Healthcare-Associated Hepatitis B and C Outbreaks (≥ 2 cases) Reported to the CDC 2008-2019

The tables below summarize healthcare-associated outbreaks of hepatitis B virus (HBV) and hepatitis C virus (HCV) infection reported in the United States during 2008-2019. Outbreaks previously reported in 1998-2008 can be found in Thompson, et alexternal icon and Redd, et alexternal icon. Because of the long incubation period (up to 6 months) and typically asymptomatic course of acute hepatitis B and C infection, it is likely that only a fraction of such outbreaks that occurred have been detected, and reporting of outbreaks detected and investigated by state and local health departments is not required. Therefore, the numbers reported here may greatly underestimate the number of outbreak-associated cases and the number of at-risk persons notified for screening.

Practical guidance on detecting and investigating such outbreaks may be found in the Healthcare Investigation Guide.

Resources for prevention include updated hepatitis B immunization guidelines, and infection control guidelines and resources.

Summary

66 outbreaks (two or more cases) of viral hepatitis related to healthcare reported to CDC during 2008-2019; of these, 62 (94%) occurred in non-hospital settings.

Hepatitis B (total 25 outbreaks including two of both HBV and HCV, 183 outbreak-associated cases, 13,246 persons notified for screening):

- 19 outbreaks occurred in long-term care facilities, with at least 133 outbreak-associated cases of HBV and approximately 1,679 at-risk persons notified for screening
    - 79% (15/19) of the outbreaks were associated with infection control breaks during assisted monitoring of blood glucose (AMBG)
- 6 outbreaks occurred in other settings, one each at: an outpatient cardiology clinic, a free dental clinic in school gymnasium, an outpatient oncology clinic, a hospital surgery service, and two at pain remediation clinics (one outbreak of HBV and one with both HBV and HCV), with 50 outbreak-associated cases of HBV and 11,567 persons at-risk persons notified for screening

Hepatitis C (43 total outbreaks including two of both HBV and HCV , 328 outbreak-associated cases, >112,406 at-risk persons notified for screening):

- 16 outbreaks occurred in outpatient or long-term care facilities (including the two outbreaks of both HBV and HCV also listed above), with 134 outbreak-associated cases of HCV and >80,293 persons notified for screening
- 22 outbreaks occurred in hemodialysis settings, with 104 outbreak-associated cases of HCV and 3,134 persons notified for screening
- Four outbreaks occurred because of drug diversion by HCV-infected health care providers, with at least 90 outbreak-associated cases of HCV and 28,989 persons notified for screening

Single identified cases are not included in the table and may be particularly difficult to confirm as healthcare-associated infection transmission events. However, although this list is not exhaustive, during 2008-2018 the following single cases were reported and confirmed as likely patient-to-patient healthcare-associated transmission:

