

Outbreaks of Hepatitis A in US Communities, 2017–2018: Firsthand Experiences and Operational Lessons From Public Health Responses

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Objectives. To identify and analyze common challenges from multiple US communities affected by the hepatitis A epidemic beginning in March 2017, and to identify operational lessons to support preparedness for similar future public health emergencies.

Methods. We conducted semistructured interviews with health officials from 9 city or county health departments to collect the firsthand experience of public health responders. We collected data from January to October 2018 via teleconference. Key informants, whom we purposefully sampled, were senior public health officials who were directly involved in outbreak response or in preparing for potential hepatitis A outbreaks in their communities.

Results. Several themes emerged during these discussions, including common challenges and solutions pertaining to sanitation and hygiene infrastructure, hepatitis A vaccination, health workforce availability and surge capacity, communication and stigma, and partnerships and coordination with local law enforcement and other stakeholders.

Conclusions. By generating key, evidence-based operational lessons, this study can inform response activities in localities currently experiencing outbreaks as well as community preparedness for possible future outbreaks due to the presence of similar at-risk populations. (*Am J Public Health.* 2019;109:S297–S302. doi:10.2105/AJPH.2019.305139)

Since early 2017, the United States has faced a series of localized hepatitis A outbreaks across the country, including in and around major cities.¹ As of January 2019, the epidemic stood at approximately 11 500 reported cases and 100 deaths (Table 1).^{2–20} Annual nationwide totals for hepatitis A cases ranged from 1239 to 2007 between the years 2012 and 2016,²¹ compared with provisional totals of 3365 cases in 2017 and 11 166 cases in 2018 (through December 29). Notably, the ongoing epidemic represents the vast majority of the nationwide total.^{22,23}

Controlling the current outbreaks has posed unique problems for public health and health care responders. In contrast to typical hepatitis A outbreaks, which are associated with exposures to contaminated food handled by an infected person or with close contact with infectious individuals (e.g., sexual contact, care of an ill individual),^{24–27} the recent

spate of outbreaks has exhibited different transmission patterns. Across the United States, outbreaks have largely been among individuals who are experiencing homelessness or who use illicit drugs, whether intravenous or nonintravenous.¹ Hepatitis A outbreaks in similar populations have been documented previously, but not nearly on the scale of this ongoing epidemic.^{28–31} Individuals who use illicit drugs or are experiencing homelessness may not seek medical care for their condition—either through unwillingness or inaccessibility—and when

they do obtain care, they may be reluctant to share information about risky or illicit behavior or to identify other at-risk individuals.^{29,31}

Individuals experiencing homelessness may be highly mobile as well, often temporarily residing at multiple locations.^{30,31} These factors make it difficult to determine the scope of an outbreak, identify potential sources, and trace contacts, which hinders the effectiveness of public health interventions.

Vaccination is used to prevent hepatitis A infection, both via routine immunization and during outbreak response. Hepatitis A vaccine was not part of routine childhood immunizations in the United States until 2006, so many adults remain susceptible. Recommendations set forth by the Advisory Committee on Immunization Practice (ACIP) did not previously identify homelessness as a risk factor for hepatitis A; however, after a number of US communities experienced outbreaks in this population, ACIP voted in October 2018 (during the course of this research) to include individuals experiencing homelessness in its recommendation for routine hepatitis A vaccination.³²

Considering the continued occurrence of significant hepatitis A outbreaks across the United States, it is important that communities with similar high-risk populations prepare for potential future outbreaks. This study aimed to identify common challenges and novel solutions from multiple jurisdictions affected by hepatitis A outbreaks by analyzing the firsthand experiences of public

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This article was accepted April 13, 2019.

doi: 10.2105/AJPH.2019.305139

TABLE 1—Hepatitis A Cases by State Linked To Person-to-Person Transmission: United States

State	Cases	Deaths	Date of Most Recent Data
Arizona ^{a,2}	15 ^b	.. ^b	October 2017 ^c
Arkansas ^{3,4}	247	2	Cases: January 9, 2019 ^d ; deaths: January 2, 2019
California ⁵	704	21	April 11, 2018 ^c
Colorado ^{a,6,7}	63	1	January 2019 ^c
Florida ⁸	559 ^e	— ^b	December 31, 2018
Indiana ⁹	861	2	January 4, 2019
Kentucky ¹⁰	3 265	21	December 15, 2018
Louisiana ¹¹	39	0	January 4, 2019
Massachusetts ¹²	267	4	January 4, 2019
Michigan ¹³	909	28	January 2, 2019
Missouri ¹⁴	241	0	December 31, 2018
New Mexico ^f	22 ^b	1 ^b	January 17, 2019
North Carolina ¹⁵	56	1	January 7, 2019
Ohio ¹⁶	1 307	2	January 7, 2019
Tennessee ¹⁷	655 ^g	2	January 4, 2019
Utah ^{18,19}	281	2 ^b	Cases: January 7, 2019; deaths: September 10, 2018
West Virginia ²⁰	2 137	12	December 21, 2018
Total ^h	11 628	99	

^aNot listed on the Centers for Disease Control and Prevention outbreak Web site,¹ but linked to the epidemic.

