated initial linkage to HBV care for both refugee and nonrefugee immigrant populations (*4–9*), but none contained standardized definitions for either linkage to or long-term retention in care for chronic HBV–infected refugees. To assess chronic HBV care, three urban sites that perform refugee domestic medical examinations and provide primary care collaborated in a quality improvement evaluation. Sites performed chart reviews and prospective outreach to refugees with positive test results for presumed HBV infection during domestic medical examinations. Linkage to care (29%–53%), retention in care (11%–21%), and outreach efforts (22%–71% could not be located) demonstrated poor access to initial and ongoing HBV care. Retrospective outreach was low-yield. Interventions that focus on prospective outreach and addressing issues related to access to care might improve linkage to and retention in care.

Patients with a positive HBV surface antigen (HBsAg) test result during domestic medical examinations were included in the quality improvement evaluation; this result was used as a proxy for presumed chronic HBV infection. For patients not receiving optimal HBV care as defined by each clinic, trained personnel performed phone outreach using standardized phone scripts and certified medical interpreters. The script queried patients about HBV care, included HBV education, and emphasized the need for follow-up. Patients were advised to reestablish care with a primary care provider if they were living outside clinic catchment areas and not in care. Sites sent scripted messages on HBV best practices to primary care providers within their health systems if their patients were lost to follow-up or not receiving optimal HBV care.

From 2006 through 2012, a state-based public health refugee medical screening clinic in Denver, Colorado, (clinic A) performed domestic medical examinations and provided follow-up care for a proportion of persons screened. All clinic A patients with positive test results for HBsAg were referred to a gastrointestinal (GI) specialist for ongoing management. Chart reviews and telephone outreach for patients with positive test results for HBsAg were conducted during 2016–2018 to determine whether patients were up to date with laboratory testing. Persons who were not up to date were offered follow-up appointments; an online search database was used to find current telephone numbers for those who could not be contacted. A nurse updated problem lists in patient charts with chronic hepatitis B diagnoses.

Clinic B, in St. Paul, Minnesota, performed domestic medical examinations and provided follow-up primary and ongoing HBV care for some patients, although patients might also have received ongoing hepatitis B care through GI specialists. Patients with domestic medical examinations performed during 2008–2017 who were aged ≥18 years at the start of the quality improvement project and had received medical care within the health system during the previous 3 years were included. During 2017, chart reviews were performed to determine whether patients were up to date with laboratory testing and liver ultrasound and had at least one appointment with a GI specialist. Initial linkage to HBV care was not evaluated at clinic B because the standard of care was to obtain alanine aminotransferase (ALT) levels and HBsAg testing for all patients and reflex laboratories (i.e., HBeAg, hepatitis B e-antibody [HBeAb], hepatitis B core antibody [HBcAb], and HBV DNA) for patients with positive test results for HBsAg; hepatitis B education was provided to patients with positive test results for HBsAg at the second visit.

Clinic C, in Philadelphia, Pennsylvania, conducted domestic medical examinations and provided follow-up care. Patients with domestic medical examinations performed during 2007–2018 were included in the analysis. Refugees with positive test results for HBsAg were followed by a primary care provider, a GI specialist, or an infectious disease specialist for ongoing hepatitis B care. Chart reviews were performed to determine whether patients were up to date with laboratory tests and appointments. Telephone outreach to patients not receiving optimal hepatitis B care was conducted from 2017 through 2018.

All sites received an Institutional Review Board waiver based on quality improvement designation. A CDC human subjects

advisor determined that this project did not meet the definition of research under 45 CFR 46.102(d).*

Laboratory Results

Clinic A. Laboratory test results indicating initial linkage to care for clinic A included HBV DNA, ALT, HBeAg, and HBeAb; those indicating retention in care included HBV DNA and ALT (Table 1). A total of 306 refugees had positive test results for HbsAg, and among these refugees, 204 were included in evaluations by clinic A; 29% (60) had initial linkage, 12% (24) were retained in care, and 84% (172) were not receiving optimal HBV care (Table 2). Despite telephone outreach efforts, 71% of patients were lost to follow-up, and one patient was confirmed to have died from hepatocellular carcinoma.

Clinic B. Laboratory results indicating retention in care for refugees who received domestic medical examinations at clinic B included HBV DNA, ALT, and alpha-fetoprotein. (Table 1). Among 137 of 310 refugees with positive test results for HBsAg who were included in the quality improvement follow-up, 21% (29) were retained in hepatitis B care (Table 2). Among the 79% (108) not receiving optimal hepatitis B care, 15% (16) were up to date on laboratory monitoring and ultrasound but had not been seen by a GI specialist, 20% (22) agreed to schedule appointments at clinic B to reestablish care, and 15% (16) reported receiving care for their HBV infection outside clinic B. Overall, 28% (30) of those not receiving optimal hepatitis B care could not be contacted by telephone, 7% (eight) were being followed by a GI specialist but were not up to date on laboratory testing and imaging, and 1% (one) declined follow-up because they lacked health insurance.

Summary

What is already known about this topic?

CDC recommends testing of all newly arriving refugees for hepatitis B virus (HBV) infection.

What is added by this report?

After diagnosis of HBV infection at three U.S. refugee screening sites, rates of linkage to specialist care were low at two sites (29% and 53%) and rates of retention in care ranged from 11% to 21%. Coordinated retrospective outreach to refugees with HBV infection was labor-intensive and low-yield.

What are the implications for public health practice?