- 2019: A single case of HCV seroconversion in a long term care facility that provided hemodialysis. HCV sequences from case with seroconversion were 100% related to HCV sequences from another hemodialysis patient in the facility; infection control lapses in hemodialysis procedures included injection safety practices and inadequate environmental disinfection in the shared dialysis treatment area. (Wagner JM, Gandhi A, Johnson W et al. Hepatitis C Virus Transmission at a Long-term Care Facility (LTCF) Providing Hemodialysis Services—Georgia, 2019. Accepted for the canceled 6th Decennial International Conference on Healthcare Associated Infections, Atlanta, March 26-30, 2020. Conference abstracts to be published in Infect Control Hosp Epi 2020 supplement.)
- 2018: A single case of HCV associated with receipt of IV therapy in an outpatient clinic with significant infection control breaches (unpublished data, Washington State Department of Health)
- 2017: Two single cases of HCV were identified in two outpatient hemodialysis units in Philadelphia (unpublished data, Philadelphia Department of Health)
- 2017: Two single cases of HCV case in two outpatient hemodialysis units in unidentified single state (unpublished data)
- 2016: a single HCV case in an outpatient hemodialysis unit in California (unpublished data, California Department of Health)
- 2015: 3 single HCV cases in 3 outpatient hemodialysis units in New Jersey (unpublished data, New Jersey Department of Health)
- 2015: an HBV case in an outpatient urology clinic (unpublished data, New York State Department of Health)
- 2015: a single HCV case due to syringe reuse in a hospital in Texas (Arnold S, Melville S, Morehead B, et al. Notes from the field: Hepatitis C Transmission from Inappropriate Reuse of Saline Flush Syringes for Multiple Patients in an Acute Care General Hospital – Texas, 2015. MMWR 2017; 66:258-60.)
- 2014: an HCV case in an outpatient dialysis clinic (unpublished data, State of New Jersey Department of Health) and an HCV case in an inpatient dialysis clinic (unpublished data, State of Massachusetts Department of Public Health)
- 2013: an HCV case in a dental clinic (Bradley KK, ed. Dental Healthcare-Associated Transmission of Hepatitis C: Final Report of Public Health Investigation and Response, 2013 pdf icon[PDF – 97 pages]external icon. Oklahoma State Department of Health; Tulsa Health Department; Cleveland J, Kolavic Gray S, Harte J, et al. Transmission of blood-borne pathogens in US dental health care settingsexternal icon. J Am Dental Assoc 2016; 147: 729-38.), an HBV case in an outpatient dialysis unit (Rhea S, Moorman A, Pace R et al. Hepatitis B Reverse Seroconversion and Transmission in a Hemodialysis Center: A Public Health Investigation and Case Report. Am J Kidney Dis. 2016 Aug;68(2):292-295.external icon), and two unrelated HCV transmissions in two New York endoscopy centers (Dentinger C et al. Acute HCV following outpatient endoscopy procedures, New York city, 2013. Presented at 2015 meeting of the American College of Gastroenterology.)
- 2012: an HCV case associated with healthcare delivery during autologous stem cell transplant (unpublished data, State of New York Department of Health)
- 2011: an HCV case in a hospital surgery unit (CDC. Transmission of Hepatitis C Virus Associated with Surgical Procedures — New Jersey 2010 and Wisconsin 2011. MMWR 2015, 64: 165-170.)
- 2010: an HCV case in an outpatient surgical center (CDC. Transmission of Hepatitis C Virus Associated with Surgical Procedures — New Jersey 2010 and Wisconsin 2011. MMWR 2015, 64: 165-170.), and an HBV case in a psychiatric long term care facility (unpublished data, State of New York Department of Healthexternal icon)
- 2009 : an HCV case in an outpatient hemodialysis clinic (unpublished data, South Dakota Department of Health)

- 2008: an HCV case in a hospital surgery unit. (Unpublished data, Pennsylvania Department of Health)

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Long-term care [4]						
Personal care home (1)	2016	PA	82	2	Multiple infection control breaches primarily suboptimal universal precautions during provision of care including assistance with personal hygiene and blood glucose monitoring	2 staff members infected; all residents and staff screened. Source patient had very high viral load
Personal care home (2)	2014	PA	49	8	Unsafe practices related to assisted blood glucose monitoring	
Sub-acute unit of a skilled nursing facility (3)	2014	CA	158	7	Infection control breaches related to instrument sterilization during the provision of podiatry care were identified; however, evidence was insufficient to implicate a specific source of transmission.	Of the 7 outbreak cases, viral molecular sequencing of DNA from 4 acute infections matched into a cluster with one chronic case. Sequencing could not be performed for three cases with serology indicative of resolving acute infection.
Assisted living facility (4)	2012	VA	84	2	Use of fingerstick devices for >1 resident	

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Assisted living facility (5) *(most residents with neuropsychiatric disorders)*	2011	VA	103	7	Use of fingerstick devices for >1 resident	An additional 4 new chronic infections were detected; of these 3 had viral molecular sequencing and all matched into the cluster with the acute cases indicating likely outbreak-related cases.
Assisted living facility (6)	2011	CA	14	2	Use of blood glucose meter for >1 resident without cleaning and disinfection Failure to maintain separation of clean and contaminated podiatry equipment Improper reprocessing of contaminated podiatry equipment Failure to perform environmental cleaning and disinfection between podiatry patients	Both infected residents received assisted monitoring of blood glucose as well as podiatry services.
Assisted living facility (7)	2010	CA	28	3	Unsafe practices related to assisted blood glucose monitoring *Although a clear infection prevention*	