^bNot officially reported by the state.

^cFinal reported data; outbreak declared over.

^dDate Web site accessed; data updated date not provided.

^eTotal 2018 cases; does not distinguish outbreak cases.

^fPhone communication with the New Mexico Department of Health Infectious Disease Epidemiology Bureau on January 17, 2019.

^gTotal from December 1, 2017; does not distinguish outbreak cases.

^hTotals are approximate based on data identified.

health responders. By documenting operational lessons, this study can inform response activities in localities currently experiencing outbreaks as well as preparedness efforts in communities anticipating future outbreaks. Additionally, the findings may support local preparedness efforts for outbreaks of other communicable diseases affecting similarly vulnerable populations.

METHODS

From January to October 2018, we conducted semistructured, qualitative interviews with local public health practitioners with firsthand experience planning for or responding to hepatitis A outbreaks linked to

the ongoing US epidemic. We purposefully sampled the jurisdictions, but the jurisdictions themselves determined the most appropriate individual(s) to participate in the interview, including health department directors, deputy directors, and health officers, as well as directors or managers of relevant health department programs, including family health services, immunization, and preparedness. The composition and number of interviewees varied by jurisdiction. We conducted interviews with health officials representing 8 jurisdictions experiencing elevated incidence of hepatitis A and 1 jurisdiction preparing for a potential outbreak because of the presence of a large at-risk population.

We conducted a scoping literature review to aid in developing a semistructured

interview guide. Interview topics were based on barriers and limitations identified during previous similar outbreak responses, news and media reports, and our knowledge of and experience with outbreak response operations. Principal topics included outbreak risk factors, response operations and barriers to response activities, and resource and policy needs, but the interviews were largely driven by the interviewees' experiences. We thematically analyzed audio recordings and interview notes to identify recurring themes, with the goal of detecting lessons that can apply broadly to improve response, particularly in populations vulnerable to hepatitis A and similar outbreaks. We did not explore all themes with each jurisdiction. The absence of a theme from a particular interview does not necessarily reflect a lack of concurrence, but rather that the issue did not arise during that interview. We did not attempt to quantify the prevalence of themes, but we do describe instances in which similar or different experiences were reported.

RESULTS

The interviewees addressed a broad scope of factors pertaining to hepatitis A outbreak response operations. Although each outbreak posed unique obstacles that required tailored solutions, some common factors emerged across many or all of the interviews. Here, we report the jurisdictions' experiences by theme.

Infrastructure and Sanitation

Multiple interviewees cited improving hygiene and sanitation as a critical element of their response strategy to interrupt hepatitis A transmission. In some jurisdictions, portable toilets and handwashing stations were installed in areas frequented by high-risk populations (e.g., known homeless encampments) to improve access to hygienic and sanitary conditions. These needed to be regularly cleaned and disinfected, requiring additional resources to maintain. Some interviewees noted, however, that adding portable toilets led to new risks, including that they became new loci of transmission. Additionally, they required law enforcement presence to ensure that they did not serve as

hubs for violence, crime, and prostitution. Some interviewees also reported particular challenges in improving the homeless population's access to hygiene and sanitation services outside of known encampments. For example, soap and hand sanitizer dispensers were not consistently available or maintained in public restrooms, portable toilets, and hand-washing stations.

Interviewees also reported barriers to disinfecting spaces potentially contaminated with hepatitis A. One jurisdiction noted that a lack of clear guidance for disinfecting public restrooms made it difficult to know how best to limit the spread of infection in facilities frequented by individuals experiencing homelessness, noting that many common household cleaning products, such as alcohol-based hand sanitizers, are not effective against nonenveloped viruses such as hepatitis A. This became a point of confusion among some business owners aiming to promote hygienic practices, sanitize their property, or both. In the absence of clear consensus on how best to sanitize hands and surfaces, some health departments issued their own guidance.