Implementation and evaluation of interventions to improve linkage to and retention in hepatitis B care for refugees, including comprehensive, standardized counseling at the time of diagnosis and at all follow-up visits, removing barriers to care, and real-time monitoring patient follow-up, are needed to improve disease management and prevent transmission.

Clinic C. Laboratory tests required for initial linkage to care included HBV DNA, ALT, HBeAg, and HBeAb; those required for retention in care included HBV DNA and ALT (Table 1). Among 53 (3%) refugees with positive test results for HBsAg, 53% were initially linked to hepatitis B care, 11% were retained in care, and 47 (89%) were not receiving optimal hepatitis B care (Table 2). Outreach was attempted for 42 of 47 patients not receiving optimal care. Among 42 patients not receiving optimal hepatitis B care for whom telephone outreach had been attempted, 69% could not be located, 10% were not in HBV care, 14% were in care with an outside provider, and 7% had moved outside the jurisdiction.

* https://www.hhs.gov/ohrp/sites/default/files/revised-common-rule-reg-text-unofficial-2018-requirements.pdf.

TABLE 1. Hepatitis B care definitions used by three clinics caring for refugees with hepatitis B virus infection — Denver, Colorado (Clinic A); St. Paul, Minnesota (Clinic B); and Philadelphia, Pennsylvania (Clinic C), 2006–2018

Definition	Clinic A	Clinic B	Clinic C
Linkage to hepatitis B care	Seen by GI specialist within 12 months of domestic medical examination for hepatitis B, with HBV DNA, ALT, HBeAg, HBeAb laboratory testing completed	Not evaluated	Seen by primary or specialty care (GI or ID specialist) within 12 months of domestic medical examination for hepatitis B, with HBV DNA, ALT, HBeAg, HBeAb laboratory testing completed
Retained in hepatitis B care	One or more primary care or GI specialist visits after initial linkage to hepatitis B care in which HBV infection was addressed within the past 12 months, including ALT and HBV DNA	Laboratory tests within previous 3–6 months: ALT, HBV DNA, and alpha-fetoprotein Liver ultrasound within previous 6–12 months GI specialist appointment at any time	One or more primary or specialty care visits after initial linkage to hepatitis B care in which HBV infection was addressed within the past 12 months, including ALT and HBV DNA
Not receiving optimal hepatitis B care	No primary or GI specialist visit in which hepatitis B was addressed within the past 12 months, including ALT and HBV DNA	Overdue for laboratory tests or liver ultrasound and no previous GI specialist appointment	No primary or specialty visit in which hepatitis B was addressed within the past 12 months, including ALT and HBV DNA

Abbreviations: ALT = alanine aminotransferase; GI = gastrointestinal; HBeAb = hepatitis B e-antibody; HBeAg = hepatitis B e-antigen; HBV = hepatitis B virus; ID = infectious diseases.

TABLE 2. Refugee demographics and hepatitis B care quality improvement results from three clinics — Denver, Colorado (Clinic A); St. Paul, Minnesota (Clinic B); and Philadelphia, Pennsylvania (Clinic C), 2006–2018

Characteristic	No. (%)		
	Clinic A	Clinic B	Clinic C
Refugees screened for hepatitis B during domestic medical exam*	5,520 (100)	5,229 (100)	1,676 (100)
Refugees with positive HBsAg	306 (6)	310 (6)	53 (3)
Refugees included in quality improvement†	204 (4)	137 (3)	53 (3)
Median age, yrs (interquartile range)	31 (24–42)	34 (27–44)	29 (25–40)
Female	77 (37)	47 (34)	16 (30)
Birth country			
Bhutan	13 (6)	3 (2)	0 (0)
Burma	101 (50)	85 (62)	27 (51)
Democratic Republic of the Congo	6 (3)	3 (2)	6 (11)
Ethiopia	7(3)	7 (5)	0 (0)
Eritrea	9 (4)	1 (1)	0 (0)
Somalia	28 (14)	28 (20)	0 (0)
Thailand	0 (0)	7 (5)	0 (0)
Other	40 (20)	3 (2)	20 (38)
Hepatitis B care outcomes§	204 (100)	137 (100)	53 (100)
Linked to hepatitis B care	60 (29)	N/A	28 (53)
Retained in hepatitis B care	24 (12)	29 (21)	6 (11)
Not receiving optimal hepatitis B care	172 (84)	108 (79)	47 (89)
Cleared hepatitis B virus infection	7 (3)	—¶	—¶
Death from hepatocellular carcinoma**	1 (<1)	—¶	—¶
Outreach, no. (%)††	167	108	42
Could not be located	119 (71)	30 (28)	29 (69)
Receiving medical care within the health system but lost to follow-up for hepatitis B; inbox message sent to primary care provider	4 (2)	15 (14)	0 (0)
UTD laboratory and ultrasound, but no GI specialist appointment	N/A	16 (15)	N/A
GI specialist following, but laboratory and ultrasound outdated	N/A	8 (7)	N/A
Receiving hepatitis B care with outside provider	1 (<1)	16 (15)	6 (14)
Declined follow-up, no insurance	N/A	1 (1)	N/A
Scheduled appointment at clinic	N/A	22 (20)	N/A
Not in hepatitis B care	37 (22)	N/A	4 (10)
Moved, hepatitis B education letter sent	6 (4)	N/A	3 (7)

Abbreviations: GI = gastrointestinal; HBsAg = hepatitis B surface antigen; N/A = not available; UTD = up to date.

* Clinic A: 2006–2012; clinic B: 2008–2017; clinic C: 2007–2018.