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
					breach was not identified at the time of the investigation, all infections were in residents receiving assisted monitoring of blood glucose by the same home health agency. The home health agency lacked written policies on infection control relating to blood glucose monitoring.	
Assisted living facility (8)	2010	NC	87	8	Use of fingerstick devices for >1 resident Use of blood glucose meter for >1 resident without cleaning and disinfection	6 of 8 case patients died from complications of hepatitis
Assisted living facilities (n=10) in the same metropolitan area served by the same home health agency for diabetic care (9)	2010	TX	>235	23	Unsafe practices related to assisted blood glucose monitoring *Although a clear infection prevention breach was not identified at the time of the investigation, all infections were in*	Cases include residents of the assisted living facilities plus one family member of an infected facility resident who experienced a needlestick injury while assisting with the resident's blood glucose monitoring.
Patients living at home in private residences served by the same home health			≥19	1		

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
agency above for diabetic care (9)					*residents of assisted living facilities or at home who received assisted monitoring of blood glucose by the same home health agency.*	
Two affiliated assisted living facilities (7, 10) *(most residents with neuropsychiatric disorders)*	2010	VA	126	14	Use of fingerstick devices for >1 resident Use of blood glucose meter for >1 resident without cleaning and disinfection Failure to use gloves and perform hand hygiene between fingerstick procedures	An additional 4 new chronic infections were detected and had viral molecular sequencing; 3 matched into the clusters with the acute cases indicating likely outbreak-related cases.
Assisted living facility after transfer of a resident from assisted living facility above (5)	2010	VA	151	5	Use of fingerstick devices for >1 resident	
Skilled nursing facility (12)	2010	NC	116	6	Unclear mode of transmission; specific lapses in infection control not identified at the time of the investigation.	

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Skilled nursing facility (11)	2010	NC	109	6	Specific lapses in infection control not identified at the time of the investigation. *However, assisted blood glucose monitoring and insulin injection (received by 4 of 6 infected patients) associated with illness in case-control study.*	
Assisted living facilities (n=2) (12) Blood glucose monitoring at both assisted-living facilities provided by same home health agency	2009	FL	65	9	Cross-contamination of clean supplies with contaminated blood glucose monitoring equipment used by home health agency *Investigators noted visible traces of blood on some of the blood glucose meters and one reusable fingerstick device.*	
Assisted living facility (5)	2009	VA	64	5	Unsafe practices related to assisted blood glucose monitoring *A clear infection prevention breach was not identified. The*	An additional 5 new chronic infections were detected; of these 4 had viral molecular sequencing and all matched into the cluster

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
					facility did use reusable fingerstick devices but denied using them for >1 resident. In an analytic study, having diabetes and undergoing blood glucose monitoring (all 5 acute cases and 4 of 5 newly identified chronic cases) was significantly associated with infection	with the acute cases indicating likely outbreak-related cases. 2 of 17 facility staff tested also had acute HBV. Investigators identified that after performing AMBG, personnel manually removed used, exposed lancets from the fingerstick device, placing themselves at risk for exposure via a sharps injury. Neither staff member received HBV vaccination.
Assisted living facility (13)	2008	IL	21	7	Use of blood glucose meter for >1 resident without cleaning and disinfection Failure to consistently wear gloves and perform hand hygiene between fingerstick procedures	Note: this outbreak is also included in Thompson, et alexternal icon.
Assisted living facility (14)	2008	PA	25	9	Use of fingerstick devices for >1 resident	Note: this outbreak is also included in

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
					Use of blood glucose meter for >1 resident without cleaning and disinfection	Thompson, et alexternal icon.
Skilled nursing facility (15) *(most residents with neuropsychiatric disorders)*	2008	CA	143	9	Failure to maintain separation of clean and contaminated podiatry equipment	
Totals			***>1,679***	***133***		
Oral Health						
Free dental clinic conducted in school gymnasium (16)	2009	WV	>1,500	5	Multiple procedural and infection control breaches were identified during retrospective investigation; however, sparse documentation did not provide evidence to link specific breaches with infection.	Of the 5 cases, 3 were patients and 2 were non-healthcare worker volunteers
Totals			***>1,500***	***5***		
Other outpatient Settings						