Vaccination

Vaccination was a principal pillar of the public health response to hepatitis A outbreaks; however, interviewees noted several barriers to implementing vaccination programs. Numerous interviewees reported difficulty obtaining enough doses of hepatitis A vaccine to support response operations. According to the Centers for Disease Control and Prevention (CDC), from January 2017 to April 2018, “responses conducted in various states resulted in increased vaccine demand and usage, resulting in constrained supplies of vaccine.”³³ Interviewees relied on a variety of sources to obtain vaccine, including the CDC's Vaccines for Children (VFC) program and purchases directly from the private market. Many interviewees reported frustration at the high cost of vaccines in the private market, and the variability of vaccines available for hepatitis A (e.g., single or multiple antigen) complicated response planning in areas that could not acquire enough of a single type of vaccine. Other jurisdictions noted that cost and lack of availability constrained their ability to purchase vaccines.

Interviewees also reported dilemmas regarding how to prioritize the use of vaccine. At the time of these responses, the ACIP guidance did not recommend routine hepatitis A vaccination on the basis of homelessness, and many interviewees discussed confusion about whether and how vaccine could be administered to individuals experiencing homelessness during the outbreak. In other jurisdictions, questions emerged regarding whether individuals living in communities with high rates of hepatitis A infection should also be eligible for vaccination. For instance, one state expanded its criteria for hepatitis A vaccination to include broadly “people who live, work, or recreate [in the affected area] and are concerned about getting hepatitis A” or anyone “who wishes to be immune to hepatitis A.”³⁴

Vaccination occurred in a variety of settings, including sanctioned homeless encampments, homeless shelters, small businesses, emergency departments (EDs), and correctional facilities. Given limited resources, most jurisdictions aimed to reach the largest possible high-risk population, so vaccinations often occurred at locations where high-risk individuals congregated or frequented. Mobile medical vehicles were used in some jurisdictions as a tool to reach transient individuals by providing health information, screening, and hepatitis A vaccination in the community. One health department discussed conducting vaccination clinics in coordination with homeless services facilities, targeting high-risk patients during lunch and dinner hours. Another jurisdiction established a mass vaccination site at a regional training center to vaccinate frontline health workers and medical first responders (e.g., firefighters, paramedics, emergency medical technicians). This reportedly alleviated concerns among these groups about contracting hepatitis A while simultaneously enabling them to safely screen, treat, and vaccinate others.

EDs were often called upon by health departments to vaccinate high-risk patients, as individuals experiencing homelessness and other at-risk individuals often utilize EDs for primary care. This approach yielded mixed results in increasing vaccination coverage among high-risk populations. Some interviewees discussed how ED providers' routine workload made it difficult for them to

participate in vaccination efforts. Additionally, multiple interviewees cited VFC program requirements—including specific equipment and certifications or constraints on where and how vaccine could be stored—and restrictions imposed by vaccine suppliers regarding who was permitted to receive vaccines among additional barriers to engaging EDs. A jurisdiction with a large population served by Medicaid indicated that they updated a state policy to allow VFC vaccines to be used for Medicaid patients to encourage hospitals to participate. Medicaid reimbursement for privately purchased vaccine did not cover the cost of administering the vaccine for Medicaid patients, so hospitals were reluctant to use these doses to support the response. Additionally, effort and resources required for hospitals to meet the VFC program requirements would have been prohibitive if the eligibility was limited to non-Medicaid patients. Interviewees from this health department viewed the expanded eligibility as a turning point in their response.

Interviewees also reported difficulties in documenting and tracking patients' immunization status. Many adult patients were not listed in state immunization registries, because many states only require documentation of childhood vaccination (and routine hepatitis A vaccination began in 2006). One jurisdiction observed that their state immunization registry was too slow and unwieldy to access from a health clinic, let alone in the field, making it difficult to determine vaccination status for high-risk individuals. Officials from this department opted to carry paper forms and later enter data electronically into the immunization registry. An interviewee noted that electronic medical record systems were not always structured to accommodate transient individuals, and providers were unable to flag these patients in their records system. It was likely that some individuals were vaccinated multiple times because of an inability to verify immunization status, possibly further stressing limited vaccine supplies.

Workforce and Surge Capacity

Interviewees frequently reported an insufficient number of trained personnel, full-time or temporary, who could be called upon to assist with the outbreak response. One

jurisdiction cited staffing as the biggest resource limitation facing its department's outbreak response, even more so than vaccine availability. Interviewees reported that the biggest workforce need was clinical staff who could administer vaccines. They frequently noted that health department employees, particularly those with clinical credentials, were diverted from other divisions (e.g., tuberculosis control, sexually transmitted infections, emergency preparedness, health education, administration) to support response activities. Some services managed by public health departments were postponed because of temporary repurposing of staff. One interviewee estimated that approximately half of the public health department was involved in the hepatitis A response during a 6-month surge at the height of the outbreak. In addition to impacts to routine duties, the hepatitis A response necessitated increased labor costs, including overtime.