† 102 patients excluded from Denver chart review because these patients were referred to other primary care clinics for ongoing care; charts not available. 173 patients excluded from clinic B quality improvement because patient had not been seen within the health system in the 3 years before start of quality improvement project or patient was aged <18 years at time of project start.

§ Clinic A: 2016–2018; clinic B: 2017–2018; clinic C: 2007–2018.

¶ Data not collected by clinics B and C.

** In Colorado, hepatitis B-related deaths were confirmed by matching cases to Colorado vital records.

†† Outreach by patient navigators to refugees not receiving optimal hepatitis B care.

Discussion

Patients with chronic HBV infection require lifelong monitoring to prevent progression to end stage liver disease and hepatocellular carcinoma. Although it is recommended that those with positive test results for HBV receive counseling and additional evaluation to determine treatment eligibility, there are no mechanisms in place to ensure that this takes place. Despite recommended HBV screening practices during domestic refugee medical examinations, significant barriers remain for long-term management of HBV infection in refugee populations. A low percentage of refugee patients who received a diagnosis of HBV infection at domestic medical examinations attended initial hepatitis B-specific appointments (clinics A and C), and retention in care was low at all three sites, ranging from 11% to 21%. These results are similar to those of another recent study, which included mostly Asian immigrants living in the United States and found that management of chronic HBV infection was poor (*10*). Although not specifically evaluated, it is hypothesized that insufficient HBV counseling at the time of diagnosis, complicated by difficulties navigating the U.S. health system because of patients' limited English proficiency, transportation challenges, access to insurance coverage, and other competing priorities, including need for work and income, likely affect both initial and long-term follow-up. In this investigation, retrospective outreach to refugees with hepatitis B infection was labor-intensive and low-yield in improving follow-up. Implementation of standard linkage and retention definitions would be useful in future

investigations to systematically assess intervention effectiveness across multiple sites. In addition, creation of hepatitis B patient registries to provide active monitoring of patients in real time might allow for prospective outreach with the goal of improving follow-up.

The findings in this report are subject to at least four limitations. First, site-specific definitions were used to assess initial linkage to and retention in care, so numbers might be under- or overestimated. Second, patient populations varied between sites; and available community supports, education level, and cultural differences in perception of U.S. health care, HBV infection, and understanding of preventive medicine might have affected linkage and retention. Third, sites only had access to internal electronic medical records; some refugees might have been receiving care through other health systems. Finally, given that an initial positive HBsAg result was used as a proxy for presumed chronic HBV infection, the number of patients with chronic HBV infection might have been overestimated.

Identification and management of hepatitis B infection in persons from countries with a high prevalence of infection, including refugees, is important to protecting their health and preventing transmission to others; refugees are at risk for not being linked to and retained in hepatitis B care. Future efforts should focus on identification of barriers and facilitators that contribute to linkage to and retention in hepatitis B care with the goal of developing interventions to improve timely outreach and long-term follow-up.

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Universal and Serial Laboratory Testing for SARS-CoV-2 at a Long-Term Care Skilled Nursing Facility for Veterans — Los Angeles, California, 2020

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On March 28, 2020, two residents of a long-term care skilled nursing facility (SNF) at the Veterans Affairs Greater Los Angeles Healthcare System (VAGLAHS) had positive test results for SARS-CoV-2, the cause of coronavirus disease 2019 (COVID-19), by reverse transcription–polymerase chain reaction (RT-PCR) testing of nasopharyngeal specimens collected on March 26 and March 27. During March 29–April 23, all SNF residents, regardless of symptoms, underwent serial (approximately weekly) nasopharyngeal SARS-CoV-2 RT-PCR testing, and positive results were communicated to the county health department. All SNF clinical and nonclinical staff members were also screened for SARS-CoV-2 by RT-PCR during March 29–April 10. Nineteen of 99 (19%) residents and eight of 136 (6%) staff members had positive test results for SARS-CoV-2 during March 28–April 10; no further resident cases were identified on subsequent testing on April 13, April 22, and April 23. Fourteen of the 19 residents with COVID-19 were asymptomatic at the time of testing. Among these residents, eight developed symptoms 1–5 days after specimen collection and were later classified as presymptomatic; one of these patients died. This report describes an outbreak of COVID-19 in an SNF, with case identification accomplished by implementing several rounds of RT-PCR testing, permitting rapid isolation of both symptomatic and asymptomatic residents with COVID-19. The outbreak was successfully contained following implementation of this strategy.

VAGLAHS includes 150 long-term care beds in three SNF patient care areas, or wards; SNF wards A and B are in building 1, and ward C is in building 2. Buildings 1 and 2 do not share common areas, but residents might have indirect contact with outside persons while receiving medical services such as dialysis. These wards admit residents who require intravenous antibiotics, complex wound care, other rehabilitation needs, routine dialysis, chemotherapy, or radiation therapy; underlying conditions, including chronic obstructive pulmonary disease, hypertension, cardiovascular disease, and chronic kidney disease, are common. At the time of the outbreak, 99 (66%) beds were occupied; >95% of residents were men aged 50–100 years. All data were abstracted from the VAGLAHS electronic health record system on which all records are maintained on inpatients, SNF residents, and outpatients.