Hepatitis B (HBV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Pain management clinic (17)	2013	SC	534	9	Suspected reuse of syringes to access single-dose vials of contrast and Marcaine that were used for >1 patient	One additional prevalent case was identified which may represent a source.
Outpatient oncology clinic (18)	2009	NJ	4,600	29	Preparation of medications in same area where blood specimens were processed Use of saline-bags for >1 patient Use of single-dose vials for >1 patient	
Totals			***5,134***	***38***		
Hospital						
Hospital-based surgery service (19)	2009	VA	**329**	**2***	HBV-infected orthopedic surgeon with high viral load performing exposure-prone procedures on patients	*An additional 4 resolved HBV infections may also have been associated with this outbreak

Outbreak of both Hepatitis B and Hepatitis C						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Outpatient						
Cardiology clinic (49)	2015	WV	**2,311**	HBV: 4 HCV: 8	Reuse of syringes to access saline vials for an individual patient; Suspected use of these single-dose vials for >1 patient	
Pain management clinic (20)	2010	CA	**2,293**	HBV:**1** HCV:**1**	Syringe reuse contaminating medication vials used for >1 patient Use of single-dose vials for >1 patient	
Totals			***4,604***	***HBV: 5*** ***HCV: 9***		

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Outpatient						
Outpatient primary care practice (60)	2019	NY	>3000	8	IV (intravenous) infusions of vitamins, antibiotics, steroids, and other medications were prepared/administered using non-sterile technique. Scope of practice issues were identified: medical assistant prepared and administered injections and IV infusions.	Investigation ongoing.
Outpatient clinic (56)	2018	CA	425	6	Suspected unsafe injection safety practices	
Alternative medicine practice (55)	2017	NY	584	5 (see comment)	IV (intravenous) infusions were prepared using non-sterile glassware and tubing, which was not properly reprocessed between patients. Scope of practice issues were also identified with a phlebotomist preparing and administering injections and IV infusions.	In addition to the 5 cases determined to be transmission-linked with HCV genetic sequencing, 3 clinic patients with resolved HCV may have had outbreak-associated infection
Vascular access clinic (59)	2016	PA	121	2	Reuse of syringes to access multi-dose vials of ketamine that were possibly used for >1 patient; multi-dose vials accessed in the immediate patient treatment area; lack of disinfection of medication vials and medication preparation area	

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Prolotherapy clinic (46)	2015	CA	>1,500	5	Syringe reuse contaminating medication vials used for >1 patient Use of single-dose vials for >1 patient	
Insulin infusion clinic (47)	2015	CA	92	9	Unsafe practices related to assisted blood glucose monitoring including use of fingerstick devices for >1 person and inadequate cleaning and disinfection of glucometer before reuse.	
Pain management clinic (48)	2015	MI	122	2	Syringe reuse contaminating medication vials used for >1 patient	
Hematology Oncology Clinic(21)	2012	MI	>300	10	Specific lapses in infection control not identified at the time of the investigation	
Pain management clinic (22)	2011	NY	466	2	Suspected syringe reuse contaminating medication vials	
Outpatient clinic (23)	2010	FL	3,929	5	Drug diversion (fentanyl) by an HCV-infected radiology technician	
Outpatient alternative medicine clinic (24)	2009	FL	163	9	Syringe reuse contaminating medication vials used for >1 patient Use of single-dose vials for >1 patient	

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Endoscopy clinics (25)	2009	NY	3,287	2	Suspected syringe reuse contaminating medication vials	2009 investigation of cases occurring in 2006- 2007
Ambulatory surgical centers (single-purpose endoscopy clinics) (n=2) (26, 27, 28)	2008	NV	>60,000	9	Syringe reuse contaminating single-use medications vials (propofol) that were used for >1 patient	8 cases were from the first center and one from the second. The health department identified an additional 106 infections that could have been linked to the clinics. Note: this outbreak is also included in Thompson, et al, but at the time of publication only 6 cases had been identifiedexternal icon.
Outpatient cardiology clinic (29)	2008	NC	1,200	5	Syringe reuse contaminating multi-dose vials of saline solution used for >1 patient	An additional 2 new infections were identified in probable source patients
Totals			***>72,189***	***71***		