Volunteers from community organizations and homeless services networks were also called upon to assist with the public health response. Some interviewees cited the Medical Reserve Corps as a potential source of vaccinators. In some cases, however, the Medical Reserve Corps was unable to provide enough volunteers with appropriate training to operate vaccination clinics, in part because many of these individuals either lacked vaccination skills or had conflicting responsibilities in the local health care system.

Partnerships and Collaboration

Interviewees emphasized the importance of collaborating with state and local government agencies and local nongovernmental organizations. Many interviewees cited operational relationships with other stakeholders established in advance of the outbreak as an important factor in facilitating collaboration during the response. Implementing increased sanitation and hygiene measures often required the participation of sanitation and environmental service agencies—in some localities, separate from the public health department—and public health interventions aimed at homeless populations were often coordinated with human or homeless services departments, nonprofit organizations (e.g., homeless and addiction support networks), and private sector entities (e.g., local

businesses and food vendors). In one jurisdiction, homeless service organizations operated a centralized campus to serve the homeless, which facilitated public health's ability to conduct vaccinations, needle exchange programs, public health information and education efforts, and other outbreak interventions. Local health departments also received assistance from state health departments, which were the primary liaisons to coordinate procurement of hepatitis A vaccine from the CDC.

Law enforcement agencies emerged as key partners in some communities. They supported a range of response activities, including helping to identify transient individuals for the purpose of screening and vaccination. Interviewees from one jurisdiction described how law enforcement personnel were paired with nurses to locate and vaccinate individuals residing outside of established facilities or encampments, including those living under highway overpasses or in canyons. One interviewee cited the critical role of correctional facilities in improving vaccine coverage, as affected populations frequently transitioned in and out of the prison system. Trusted correctional officers were called upon to recommend vaccination to inmates, which reportedly improved vaccination rates in the jails; however, vaccine uptake among inmates was not uniformly high across the health departments interviewed.

Communication and Stigma

Interviewees reported myriad problems in conducting patient outreach and risk communication, especially with respect to encouraging adherence to recommended protective actions, including vaccination. Several interviewees reported a high level of mistrust toward official government messaging among high-risk populations, which were largely underserved, difficult to access, and subject to comorbidities. Many interviewees specifically discussed challenges in getting high-risk populations to accept the hepatitis A vaccine, largely because of mistrust of government and concerns about vaccine safety. Some jurisdictions felt that they lacked an appropriate "script" for discussing the risks of hepatitis A and the importance of vaccination and other interventions. Some interviewees reported that some patients, such

as those living in correctional facilities, were hesitant to comply with advice and directives from health officials, which increased the risk of infection and further transmission.

Some jurisdictions adopted alternative strategies to engage and gain the trust of affected populations. For example, one jurisdiction noted that certain bathhouses, adult arcades, and bars were identified as priority outreach sites for men who have sex with men; recognizing the value of word-of-mouth information exchange, local health officials engaged directly with the owners and operators of these establishments to connect with their clients. Noting high rates of cell phone use among some affected populations, some interviewees indicated that their health departments conveyed public health information via text message and common social media platforms. For instance, one jurisdiction developed targeted advertisements for Facebook and the dating app Grindr to connect directly with high-risk individuals in the community, including men who have sex with men.

Interviewees reported divergent approaches to communication with the public, including residents, business owners, and the press. Some health departments communicated updated information to the public more frequently and used local media to promote social mobilization. Conversely, one jurisdiction minimized official communication with the public until after the outbreak had peaked in an attempt to reduce further stigmatization of already-marginalized high-risk communities, instead relying on word-of-mouth communication among affected populations.

Preparedness, Prevention, and Other Challenges

Nearly all of the interviewees spoke of financial limitations encountered in responding to or preparing for a hepatitis A outbreak. Many interviewees indicated that their health departments exceeded their allotted response budgets, requiring diversion of resources from other programs or supplemental funding requests. Multiple interviewees specifically noted the absence of contingency funds for vaccine procurement as a major burden. One jurisdiction observed that budgetary regulations did not allow for

purchasing vaccines in advance of an outbreak, which prevented the jurisdiction from conducting preemptive vaccination of high-risk individuals. The governor of a state with hundreds of hospitalizations and deaths declared a public health emergency in an effort to marshal additional resources, including the immediate purchase of additional vaccines for distribution to local health departments.³⁵

Beyond resource limitations, interviewees noted a number of additional issues that hindered outbreak response. Some jurisdictions raised questions about how to appropriately sequester homeless patients who were not sick enough to be hospitalized but still required monitoring and isolation to prevent further transmission. Some jurisdictions reached out to homeless shelters or single-occupancy hotels to identify places that could safely isolate infectious patients, but others reported ongoing challenges with identifying isolation sites. Jurisdictional issues also presented limitations in implementing response strategies in some communities. For example, a county health department that serves multiple cities, towns, and unincorporated areas established sanitation stations in its most populous city, but then had to coordinate individually with each municipality to expand this intervention across the county.