To reduce the risk for introduction of SARS-CoV-2, on March 6, all VAGLAHS staff members and visitors were screened for symptoms of COVID-19 (i.e., fever, cough, or shortness of breath), travel to countries that had CDC travel warnings for COVID-19, and any close contact with persons with known COVID-19; those with relevant symptoms or exposures were not allowed entry to any area of the facility. On March 11, all SNF admissions were suspended, and daily temperature and symptom screening began for all residents. Residents with fever or lower respiratory tract signs or symptoms were placed on droplet and contact precautions in single-person rooms. On March 17, visitors were prohibited from entering any SNF building.

On March 26, the index patient (patient A0.1[†]) in ward A developed fever. A second ward A patient (patient A0.2) developed fever and cough on March 27. Nasopharyngeal swabs collected the day of fever onset were reported as positive for SARS-CoV-2 for both patients A0.1 and A0.2 on March 28. In response, during March 29–31, VAGLAHS staff members screened all building 1 (wards A and B) residents, regardless of symptoms, by SARS-CoV-2 RT-PCR testing of nasopharyngeal swabs. On March 29, a resident from ward C (C0.1) in building 2 became symptomatic; SARS-CoV-2 RT-PCR nasopharyngeal testing was positive on March 30, prompting testing of all building 2 residents on March 31. All three residents with a diagnosis of COVID-19 (patients A0.1, A0.2, and C0.1) were transferred to the affiliated acute care hospital for isolation and clinical management.

Implementation of infection control procedures (i.e., hand hygiene, droplet and contact precautions for persons with fever or lower respiratory tract signs or symptoms), and strategies for case identification and containment were reviewed with SNF staff members. Although staff members could previously be assigned to daily shifts on different wards, beginning on March 28, each staff member was assigned to a single ward.

[*] These authors contributed equally to this report.

[†] Residents in this report are labeled as follows: the first character (A, B, C) represents the originating ward of the patient with a diagnosis of COVID-19; the numeric character preceding the decimal point represents whether they were identified as an index patient (0) or in a round of surveillance testing (1, 2); the numeric character following the decimal point (1–10) represents the individual patient ordered chronologically by receipt of positive test result.

During the outbreak, an infection control nurse regularly reviewed and monitored the use of recommended personal protective equipment (PPE) with all SNF staff members. Protocols for use of PPE, based on CDC guidance,[§] did not change during the outbreak. All staff members were screened by RT-PCR at least once during March 29–April 10.

RT-PCR Testing of Residents

RT-PCR testing of all residents, conducted during March 29–March 31 in wards A, B, and C, identified SARS-CoV-2 in four (13%) of 30 residents on ward A, none of 30 residents on ward B, and 10 (28%) of 36 residents on ward C. All infected residents were transferred to the affiliated hospital for isolation and clinical management, and the wards were closed to new admissions. Following the initial testing, some residents moved between the SNF and the affiliated hospital for treatment of medical conditions unrelated to COVID-19.

Considering the number of cases identified through initial testing, the Infection Control team, in coordination with the SNF nursing staff members, implemented serial (approximately weekly) RT-PCR testing among residents of wards A and C until no additional residents received a positive test result. On April 3, all 22 remaining ward A residents received negative test results and were subsequently transferred to wards B and C. Ward A was converted into a COVID-19 recovery unit to cohort patients without acute hospital needs with continued RT-PCR–positive test results during convalescence. On April 6, the 28 residents on ward C were retested; two had positive test results and were transferred to the COVID-19 recovery unit (Box). A third round of testing was performed on ward C on April 13; all 27 residents had negative test results. During April 22–23, a final round of testing conducted on wards B and C identified no positive test results among the remaining 83 residents.

In total, three residents were identified with COVID-19 based on testing conducted because of symptoms, and 16 additional residents were identified with COVID-19 because of RT-PCR testing, two of whom reported or were identified with symptoms at the time of RT-PCR testing (Table). Fourteen of the 19 (74%) residents with COVID-19 reported no symptoms at the time of testing; among these residents, eight were presymptomatic, developing symptoms 1–5 days after the date of specimen collection. One of the three initially identified patients, C0.1, a man aged >90 years, died.

[§] https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control.html.

BOX. Discharge criteria for Veterans Affairs Greater Los Angeles Healthcare System (VAGLAHS) facility patients with positive test results for SARS-CoV-2 and criteria for transfer back to acute care hospital — Los Angeles, California, 2020

Required criteria for discharge from acute care to COVID-19 recovery unit*

- Confirmed COVID-19 diagnosis
- During the preceding 2 days
  - Temperature <100°F (<37.8°C)
  - Respiratory rate <24 per minute
- The day before discharge
  - Room air pulse oximetry >93% or no change from established baseline for residents with chronic oxygen requirement for 24 hours before transfer
  - D-dimer <2 μg/mL FEU (per VAGLAHS test readout) within 24 hours before transfer
  - White blood cells <11,000/μL
- Resident satisfies all other eligibility criteria for admission to VA SNF

Required criteria for discharge from COVID-19 recovery unit to VA SNF†

- 14 days have passed since admission to hospital and no fever for ≥72 hours without the use of fever-reducing medications and
- Negative results of a Food and Drug Administration Emergency Use Authorized COVID-19 molecular assay for detection of SARS-CoV-2 RNA from at least two consecutive nasopharyngeal swab specimens collected ≥24 hours apart (total of two negative specimens)

Required criteria for transfer back to acute care hospital

- Room air pulse oximetry <94% or change from established baseline for residents with chronic oxygen requirement
- Signs or symptoms as per the judgment of the COVID-19 recovery unit staff members
- Within a 24-hour period, both of the following:
  - Temperature >99.9°F (>37.7°C)
  - Respiratory rate ≥24 per minute

Abbreviations: COVID-19 = coronavirus disease 2019; FEU = fibrinogen equivalent units; SNF = long-term care skilled nursing facility; VA = Veterans Affairs.