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Long-term care						
Skilled nursing (30)	2013	ND	**>500**	**46**	Epidemiologic analysis suggested podiatry care, phlebotomy, and nail care performed at the skilled nursing facility were associated with HCV infection	
Hospital						
Hospital emergency room (57)	2018	WA	2,762	12	Narcotics tampering by nurse	
Hospital (50)	2015	UT	7,217	7	Drug diversion by nurse	
Hospital (31)	2012	NH AZ GA KS MD MI NY PA	**>11,000**	**45**	Drug diversion by radiology technologist.	Patients from 16 facilities in 8 states were notified about potential exposure and recommended to undergo testing for HCV infection.
Hospital-based surgery service (32)	2009	CO	**>8,000**	**26**	Drug diversion (fentanyl) by an HCV-infected surgical technician	18 cases were linked by viral sequencing to the surgical technician; an additional 8 infections were determined to be

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
						epidemiologically linked but viral sequencing was not able to be performed. The number screened includes patients from three facilities where the surgical technician had worked.
Totals			***>28,979***	***90***		
Hemodialysis						
Outpatient hemodialysis facility (58)	2018	PA	108	2	Specific lapses in infection control not identified, however, practices observed at the time of the investigation may have not represented usual facility practices. Case patients were dialyzed in close proximity and cared for by the same staff.	Of these two new acute case-patients identified in 2018, one had HCV virus genetically related to virus from two facility patients with chronic infection who had been part of an earlier 2015 outbreak at this same location, listed below.

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Outpatient hemodialysis facility (53)	2017	GA	47	2	Patients were dialyzed in close proximity and cared for by the same staff Lapses identified included environmental cleaning, hand hygiene	
Outpatient hemodialysis facility (33)	2016	unspecified	203	2	Specific lapses in infection control not identified at the time of the investigation	
Outpatient hemodialysis facility (54)	2016	PA	154	2	Breaches in environmental cleaning and disinfection practices identified included: lapses in hand hygiene, mixing of clean and dirty areas, inadequate cleaning of stations between patients	
Outpatient hemodialysis facility (51)	2015	NJ	237	2	Multiple lapses in infection control identified, including hand hygiene and glove use, vascular access care, medication preparation, cleaning and disinfection	
Outpatient hemodialysis facility (51)	2015	NJ	84	2	Multiple lapses in infection control identified, vascular access care, medication preparation, cleaning and disinfection	
Outpatient hemodialysis facility (51)	2015	NJ	98	2	Multiple lapses in infection control identified, including hand hygiene	

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
					and glove use, vascular access care, medication preparation, cleaning and disinfection	
Outpatient hemodialysis facility (52)	2015	PA	115	3	Multiple lapses in infection control identified, medication preparation close to treatment area	
Outpatient hemodialysis facility (52)	2015	PA	130	3	Multiple lapses in infection control identified, medication preparation close to treatment area	
Outpatient hemodialysis facility (52)	2015	PA	97	2	Multiple lapses in infection control identified, medication preparation close to treatment area, Use of single-dose vials for >1 patient, no separation of dirty and clean areas	(Philadelphia)
Outpatient hemodialysis facility (53	2015	CA	28	3	Breaches in environmental cleaning and disinfection practices	
Outpatient hemodialysis facility (34)	2014	WA	186	3	Breaches in environmental cleaning and disinfection practices identified included: failure to consistently change gloves and perform hand hygiene between patients, and breaches in environmental cleaning and disinfection practices to prevent cross-contamination between clean and dirty areas	

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Outpatient hemodialysis facility (35)	2014	TN	62	2	Breaches in environmental cleaning and disinfection practices	
Outpatient hemodialysis facility (36)	2014	NJ	69	4	Breaches in environmental cleaning and disinfection practices identified included failure to: wash hands before and after glove use; adequately clean surrounding area of the station, the dialysis chair and priming bucket after use	
Outpatient hemodialysis facility (37)	2014	NJ	97	2	Breaches in environmental cleaning and disinfection practices identified included failure to: appropriately separate clean and contaminated supply areas, properly disinfect clamps in the open position, adequately clean the dialysis chair and priming bucket after use; ensure patients applying pressure to their own hemodialysis access site wash their hands after doffing gloves and prior to using the scale.	
Outpatient hemodialysis facility (38)	2012	PA	66	18	Multiple lapses in infection control identified, including hand hygiene and glove use, vascular access care, medication preparation, cleaning and disinfection	18 new HCV infections between 2008–2013; (Philadelphia)