DISCUSSION

Interviewees identified a number of important challenges that public health departments faced in either responding to or preparing for a hepatitis A outbreak. They cited engagement with the affected communities, largely marginalized and vulnerable to begin with, as a major obstacle. Jurisdictions took a variety of approaches to outreach and education, which inherently varied on the basis of the composition of local affected populations. A key lesson that emerged during this study was the importance of building and maintaining multisectoral partnerships, particularly in advance of an event. Health departments stressed the role of strong, preexisting relationships with social service organizations, law enforcement and corrections departments, EDs, and environmental services. Those with strong operational partnerships with other sectors were able to efficiently enlist these organizations in efforts

to identify, communicate with, educate, and vaccinate high-risk populations. In addition to traditional engagement through government programs and community organizations, health officials may need to use more novel approaches, such as targeted outreach on various social media platforms or word-of-mouth communication via community leaders. These high-risk communities have complex contact networks, and engaging via existing, trusted contact points is critical to establishing a relationship and promoting protective behaviors.

Vaccination was the principal response mechanism for all participating jurisdictions, but these efforts faced myriad barriers. Many interviewees discussed the need to expand routine hepatitis A vaccination to include individuals experiencing homelessness. The recent ACIP decision addresses this gap, but similar issues could potentially arise for other outbreaks in similar vulnerable populations. A number of jurisdictions encountered difficulties in obtaining and distributing vaccine. Lack of clarity about the number of vaccine doses available to jurisdictions from public sources (e.g., VFC program) and questions about which populations are eligible to receive such vaccines make it difficult for jurisdictions to develop and implement vaccination plans. Additionally, some jurisdictions reported insufficient numbers of staff with appropriate training to administer vaccines, which portends problems for responses to larger outbreaks that require mass vaccination approaches. Determining and tracking the vaccination status of high-risk individuals can also be a challenge, especially for transient populations, and developing mechanisms to do so can make efficient use of limited response resources. Finally, jurisdictions noted that their outbreak response would have benefited from official guidance on issues such as how to communicate with high-risk groups that may distrust government (e.g., homeless and drug-using populations) about the importance and safety of hepatitis A vaccines.

Limitations

This research reflects the interviewees' firsthand experience in preparing for and responding to hepatitis A outbreaks in their respective jurisdictions, but these findings are not necessarily generalizable to all

jurisdictions. The interviewees largely represented major urban and suburban areas, and the characteristics of their public health, health care, and response agencies and organizations may differ from those of other jurisdictions, particularly rural or remote jurisdictions. Additionally, the characteristics of the affected populations in each city varied, and they will inevitably differ across future outbreaks as well. States and local jurisdictions have specific laws and policies that may affect response operations, and those noted in this article may not reflect the environment in other locations. Finally, the hepatitis A epidemic continues to grow, and outbreaks have been identified in a number of other jurisdictions since the completion of our interview process. This research is not designed to be wholly generalizable across all jurisdictions, but the findings and analysis represent the types of difficulties that others may face with this outbreak and lessons that are broadly applicable to similar responses.

Public Health Implications

Lessons from communities that have experienced hepatitis A outbreaks can inform preparedness for future hepatitis A and other infectious disease outbreaks affecting hard-to-reach populations. In particular, themes captured in these interviews point to a need for multisectoral outbreak response plans that include strategies for risk communication, rapid vaccination, and isolation of hard-to-reach individuals. Finally, considering the known mobility of these high-risk populations, outbreak response plans should be coordinated across jurisdictions. **AJPH**

CONTRIBUTORS

M. R. Snyder led the manuscript authorship. M. P. Shearer coordinated manuscript preparation and submission. J. B. Nuzzo and M. D. McGinty conceptualized the study. All authors contributed substantively to authoring and revising the manuscript and contributed to the study design, literature review, participant interviews, and analysis.

ACKNOWLEDGMENTS

Funding for this research was provided by the Open Philanthropy Project.

We acknowledge the National Association of County and City Health Officials (NACCHO) members who participated in this research effort and health officials nationwide who have responded to the multistate epidemic of hepatitis A.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

The institutional review board of the Johns Hopkins Bloomberg School of Public Health determined that this research was not human participants research.

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