* Laboratory tests are not required for asymptomatic comfort care residents who are otherwise candidates for transfer to the COVID-19 recovery unit.

† A test-based strategy is preferred for discontinuation of transmission-based precautions for residents who are being transferred to a long-term care or assisted living facility. All testing must be complete before transfer.

TABLE. Characteristics of long-term care skilled nursing facility residents with positive test results for SARS-CoV-2 (N = 19) — Veterans Affairs Greater Los Angeles Healthcare System, Los Angeles, California, 2020

Characteristic	No. (%)			
	Asymptomatic* (n = 6)	Presymptomatic* (n = 8)	Symptomatic* (n = 5)	All (N = 19)
Demographic				
Age, yrs, median (IQR)	75 (72–75)	67 (66–84.5)	84 (70–85)	75 (66–85)
Male sex	6 (100)	8 (100)	5 (100)	19 (100)
Race/Ethnicity†				
Asian	—	—	—	—
Black or African American	2 (33)	4 (50)	2 (40)	8 (42)
Native Hawaiian or Pacific Islander	—	1 (13)	—	1 (5)
White	3 (50)	3 (38)	2 (40)	8 (42)
Unknown	1 (17)	—	1 (20)	2 (11)
Hispanic	—	—	—	—
Underlying medical condition§				
Hypertension	5 (83)	5 (63)	3 (60)	13 (68)
Cardiovascular disease	3 (50)	4 (50)	5 (100)	12 (63)
Diabetes	4 (67)	5 (63)	2 (40)	11 (58)
Body mass index >30 kg/m^2	3 (50)	2 (25)	2 (40)	7 (37)
Chronic kidney disease (stage 4 or above)	—	2 (25)	1 (20)	3 (16)
Chronic obstructive pulmonary disease	1 (17)	1 (13)	2 (40)	4 (21)
Symptoms at time of or after testing¶				
Constitutional symptom	—	6 (75)	5 (100)	11 (58)
Fever	—	6 (75)	5 (100)	11 (58)
Myalgia	—	—	1 (20)	1 (5)
Headache	—	1 (13)	1 (20)	2 (11)
Respiratory symptom	—	4 (38)	5 (100)	9 (47)
Cough	—	2 (25)	5 (100)	7 (37)
Dyspnea	—	2 (25)	1 (20)	3 (16)
Gastrointestinal symptom	—	5 (63)	1 (20)	6 (32)
Nausea	—	1 (13)	—	1 (5)
Emesis	—	1 (13)	—	1 (5)
Diarrhea	—	2 (25)	—	2 (11)
Poor appetite	—	3 (38)	1 (20)	4 (21)
Laboratory findings on admission,,†† median (IQR) [No.]**				
WBC (x 1,000/μL)	4.32 (3.67–5.91) [5]	4.35 (3.93–6.10) [8]	6.24 (6.09–7.08) [5]	5.32 (3.94–6.20) [18]
Lymphocytes (%)	31.5 (26.4–32.7) [5]	22.0 (17.5–25.9) [8]	16.7 (11.4–16.9) [5]	22.0 (17.0–30.3) [18]
Lymphocytes (x 1,000/μL)	1,200 (1,140–1,200) [5]	960 (775–1,105) [8]	880 (770–1,200) [5]	1,025 (835–1,200) [18]
Creatinine (mg/dL)	1.00 (0.89–1.05) [4]	1.01 (0.82–1.07) [8]	2.84 (1.99–3.23) [5]	1.04 (0.88–1.41) [17]
AST (U/L)	19 (17–21) [3]	24 (20–29) [5]	31 (NA) [1]	22 (19–29) [9]
ALT (U/L)	16 (13–21) [4]	17 (14–44) [6]	28 (21–28) [3]	16 (14–28) [13]
D–Dimer (μg/mL FEU)	0.54 (0.42–0.83) [4]	0.66 (0.55–1.42) [7]	0.94 (0.59–1.17) [3]	0.63 (0.50–1.29) [14]
Ferritin (ng/mL)	60.8 (51.2–99.7) [5]	343.0 (162.5–540.6) [8]	184.6 (NA) [2]	179.1 (59.0–354.2) [15]
CRP (mg/dL)	0.605 (0.420–1.190) [4]	1.070 (0.900–2.565) [7]	6.765 (NA) [2]	1.03 (0.71–2.63) [13]
Outcomes				
Supplemental oxygen required	—	4 (50)	4 (80)	8 (42)
Death	—	—	1 (20)	1 (5)
Length of hospital stay, days, median (IQR)	6 (1–6)	9 (7–10)	10 (5–13)	6 (5–10)

Abbreviations: ALT = alanine aminotransferase; AST = aspartate aminotransferase; CRP = C-reactive protein; FEU = fibrinogen equivalent units; IQR = interquartile range (1st–3rd); NA = not applicable; WBC = white blood cell.

* Patients were classified as symptomatic if they had at least one listed symptom at the time of first positive specimen collection, presymptomatic if they did not exhibit symptoms at the time of specimen collection but later developed at least one listed symptom, and asymptomatic if they did not exhibit symptoms at any time between specimen collection and the last date of data collection.

† Asian, black, Native Hawaiian or Pacific Islander, and white residents in this cohort were non-Hispanic; Hispanic persons could be of any race.