Hepatitis C (HCV) Outbreaks by Setting						
Setting	**Year**	**State**	**Persons Notified for Screening[1]**	**Outbreak-Associated Infections[2]**	**Known or suspected mode of transmission[3]**	**Comments**
Outpatient hemodialysis facility (39)	2012	CA	42	4	Specific lapses in infection control not identified at the time of the investigation	
Outpatient hemodialysis facility (40)	2011	GA	89	6	Failure to maintain separation between clean and contaminated workspaces	
Outpatient hemodialysis facility (41)	2010	TX	171	2	Specific lapses in infection control not identified at the time of the investigation	
Outpatient hemodialysis facility (42)	2009	MD	250	8	Breaches in medication preparation and administration practices Breaches in environmental cleaning and disinfection practices	
Hospital-based outpatient hemodialysis facility (43)	2009	NJ	144	21	Breaches in medication preparation and administration practices Breaches in environmental cleaning and disinfection practices	All patients who received dialysis in this facility since 2005 were notified for screening
Outpatient hemodialysis facility (44)	2008	NY	657	9	Failure to consistently change gloves and perform hand hygiene between patients. Breaches in environmental cleaning and disinfection practices	All patients who received dialysis in this facility since 2004 were notified for screening
Totals			***3,134***	***104***		

1 The number of persons notified for screening is dependent upon information and resources available at the time of investigation and may underestimate the total number of individuals at risk.

2 Outbreak-associated HBV and HCV infections are defined as those with epidemiologic evidence supporting healthcare related transmission and include patients/residents identified with acute infection, or previously undiagnosed chronic infections with epidemiologic evidence indicating that these were likely outbreak-related incident cases that progressed from acute to chronic. Patients/residents identified as likely (previously infected) sources for transmission are not included. In the outbreak investigation setting case definitions are based on laboratory profile and clinical evidence rather than CDC surveillance case definitions which may omit asymptomatic cases.
Acute HBV is typically defined as having a positive hepatitis B surface antigen and positive IgM core antibody, or positive surface antigen and negative total core antibody (early infection). Chronic HBV is typically defined as having a positive hepatitis B surface antigen, positive total core antibody and negative IgM core antibody. There are no serologic markers to differentiate between acute and chronic HCV infection; defining an infection as possible healthcare transmission is dependent upon epidemiologic evidence along with a new finding of hepatitis C antibody and/or RNA positivity in a person not previously known positive (whether or not symptoms or alanine aminotransferase [ALT] elevation are present).

3 All modes of transmission are patient-to-patient unless otherwise indicated.

4 One additional healthcare facility outbreak was reported during 2009, in an Illinois psychiatric long term care facility with 8 outbreak-related hepatitis B cases among 180 residents screened, and an additional three cases of chronic HBV infection detected at the time of screening. The likely mode of transmission was sexual contact, though other behavioral risk factors such as illicit drug use could not be ruled out.
Source: Jasuja S, Thompson N, Peters P et al. Investigation of hepatitis B virus and human immunodeficiency virus transmission among severely mentally ill residents at a long term care facility. PLoS ONE 2012; 7: e43252.
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Hepatitis B Immunization Guidelines

Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices.
https://www.cdc.gov/mmwr/volumes/67/rr/rr6701a1.htm

Immunization of Health-Care Personnel. Recommendations of the Advisory Committee on Immunization Practices (ACIP)
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Infection Control Guidelines and Resources

Evidence-based infection prevention guidelines for healthcare settings including those for disinfection and sterilization, environmental cleaning, and hand hygiene available at: https://www.cdc.gov/hicpac/pubs.html

Injection safety resources available at:
https://www.cdc.gov/injectionsafety/providers.html
http://www.oneandonlycampaign.org/external icon

Infection prevention resources for assisted monitoring of blood glucose available at:
https://www.cdc.gov/injectionsafety/blood-glucose-monitoring.html

Setting specific resources available at:

General Outpatient: https://www.cdc.gov/HAI/settings/outpatient/outpatient-settings.html

Outpatient Oncology: https://www.cdc.gov/HAI/settings/outpatient/basic-infection-control-prevention-plan-2011/index.html

Hemodialysis: https://www.cdc.gov/dialysis/provider/index.html

Long-term care: https://www.cdc.gov/HAI/settings/ltc_settings.html

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