§ Comorbidities were determined based on documented SNOMED CT and *International Classification of Diseases, Ninth Revision* codes and review of patient's vital signs, laboratory values, imaging findings, and provider notes. Chronic kidney disease stage was calculated using the Cockcroft-Gault equation to determine creatinine clearance; patients with estimated glomerular filtration rates <30 mL per minute were considered stage 4 and above. One symptomatic patient was dialysis-dependent. Cardiovascular disease includes coronary artery disease, peripheral artery disease, and previous cerebrovascular accident.

¶ Symptoms were collected through review of all provider notes from March 26 through April 20. Constitutional, respiratory, and digestive symptoms were counted if any one of the symptoms at the time of or after testing was present as a change from baseline. Fever includes measured temperature >100.4°F (>38°C) or fever reported by provider.

** These values include the first available laboratory results within 48 hours of admission for each patient.

†† Reference values are as follows: WBC = 4.5–11.0 x 1,000 per μL; lymphocytes = 600–4,800 x 1,000 per μL; % lymphocytes = 20%–40%; creatinine = 0.66–1.28 mg per dL; AST = 13–35 U per liter; ALT = 7–45 U per liter; d-Dimer = 0.00–0.42 μg per mL FEU; ferritin = 22–322 ng per mL; CRP = 0–0.744 mg per dL.

RT-PCR Testing of Staff Members

During March 29–April 10, universal RT-PCR testing of all 136 staff members identified eight (6%) infections: three in registered nurses and five in licensed vocational nurses, all of whom worked in wards A or C. Four of the eight infected staff members were symptomatic and were tested within 2 days after symptom onset; one developed fever at work and was immediately tested and sent home. None of the others worked during or after symptom onset. Although serial RT-PCR testing of staff members was not feasible because of limited testing supplies, testing remained available for symptomatic staff members. No cases among staff members were identified after the initial round of testing.

Discussion

During March 26–April 23, a total of 19 cases of COVID-19 were diagnosed among 99 SNF residents (19.2%). At the time of diagnosis, 14 of 19 residents were asymptomatic, eight of whom were presymptomatic; one patient died. One half of the eight staff members with a diagnosis of COVID-19 were initially asymptomatic. This report demonstrates the high prevalence of asymptomatic SARS-CoV-2 infection that can occur in SNFs, highlighting the potential for widespread transmission among residents and staff members before illness is recognized and demonstrating the utility of universal RT-PCR testing for COVID-19 after case identification in this setting.

SNFs and other long-term care facilities where residents have high rates of underlying medical conditions are particularly susceptible to COVID-19 outbreaks (*1*–*3*). Limited testing and delayed recognition of symptomatic cases in congregate living settings can result in large and protracted outbreaks (*3*). In a recently described outbreak within homeless shelters, RT-PCR testing of all residents, coupled with rapid isolation and cohorting procedures, limited transmission (*4*).

Multiple studies have demonstrated efficient transmission of SARS-CoV-2 from infected persons who are not yet symptomatic (*1*,*5*,*6*). One study in Italy showed through community surveillance testing that 43% of persons with confirmed SARS-CoV-2 infection were asymptomatic and that transmission from asymptomatic and presymptomatic persons also occurred within households.¶ In this cohort, transmission from asymptomatic persons was likely, because a large proportion of residents and staff members did not have symptoms at the time of diagnosis.

RT-PCR testing among SNF residents was repeated approximately weekly until all residents had negative test results. Serial testing aided the identification of subsequent cases. Testing of staff members might be especially important because they can acquire SARS-CoV-2 in the community and reintroduce it into the SNF. Although serial laboratory testing of staff members was considered after the initial round of testing, insufficient supplies limited the ability to fully carry this out.

Swift isolation and cohorting of residents with COVID-19 reduced further transmission within the SNF; residents who had positive test results were quickly transferred out of the SNF, either to the acute care hospital or directly to a separate COVID-19 recovery unit. The conversion of ward A into a COVID-19 recovery unit allowed cohorting of clinically stable residents within the SNF without requiring transfer to the affiliated hospital. This measure decreased burden on the hospital and allowed residents to remain in a familiar setting. Restricting staff movement between SNF wards reduced potential for transmission between wards. With these measures, the outbreak in ward A was suppressed within 1 week, the outbreak in ward C was suppressed within 2 weeks, and no cases occurred in ward B.

The Centers for Medicare & Medicaid Services currently recommends symptom screening of all SNF patients and cohorting of staffing teams for infected and uninfected patients (*7*). Medicare has expanded coverage for SARS-CoV-2 tests (*7*), and, as of April 30, Los Angeles County Department of Public Health had endorsed mass testing if a COVID-19 case is identified in a long-term care facility (*8*). At the time of the VAGLAHS SNF outbreak, the Los Angeles County Department of Public Health criteria for testing did not include RT-PCR testing of asymptomatic persons (*9*).

The findings in this report are subject to at least three limitations. First, because residents' recall might be limited by cognitive disorders or recall bias, over- or underreporting of symptoms was possible and could have affected classification of patients as symptomatic or asymptomatic. Second, symptom data obtained from medical records might have been incomplete, because the daily symptom screening only included fever and respiratory symptoms and did not include symptoms more recently recognized as being associated with COVID-19, such as loss of sense of smell or taste,** which could have led to an overestimation of the asymptomatic population. Finally, because the all-male cohort of patients with laboratory-confirmed COVID-19 might have comorbidity profiles that differ from other groups, these findings might not be generalizable to other SNFs.

This investigation demonstrates the benefit of RT-PCR testing of SNF residents and staff members for SARS-CoV-2 after an initial case of COVID-19 is diagnosed. Identification of asymptomatic COVID-19 cases after initial RT-PCR testing supports implementation of serial laboratory testing in SNFs

¶ https://www.medrxiv.org/content/10.1101/2020.04.17.20053157v1.

** https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-criteria.html.

Summary

What is already known about this topic?

Long-term care skilled nursing facilities (SNFs) are at high risk for COVID-19 outbreaks. Many SNF residents and staff members identified with COVID-19 are asymptomatic and presymptomatic.

What is added by this report?

After identification of two cases of COVID-19 in an SNF in Los Angeles, universal, serial reverse transcription–polymerase chain reaction (RT-PCR) testing of residents and staff members aided in rapid identification of additional cases and isolation and cohorting of these residents and interruption of transmission in the facility.

What are the implications for public health practice?

Universal and serial RT-PCR testing in SNFs can identify cases during an outbreak, and rapid isolation and cohorting can help interrupt transmission.

where COVID-19 cases have been identified. Identification of asymptomatic and presymptomatic residents with positive laboratory results for SARS-CoV-2 facilitated rapid transfer of these residents out of the SNF until a dedicated ward to cohort those with COVID-19 was created within the SNF, thereby reducing transmission. In congregate living settings that include persons with conditions that might place them at high risk for severe COVID-19, universal and serial laboratory-based testing for SARS-CoV-2 is an effective strategy that can be implemented for rapid identification of infection to minimize transmission.

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Notes from the Field

Impact of a Mass Drug Administration Campaign Using a Novel Three-Drug Regimen on Lymphatic Filariasis Antigenemia — American Samoa, 2019

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Lymphatic filariasis is a debilitating and disfiguring mosquitoborne parasitic disease. As part of the Global Programme to Eliminate Lymphatic Filariasis, the World Health Organization (WHO) recommends at least five rounds of annual mass drug administration (MDA) in areas with endemic disease to reduce incidence and prevalence (*1*). Onward transmission is expected to end once community prevalence falls below 1% (*1*).

American Samoa, located in the southern Pacific Ocean, is the only U.S. territory with evidence of ongoing lymphatic filariasis transmission. After 7 years of MDA (2000–2006), the prevalence of lymphatic filariasis antigenemia in American Samoa declined from 16.5% to 2.3%, and MDA was stopped (*2*,*3*). In 2016, a household survey among 2,507 participants revealed that the prevalence of antigenemia had rebounded to 6.2%, and transmission was ascertained to be widespread across the territory (*4*). MDA was resumed in 2018 using a novel three-drug regimen of ivermectin, diethylcarbamazine, and albendazole, which has been shown to more effectively clear filarial larvae from the blood than the standard two-drug treatment of albendazole with diethylcarbamazine or ivermectin alone (*5*,*6*). This WHO-recommended three-drug regimen is anticipated to accelerate progress toward global elimination goals in areas without other filarial infections that would contraindicate the use of diethylcarbamazine (onchocerciasis) or ivermectin (loiasis).

During July 11–August 17, 2019, the American Samoa Department of Health (ASDOH) conducted a survey in collaboration with CDC and the Pacific Island Health Officers' Association* to determine the effect of three-drug MDA on lymphatic filariasis prevalence in American Samoa. Households were selected from all 68 villages on the main islands of Tutuila and Aunu'u using systematic random sampling. Children aged 5–9 years and villages previously known to have high transmission rates were oversampled. Eligible household members aged ≥5 years with provision of informed consent were administered a questionnaire and provided a blood specimen for lymphatic filariasis antigen testing using the Alere filariasis test strip (Abbott). All participants who received antigen-positive test results were offered treatment.

ASDOH visited 1,865 households and enrolled 2,081 persons in the survey. A total of 47 participants with a positive antigen test for lymphatic filariasis were identified. Cases were geographically dispersed; however, a large proportion of cases were found along the western coast of Tutuila. By age, the antigen test positivity rate was 1.1% among children aged 5–9 years and 2.9% among household members aged ≥10 years. After adjusting for age and location, the overall prevalence of lymphatic filariasis antigenemia in American Samoa was estimated to be 2.7%. Adjusted prevalence of antigenemia was higher among males (4.8%) than among females (1.0%) ($p<0.001$), and this pattern was consistent across age groups (Figure). Differences in antigen prevalence by sex can be attributed in part to differences in MDA participation. Nonparticipation in the 2018 MDA was 35.2% among participants with positive antigen test results, compared with 22.2% among participants with negative antigen test results, and antigen prevalence among men aged >40 years who did not participate in the MDA was >10%.

These results indicate that lymphatic filariasis antigenemia has declined since 2016 but remains above the 1% WHO threshold in all age groups, suggesting that lymphatic filariasis transmission in American Samoa is ongoing. To interrupt transmission in this setting, American Samoa should consider following WHO recommendations (*5*) and continue annual three-drug MDA with appropriate monitoring of progress toward elimination until targets are met. Lymphatic filariasis control activities should target high-prevalence sectors of the population, including adult men, to ensure that this population is adequately covered in the future.

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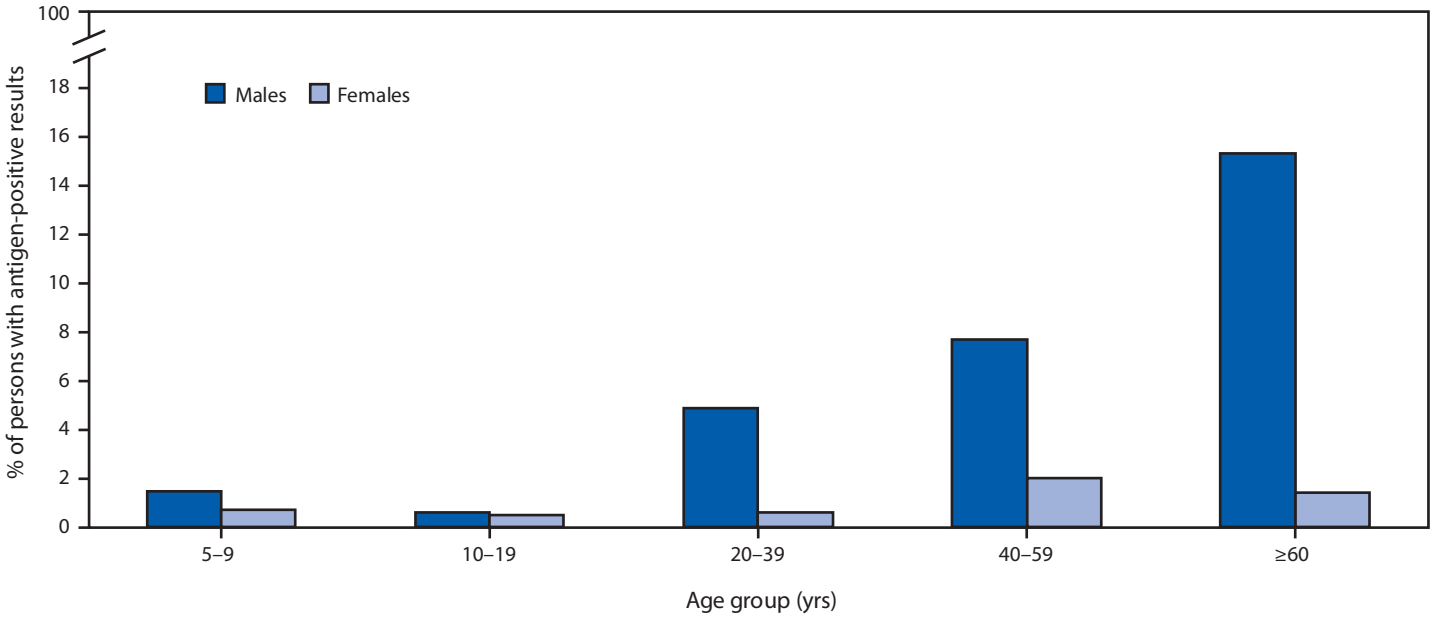
* https://www.pihoa.org/.

FIGURE. Prevalence of lymphatic filariasis antigenemia following mass drug administration using a novel three-drug* regimen, by age group and gender — American Samoa, 2019



* Ivermectin, diethylcarbamazine, and albendazole.

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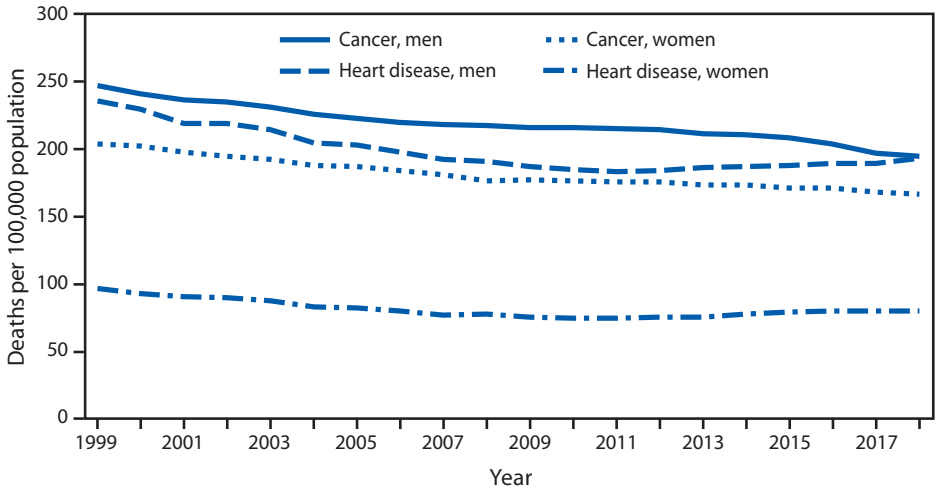
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Cancer and Heart Disease Death Rates,*,† Among Men and Women Aged 45–64 Years — United States, 1999–2018



* Per 100,000 U.S. population aged 45–64 years.
† Cancer deaths are identified with *International Classification of Diseases, Tenth Edition* codes C00-C97; heart disease deaths are identified with codes I00–I09, I11, I13, I20–I51.

The cancer death rate for both men and women aged 45–64 years declined steadily from 247.0 per 100,000 in 1999 to 194.9 in 2018 for men and from 204.1 to 166.3 for women. The heart disease death rate for men declined from 1999 (235.7) to 2011 (183.5) but then increased to 192.9 in 2018. For women, the heart disease death rate declined from 1999 (96.8) to 2011 (74.9), increased through 2016 (80.3), and then leveled off. In 2018, the cancer death rate for men aged 45–64 years was 1% higher than the heart disease death rate; for women, the cancer death rate was approximately twice the heart disease death rate.

Source: National Vital Statistics System, Mortality Data. https://www.cdc.gov/nchs/nvss/deaths.htm.

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